Part VI OCCUPATIONAL HEALTH REQUIREMENTS

Index

Explanations

The Standards listed below are referenced in this Part of the Regulations.

Standard Agency	Standard Number	Standard Title

CSA	*CSA Z94.2*	*Hearing Protection Devices – Performance, Selection, Care and Use*
CSA	*CSA 107.56*	*Procedures for the Measurement of Occupational Noise Exposure*

In addition to the Guide, more information and practical guidance can be obtained from the *Guideline for the Prevention of Soft Tissue Injuries*. The *Guideline* provides detailed and practical information on how to recognize, evaluate and control risk factors for Soft Tissue Injuries. For the purposes of the OHS Regulations and this Guide, the term “Soft Tissue Injuries” has the same meaning and is used interchangeably with the term “Musculoskeletal Injuries”.

For copies of the *Guideline for the Prevention of Soft Tissue Injuries,* visit the Department of Government Services, OHS Division website at or the Workplace Health, Safety and Compensation Commission (WHSCC) Website or contact the WHSCC at (709) 778-1046.

Definitions

dBA - decibels of noise, measured with an A-weighted filter

dBA Lex - the level of a worker's total exposure to noise in dBA, averaged over the entire workday and adjusted to an equivalent 8 hour exposure (for example, a worker who works in an average of 85 dBA of noise for 16 hours has an Lex of 88 dBA, and for four hours an Lex of 82 dBA)

Section E42 Hazardous Substances

Subsection E42(7)(d) Where Subsection 42(7)(d) is applicable, then Subsection 42(7)(e) must also be considered.

Section E44 Thermal environment

Removal of clothing during outdoor work in warm weather exposes workers to UV radiation from the sun. Workers and employers need to be aware of the hazard from solar radiation, and need to take measures to limit exposure, by using appropriate attire and the use of sun block creams.

Section E50 Musculoskeletal injury prevention

The musculoskeletal injury prevention requirements are intended to help address the risk of overexertion injuries, as well as strain and sprain injuries to other parts of the body. They are also intended to address the risk of injuries or conditions such as tenosynovitis, tendonitis, bursitis, hand arm vibration syndrome, epicondylitis, carpal tunnel syndrome, cubital tunnel syndrome, radial tunnel syndrome, thoracic outlet syndrome, and trigger finger

The definition of "musculoskeletal injury" includes reference to a sprain, strain, and inflammation that may be caused or aggravated by work.

A **sprain** is a joint injury in which some of the fibers of a supporting ligament are ruptured but the continuity of the ligament remains intact.

A **strain** is an overstretching or overexertion of some part of the musculature.

An **inflammation** is a localized response to injury or trauma that is marked by increased blood flow, redness, heat, pain, swelling, and often a loss of function.

Subsection E50(2) outlines the responsibility of the employer. This Guide provides information on the context of and how to recognize risk factors for MSIs.

Risk factor recognition is the first step in a process involving recognition, evaluation, control, and monitoring.

Risk recognition will be conducted by persons who are knowledgeable of work procedures, and the associated MSI risk factors. The risk recognition process can be a part of a workplace safety inspection carried out under Section 18 – Safety Inspections, of the Regulations.

Note: ***Section 54*** requires that the Occupational Health and Safety Committee or Worker Health and Safety Representative or Workplace Health and Safety Designate, as applicable, must be consulted on risk recognition.

How are risk factors recognized?

In recognizing risk factors, the employer should give priority to jobs which have a high risk of MSI.

The employer should check past workplace records for evidence of MSI, including reports by workers of poor working conditions, first aid records and claims history. The records should be examined for a sufficient period of time to ensure that any occurrences are recognized, and where possible, that any patterns are clear. To achieve both objectives it is recommended that records be kept for at least several years.

Other sources of information include:

- Interviews with workers and supervisors,
- Trends in the employer's industry,
- MSI statistics in similar operations where available, as well as
- Observation of workers performing their tasks in their normal work environment.

Generally, there will be more than one risk factor recognized for a given work activity. This may occur because of the nature of the activity but may also be attributable to the personal characteristics of different workers doing the job, for example, their height.

Notes of the records reviewed, priorities established, and risk factors recognized in work activities will be of assistance to the employer in following through on risk evaluation and control.

Section E50(2) This Guide outlines objectives for the risk evaluation, and provides information on who should conduct it and how it can be performed.

Objectives of the risk evaluation

The objectives include:

- Determining the extent of impact of various risk factors on the potential for MSI,
- Where feasible, determining the relative risk of MSI among workers or groups of workers.

Achieving these objectives will assist with establishing priorities for the control of risks.

Who performs the evaluation?

The risk evaluation will be completed by a person who has a good understanding of:

- The work processes involved,
- The methods for performing a risk evaluation such as those referred to in this guideline.

Note: ***Section 54(1)*** requires that the Occupational Health and Safety Committee or Worker Health and Safety Representative or Workplace Health and Safety Designate, as applicable, must be consulted on the risk evaluation. Also, ***Section 54(2)*** requires that during a risk evaluation, the employer must consult with the workers with signs or symptoms of MSI, and a representative sample of the workers who are required to carry out the work being evaluated.

Consultation with affected workers should take place and be documented before and after a modification or risk control is implemented. This provides for more effective monitoring of control effectiveness.

How is the evaluation performed?

A risk evaluation can be performed using a variety of methods.

Methods of evaluation may include but are not limited to:

- Observation of workers performing their tasks, including videotaped activities where consent of the worker has been obtained,
- Still photographs of work postures, workstation layout, etc,
- Workstation measurements, using for example, a measuring tape, or weigh scales,
- Measurement of handle size, weighing tools, measuring tool vibration, etc,
- Determination of characteristics of work surfaces such as slip resistance,
- Measurement of exposures to heat, cold, vibration, noise, and lighting,
- Biomechanical calculations, for example, the force required to accomplish a task or the pressure put on a spinal disk,
- Physiological measures,
- Worker surveys (for example, use of subjective force rating scales)
- Task analysis techniques (for example, NIOSH lifting equation, SNOOK push/pull tables-see *The design of manual handling tasks: Revised table of maximum acceptable weights and forces in Ergonomics, Vol. 34, No. 9, 1991*). Also, a Push/Pull/Carry Calculator is provided via the Ergonomics portal on the web site *www.worksafebc.com*,
- Postural analysis techniques (for example, the Ovako Working Posture Analysis System (OWAS), Rapid Upper Limb Assessment (RULA), or WATBAK (a biomechanical modeling program from the University of Waterloo).

The person(s) performing the evaluation and using any of these methods should understand the applications and limitations of the method being used.

General information

Where risk factors have been identified, they need to be evaluated for their possible impact on workers. Not all tasks will have all risk factors present.

In addition, it is expected that the employer will prioritize the risk factors considering tasks that have caused injuries in the past.

Information on risk factors for MSIs

Each of the factors listed, and discussed, in this section are considered to be risks of MSIs. Though listed separately, these factors often act in combination.

Forceful Exertions

This refers to the effort a worker must exert to counteract a load. This load may be experienced in the body through tension (such as muscle tension), pressure (such as increased pressure in the carpal canal), or irritation (such as irritation of

a peripheral nerve). The greater the magnitude/intensity of the force, the greater the risk of causing an MSI. This type of force can typically be exerted when performing manual handling tasks (i.e. lifting, pushing, pulling, etc.) however it can also be encountered in the use of poor or awkward postures or forceful gripping and other physical tasks.

Repetitive Motions
Repetition motions are motions that use the same muscles repeatedly, for example repeatedly packing items into boxes on an assembly line. If motions are repeated frequently or for long periods without sufficient time for muscles to rest, there is a risk of developing MSI. Consideration should be given to the following:

- How often the same motion or muscular effort is performed within a certain period of time,
- The amount of time during a work cycle or between work cycles for the affected muscles to rest

Awkward postures
"Postures" refer to the position of body parts during any activity. Most joints are in a "neutral" posture when they are being used ear the middle of their full range of motion. An "awkward posture" refers to a posture that is not neutral (e.g. over head reaching). The more awkward the posture, (i.e. the further from neutral that a joint moves), the more strain is put on the muscles, tendons and ligaments around the joint (e.g. leaning over a bath while bathing a patient). Postures to watch for include:

- Twisting the torso,
- Shoulder abduction or flexion,
- Flexion or extension of the wrist,
- Ulnar deviation of the wrist,
- Squatting, stooping and bending,
- Flexion or extension of the neck, and
- Rotation or side bending of the neck.

Duration
Awkward body postures, repetitive tasks and forceful tasks that are held or performed for long periods of time can cause muscles to tire quickly and to become prone to injury. "Duration", or how long a task is performed or a posture is held, should be considered in combination with each of the previous three risk factors. For example:

- For how long is the worker using force? (e.g. to grasp or hold an object)
- For how long is the worker performing a repetitive task?
- For how long does the worker work in an awkward posture?

Layout and Condition of Workplace or Workstation
Various conditions tend to combine two or more of the risk factors outlined in this section. These conditions can be recognized in the workplace by performing

inspections, communicating with employees and using surveys, among other risk recognition methods.

For purposes of recognizing and evaluating risk factors, the layout and condition of the workplace or workstation should be considered. The following points outline some of the typical considerations:

Local contact stresses
This refers to physical contact between body tissues (in a small localized area) and objects in the work environment such as tools, machinery, and products. Local contact stress, when applicable, usually involves the knee, shoulder, elbow, wrist, or hand. Point pressure may also occur at the sides of fingers. Excessive, repeated or prolonged pressure over these areas may inhibit nerve function and/or blood flow.

Working reaches
This refers to the risks that can result from reaching behind the shoulder, forward, or across the body (i.e. using awkward postures). This factor may cause MSI, either through a single incident or through a repetitive or cumulative process.

Working heights
This refers to the risks from having to accommodate to inappropriate work surface heights for an extended period of time. (i.e. using awkward or sustained postures).

Seating
This refers either to the physical properties of a chair or seat, or prolonged sitting required by some jobs. The Canadian Standards Association (CSA) has issued the standard *CAN/CSA-Z412 A Guideline on Office Ergonomics*. This publication can assist with an understanding of this factor. Other publications are also available on this topic through the Canadian Centre for Occupational Health and Safety (CCOHS at www.ccohs.ca) or other OHS Agencies.

Floor surfaces
This refers to the physical characteristics of a floor, including grade, surface texture and material, unevenness, and slip resistance. Examples of risk factors associated with floor surfaces include:

- Sloped surfaces and ramps, which can result in an increased effort to carry, push, pull, or manipulate loads,
- Hard surfaces, which can cause increased fatigue and back discomfort to workers who have to stand on them for an extended period of time,
- Uneven work surfaces, which can increase the force needed to move objects,
- Slippery floors, which can cause an increased risk of falling or slipping.

Characteristics of Objects Handled

Characteristics of objects handled should also be considered when recognizing and evaluating risk. Below are some of the most common considerations:

Size and shape

This refers to the size and shape of an object and how it influences physical demands on the body. A large bulky object requires greater energy, puts greater stress on the spine, and increases difficulty in gripping. Large loads may restrict vision or require the use of an awkward posture to see around them. If the outside corners of a deep box are not within reach when the top of the box is at waist height, a good grip will be difficult.

Load condition and weight distribution

The condition and weight of a load will determine how workers handle it. For inanimate objects, the term "condition" typically refers to factors such as whether the load is slippery, sharp, fragile, hot or cold, rigid, or liquid. For example, to handle fragile loads, workers may have to use awkward or static postures. On the other hand, rigid loads facilitate a good grip and smooth predictable movements.

Note: Patient handling is an important issue in the prevention of MSI in the health care sector. Factors such as patient size and condition are significant considerations for the safety of both the worker and the patient. The condition of the patient may affect the degree of effort needed to move the patient safely, and the precautions necessary to help ensure the move does not involve unexpected risks.

Container, tool and equipment handles

Objects without handles are more difficult to handle and require more forceful gripping, which can result in an awkward posture. Important considerations in handle design include size, shape, texture, and location.

Size	Improper handle size increases fatigue; handles should accommodate gloves
Shape	Sharp edges, grooves, seams may cause contact stress
Texture	Slippery handles may cause dropping
Location	Improperly placed handles may force an awkward posture of wrists or arms. Asymmetrical placement may cause hazards of tipping of an unstable load

Environmental conditions

Cold temperatures may have a direct adverse effect on the tissue through vascular constriction. Cold temperatures are related to increased forceful exertions and increased gripping forces.

Poor lighting and glare can adversely affect postures as well as cause eyestrain. (For more information regarding the Regulations concerning 'Illumination' refer to Part V, General Health and Safety Requirements, Section 36 Illumination, of the OHS Regulations)

Hand and Arm Vibration is linked to conditions such as carpal tunnel syndrome, and vibration white finger disease. At the workplace, Hand and Arm Vibration typically occurs where hand held power tools are used.

Whole Body Vibration has been linked to back disorders including lower back pain, as well as having a negative effect on the digestive system and visual performance. At the workplace, Whole Body Vibration typically occurs where riding in or driving transportation or construction equipment is required.

The CCOHS website is a source of information regarding Hand and Arm Vibration as well as Whole Body Vibration.

Organization of Work

Characteristics of the organization of the actual work tasks can help to minimize the risk of MSI and human error. Consider work-recovery cycles, task variability and pace of work.

Work-recovery cycles

This refers to the availability and distribution of breaks in a particular activity to allow the tissue to return to a resting state for recovery. Breaks can be achieved in various ways, including job rotation or use of different body parts to perform a task, for example alternate use of the right and left hands.

Task variability

The longer the time a task remains unchanged, unvaried, or uninterrupted, the less likely are the affected tissues to return to a resting state for recovery. A lack of task variety leads to human error due to monotony or poor concentration.

Pace of work

This refers to the speed at which the tasks are being carried out. Individual workers may vary somewhat in the rates at which they can safely perform the same task. In some cases work rate may be associated with non-optimal work techniques that could add to the risk of injury. The more critical or physically demanding the task, the more appropriate it is to ensure the pace is properly set for the worker. Planning the work rate will also involve consideration of work recovery cycles, task variability, and staffing schedules.

Section E51 MSI: Risk Control

Subsection E51(2) The employer must eliminate or minimize the risks by creating control mechanisms for the risk factors found during the risk assessment.

In some cases, the control of MSI risk involves matters covered in other sections of the *OHS Regulation*, or in the *Workers Compensation Act*. Examples include lighting, unsafe work practices, and training.

Risk factors must be eliminated where practicable. In determining if elimination is "practicable," the relevant considerations include

- Degree of risk to the worker arising from risk factors
- Extent of available information on the risk and the means of controlling it
- Availability and suitability of control measures
- Frequency of performing tasks that contain risk factors
- Resources needed to control the risk

Where elimination is not practicable, the specific risk factors identified in the risk assessment should be reduced to the lowest practicable level. Typically this means minimizing the duration, magnitude, and/or frequency of the relevant risk factor. Care should be taken to ensure that the reduction of risk of MSI from one factor does not increase the risk from another.

As a general rule, risk factors for tasks which are performed most of the time should be considered first. The primary risk factors to consider normally include awkward postures, force required, and repetition.

Note: The employer is required under section 54 (MSI: Consultation) to consult with the occupational health and safety committee or worker health and safety representative, as applicable, on the implementation of controls.

Subsection E51(2) Personal Protective Equipment should not be used as a primary approach to control risks for MSI. It should only be used when engineering and administrative controls have been shown not to be practicable. PPE for MSI includes, but is not limited to the following:

- Gloves (for example, vibration dampening gloves, friction gloves)
- Footwear (for example, safe, cushioned footwear with a comfortable toe box, and proper-fitting, low profile heels)
- Devices to protect against contact stress (for example, knee pads and wrist rests on computer keyboards)

WorkSafeBC provides Ergonomics Commentary sheets on topics such as the computer mouse, wrist braces, and back belts. These can be accessed via the Ergonomics Portal at the WorkSafeBC website.

Subsection E51(3) This section requires the use of interim controls if the introduction of permanent controls will be delayed.

"Delayed" in this context means delaying the introduction of permanent control measures for reasons related to practicability. For example, the cost of, or time required to develop control measures, may require that they be phased in over a period of time.

Section 51(3) requires that "interim control measures" be applied to minimize risk while more effective or long term solutions are being developed. The section does not authorize the employer to delay the introduction of practicable control measures for other reasons.

Section E52 MSI: Educational Training

This Guide provides information to assist with understanding terms in subsection 52(a) and on what is meant by "trained" in subsection 52(b).

Subsection E52(a) This provision requires that workers be educated as to the risk factors which have been identified during the risk recognition process under Subsection 50(2)(a) for a work activity that they perform. The education needs to be sufficient for workers to be aware of the applicable risk factors and their potential impact on the body.

Because all work has a physical component to it (i.e. from lifting a box to sitting behind a desk) risk factors are likely to be identified in the majority of jobs. Therefore, most workers will need education under this provision.

The early signs and symptoms of MSI include but are not limited to the following:

- Pain or discomfort,
- Reduced range of motion at a joint,
- Swelling,
- Tingling, numbness, and
- Weakness when trying to perform a natural action like grasping.

Subsection E52(b) In this provision, "trained" refers to the provision of practical information so that the workers affected understand why a control measure is in place and they are able to effectively apply the control measures in their work.

Workers should be able to demonstrate an understanding of the education and training. To check this, it may be useful to ask workers about the risk factors present in their job and if there are specific procedures or equipment they use to

reduce the risk. Sample questions for the worker could include, but are not limited to:

- What are some early signs and symptoms of MSI, and what could happen if they are ignored?
- Who should you report any signs and symptoms of MSI to?
- What are the risks of MSI in your job?
- What can be done to reduce the risk of MSI in your job?

Section E53 MSI: Evaluation

This Guide provides information on what is meant by 'monitoring' under Section (53).

Consultation with workers which took place in the 'risk recognition' portion of this work should be revisited when monitoring the effectiveness of controls. If monitoring shows there has been no reduction in the level of risk to workers or reports of discomfort, the effectiveness of the measures taken will need to be considered. A determination should be made as to whether additional, or different, corrective action(s) should be taken.

If any different injury or signs or symptoms are reported, or any new risk factors are recognized during a review, these need to be evaluated and appropriate risk control measures taken. Recognition of new MSI or new risks means the priority for addressing MSI should be reviewed, and the overall MSI program adjusted as necessary to ensure the areas of highest risk are receiving appropriate action.

Section E54 MSI: Consultation

This Guide provides information on expectations for consultation under subsections (1) and (2) of this Regulation. Consultation includes seeking the participation of the affected parties and asking for their input on measures taken under sections 50 to 53 of the OHS Regulations.

Section E54(1) requires the employer to consult with the occupational health and safety committee or worker health and safety representative or workplace health and safety designate, as applicable, regarding proper use of ergonomics for the prevention of MSI. It is expected that ergonomics will be incorporated as part of the occupational health and safety program for the workplace.

Section E54(2) requires the employer to consult with the affected workers when a risk evaluation is being done regarding tasks or functions performed by those workers. A "representative sample" under subsection (2)(b)

means, in addition to workers with signs or symptoms, a cross section of workers, having regard to differences in age, shift schedule, gender, size (height, weight), and work location (climatic conditions can vary considerably, and clothing or icy surfaces may result in different levels of risk for similar tasks). The size of the sample will depend on how many applicable differences there are in the group.

Section E56 Lifting and Handling

Subsection E56(1) The lifting and handling of loads, usually called manual materials handling, is often physically demanding work. Lifting and handling involves the activities of lifting, pushing, pulling, carrying, handling or transporting loads. The intent of this subsection is for employers to reduce the amount and type of manual handling that a worker must do. By doing so, workers and employers may experience a reduction in the number of worker injuries (fewer sprains, strains, and back injuries), a reduction in the number of lost-time claims, increases in efficiency and productivity, and fewer product losses through damage.

To accomplish this, employers must provide, where reasonably practicable, appropriate equipment that will help workers lift, lower, push, pull, carry, handle or transport heavy or awkward loads. In many cases the equipment will cost little; in others a meaningful investment may be necessary.

Figures 56.1 through 56.38 show examples of the type of equipment that can be used to eliminate or minimize the lifting and handling of loads.

For the purposes of section 56(1), a heavy or awkward load includes equipment, goods, supplies, persons and animals. As a result, this section applies not only to industrial settings where objects are handled, but also to workplaces such as hospitals, long term care facilities, veterinary clinics, pet stores and zoos where persons and animals are handled.

The lifting and handling of persons and animals presents its own set of challenges because of unpredictable movements, lack of appropriate lifting “handles”, and the possibility that the person or animal resists being lifted and handled.

General manual materials handling – more information can be found at the links listed below:

☑ http://www.osh.govt.nz/order/catalogue/pdf/manmanuf.pdf
Manual Handling in the Manufacturing Industry (Department of Labour, New Zealand)

☑ http://www.osh.govt.nz/order/catalogue/pdf/manualcode.pdf
Code of Practice for Manual Handling (Department of Labour, New Zealand)

☑ http://www.hse.gov.uk/pubns/indg143.pdf
Getting to Grips with Manual handling (Health and Safety Executive, United Kingdom)

☑ http://www.ergonomics4schools.com/lzone/handling.htm
The Learning Zone – Manual Handling

Figure 56.1 Lever to lift and transport heavy objects

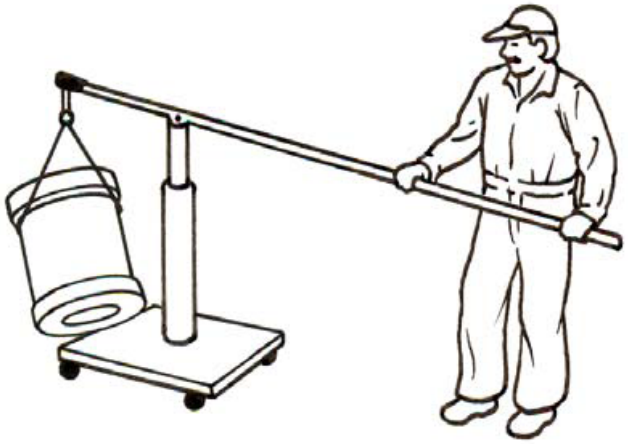


Figure 56.2 Two-wheeled trolley for moving doors and windows

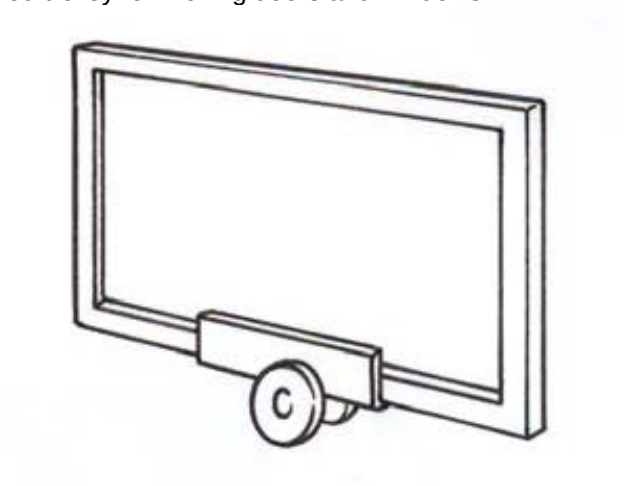


Figure 56.3 Scissor lift to raise load at loading dock

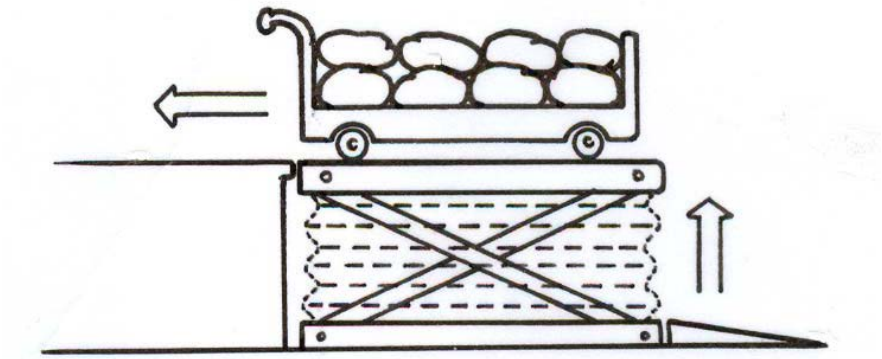


Figure 56.4 Rollers in floor of cargo truck

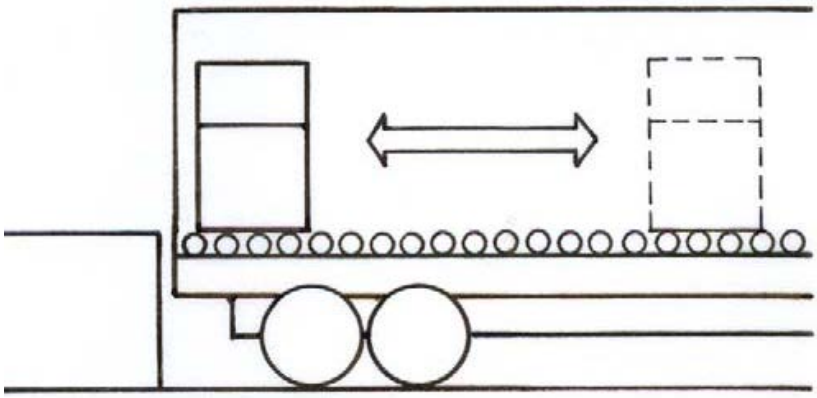


Figure 56.5 Cart modified as tool caddy

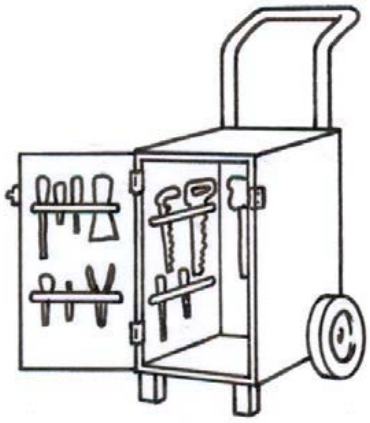


Figure 56.6 Hand truck with loads raised off the floor

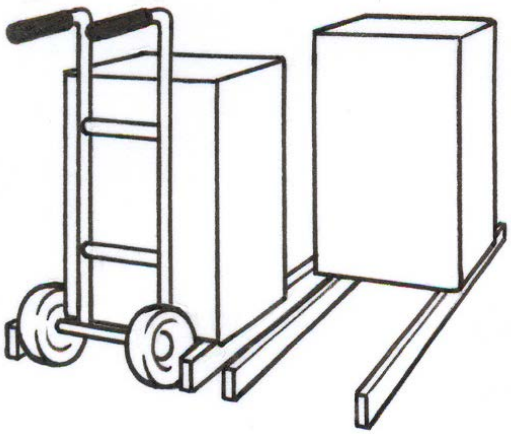


Figure 56.7 Hand trolley for bagged materials

Figure 56.8 Oversized box modified for two-person lifting

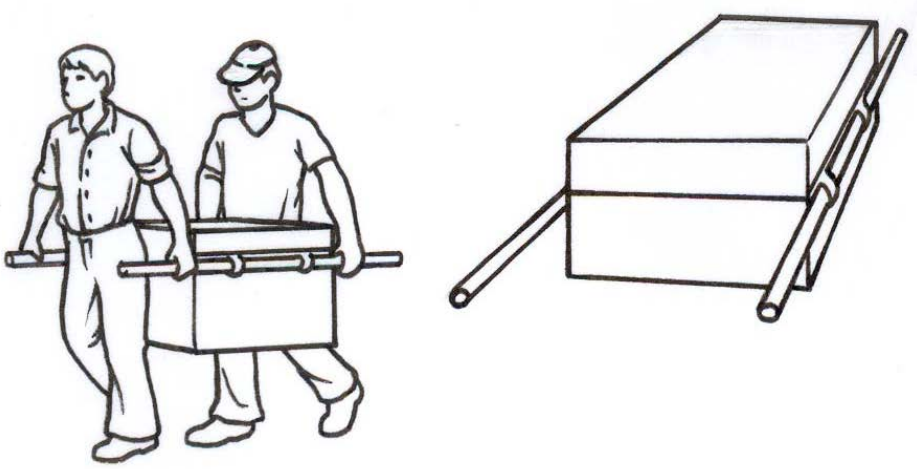


Figure 56.9 Specialized hand truck for moving spooled wire

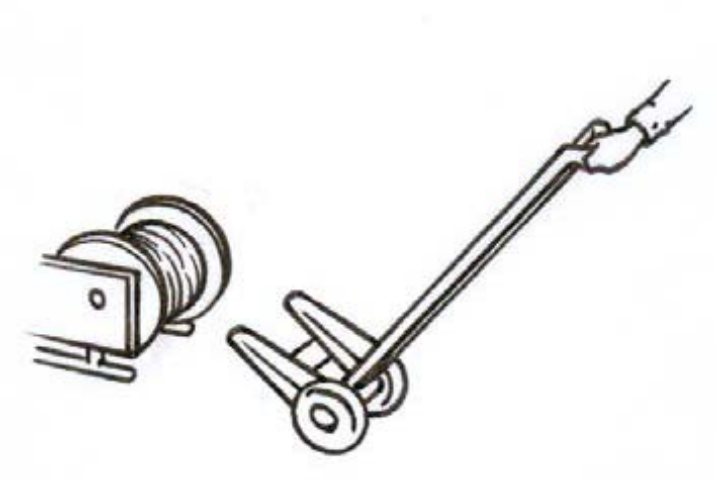


Figure 56.10 Wheeled dolly for awkward access

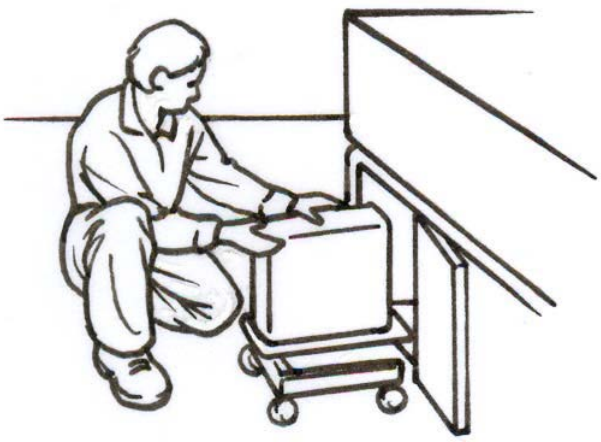


Figure 56.11 Jig for holding and securing work piece

Figure 56.12 Drum lifter for pouring liquids

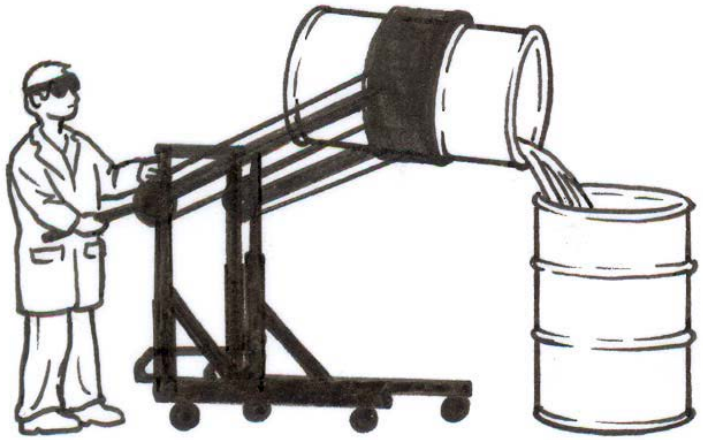


Figure 56.13 Rotating pallet holder

Figure 56.14 Magnetic handles for carrying sheet metal

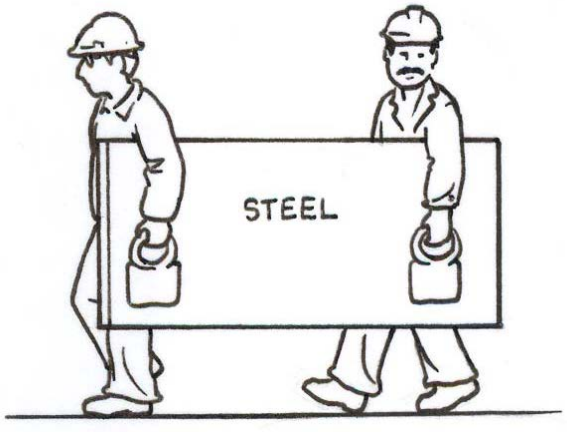


Figure 56.15 Magnetic lifting head on overhead crane

Figure 56.16 Spring-loaded hand truck platform that eliminates stooping

Figure 56.17 Sliding cargo floor

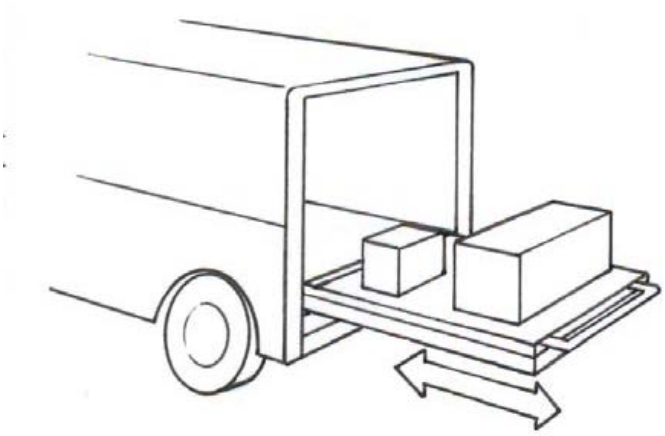


Figure 56.18 Hand operated hoist

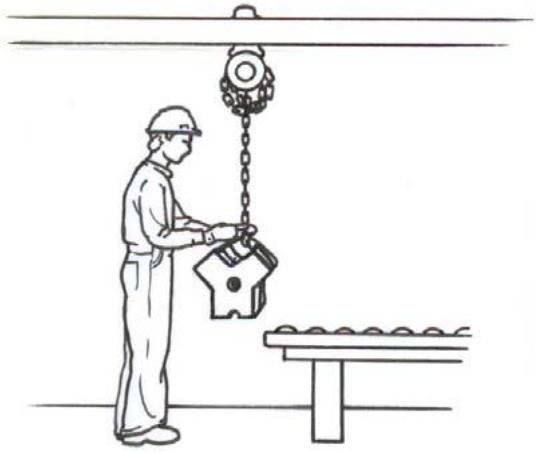


Figure 56.19 Heavy loads suspended from and moved on overhead trolleys

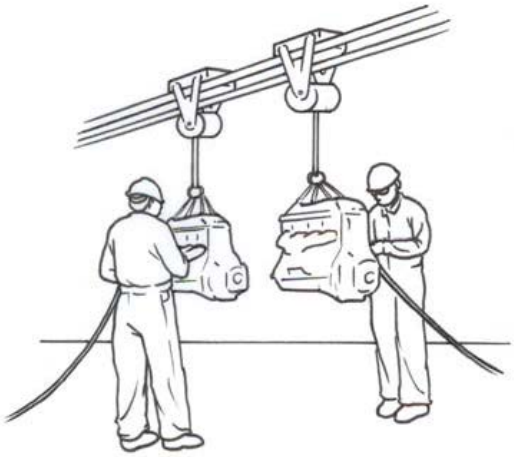


Figure 56.20 Roller conveyor

Figure 56.21 Variable height scissor lift

Figure 56.22 Variable height mobile scissor lift truck

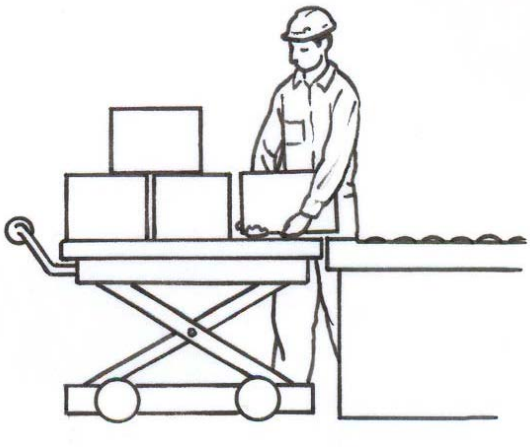


Figure 56.23 Four-wheel drum truck

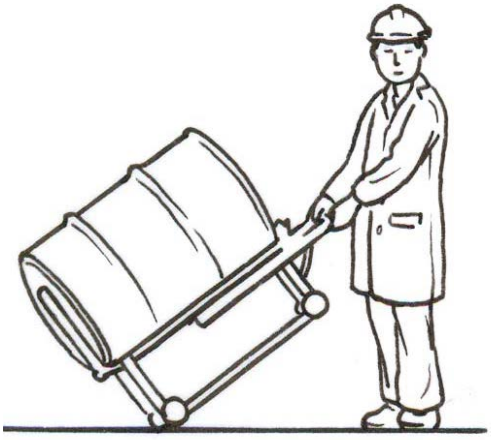


Figure 56.24 Drum lifter

Figure 56.25 Forklift truck with specialized drum attachment

Figure 56.26 Lifter for manhole covers

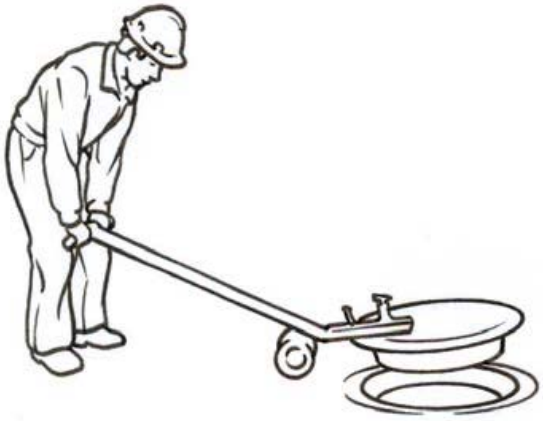


Figure 56.27 Wheeled dolly for moving small, heavy items

Figure 56.28 Hydraulic jig mechanically positions and holds work piece

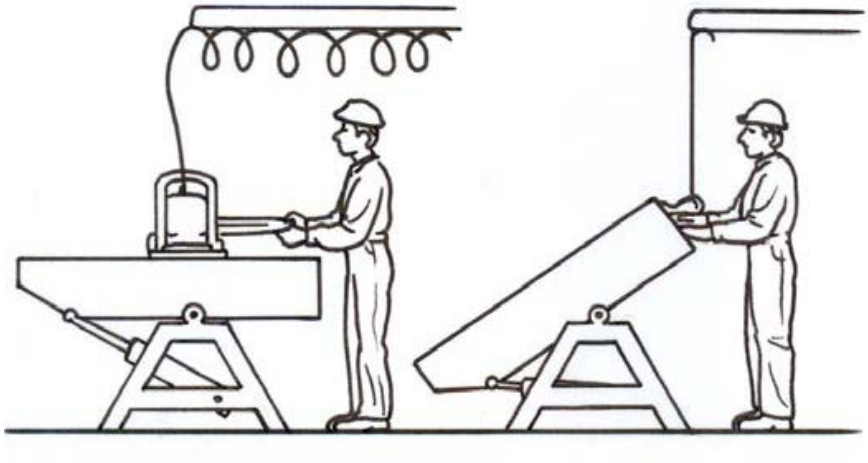


Figure 56.29 Overhead crane

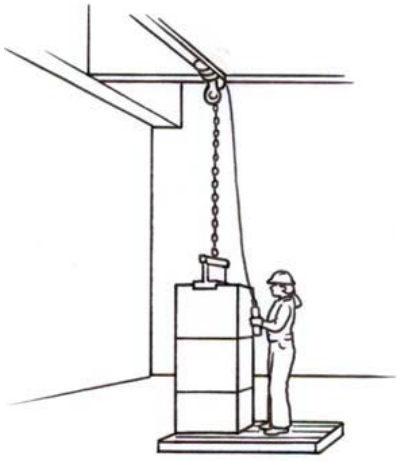


Figure 56.30 Mobile floor crane

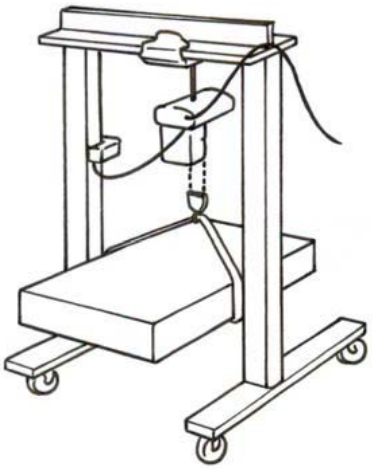


Figure 56.31 Vacuum lifter

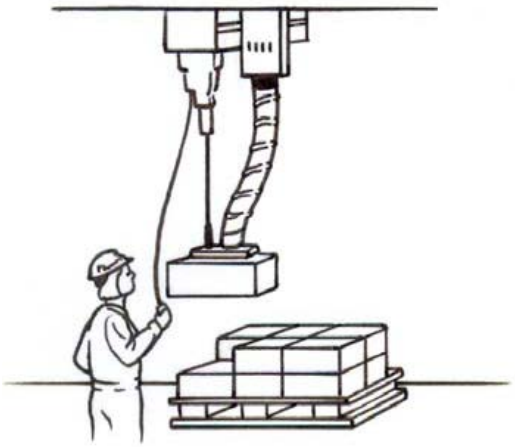


Figure 56.32 Electric powered hoist on moveable davit arm

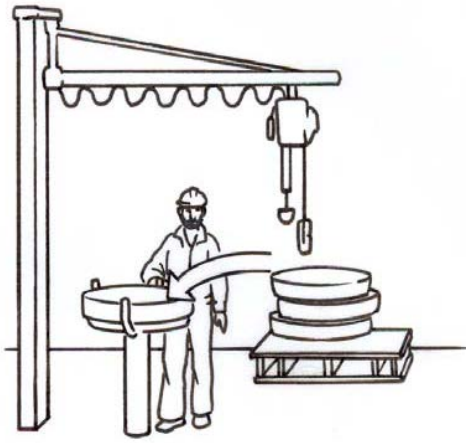


Figure 56.33 Specialized attachment for lifting stack of boxes

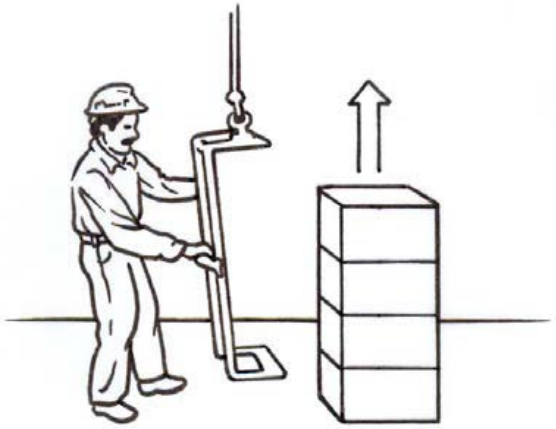


Figure 56.34 Spring-mounted weigh scale platform reduces unnecessary handling

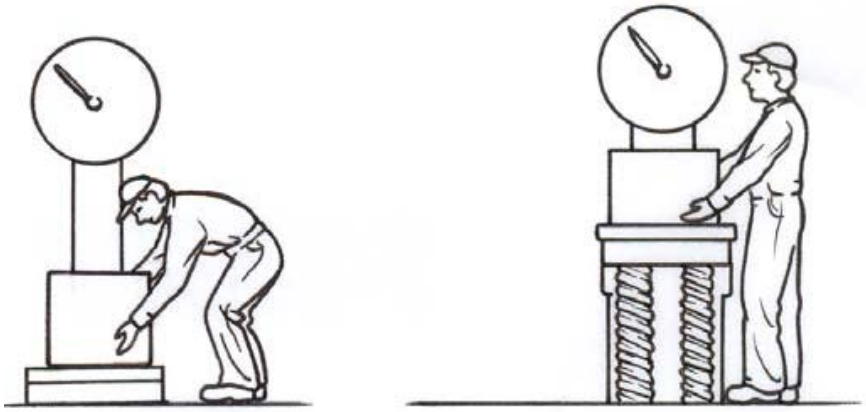


Figure 56.35 Hose to container on trolley reduces lifting of liquid-filled container

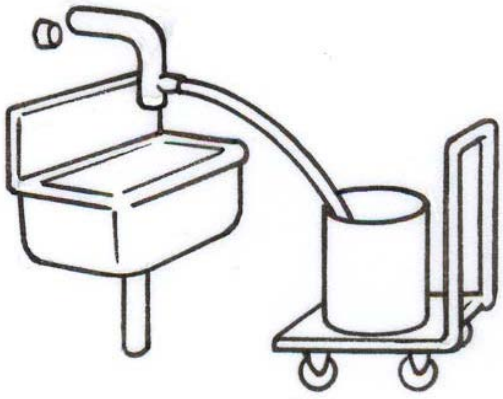
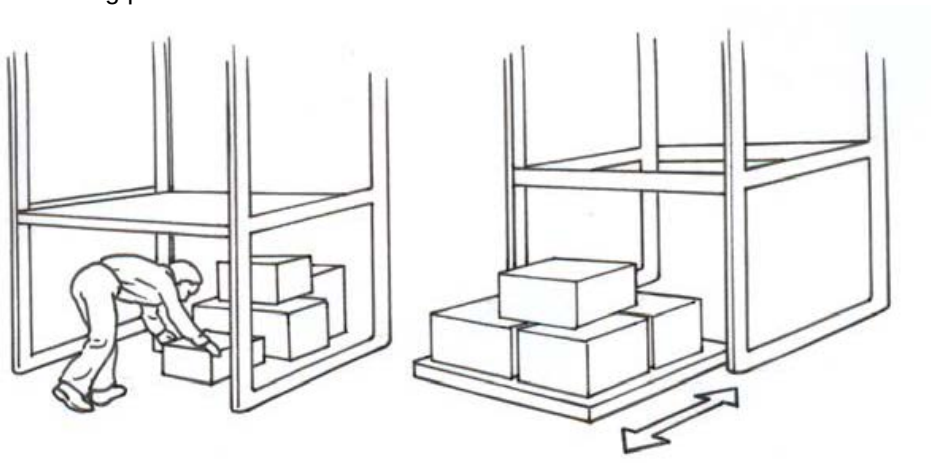


Figure 56.36 Pouring device eliminates handling of container filled with hot liquid

Figure 56.37 Self height-adjusting storage container that turns

Figure 56.38 Sliding pallet



Subsection E56(2) In some situations, and with a particular heavy or awkward load, it may not be reasonably practical for the employer to provide equipment as required by subsection 56(1). In such circumstances the employer is required to

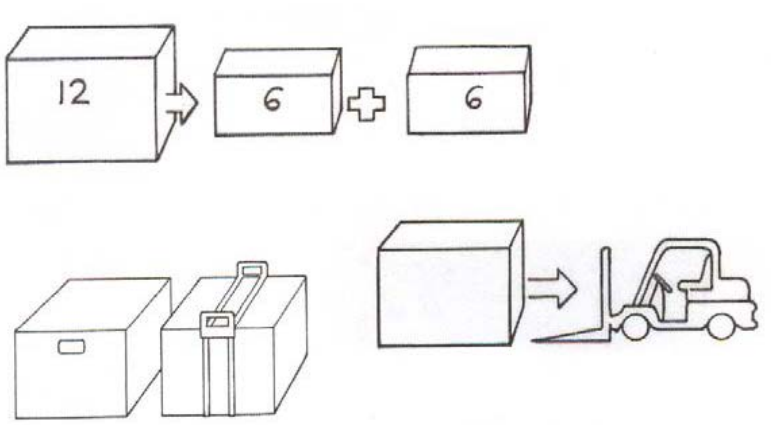
(1) adapt the load to make it easier for workers to lift, lower, push, pull, carry, handle or transport the load without injury. Examples of how to do this include:

(a) reducing the weight of the load by dividing it into two or more manageable loads (see Figure 56.40);
(b) increasing the weight of the load so that no worker can handle it and therefore mechanical assistance is required (see Figure 56.40);
(c) reducing the capacity of the container;
(d) reducing the distance the load must be held away from the body by reducing the size of the packaging; and
(e) providing handholds (see Figure 56.40), or

(2) otherwise minimize the manual handling required to move the load. Examples of how to do this include:

(a) team lift the object with two or more workers;
(b) improve the layout of the work process to minimize the need to move materials;
(c) reorganize the work method(s) to eliminate or reduce repeated handling of the same object;
(d) rotate workers to jobs with light or no manual handling; and
(e) use mobile storage racks to avoid unnecessary loading and unloading.

Figure 56.40 Examples of dividing a load, increasing the weight of a load, and providing a load with lifting handles



Some comments about lifting technique

For many years workers were taught to keep their backs straight and “lift with your legs”. Despite years of train-the-trainer programs preaching this approach, back injuries have not decreased so researchers have questioned this method of lifting. In practice, most people use a semi-squat posture, with both the back and knees slightly bent.

People make up their own minds as to the most efficient way of lifting loads in terms of energy and time. This so-called freestyle technique is fine as long as the following basic principles are followed:

(1) *keep the natural curve in the lower back* – when standing straight, the lower back naturally curves to create a slight hollow. Always try to maintain this curve when lifting, lowering or moving objects. The spine and back are their most stable in this position;

(2) *contract the abdominal muscles* – contract the abdominal muscles during lifting, lowering or moving activities. This improves spine stability. Sometimes described as “bracing”, contracting the abdominal muscles even slightly (as little as four to five percent) improves spine stability and reduces the likelihood of injury;

(3) *avoid twisting* – twisting the back can make it less stable, increasing the likelihood of injury. Bracing helps reduce any tendency to twist; and

(4) *hold it close* – keep the load as close to the belly button and body as possible. Doing so reduces the strain on muscles of the back and trunk. If necessary, protective clothing such as leather aprons should be used so that sharp, dirty, hot, or cold objects can be held as close to the body as possible.

Some comments about pushing and pulling

Whenever possible, loads should be pushed rather than pulled (see Figure 56.41). The reasons for this include:

(a) the feet can be run over and the ankles struck painfully when pulling carts or trolleys;

(b) pulling a load while facing the direction of travel means that the arm is stretched behind the body, placing the shoulder and back in an awkward posture. This increases the likelihood of injury to the shoulder and arm;

(c) pulling while walking backwards means that the person is unable to see where he or she is going; and

(d) most people can develop higher push forces than pull forces as they lean their body weight into the load.

Trolleys and carts should be sized and designed to allow almost any worker to move a load without excessive effort (see Figure 56.42).

Figure 56.42 Pushing is preferred to pulling with an arm extended backwards

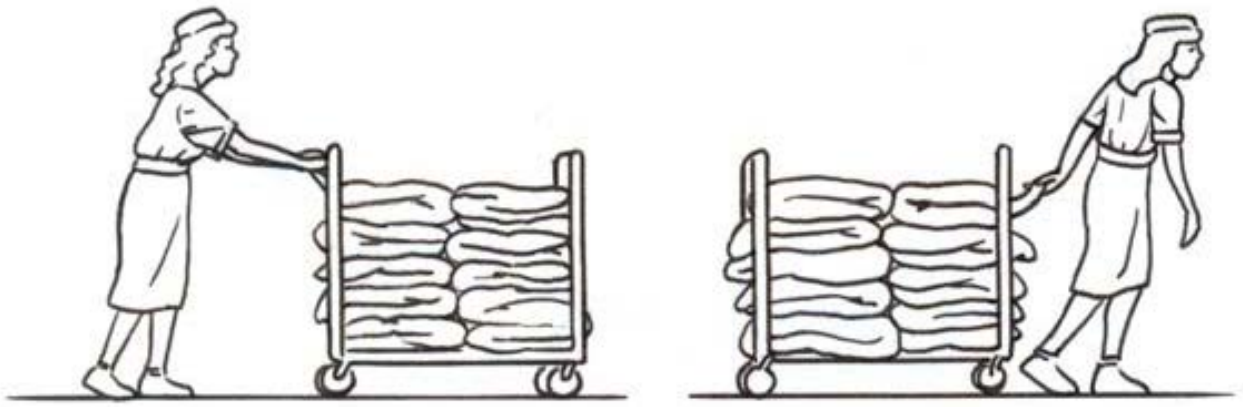
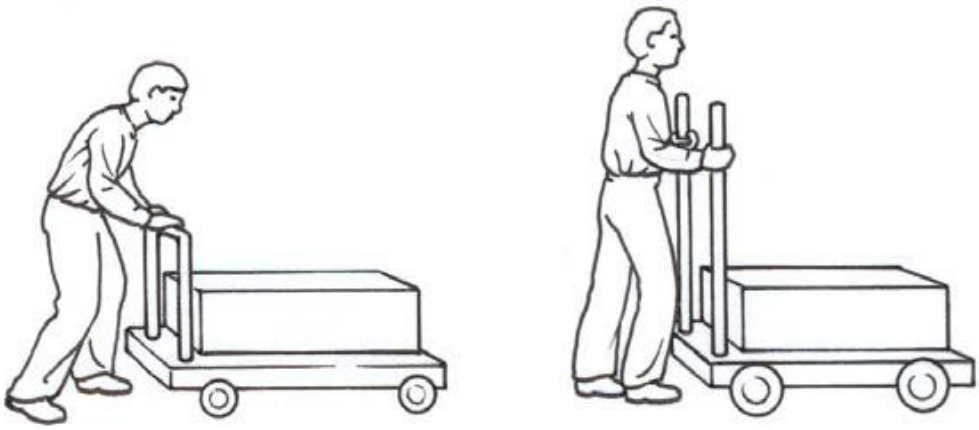


Figure 56.43 Cart push bar must be at a height suitable for all workers



More information can be found at the following links:

☑ http://employment.alberta.ca/documents/WHS/WHS-PUB_bcl004.pdf
Lifting and Your Back – Some Fresh Ideas

☑ http://employment.alberta.ca/documents/WHS/WHS-PUB_ph003.pdf
Let's Back Up a Bit – Some Truths About Back Belts

☑ http://employment.alberta.ca/documents/WHS/WHS-PUB_bcl005.pdf
Seven Myths About Back Pain

☑ http://employment.alberta.ca/documents/WHS/WHS-PUB_erg014.pdf
Sitting and Preventing Back Pain

☑ http://www.darcor.com/technical/caster-white-paper
The Ergonomics of Manual Material Handling

Section E57 Permitted Quantities

Subsection E57(2) A "bulk or reserve quantity" is that quantity in excess of what is reasonably needed for use during a work shift, but doesn't include amounts for display or sale in public areas of a mercantile facility.

Section E59 Storage of hazardous substances

Subsection E59(1) refers to the phrase "suffer damage". The phrase "suffer damage" includes damage to the substance resulting from chemical instability such as peroxidation, as well as exposure to light, shock or vibration. Employers must be aware that the Workplace Hazardous Materials Information System (WHMIS) Regulations may be applicable. The appropriate material safety data sheet should also be referenced.

Section E62 Washing Facilities

Subsection E62(1)(b) refers to "a supply of clean hot and cold or warm water, soap and clean towels or other suitable means of cleaning and drying." For the purposes of this section, hand sanitizer meets the requirements as defined in this section.

Section E68 Noise Hazards

Noise control solutions lie on a continuum, starting with quick fixes, through regular maintenance, extending through low-cost solutions to large capital expense programs (see examples of controls below). One guide in deciding whether noise control is practicable is to determine if the control measure has been adopted by the industry and found acceptable. Although noise control frequently may be technically capable of being done, it may prove to be impracticable. In some instances, noise control solutions are only achieved through long-term research and development programs or complete rebuilds. However, research and development programs may place an unreasonable economic burden on an individual employer and are therefore considered impracticable. Complete rebuilds would likely also be impracticable unless the employer is, for other business reasons, planning to rebuild a facility.

Some examples of typical means for appropriate action (i.e. engineered noise control) are:

Repairing: Cover holes in walls/windows/doors of noise enclosures/operator booths, engine mufflers, doors seals, and sills.

Fitting: Install compressed air exhaust mufflers, air jet noise silencer nozzles, etc.

Changing: Change "screaming" saw blades for quieter blades.

Applying: Apply mechanical damping treatment to steel panels in impact situations, shock absorber configurations in material handling, duct silencers for fan noise, etc.

Enclosing: Enclose planers, molders, punch presses, air compressors, and circular saws.

Isolating: Provide noise enclosure booths (complete or partial) for any commercial or industrial operations, and the operators of mobile equipment.

Installing: Install absorbent panels on walls/ceiling near noisy tools, absorbent ceiling baffles, etc.

Substituting: Provide quieter machines/tools/processes such as hydraulic rather than pneumatic power or impact force.

Developing: Develop treatment for band mills, hard rock drills, electric arc furnaces, etc.

Modifying: Change the work process or equipment.

Designing and acoustically treating: Modify the work area.

Subsection E68(1)(a) If noise in the workplace exposes workers to noise levels that exceed the permissible noise exposure limits as defined by the ACGIH TLVs, the employer must implement effective noise control(s).

Subsection E68(1)(b) Personal Protective Equipment (PPE) regarding noise control is a last resort when there is no other viable option. Even then, the PPE must be able to bring the exposure levels of the noise to within the acceptable Threshold Limit Values (TLV) as outlined by the American Conference of Industrial Hygienists (ACGIH) Noise TLVs.
The current applicable standard is the *CSA Standard Z94.2*. This standard provides a process for selecting adequate hearing protection for noise-exposed individuals, taking into account factors such as:

- Worker noise exposure
- Worker hearing ability
- Use of other personal protective equipment
- Temperature and climate
- Physical constraints of the worker or work activity
- Comfort

Comfort is a selection criterion specified in the standard and is considered as important as attenuation (sound reduction). It is important since workers will be

more likely to properly wear their hearing protectors if there is a comfortable fit, thereby increasing self-compliance.

Hearing protection classification/grade

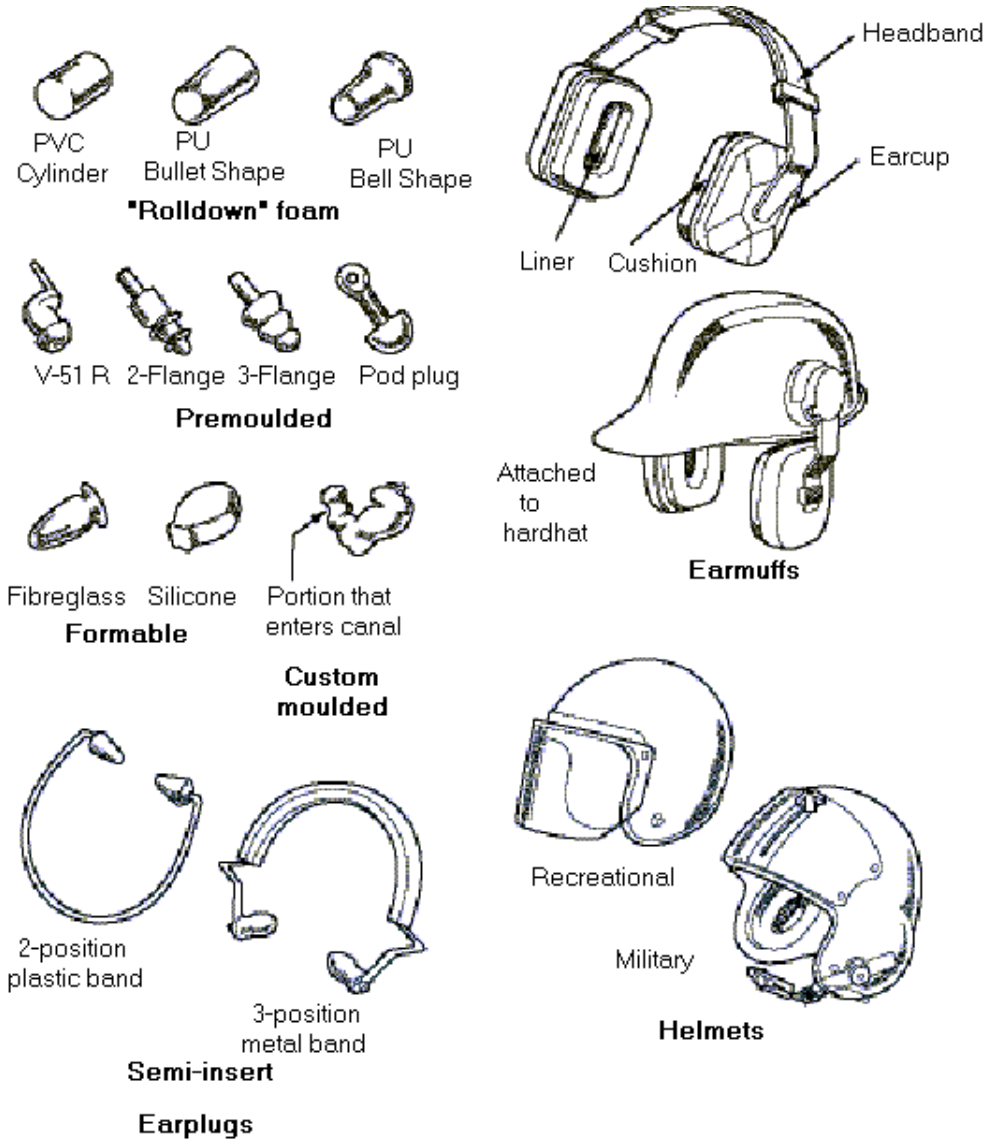
CSA Standard Z94.2 outlines the processes and criteria for selecting appropriate hearing protection. The processes and criteria involved also consider “overprotection” as a result of a certain chosen level of hearing protection.

Overprotection is undesirable as it:

- May prevent workers from hearing audible warning signals
- Reduces the ability of workers to verbally communicate in the noisy environment, resulting in temporary removal of hearing protection
- Results in the need for workers to "yell" at one another, causing voice strain
- Limits a worker's ability to hear changes in machinery or process performance that may indicate developing production problems
- Does not provide any additional protection against noise-induced hearing loss

Application of the selection criteria in the standard typically means more than one style and class or grade of hearing protector should be made available to workers. For example, if a worksite has noise exposures ranging from 85-98 dBA Lex, then Class A and Class B (Grade 3, 2, and 1) protection should be supplied, to accommodate the criterion "daily noise exposure of the worker." Similarly, if there are workers with hearing impairment at the worksite, Class A and B (Grade 3, 2, and 1) protection should be supplied to accommodate the criterion "worker hearing ability." In addition, earplugs and earmuffs will likely have to be supplied to accommodate the criteria "use of other personal protective equipment," "temperature and climate," and "physical constraints of the worker." This last criterion includes such aspects as very small or very large ear canals, sensitive skin in the ear canal, and unusual head size or shape.

Figure 56.39 Examples of Hearing Protection



Specialized hearing protection

Beyond these conventional protectors, the following types of workers may need more specialized hearing protection, due to listening demands:

- Workers with significant hearing losses
- Supervisors
- Trades workers
- Vehicle operators
- Instructors
- Musicians (performers as well as technical support personnel)
- Hospitality workers

Where one- or two-way radio communication is required, a commercially manufactured hearing protection device with built-in speakers and/or microphone

should be supplied. There is an entire section in the CSA standard devoted to specialized hearing protection.

NOTE: The standard also states that hearing protection must be visually inspected during the annual hearing test for condition and fit.

Subection E68(3)(b) & (c) involve hearing tests. There are a number of industries where noise levels are known to exceed the exposure limits referenced in Subsection 68(1). However, workers are often employed in these industries on a seasonal basis. Examples of such industries are fish processing, shipbuilding, logging, and construction.

The fact that an employer may have seasonal workers doesn't exclude those seasonal workers from the hearing conservation program.

***Note* that Section 68(3)(b) requires hearing tests for every exposed worker in excess of permissible levels, whereas Section 68(3)(c) establishes an obligation to test (within three (3) months of starting employment) any new worker who will be exposed to noise in excess of the permissible levels.**

Hearing tests must be administered by a hearing tester authorized by the Minister. Authorized testers have been trained to:

- Obtain relevant medical history information
- Record the hearing tests in a manner required by the Minister
- Advise the worker of the test results
- Counsel the worker on the use and maintenance of hearing protection
- On request, provide a copy of the test results to the worker

Subsection E68(3)(d) The mandatory education and training of workers exposed to noise above the stated exposure limits shall include, but is not limited to:

- The results of any noise exposure measurements,
- The effects of noise on hearing,
- The proper use and maintenance of hearing protection, and

- The purpose of hearing testing.

Subsection E68(5) & (6) these sections involve warning signs. Sometimes workers move in and out of noise hazard areas during their workday. Supervisors or other workers whose duties require them to routinely work in posted noise hazard areas must be provided with, and wear, hearing protection in the posted areas. Workers who briefly and infrequently pass through posted noise hazard areas do not need to wear hearing protection, except in areas where the exposure limit for peak sound level is exceeded. These workers must be recognized as part of the noise survey of the workplace as required by Subsection 68(3)(a).

The employer may establish workplace policies which exceed the requirements of the OHS Regulations regarding the use of hearing protection in noise hazard areas. For example, the employer may instruct workers that the use of hearing protection is mandatory for all workers in any designated noise hazard area in their facility.

Hearing protection does not need to be worn when the source of noise that makes the area hazardous is shut down.