



WORK INSTRUCTIONS ON WORKING POSITION

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WORKING POSITION

Working in a Sitting Position - Basic Requirements

What are the basic requirements for sitting comfort?

A workstation suitable for the worker and the tasks plus good job design is important for workers who work in a sitting position.

Workstation

A workstation should allow the worker to sit in a balanced body position.

- Use a workstation that ensures that the alignment of the spine is the same whether the worker sits or stands.
- Use a workstation that allows the worker to move the spine freely.

Job design

A job design should allow the worker to work in a variety of balanced positions.

- Design tasks so they require movement of the spine and encourage the worker to alternate positions frequently.
- Avoid an excessive range of movement by:
 - providing all materials at working level.
 - positioning tasks within easy reach.
 - avoid lifting and transferring loads while sitting.
 - Position visual tasks that maintain the vertical alignment of the head and spine
 - Design the lighting system to:
 - provide good general lighting.
 - provide task lighting where necessary.
 - avoid glare.

How should manual tasks be designed?

Design manual tasks to maintain vertical alignment of the spine, and avoid constant stress on the shoulder region.

- Provide materials at or slightly below elbow height.
- Provide arm rests where appropriate.
- Provide tool balancers.
- Avoid heavy hand tools.

What should be considered when a foot task is necessary?

- Position foot tasks so that they can be done without twisting hips.
- Design foot tasks to avoid movement and exertion by only one leg.
- Provide the appropriate support for both working and non-working leg.
- Design a sitting task that encourages the worker to alternate positions frequently.

Working in a Sitting Position - Overview

Why is there so much fuss being made about "sitting"?

Widespread mechanization and automation have affected virtually every sector of the Canadian economy. From offices to industry, new technologies have changed the way people do their jobs. Machines are now doing work previously done manually. More and more people work in a sitting position to operate these machines.

Sitting jobs require less muscular effort, but that does not exempt people from the injury risks usually associated with more physically demanding tasks. For example, clerks, electronic assembly-line employees, and data entry operators who work in a sitting position also suffer back pain, muscle tenderness and aches. In fact, reports of varicose veins, stiff necks, and numbness in the legs are more common among seated employees than among those doing heavier tasks.

Injuries resulting from sitting for long periods are a serious occupational health and safety problem. This problem will likely become more common in the future because the trend toward work in a sitting position is still increasing.

Can work in a sitting position affect your health?

When the employee can alternate sitting with other body positions, sitting at work is not a risk for injury or discomfort.

For those who have no choice and must sit for long periods, the situation is different. Although sitting involves less muscular effort than such physically demanding jobs as gardening or floor mopping, it still causes fatigue. Sitting requires the muscles to hold the trunk, neck and shoulders in a fixed position. A fixed working position squeezes the blood vessels in the muscles reducing the blood supply to the working muscles just when they need it the most. An insufficient blood supply accelerates fatigue and makes the muscles prone to injury.

Sedentary employees may also face a gradual deterioration in health (if they do not exercise or do not lead a physically active life). Prolonged sitting drops the employee's physical activity to the lower limit needed for healthy-body functioning. The most common health problems that employees suffer are disorders in blood circulation and injuries affecting their ability to move.

How does the work in a sitting position affect blood circulation?

There is less demand on the circulatory system due to the limited mobility while sitting. As a result the heart activity and the blood flow slow down. Maintaining a steady upright body position while sitting further decreases blood circulation.

An insufficient blood flow, specifically blood that is returning to the heart from the lower legs, causes blood to pool. Pressure on the underside of the thighs from a seat that is too high can further aggravate this. The result can be swollen or numb legs and eventually varicose veins. Also, a reduced blood supply to the muscles accelerates fatigue. This is why an employee who sits all day long doing little physical work often feels tired at the end of a work shift.

Can work in a sitting position cause injuries that affect movements?

Limited mobility contributes to injuries in the parts of the body responsible for movement: the muscles, bones, tendons and ligaments. Another factor is the steady, localized tension on certain regions of the body. The neck and lower back are the regions usually most affected. Why? Prolonged sitting:

- reduces body movement making muscles more likely to pull, cramp or strain when stretched suddenly,
- causes fatigue in the back and neck muscles by slowing the blood supply and puts high tension on the spine, especially in the low back or neck, and
- causes a steady compression on the spinal discs that hinders their nutrition and can contribute to their premature degeneration.

Are there any other adverse effects of working in a sitting position?

Employees, who for years spend most of their working time seated, also experience other, less specific adverse health effects. Decreased fitness, reduced heart and lung efficiency, and digestive problems are common. Although these conditions are not diseases or injuries themselves, they do predispose the employee to other diseases.

What aspect of working in a sitting position is responsible its ill effects?

A poor body position is largely responsible for the ill effects of prolonged sitting. Poor body positions can also originate from an **unsuitable job design** that requires employees to sit uninterrupted for longer than one hour. The duration of sitting, along with the shape of the body in a sitting position, is the most critical risk factor in work in a sitting position.

An unsuitable work space that prevents employees from sitting in a balanced position can cause poor body positions. The physical arrangement of work space elements such as work surfaces, tools and equipment may not correspond with the reaches and clearances of seated employees. The workstation may also be unsuitable because the chairs are too high or low for an employee's body size and shape.

Improper or inadequate training can also lead to poor body positions. Employees may be unaware of the health hazards of sitting jobs because they are not as obvious as those of strenuous jobs. As a result, employees may not know which practices to avoid and which ones to adopt.

Is there a "good" sitting position?

For each major joint such as the hips, knees, and elbows, there are ranges within which every healthy person can find comfortable positions. These positions should not impede a person's breathing or circulation, interfere with muscular actions or hinder the normal functions of the internal organs. Varying these positions is the essence of good sitting work. So, a good sitting position is one that allows employees to change their body positions frequently and naturally when they want without being restricted by the work station or job design.

Perhaps the best description of a "good" position is a set of naturally chosen body positions that fall within an acceptable range. A workstation that allows frequent changes and more mobility allows an employee to have a more natural and healthier work pattern.

How can you reduce harmful effects of prolonged sitting?

Recommendations on how to sit properly are not compulsory. Sometimes, it is acceptable to deviate with outstretched or cramped positions to relieve muscle tension.

A "good" sitting position at work can be achieved only by focusing efforts on the three areas that are identified as potentially hazardous:

- workplace design (including tasks, workstation, and chair design)
- job design, and
- training.

None of these areas is more important than the other, and none of them alone can bring about substantial improvement.

What elements of a workplace are important for comfort of the seated employee?

The workplace design should enable the employees to carry out work in comfort and safety while allowing them to make voluntary changes in the working posture. To achieve this, the design should include the following elements:

- tasks
- work station
- chair

How can "task design" improve work in sitting position?

Before considering the requirements for the design of a workstation and a chair, take into account the anticipated tasks. The work may require visual, manual, or foot tasks, or combinations of these. Each of these types of tasks requires different modifications in work station design.

Visual tasks place tension on the neck, trunk and pelvis so that the eyes can achieve and maintain the required vision for a needed duration of time. It is important that the design of the work station reduces the strain on the neck. In some work situations it is possible to do this by properly positioning the visual tasks. Where this is not possible, work schedules should shorten the amount of time employees spend on each task.

Both the movement and the forces involved in manual tasks affect body position. For light manipulating tasks, wrist and arm support may help. For heavier tasks, it might help to arrange the work surface below the employee's elbow height. The arrangement of the work station should allow the employee to keep the spine vertically aligned while exerting force. The employees should not have to lift and transfer loads horizontally.

Employees doing foot tasks should have pedals located directly in front of them to prevent their hips from twisting. It is important that employees are able to support their body evenly.

Why is the design of workstations important?

The chair should always be considered as an integral component of the workstation and not in isolation. The other workstation components, such as the desk and VDT (computer), workbench or panel in a control room all affect the employee's body position. They, together with a chair, make it possible to work in a balanced body position. A work station should also allow for frequent changes between a variety of body positions.

How do I select the proper chair?

A basic rule of ergonomics is that there is no such thing as the "average" person; however, providing an individually designed chair for every employee is not practical. The only solution is to provide the employee with a fully adjustable chair that can accommodate the maximum range of people (typically 90 to 95 percent of the population). The chair must have controls to allow easy adjustment of the seat height and tilt, as well as the backrest height and angle. It is important that the employee can operate these controls from a sitting position. The chair's design must match the tasks.

A trial period is essential to the process of selecting a chair. Employees should try out the chair in the real work situation and ensure it meets the needs of the job before the final selection is made.

The "ergonomic" chairs now available are designed for a range of people, but not always for one person in particular. Nor are they designed for any specific tasks or arrangement of the work station. Therefore, purchasing a chair because it is labeled "ergonomic" can be a mistake. The chair becomes ergonomic only when selected to suit the employee's or a group of employees' body dimensions, particular workstation, and tasks.

How can you design a job that requires prolonged sitting?

No matter how well the workplace is designed, an employee who sits for long periods will suffer discomfort. The main objective of a job design for a seated employee is to reduce the amount of time the person spends "just" sitting. Frequent changes in the sitting position are not enough to protect against blood pooling in the employee's legs.

Five minutes of a more vigorous activity, such as walking for every 40 to 50 minutes of sitting, can protect an employee from swollen legs. These breaks are also beneficial because they give the heart, lungs and muscles some exercise to help counterbalance the effects of sitting for prolonged periods in a relatively fixed position. Where practical, jobs should incorporate "activity breaks" such as work-related tasks away from the desk or simple exercises which employees can carry out on the worksite.

Another important aspect of job design is feedback from employees. No matter how good the workplace and the job designs, there is always need for individual tailoring. Consultation with employees can secure their active participation and personalize their work.

What elements of a training program are important for employees who work in a sitting position?

Individual work practices, including sitting habits, are shaped by proper training. Training should encourage employers and employees to adopt methods that reduce fatigue from too little and too much a workload. It is important to acknowledge that some traditional ideas, such as "sitting work is light work" or "people work harder standing," are mistaken.

Training should also explain the health hazards of prolonged sitting and give recommendations on what a worker in a given workplace can do to improve the working position. Employees need to know how to adjust the workstation to fit their individual needs for specific tasks. They also must know how to readjust the workstation throughout the day to relieve muscular tension.

Training should also emphasize the importance of rest periods for the employees' health and explain how active rest can do more for keeping employees healthy than passive rest. The effect of such training can reach far beyond occupational situations because the employees can apply this knowledge also in their off-job life.

Working in a Sitting Position - What to Avoid while Sitting

Why is body position or posture important while sitting?

Poor arrangement of the workstation encourages an awkward body position. A poor body position or posture can hinder breathing and blood circulation and contribute to injuries affecting people's ability to move.

What should I avoid while sitting?



- Sitting on a chair that is too high.
- Tilting the head forward. This helps prevent neck injury.
- Sitting without lumbar support. This helps prevent back pain.
- Working with arms raised. This helps prevent neck and shoulder pain.
- Bending wrists. This helps prevent muscle cramps.
- Working with unsupported forearms. This helps prevent shoulder and back pain.

- Cramming thighs under a worktable. This reduces blood circulation.
- Working with legs dangling. This destabilizes the body causing tiredness.
- Pressure on an underside of thighs. This reduces back flow of blood and can cause swelling in the legs.
- Sitting on a chair that has poor support. It can overturn and cause injuries.

How does sitting on a chair that is too low affect your body?



- It disrupts blood circulation in lower legs, causing swelling.
- It puts pressure on internal organs.
- It creates too much pressure on buttocks and causes ...

How does work at a worktable that is too high affect your health?

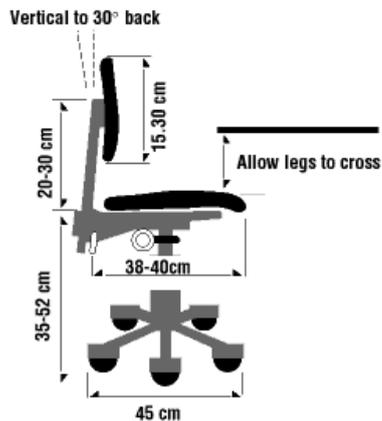
- It prevents use of proper lumbar support and can cause back injury.
- It over-stretches spine and can cause back injury.
- It forces the head to tilt forward and can cause neck injury.
- It stresses shoulders and causes pain.
- It tires the whole body.

Working in a Sitting Position - Work Chairs

What is the basic requirement of a work chair?

A good chair supports the worker in a comfortable working position and allows for frequent changes in body position.

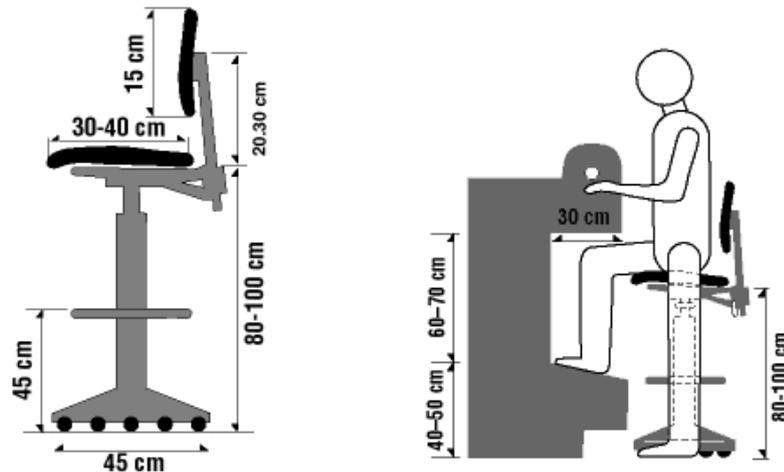
What should I consider when selecting an office chair?



- Check that the adjustability range that can accommodate the workers' body sizes.
- Select a chair that allows the worker to adjust the height and depth of the seat as well as the height and tilt of the backrest. An adjustable seat tilt is also desirable.
- Select a chair with:
 - a backrest that is shaped to support the lower back and does not give way
 - a seat height that does not compress the underside of the thighs
 - a front edge curved downwards
 - non-slip, breathable fabric on the seat
 - stable base (5 legs).
- Choose a chair with arm rests where practical
- Use a footrest when feet cannot rest on the floor

What else should I consider if choosing a chair if my work involves both sitting and standing?

- Ensure that the chair has a wheel locking mechanism.
- Use a swivel chair with an adjustable seat height.
- Adjust workstation to the proper height.
- Adjust the chair seat height between 25 to 35 cm (about 10 to 14 in.) below the work surface.
- Use a footrest with a height of 40 to 50 cm (about 16 to 20 in.)



Working in a Sitting Position - Alternative Chairs

What are examples of "alternative" chairs?

The forward sloping chair and the kneeling chair are alternatives for workers who sit continuously. A saddle chair (sit-stand seat) allows a worker to alternate between sitting and standing.

What is a forward sloping chair?



A forward sloping chair has a mechanism that allows the user to adjust the tilt of the seat pan forward. The angle of tilt from the horizontal should not be greater than 10 degrees.

What are some advantages of a forward sloping chair?

The use of a forward sloping chair:

- Increases the number of possible positions.
- Provides better alignment for spine.
- Improves visual distance and angle to the task on a worktable.
- Improves head position.
- Improves return blood flow from the lower legs.
- Decreases pressure on internal organs.

What are some disadvantages of a forward sloping chair?

The use of a forward sloping chair:

- Places more weight on legs to control forward tilt of the upper body, and may result in earlier development of tiredness.
- May cause the body to slide forward; however, if the seat pan of such a chair is curved from front to back, it would allow you to sit without sliding. Nevertheless, you do have to exert some muscular effort in your lower legs to remain seated. This effort is in fact beneficial (providing the slope is not greater than 15 degrees) because it improves the return blood flow from your lower legs.
- May cause clothing to ride up legs.

What is a kneeling chair?



A kneeling chair has a fixed seat sloping at 30 degrees forward and padded support for knees.

What are some advantages of a kneeling chair?

A kneeling chair:

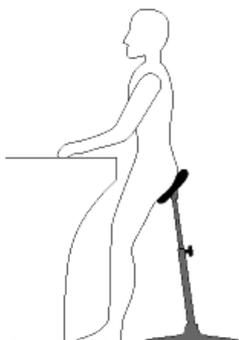
- Provides proper alignment for the spine.
- May be good for some people if fitted to the individual.
- Provides considerable comfort for short periods of time.

What are some disadvantages of a kneeling chair?

A kneeling chair:

- Causes shins to bear weight.
- Over-flexes knees and ankles.
- Limits the number of possible sitting positions.
- May cause fatigue to develop earlier.
- May cause clothing to ride up legs.
- Makes getting in and out of the chair difficult.
- Reduces the range of reaches.

When would you use a saddle chair or a sit-stand seat?



A saddle chair can be used where the worker can alternate between sitting and standing in his or her work.

A saddle chair:

- reduces fatigue by decreasing muscular effort
- improves alignment of the spine



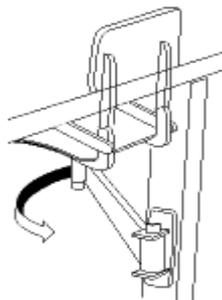
Combining the saddle chair with a tilted worktable, where possible, is beneficial because it:

- improves the head position and
- reduces stress on shoulders and neck.

Alternate sitting and standing frequently.

Are there some other things I should know about alternative seating?

There are situations when rest chairs and sitting/kneeling support should be made available.



Rest Chair

It is desirable to have a chair for resting even when work can only be done standing. If space is limited, then chair that can be folded up and stored out of the way can be used.

Sitting/Kneeling Support



Making hip support available where the work requires kneeling:

- reduces tension in the thigh muscles, by widening the angle of the knees
- reduces compression on the knees, ankles and lumbar region (middle to lower back)
- improves blood circulation

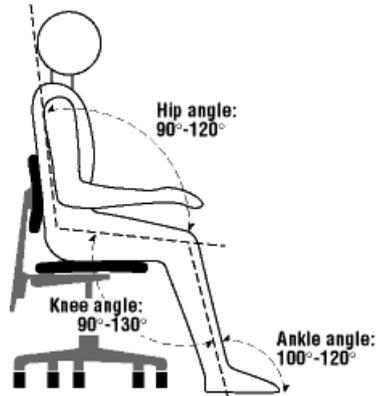


- Do not maintain kneeling/sitting position for extended periods.
- Avoid bending.
- Stand up and walk whenever possible.

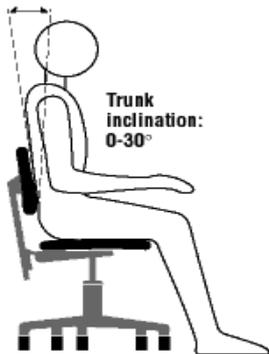
Working in a Sitting Position - Good Body Position

What is a "good" sitting body position?

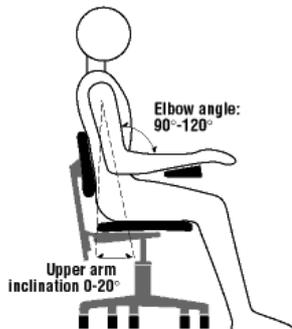
There is no one or single body position that is recommended for sitting. Every worker can sit comfortably by adjusting the angles of their hips, knees, ankles and elbows. The following are general recommendations. Occasional changes beyond given ranges are acceptable and sometimes beneficial.



- Keep the joints such as hips, knees and ankles open slightly (more than 90°).

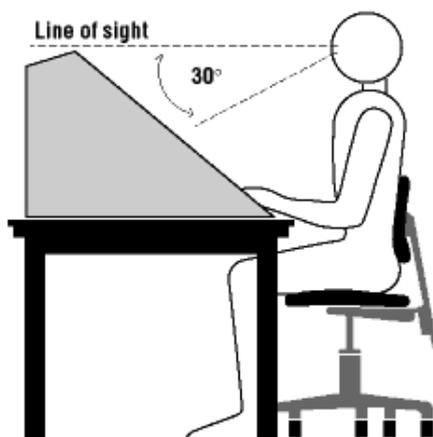


Keep the upper body within 30° of an upright position.



- Always keep the head aligned with the spine.
- Keep upper arms between vertical and 20° forward.
- Keep elbows at an angle between 90° and 120°.
- Keep forearms between horizontal and 20° up.
- Support the forearms.

- Keep the wrists straight and aligned with the forearms.
- Place the working object so that it can be seen at viewing angle of 10° to 30° below the line of sight.



- Keep shoulders low and relaxed.
- Keep elbows tucked in.
- Tuck chin in and do not bend forward when looking down and forward.

- Change positions frequently but remain within recommended ranges.
- Alternate crossed legs.
- Avoid bending to the side.
- Avoid bending forward.
- Do not slouch.
- Do not sit for more than 50 minutes at a time.

Working in a Standing Position - Basic Information

Can work in a standing position cause health problems?

Standing is a natural human posture and by itself poses no particular health hazard. However, working in a standing position on a regular basis can cause sore feet, swelling of the legs, varicose veins, general muscular fatigue, low back pain, stiffness in the neck and shoulders, and other health problems. These are common complaints among salespeople, machine operators, assembly-line workers and others whose jobs require prolonged standing.

Why working in a standing position can be a problem?

While working, the worker's body position is affected by the arrangement of the work area and by the various tasks that the worker does. The physical layout of the workstation, the tools, and the placement of keys, controls and displays that the worker needs to operate or observe determines or limits the body positions that worker can assume when working. As a result, the number of working body positions available is limited and the positions themselves are more rigid. This gives the worker less freedom to move around and rest working muscles. This lack of flexibility in choosing body positions contributes to health problems.

These conditions commonly occur where the job is designed without considering characteristics of the human body. When the job design ignores the basic needs of the human body (and individual workers), work can cause discomfort in the short term and can eventually lead to severe and chronic health problems.

What are some of the health hazards?

Keeping the body in an upright position requires considerable muscular effort that is particularly unhealthy even while standing motionless. It effectively reduces the blood supply to the loaded muscles. Insufficient blood flow accelerates the onset of fatigue and causes pain in the muscles of the legs, back and neck (these are the muscles used to maintain an upright position).

The worker suffers not only muscular strain but other discomforts also. Prolonged and frequent standing, without some relief by walking, causes blood to pool in the legs and feet. When standing occurs continually over prolonged periods, it can result in inflammation of the veins. This inflammation may progress over time to chronic and painful varicose veins. Excessive standing also causes the joints in the spine, hips, knees and feet to become temporarily immobilized or locked. This immobility can later lead to rheumatic diseases due to degenerative damage to the tendons and ligaments (the structures that bind muscles to bones).

What are some recommendations for improving the workplace design?

In a well-designed workplace, the worker has the opportunity to choose from among a variety of well-balanced working positions and to change between them frequently.

Working tables and benches should be adjustable. Being able to adjust the working height is particularly important to match the workstation to the worker's individual body size and to the worker's particular task. Adjustability ensures that the worker can carry out work in well-balanced body positions. If the workstation cannot be adjusted, platforms to raise the shorter worker or pedestals on top of workstations for the tall worker should be considered.

Organization of the work space is another important aspect. There should be enough room to move around and to change body position. Providing built-in foot rails or portable footrests allows the worker to shift body weight from one leg to the other. Elbow supports for precision work help reduce tension in the upper arms and neck. Controls and tools should be positioned so the worker can reach them easily and without twisting or bending.

Where it is possible, a seat should be provided so that the worker can do the job either sitting or standing. The seat must place the worker at a height that suits the type of work being done. For work that requires standing only, a seat should be provided in any case to allow the worker to sit occasionally. Seats at the workplace expand the variety of possible body positions and give the worker more flexibility.

The benefits from greater flexibility and a variety of body positions are twofold. The number of muscles involved in the work is increased which equalizes the distribution of loads on different parts of the body. Thus, there is less strain on the individual muscles and joints used to maintain the upright position. While, changing body positions improves the blood supply to the working muscles. Both effects contribute to the reduction of overall fatigue.

Quality of footwear and type of flooring materials are also major factors contributing to standing comfort. For further details on these subjects, refer to these related documents on Personal Protective Equipment.

How job design can reduce ill effects of working in a standing position?

The basic principles of good job design for standing work are:

- Change working positions frequently so that working in one position is of a reasonably short duration.
- Avoid extreme bending, stretching and twisting.
- Pace work appropriately.
- Allow workers suitable rest periods to relax; exercises may also help.
- Provide instruction on proper work practices and the use of rest breaks.
- Allow workers an adjustment period when they return to work after an absence for vacation or illness so they can gradually return to a regular work pace.

How work practices can reduce ill effects of working in a standing position?

A well-designed workplace combine with a well-designed job make it possible to work in a balanced position without unnecessary strain on the body. Although the actual performance of the task depends on the worker (including how the worker stands, moves or lifts), work practices can make the job either safer or more hazardous. Proper training shapes individual work habits and by a supervisor who encourages the worker to use the skills they have learned.

It is important that the worker is informed of health hazards in the workplace. The worker needs to understand which body movements and positions contribute to discomfort and that the conditions causing mild discomfort can lead to chronic injury in the long term. Worker training should also contain information on how to adjust specific workplace layouts to the individual's advantage to reduce or eliminate health hazards.

The worker should be aware that rest periods are important elements of the work. Rest periods should be used to relax when muscles are tired, to move around when muscles are stiff, to walk when work restricts the worker's ability to change postures or positions, and so on. The worker should also be encouraged to report discomforts experienced during work. It may result in correcting working conditions.

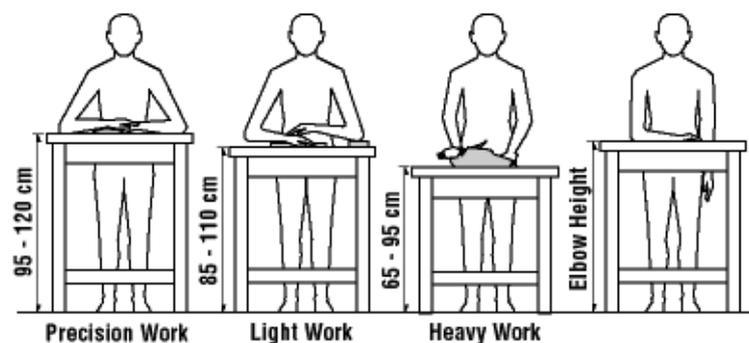
All these elements--training and supervision, coupled with active worker input--can result in sound work practices. It must be remembered that a well-designed job and workplace are essential to healthy and safe work. Without these, good work practices cannot be effective.

What is an example of a workstation designed for a standing worker?

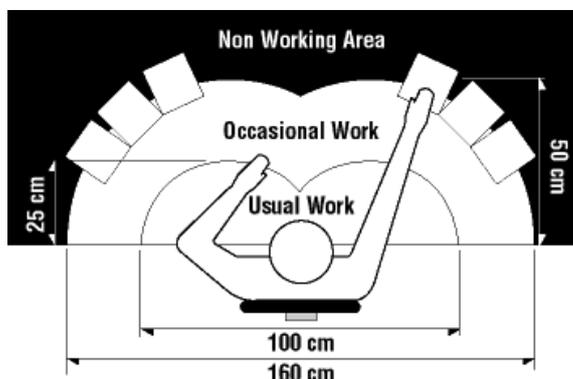
Workplace design should fit the variety of workers' shapes and sizes and provide support for the completion of different tasks.

Different tasks require different work surface heights:

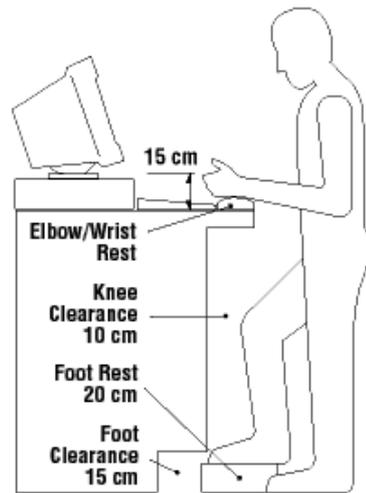
- Precision work, such as writing or electronic assembly - 5 cm above elbow height; elbow support is needed.
- Light work, such as assembly-line or mechanical jobs - about 5-10 cm below elbow height.
- Heavy work, demanding downward forces - from 20-40 cm below elbow height.



What can workers do to reduce a discomfort or working in standing?



- Adjust the height of the work according to body dimensions. Use elbow height as the guide.
- Organize your work so that the usual operations are done within easy reach.



- Always face the object of work.
- Keep body close to the work.
- Adjust the workplace to get enough space to change working position.
- Use a foot rail or portable footrest to shift body weight from both to one or the other leg. Use a seat whenever possible while working, or at least when the work process allows for rest.

What should workers avoid while working in standing?

- Avoid reaching behind the shoulder line. Shifting feet to face the object is the recommended way.
- Avoid overreaching beyond the point of comfort.
- Avoid reaching above shoulder line.

What are some do's and don'ts about good footwear?

Your feet can only be as comfortable as the footwear permits.



- Wear shoes that do not change the shape of your foot.
- Choose shoes that provide a firm grip for the heel. If the back of the shoe is too wide or too soft, the foot will slip, causing instability and soreness.
- Wear shoes that allow freedom to move your toes. Pain and fatigue result if shoes are too narrow or too shallow.
- Ensure that shoes have arch supports. Lack of arch support causes flattening of the foot.
- Wear shoes with lace-up fastenings.
- Tighten the lace instead of your footwear firmly. The foot is prevented from slipping inside the footwear.
- Use padding under the tongue if you suffer from tenderness over the bones at the top of the foot.
- Use a shock-absorbing cushioned insole when working on metal or cement floors.
- Do not wear flat shoes.
- Do not wear shoes with heels higher than 5 cm (2 inches).
- Choose footwear according to the hazard at your workplace.
- Select safety footwear, if required, that carries the proper ratings for the hazard. The document "[Safety Footwear](#)" under the document on Personal Protective Equipment has additional information.
- Select footwear taking into account individual fit and comfort. Try on and walk in footwear before using.

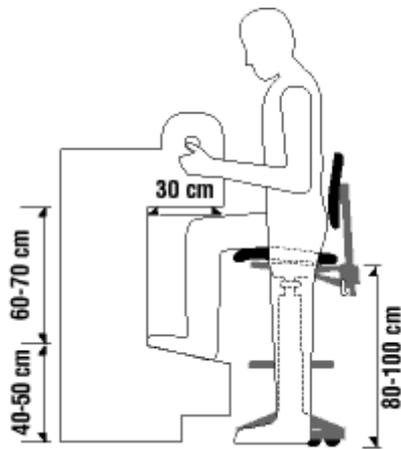
What recommendations are suggested for the floors of a workplace?

- Keep work areas clean.
- Avoid standing on concrete or metal floors. Recommended for standing work are wooden, cork or rubber covered floors.
- Ensure that the floors are level and non-slippery.
- Cover concrete or metal floors with mats. Slanted edges on mats help prevent tripping.
- Do not use thick foam-rubber mats. Too much cushioning can cause fatigue and increase the hazard of tripping.

Working in Standing/Sitting Positions

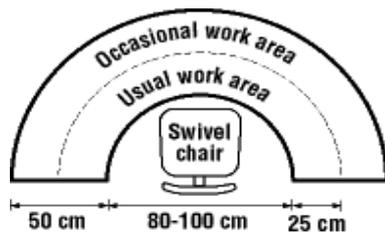
What is an example of a workstation for sitting/standing?

Continuous standing or sitting while working is a common source of discomfort and fatigue. Frequent changes of body positions, including alternating between sitting and standing, helps to avoid fatigue.



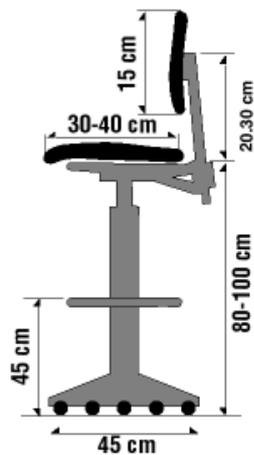
- Adjust the workstation to the proper height. Refer to the document "[Working in a Standing Position](#)" above for more information.
- Use a swivel chair with an adjustable seat height.
- Adjust the chair seat height to 25-35 cm (about 10 - 14 in.) below the work surface.
- Use a footrest with a height of 40-50 cm (about 16 - 20 in.).

What is an example of a semi-circular workstation?



- Arrange work in a semi-circle.
- Use a swivel chair to reduce body twisting, to allow easy movements, and to reduce side-to-side motions.
- Use sloping work tables whenever possible to reduce bending, and to encourage an upright position while sitting or standing.

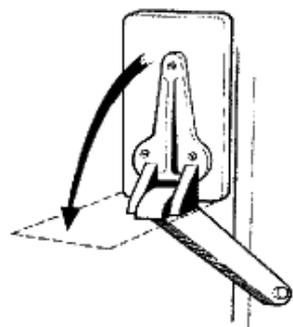
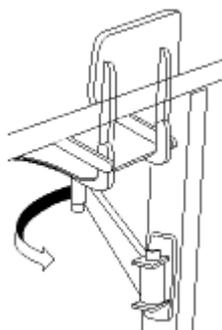
What are examples of a chair for sitting/standing workstations?



Whenever possible, a worker should be able to work sitting or standing at will.

- Ensure that the seat has a minimum width of 40 cm (about 16 in.).
- Choose back rests that are contoured vertically and horizontally.
- Use a seat covering of non-slip, breathable fabric.
- Select seat padding that is about 2-3 cm (1 in.) thick.

- Provide a chair that can fold up and be stored out of the way where space is limited.
- Ensure that chairs have a back support.
- Provide a chair for resting purposes even when work can only be done standing.



Prevention of Slips, Trips and Falls

Why is prevention of slips, trips and falls important?

Most of the workers get injured annually due to fall accidents. This number represents about fifteen percent of the "time-loss injuries" that were accepted by workers' compensation boards or commissions across Canada. Not mentioning a great economical loss, it amounts for a lot of pain and suffering and sometimes (much too often) even death. All these, in most of cases, do not have to happen. What is needed is:

- understanding how fall accidents happen,
- identifying the trouble areas, and
- eliminating or minimizing hazards of falling.

How do falls happen?

Statistics show that the majority (60 percent) of falls happen on the same level resulting from slips and trips. The remaining 40 percent are falls from a height. This document will summarize information on "falls on the same level" (slips and trips). Falls from an elevation, such as falls from ladders, roofs, down stairs or from jumping to a lower level, etc., will be discussed in another document since each type of fall requires different features in a fall prevention program.

Slips

Slips happen where there is too little friction or traction between the footwear and the walking surface. Common causes of slips are:

- wet or oily surfaces,
- occasional spills,
- weather hazards,
- loose, unanchored rugs or mats, and
- flooring or other walking surfaces that do not have same degree of traction in all areas.

Trips

Trips happen when your foot collides (strikes, hits) an object causing you to lose the balance and, eventually fall. Common causes of tripping are:

- obstructed view,
- poor lighting,
- clutter in your way,
- wrinkled carpeting,
- uncovered cables,
- bottom drawers not being closed, and
- uneven (steps, thresholds) walking surfaces.

How to prevent falls due to slips and trips?

Both slips and trips result from some a kind of unintended or unexpected change in the contact between the feet and the ground or walking surface. This shows that good housekeeping, quality of walking surfaces (flooring), selection of proper footwear, and appropriate pace of walking are critical for preventing fall accidents.

Housekeeping

Good housekeeping is the first and the most important (fundamental) level of preventing falls due to slips and trips. It includes:

- cleaning all spills immediately,
- marking spills and wet areas,
- mopping or sweeping debris from floors,
- removing obstacles from walkways and always keeping them free of clutter,
- securing (tacking, taping, etc.) mats, rugs and carpets that do not lay flat,
- always closing file cabinet or storage drawers,
- covering cables that cross walkways,
- keeping working areas and walkways well lit,
- replacing used light bulbs and faulty switches.

Without good housekeeping practices, any other preventive measures such as installation of sophisticated flooring, specialty footwear or training on techniques of walking and safe falling will never be fully effective.

For more information about effective housekeeping refer document on [Workplace Housekeeping - Basic Guide](#).

Flooring

Changing or modifying walking surfaces is the next level of preventing slip and trips. Recoating or replacing floors, installing mats, pressure-sensitive abrasive strips or abrasive-filled paint-on coating and metal or synthetic decking can further improve safety and reduce risk of falling. However, it is critical to

remember that high-tech flooring requires good housekeeping as much as any other flooring. In addition, resilient, non-slippery flooring prevents or reduces foot fatigue and contributes to slip prevention measures.

Footwear

In workplaces where floors may be oily or wet or where workers spend considerable time outdoors, prevention of fall accidents should focus on selecting proper footwear. Since there is no footwear with anti-slip properties for every condition, consultation with manufacturers' is highly recommended.

Properly fitting footwear increases comfort and prevents fatigue which, in turn, improves safety for the employee. For more information on footwear visit our web-page Foot safety.

What to be done to avoid falling at work?

It is important remembering that safety is everybody business. However, it is employers' responsibility to provide safe work environment for all employees. Employees can improve their own safety too.

You can reduce the risk of slipping on wet flooring by:

- taking your time and paying attention to where you are going,
- adjusting your stride to a pace that is suitable for the walking surface and the tasks you are doing,
- walking with the feet pointed slightly outward, and
- making wide turns at corners.

Reduce the risk of tripping by:

- always using installed light sources that provide sufficient light for your tasks or,
- using a flashlight if you enter a dark room where there is no light, and
- ensuring that things you are carrying or pushing do not prevent you from seeing any obstructions, spills, etc.

Stairways - Fall Prevention

Why do we need to worry so much about falls on stairs?

Stairs of all types have been used since ancient times, and because they are inherently hazardous, people have been falling on them, getting hurt or even killed in the process. In North America tens of people die and tens of thousand people get injured every year from the falls on stairs. The American National Council on Compensation Insurance estimated in 2001-2002 that the cost of such fall injuries was second only to those caused by motor vehicles.

The vast majority of stairway falls result from a loss of balance, just as falls are on the level. Please refer the document on Prevention of Slips, Trips and Falls.

A very common contributing factor is neglecting to use handrails. The consequences can be quite nasty. Because stairway accidents can cause severe injury and even death, building codes for stairs and ramps are justifiably very rigorous. Good design can substantially reduce the potential for mis-stepping by providing us with the means to retrieve our balance, but even the best design cannot eliminate falling hazards entirely. The need for proper design also applies to ramps. The fact is that some incidents can be caused by inattention and unsafe behaviour.

The best approach to minimize the hazard of falling down stairs is to encourage the building of well-designed stairways, combined with training focused on raising our awareness of the potential for disaster.

What factors must we consider in designing safer stairs?

Stair dimensions

Figure 1 shows the recommended dimension ranges for all the important elements of stairways.

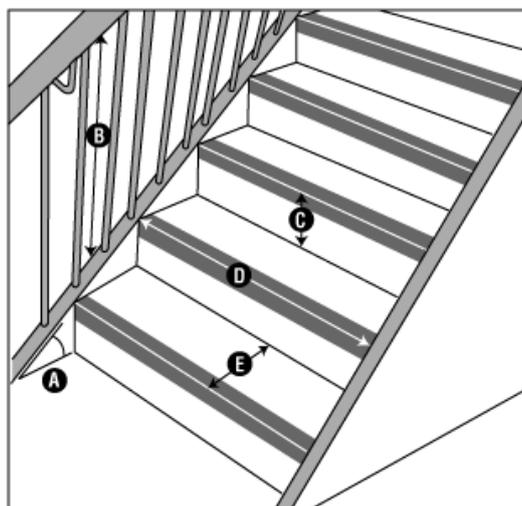


Figure 1

Figure 1: Legend

- A - Optimal range: 30°-35°
- B - Handrail height: 80-97 cm
- C - Riser height: 12.5-20 cm

D - Step width: 56 cm min.

E - Tread depth: 17-24 cm

The maximum range for a stair slope is 20¼-50¼. However, because the majority of people prefer a slope of 30¼-35¼, this is the recommended range.

Steeper stairs change the way you climb them because the steeper they are the more effort you exert. The ratio of riser height and tread depth has to be adjusted accordingly. (See Figures 2 and 3)

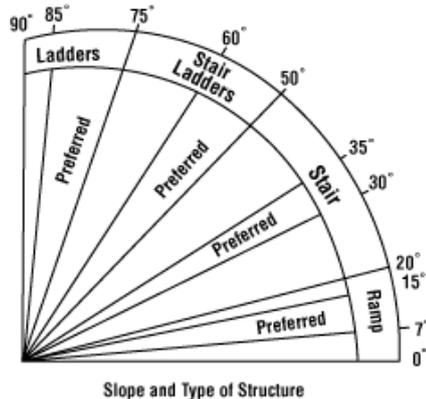


Figure 2

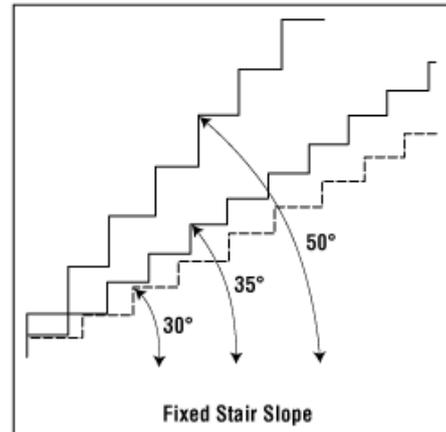


Figure 3

The dimension of risers or treads in a stairway should not vary more than 1 cm. When doors open directly into the stairwell, a 50 cm-wide platform should be provided beyond the swing of the door. The recommended maximum number of steps between landings is 18, with no more than two flights without a change of direction. The depth of any landing should be at least equal to the width of the stairs.

Stair surface

To reduce the risk of slipping on stairs, non-slippery surface on the whole steps or at least on the leading edges is crucial. Such a surface can be made of rubber, or metal or painted with special slip-resistant paint. Regular maintenance of the stairs in good repair plus good housekeeping can reduce hazards for tripping.

Stair handrails

Attempts to design aesthetically pleasing stairways including handrails must not compromise functionality.

The prime function of the handrail is for holding as support while going up or down stairs.

It is therefore crucial to be able to grasp it quickly, easily and firmly if you should start losing your balance.

Figure 4 shows the recommended cross-section and dimensions of a good handrail. Ideally the cross-section should be round (diameter 4-5 cm, with circumference of 12-14 cm) to allow for a good firm grip.

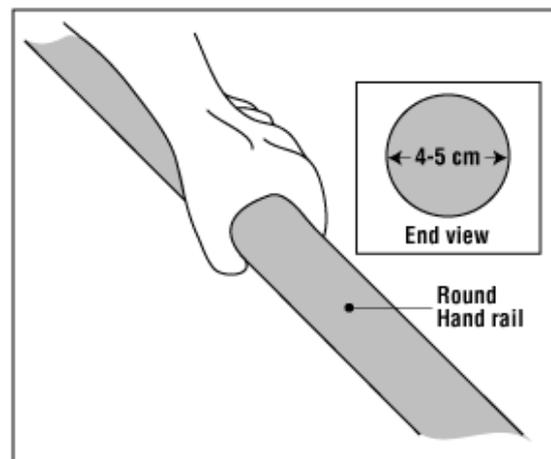


Figure 4

You should be able to run your hand smoothly along the entire length without having to adjust your grip. You should apply the so-called "tennis-racket grip" at all times when possible.

Guardrails 40 cm above the surface of the stairs are needed to prevent falls off the side of the stairs that are not equipped with a banister.

Visibility on stairs

Improving visibility on stairs significantly reduces the risk for common mishaps caused by misjudging distances. Otherwise you can trip on a step or miss it completely. You can catch a heel on the edge of a step. Such mishaps are a routine cause of twisted ankles, sprained knees or more serious injuries incurred by a total fall.

- Recommended illumination should be at the minimum 50 lux level.
- Use angular lighting and colour contrast to improve depth perception.

- Use matte finishes on the treads to avoid glare.
- Avoid patterned carpeting that may visually hide differences in depth.
- Be very cautious on stairs if you are wearing bifocal glasses.

Work activity

- Use any means to persuade people to grasp the handrail while both ascending or descending stairs.
- Avoid carrying objects with both hands.
- Do not carry bulky objects that block your vision.

Housekeeping

Good housekeeping is also vital to stair safety:

- Nothing should be sticking out the surfaces of stairs, handrails or bannisters (like nails or splinters) that could cause a fall.
- Spills, wet spots, or any debris should be immediately cleaned up.
- Broken or malfunctioning lighting should be repaired or replaced.

For more information on Housekeeping refer documents:

[Workplace Housekeeping - Basic Guide \(WI-OHS-02- Ergonomics\)](#)

[Workplace Housekeeping - Checklist for Workplace Housekeeping \(WI-OHS-02- Ergonomics\)](#)

Portable Ladders

What should be known about portable ladders before using them?

Falls from portable ladders are a major source of serious injury. Be aware of the hazards and take proper precautions to prevent falling.

What should be done before using a portable ladder?

- Inspect the ladder before and after each use.
- Reject and tag any ladders that have defects. Have faulty ladders repaired or thrown out.
- Use a ladder designed for your task. Consider the strength, type, length and the Canadian Standards Association (CSA) approval.
- Get help when handling a heavy or long ladder.
- Keep ladders away from electrical wires.
- Tie off ladders at the top and secure bottom to prevent them from slipping.
- Set up barricades and warning signs when using a ladder in a doorway or passageway.
- Before mounting a ladder, clean the boot soles if they are muddy or slippery. Avoid climbing with wet soles. Ensure that footwear is in good condition.
- Face the ladder when going up or down and when working from it.
- Keep the centre of your body within the side rails.

What should be avoided when using a portable ladder?

- Do not use a ladder in a horizontal position as a scaffold plank or runway.
- Do not carry objects in your hands while on a ladder. Hoist materials or attach tools to a belt.
- Do not work from top three rungs. The higher a person goes on a ladder, the greater the possibility that the ladder will slip out at the base.
- Do not use items such as a chair, barrel or box as a makeshift ladder.
- Do not use a portable ladder when other equipment is available. Replace a ladder with a fixed stairway or scaffold.
- Do not join two short ladders to make a longer ladder. Side rails are not strong enough to support the extra load.
- Do not paint wooden ladders. Defects may be hidden by the paint. Wood preservatives or clear coatings may be used.

How to set up the ladder?

- Place the ladder feet 1/4 of the ladder's working length (e.g., foot to top support point) away from the base of the structure (e.g., for every 4 feet high, the base of the ladder should be out 1 ft; that means one horizontal foot from the support point).
- Extend the ladder at least 1 m (3 ft) above the landing platform.
- Place the ladder on a firm, level footing. Use a ladder with slip-resistant feet or secure blocking, or have someone hold the ladder.
- Rest both side rails on the top support and secure ladder to prevent slipping.

What should be known about climbing portable ladders?



3 Point Contact

- Check for overhead electrical wires before setting up a ladder.
- Clear area around base and top of the ladder of debris, tools and other objects.
- Tie off yourself with a safety harness when working 3 m (10 ft) or more off the ground or when working with both hands.
- Ensure that only one person is on a single-width ladder. Only one person is allowed on each side of a double-width ladder.
- Maintain three-point contact by keeping two hands and one foot, or two feet and one hand on the ladder at all times.
- Grasp the rungs when climbing a ladder, not the side rails. If your foot slips on a ladder, holding onto rungs is easier than holding onto the side rails.

- Wear protective footwear with slip-resistant soles and heels.
- Ensure that all electrical equipment used during ladder work is in good condition and properly grounded.
- Rest frequently to avoid arm fatigue and disorientation when the work requires you to look up and reach above your head.
- Drape your arms over a rung and rest your head against another rung or side rail if you become dizzy or panicky. Climb down slowly.

What should be avoided when climbing portable ladders?

- Do not use a ladder in passageways, doorways, driveways or other locations where a person or vehicle can hit it. Set up suitable barricades or lock the doors shut.
- Do not place a ladder against flexible or moveable surfaces.
- Do not straddle the space between a ladder and another object.
- Do not erect ladders on boxes, carts, tables, scaffold or other unstable surfaces.
- Do not use ladders on ice.
- Do not stand a ladder on any of its rungs. Ladders must rest on both side rails.
- Do not allow anyone to stand under a ladder.
- Do not overreach from a ladder; move as required.
- Do not use any type of ladder near electrical wires.