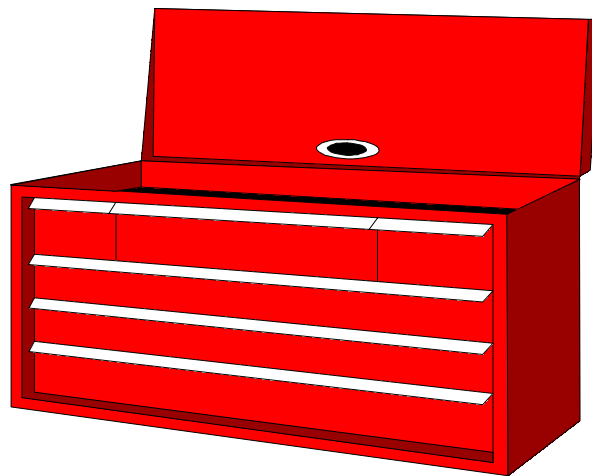


# INDUSTRIAL MUSCULOSKELETAL INJURY REDUCTION PROGRAM

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## Common Industry Jobs (CIJs) Warehouseperson Tool Kit



**IMIRP** program coordinated by:

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Council of  
Forest  
Industries



Industrial  
Wood & Allied  
Workers of  
Canada



Advanced  
Ergonomics  
Inc.

In cooperation with the Workers' Compensation Board of British Columbia

# WAREHOUSEPERSON TOOL KIT

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Warehouseperson  
Tool Kit

# Overview

## Warehouseperson

### Job Summary

A Warehouseperson is responsible for stocking the warehouse with supplies for the mill. A Warehouseperson may pack and unpack freight, use a forklift, stock shelves, clean the warehouse, and do inventory. A Warehouseperson may also do office work, which includes computer work, paperwork, and handling telephone calls. Refer to the Physical Demands Analysis for more detail.

### Physical Demands

The physical demands of the Warehouseperson may include:

- a) Forceful movements of the shoulder and low back
- b) Repetitive motion of the neck, shoulder, and low back
- c) Awkward postures of the neck, shoulder, low back, and knee
- d) Static postures of the low back and knee
- e) Whole body vibration affecting the low back
- f) Walking to stock shelves
- g) Sitting to work at computer workstation and to operate forklift
- h) Standing while taking inventory
- i) Kneeling/Crouching while retrieving items from low shelving
- j) Lifting/Lowering items on and off shelves
- k) Pushing/pulling to manipulate items for storage
- l) Carrying items to store them in the warehouse

## **Mental Demands**

A Warehouseperson is responsible for keeping the warehouse stocked with items that the mill needs to function. Keeping track of all items in the warehouse and dealing with requests can put a lot of mental stress on the workers.

## **Major Variations**

With different mills, the following major variations may be found:

- 1) A Warehouseperson may:
  - a) Keep records using a computer
  - b) Keep paper records
  
- 2) A Warehouseperson may move items:
  - a) Using mechanical lifting aids
  - b) Manually

## **Minor Variations**

With different mills, the following minor variations may be found:

- 1) A Warehouseperson may:
  - a) Work alone
  - b) With an additional person

# Physical Demands Analysis Warehouseperson

## PDA General Instructions: Warehouseperson

The purpose of this PDA is to familiarise healthcare professionals with the physical demands of a Warehouseperson. This PDA can be used to gather information about an individual's job and to assist in developing a rehabilitation and return-to-work plan. It is not intended for use in claims adjudication.

Where applicable, common industry job data (e.g., hand tools, tasks) have been included in the tables of this document. The information reported was collected from a sample of Warehouseperson(s) in the BC Sawmill Industry. However, the PDA requires completion by the healthcare professional, with input from the injured worker to highlight tasks that aggravate the injury or prevent the worker from returning to their job. The worker's supervisor may be contacted for further information or verification of tasks.

A PDA should be filled out for each individual worker following an injury. Subsequent changes in the work process may reduce the accuracy of any pre-existing physical demands assessments.

### **Disclaimer**

*The IMIRP Society accepts no responsibility for the use or misuse of the PDA,  
or the accuracy of the PDA as it applies to any specific workplace.*

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# Physical Demands Analysis Warehouseperson

## Task List

For each of the tasks listed below, please indicate whether it occurs at the mill.

### Office work

- Computer work
- Paper work
- Telephone

A Warehouseperson may be responsible for placing orders, calling for prices, invoicing, and inventory. This involves working with a computer, doing paper work, and making telephone calls.

*Does this task occur at your mill?*

Yes       No



## Pack and unpack freight

A Warehouseperson may pack freight for transportation and unpack freight received.

*Does this task occur at your mill?*

- Yes       No



## Forklift use

A Warehouseperson may use a forklift to move large and heavy items around the warehouse or unload trucks.

*Does this task occur at your mill?*

- Yes       No



## Clean-up tasks

A Warehouseperson may perform clean-up tasks such as sweeping in order to keep the warehouse clean.

*Does this task occur at your mill?*

Yes       No

## Stock shelves

A Warehouseperson may lift and lower items to stock shelves.

*Does this task occur at your mill?*

Yes       No



## Inventory

A Warehouseperson may perform inventory on the items stored in the warehouse and rotate the stock when necessary.

*Does this task occur at your mill?*

Yes       No



## Job Profile

Date: \_\_\_\_\_

Company Name: \_\_\_\_\_

Division: \_\_\_\_\_

Employee Name: \_\_\_\_\_

Supervisor: \_\_\_\_\_

Phone: \_\_\_\_\_

Fax: \_\_\_\_\_

Is a Return-to-Work (RTW) strategy in place?  Yes  No

If yes, check all that apply:  Modified Job  Modified Worksite  Graduated RTW

Describe:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Length of shift \_\_\_\_\_ hours

Formal breaks

- Two 10 minute breaks
- One 30 minute lunch break
- Other: \_\_\_\_\_

Informal breaks

- Yes, length of break varies
- Yes, \_\_\_\_\_ minutes/shift

Work pace control

- Self-paced
- Time pressure (e.g., completing a task during the 30 minute lunch break)
- Other: \_\_\_\_\_

Job rotation

Describe:

Yes  No

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

## Work Organisation

### Task Description

The table below contains a list of tasks performed by a Warehouseperson. Use the left column to check off (✓) tasks that are present. Estimate the *Percent of Shift* each task is performed and place a check mark (✓) in the appropriate column. The *Comments* section may be used to include information related to duration, frequency, and cycle times. Additional tasks can also be included under *Other*.

Task	Percent of Shift				Comments
	Rarely 0 to 5%	Occasionally 6 to 33%	Frequently 34 to 66%	Constantly 67 to 100%	
<i>Office work:</i> <ul style="list-style-type: none"> <li>• <i>Computer work</i></li> <li>• <i>Paper work</i></li> <li>• <i>Telephone</i></li> </ul>					<ul style="list-style-type: none"> <li>• <i>1 hour to 4 hours</i></li> <li>• <i>30 minutes at one time (average)</i></li> </ul>
<i>Pack and unpack freight</i>					<ul style="list-style-type: none"> <li>• <i>1 hour to 2 hours</i></li> </ul>
<i>Forklift use</i>					<ul style="list-style-type: none"> <li>• <i>30 minutes to 2 hours</i></li> </ul>
<i>Clean-up tasks</i>					<ul style="list-style-type: none"> <li>• <i>30 minutes to 2 hours</i></li> </ul>
<i>Stock shelves</i>					<ul style="list-style-type: none"> <li>• <i>1 hour</i></li> </ul>
<i>Inventory</i>					<ul style="list-style-type: none"> <li>• <i>Varies from once per year to continually</i></li> </ul>
<i>Other:</i>					

## **Workstation Characteristics**

### **Dimensions & Layout**

Sketch workstation(s) and indicate relevant measurements, such as working heights and reaches.

**Flooring, Displays and Seating**

The table below lists several components of a workstation. For *Flooring* and *Displays* there are several options provided. Please indicate all of the options that apply to the workstation. For the *Seating* section, describe and identify the features of the seat, if applicable. The *Comments* section may be used to include additional information, especially any workstation characteristics of concern.

Workstation Characteristics	Comments
<p><b>Flooring</b> (<i>Check all that apply</i>)</p> <p><input type="checkbox"/> Cement</p> <p><input type="checkbox"/> Wood</p> <p><input type="checkbox"/> Rubber matting</p> <p><input type="checkbox"/> Metal</p> <p><input type="checkbox"/> Other: _____</p>	
<p><b>Displays</b> (<i>Check all that apply</i>)</p> <p><input type="checkbox"/> Lights on console</p> <p><input type="checkbox"/> Mirrors</p> <p><input type="checkbox"/> Video monitors</p> <p><input type="checkbox"/> Computer monitors</p> <p><input type="checkbox"/> Scrolling display</p> <p><input type="checkbox"/> Signal lights</p> <p><input type="checkbox"/> Other: _____</p>	
<p><b>Seating</b> (<i>Check all that apply</i>)</p> <p><input type="checkbox"/> Armrests</p> <p><input type="checkbox"/> Backrest</p> <p><input type="checkbox"/> Swivel seat</p> <p><input type="checkbox"/> Slide track</p> <p><input type="checkbox"/> Lumbar support</p> <p><input type="checkbox"/> Foot rest</p> <p><input type="checkbox"/> Casters #: _____</p> <p><i>Indicate if adjustable:</i></p> <p><input type="checkbox"/> Height</p> <p><input type="checkbox"/> Armrests</p> <p><input type="checkbox"/> Backrest</p> <p><input type="checkbox"/> Forward tilt</p>	<p>Height of seat: _____ cm</p> <p>Depth of seat: _____ cm</p> <p>Width of seat: _____ cm</p> <p>Covering type: _____</p>

## Equipment & Machinery Controls

The table below contains a list of the types of controls used by a Warehouseperson. Use the left column to check off (✓) controls that are present at the work site. Highlight controls that may aggravate the injury, or which the worker finds difficult to use. The *Comments* section may be used to include any additional information. Additional controls can be included under *Other*.

Type of Control	Function	Comments	
	<i>Keyboard</i>	<ul style="list-style-type: none"> <li>• <i>Enter information into the computer</i></li> </ul>	
	<i>Mouse</i>	<ul style="list-style-type: none"> <li>• <i>Enter information into the computer</i></li> </ul>	
	<i>Forklift foot pedals</i>	<ul style="list-style-type: none"> <li>• <i>Gas, brake, and clutch</i></li> </ul>	
	<i>Forklift levers</i>	<ul style="list-style-type: none"> <li>• <i>Forklift controls</i></li> </ul>	
	<i>Steering wheel</i>	<ul style="list-style-type: none"> <li>• <i>Change directions</i></li> </ul>	
	<i>Pallet jack handle</i>	<ul style="list-style-type: none"> <li>• <i>Lift and lower forks</i></li> </ul>	
	<i>Other:</i>		
	<i>Other:</i>		
	<i>Other:</i>		

## Physical Demands

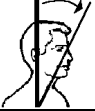

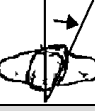



### Whole Body Physical Demands



Identify each of the physical demands required by a Warehouseperson and list the corresponding tasks in the second column. Check off (✓) the estimated *Percent of Shift*, and use the *Comments* section to include information related to duration, frequency, and cycle times.

Physical Demands	Tasks or Activity	Percent of Shift				Comments
		Rarely 0 to 5%	Occasionally 6 to 33%	Frequently 34 to 66%	Constantly 67 to 100%	
<i>Example: Climbing</i>	• <i>Stock shelves</i>		✓			• <i>A Warehouseperson may have to climb steps to stock high shelves</i>
<i>Walking</i>						
<i>Sitting</i>						
<i>Standing</i>						
<i>Climbing</i>						
<i>Balancing</i>						
<i>Kneeling/ Crouching</i>						
<i>Other:</i>						





## Body Postures





The table below outlines the body postures that may be adopted throughout the shift by a Warehouseperson, related to tasks. Check off (✓) the estimated *Percent of Shift*, and use the *Comments* section to include information describing posture duration, frequency, cycle times, and hand used.

Body Posture	Task(s)	Percent of Shift				Comments
		Rarely 0 to 5%	Occasionally 6 to 33%	Frequently 34 to 66%	Constantly 67 to 100%	
<i>Example: Shoulder Flexion</i>	<ul style="list-style-type: none"> <li>Stock shelves</li> </ul>		✓			<ul style="list-style-type: none"> <li>A Warehouseperson may have to lift items above or at shoulder height to stock shelves</li> </ul>
<b>Neck</b>						
<i>Flexion</i> 						
<i>Extension</i> 						
<i>Twisting</i> 						
<b>Shoulder</b>						
<i>Flexion</i> 						
<i>Abduction/ adduction</i> 						
<i>Extension</i> 						

Body Posture	Task(s)	Percent of Shift				Comments
		Rarely 0 to 5%	Occasionally 6 to 33%	Frequently 34 to 66%	Constantly 67 to 100%	
<b>Forearm</b>						
<i>Rotation</i> 						
<b>Wrist</b>						
<i>Wrist Movements</i> 						
<b>Hand/Fingers</b>						
<i>*Handling</i>						
<i>*Fingering</i>						
<i>*Gripping</i>						

### Legend for Hand/Fingers

<i>Handling</i>	<i>Grasping, turning, holding, etc.</i>			
<i>Fingering</i>	<i>Picking, pinching, etc.</i>			
<i>Gripping</i>	<i>Power</i> 	<i>Pinch</i> 	<i>Hook</i> 	<i>Precision</i> 

Body Posture	Task(s)	Percent of Shift				Comments
		Rarely 0 to 5%	Occasionally 6 to 33%	Frequently 34 to 66%	Constantly 67 to 100%	
<b>Back</b>						
<i>Flexion</i> 						
<i>Lateral Flexion</i> 						
<i>Twisting</i> 						
<i>Extension</i> 						

## Manual Material Handling

The table below contains a list of general manual material handling activities performed by a Warehouseperson. Indicate tasks that require one or more of these activities, and fill in the weight of the objects, or the force required, for each action. Check off (✓) the estimated *Percent of Shift*, and use the *Comments* section to include information related to duration, frequency, cycle times, and characteristics of objects handled. If necessary, please refer to Appendix A to calculate the weight of the wood being handled.

Activity	Task Description	Weight (kg)	Percent of Shift				Comments
			Rarely 0 to 5%	Occasionally 6 to 33%	Frequently 34 to 66%	Constantly 67 to 100%	
<i>Pushing</i>	<i>Stock shelves</i>	2.0					<ul style="list-style-type: none"> <li>A Warehouseperson may use a cart to move items around the warehouse</li> </ul>
<i>Pulling</i>	<i>Forklift use</i>	20.4					<ul style="list-style-type: none"> <li>A Warehouseperson may open/close large sliding doors to allow the forklift in and out of the warehouse. This may occur once or twice a day</li> </ul>
<i>Lifting</i>	<i>Stock shelves</i>	Up to 55					<ul style="list-style-type: none"> <li>Rotating stock greatly increases the frequency of lifting</li> </ul>
<i>Lowering</i>	<i>Stock shelves</i>	Up to 55					<ul style="list-style-type: none"> <li>Rotating stock greatly increases the frequency of lowering</li> </ul>
<i>Carrying</i>	<i>Stock shelves</i>	Up to 55					<ul style="list-style-type: none"> <li>Duration may vary depending on layout of the warehouse</li> </ul>

## Hand Tools

Indicate the hand tools used by a Warehouseperson by placing a check mark (✓) in the far left column. Determine the weight of the hand tool and enter it in the appropriate column. Check off (✓) the estimated *Percent of Shift*, and use the *Comments* section to include information related to duration, frequency, cycle times, and characteristics of objects handled.

Type of Tool	Task(s)	Weight (kg)	Percent of Shift				Comments
			Rarely 0 to 5%	Occasionally 6 to 33%	Frequently 34 to 66%	Constantly 67 to 100%	
<i>Pocket knife</i>	<ul style="list-style-type: none"> <li><i>Pack and unpack freight</i></li> </ul>	< 1					<ul style="list-style-type: none"> <li><i>A Warehouseperson may use a knife to open boxes</i></li> </ul>
<i>Tape measure</i>	<ul style="list-style-type: none"> <li><i>Pack and unpack freight</i></li> </ul>	< 1					<ul style="list-style-type: none"> <li><i>A Warehouseperson may use a tape measure to measure objects</i></li> </ul>
<i>Packing tape dispenser</i>	<ul style="list-style-type: none"> <li><i>Pack and unpack freight</i></li> </ul>	< 1					<ul style="list-style-type: none"> <li><i>A Warehouseperson may use a tape dispenser to wrap packages</i></li> </ul>
<i>Broom</i>	<ul style="list-style-type: none"> <li><i>Clean-up tasks</i></li> </ul>	< 5					<ul style="list-style-type: none"> <li><i>A Warehouseperson may use a broom to clean the warehouse</i></li> </ul>
<i>Other:</i>							
<i>Other:</i>							
<i>Other:</i>							
<i>Other:</i>							

## Environmental Conditions

### Work Environment

The table below contains a list of environmental conditions that may be of concern. If any of these factors aggravate the injury, describe in the *Comments* section.

Factor	Comments
<b>Vibration</b> ( <i>Indicate source</i> ) <input type="checkbox"/> Seat <input type="checkbox"/> Floor <input type="checkbox"/> Tool <input type="checkbox"/> Other: _____	
<b>Noise level</b>	
<b>Lighting level</b>	
<b>Other:</b>	

### Location of Workstation

The table below contains a list of potential work environments. Indicate with a check mark (✓) in the left column which of the work environments apply to the specific workstation. For example, the workstation may be inside a building with both a local fan and heater, exposed to the outside by a doorway that is always open. In this situation, 'Inside exposed', 'Heater present', and 'Fan present' would all be checked.

Work Environment	
	Outside uncovered
	Outside covered
	Inside enclosed
	Inside exposed
	Heater present
	Fan present

## Temperature

The table below contains a list of the geographical regions of British Columbia. Indicate the appropriate region with a check mark (✓) in the left column. Refer to the regional map in Appendix A of the PDA.

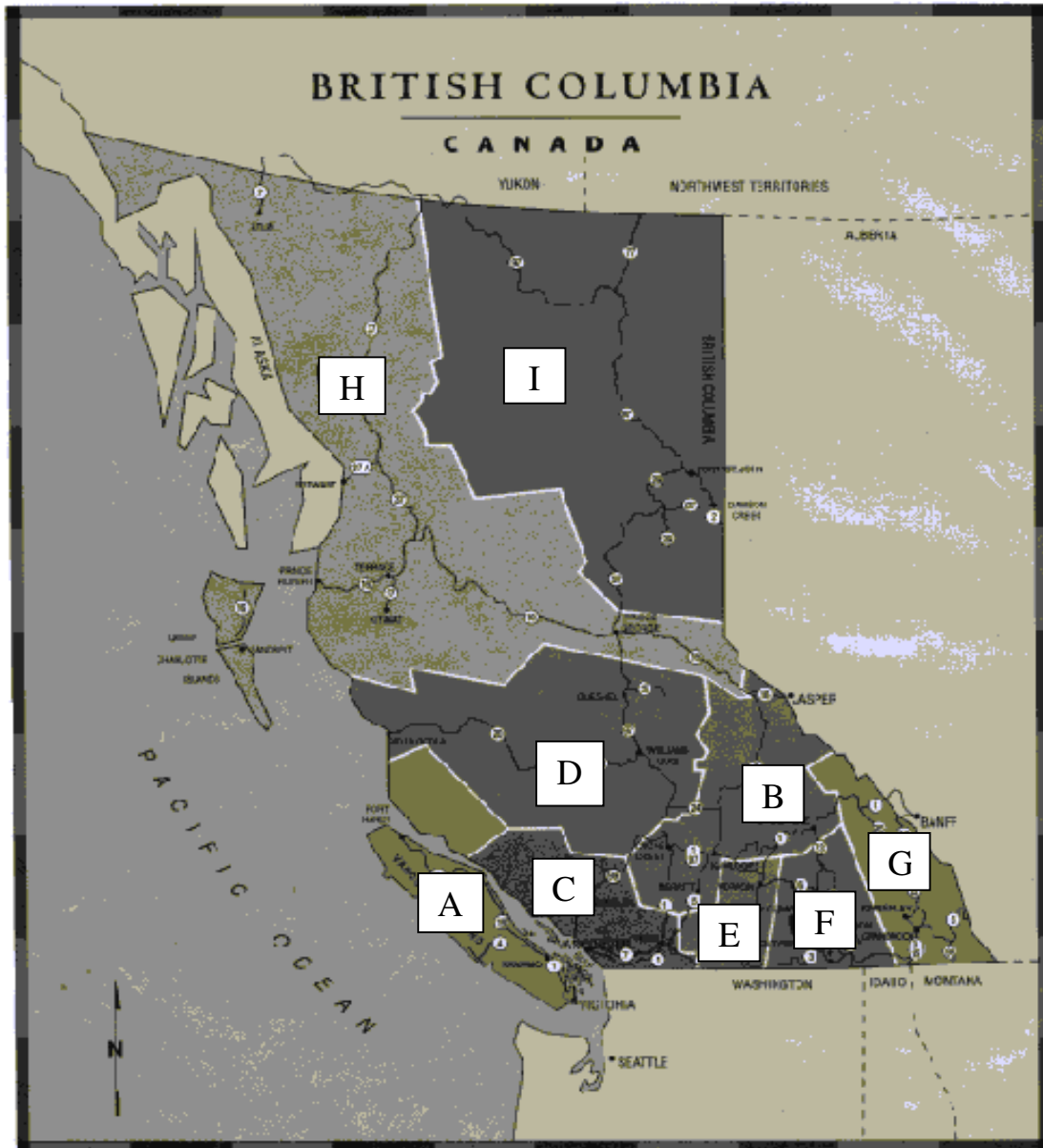
Region	Avg. Max July/Aug	Avg. Min Dec/Jan	Extreme Max.	Extreme Min.
<input type="checkbox"/> Vancouver Island	22.5 °C	-0.6 °C	36.1 °C	-18.8 °C
<input type="checkbox"/> Southwestern BC	22.9 °C	0.4 °C	35.6 °C	-18.3 °C
<input type="checkbox"/> Cariboo Chilcotin Coast	22.2 °C	-11.6 °C	36.4 °C	-42.5 °C
<input type="checkbox"/> High Country	26.3 °C	-9.9 °C	39.6 °C	-39.7 °C
<input type="checkbox"/> Okanagan Similkameen	26.5 °C	-8.4 °C	36.0 °C	-36.3 °C
<input type="checkbox"/> Kootenay Country	26.2 °C	-6.7 °C	38.5 °C	-32.0 °C
<input type="checkbox"/> British Columbia Rockies	24.7 °C	-12.3 °C	37.5 °C	-42.2 °C
<input type="checkbox"/> North by Northwest	19.5 °C	-11.7 °C	32.9 °C	-38.1 °C
<input type="checkbox"/> Peace River Alaska Highway	20.0 °C	-20.2 °C	34.6 °C	-47.7 °C

## Personal Protective Equipment

The table below contains a list of the personal protective equipment (PPE). For the Warehouseperson at your mill, indicate with a check mark (✓) which of the PPE items are required.

<input type="checkbox"/>	Gloves Type:	<input type="checkbox"/>	Hard Hat	<input type="checkbox"/>	Leather Apron
<input type="checkbox"/>	Glove Liners	<input type="checkbox"/>	Steel-toed Boots	<input type="checkbox"/>	Dust Mask
<input type="checkbox"/>	Eye Protection	<input type="checkbox"/>	Hearing Protection	<input type="checkbox"/>	Seat Belt
<input type="checkbox"/>	Face Shield/Helmet	<input type="checkbox"/>	Life Jacket	<input type="checkbox"/>	Harness
<input type="checkbox"/>	Knee Pads	<input type="checkbox"/>	Other:	<input type="checkbox"/>	Other:

## Appendix A – Regional Map



- |                                    |                                       |
|------------------------------------|---------------------------------------|
| <b>A</b> - Vancouver Island        | <b>F</b> - Kootenay Country           |
| <b>B</b> - High Country            | <b>G</b> - British Columbia Rockies   |
| <b>C</b> - Southwestern BC         | <b>H</b> - North by Northwest         |
| <b>D</b> - Cariboo Chilcotin Coast | <b>I</b> - Peace River Alaska Highway |
| <b>E</b> - Okanagan Similkameen    |                                       |

# Risk Factor Identification Checklist

## Warehouseperson

### Purpose

The Risk Factor Identification Checklist for a Warehouseperson is used to **identify** potential ergonomic risk factors. Keep in mind that the purpose of this checklist is only to **identify** potential ergonomic risk factors, **not** to assess them.

The checklist can be used as part of your ergonomic intervention process, when workers express concerns about their work environment, during regular workplace inspections and observations, or when conducting an accident or injury investigation. Ideally, management and worker representatives who have completed the IMIRP Occupational Health & Safety Committee and Supervisor Ergonomic Training Session should complete this checklist. Try to view different workers in the same occupation when completing the checklist. Some specific examples are given to help answer the questions.

### Instructions

#### **General**

Except for the first two questions, all remaining questions will require an answer with an implied frequency. For appropriate questions indicate with a check mark (✓) whether the answer to the question is 'No' or 'Yes'. This way you will have a record indicating that all risk factors have been considered in the identification process.

If you indicate 'No', please continue to the next question. If the question refers to a situation which does not exist (e.g., there is no seating available), please indicate 'No' in the appropriate box and continue to the next question.

If your answer is 'Yes', please check the appropriate box and then circle the frequency ('S' for 'Sometimes' or 'O' for 'Often'). If you answer 'Yes – Sometimes', then this risk factor **may be** a potential area of concern. If you answer 'Yes – Often' then there is an increased likelihood that this risk factor **is** an issue. Each mill will be responsible for defining what 'Sometimes' and 'Often' will mean to them. It is important that all people who complete the checklist are consistent in how they determine if a risk factor occurs 'Sometimes' or 'Often'. Use the 'Comments' section to indicate specific tasks, or to make other notes about the direct risk factors.

Since ergonomic risk factors frequently occur in combinations, you may find similar questions in different sections. Answering all questions will ensure that the situations that involve combinations of ergonomic risk factors are identified. It is very important to recognise all risk factors that occur in the work area.

Please note that for some of the questions it will be beneficial to ask the worker for their input. Please take the opportunity to include the operator in the risk factor identification process as much as possible. Videotaping the job of interest and reviewing the checklist in a quiet area with the worker may allow for more discussion.

### **Summary Tables**

At the end of each body part section, summarise your findings in the table provided. If any of the direct risk factor sections contain a 'Yes', indicate 'Yes' in the appropriate section of the summary table. Answer the questions referring to injury statistics and discomfort survey findings. If there are only 'No' answers in a direct risk factor section, indicate 'No' in the summary table for that section. Use the summary information to determine how you will use the Work Manual.

## Risk Factor Identification Checklist – Warehouseperson

Management Representative \_\_\_\_\_

Risk Identification completed:

Worker Representative \_\_\_\_\_

Before implementation of solutions

Date \_\_\_\_\_

After implementation of solutions

Job History		No	Yes	Comments
1	Are there records of musculoskeletal injuries or accidents to indicate a risk of musculoskeletal injury? (refer to Worksheet 1 in Implementation Guide)			
2	Are there worker comments to indicate a risk of musculoskeletal injuries? (refer to Worksheet 2 in Implementation Guide)			

### Definitions

**Force:** Force is the amount of physical effort required by the person to do a task and/or maintain control of tools and equipment. The effort depends on the type of grip, object weight and dimensions, body posture, type of activity, surface of the object, temperature, vibration, duration of the task, and number of repetitions.

**Repetition:** Repetition is defined as similar or the same motions performed repeatedly. The severity of risk depends on the frequency of repetition, speed of the movement or action, the number of muscle groups involved, and the required force. Repetition is influenced by machine or line pacing, incentive programs, piecework, and deadlines.

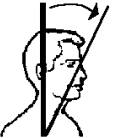

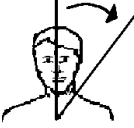
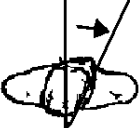
**Static Postures:** Static loading (sustained exertions) is physical effort (body postures) that is held, requiring muscle contraction for more than a short time.

**Contact Stress:** Contact stress is the contact of the body with a hard surface or edge. Contact stress can also result when using a part of the body as a hammer or striking instrument.

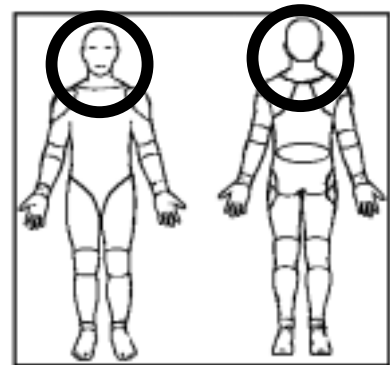
**Awkward Postures:** Awkward postures occur when there is a deviation from a power working posture. Some examples of awkward postures typically include reaching behind, twisting, working overhead, and forward or backward bending.

**Vibration:** Vibration is oscillation of a tool or surface. Vibration can be transmitted through the arm or through the whole body.

# NECK

Repetition		N	Y	Comments:
Are identical or similar motions performed over and over again? (e.g., looking up or down frequently)			S O	
Ask the worker: Do you spend a large percentage of the day performing one action or task? (e.g., viewing computer screen)			S O	
Static Posture				
Ask the worker: Do tasks require your neck or shoulders to be maintained in a fixed or static posture? (e.g., looking down at a computer screen for a long period)			S O	
Awkward Posture				
Flexion			S O	
Extension			S O	
Lateral Bending			S O	
Rotation			S O	



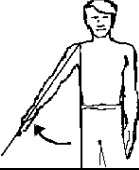
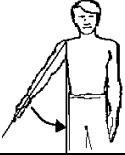
Please indicate whether the following direct risk factors were identified at the <b>NECK</b> .		
<b>Direct Risk Factors</b>	Repetition	<input type="checkbox"/> Yes <input type="checkbox"/> No
	Static Posture	<input type="checkbox"/> Yes <input type="checkbox"/> No
	Awkward Posture	<input type="checkbox"/> Yes <input type="checkbox"/> No
In the <b>Injury Statistics</b> investigation, were there injury reports for the Neck or Head/Eye or Upper Back? (see Worksheet 1 in the Implementation Guide)		<input type="checkbox"/> Yes <input type="checkbox"/> No
In the <b>Discomfort Survey</b> investigation, were there reports of discomfort for the Neck or Head/Eye or Upper Back? (see Worksheet 2 in the Implementation Guide)		<input type="checkbox"/> Yes <input type="checkbox"/> No



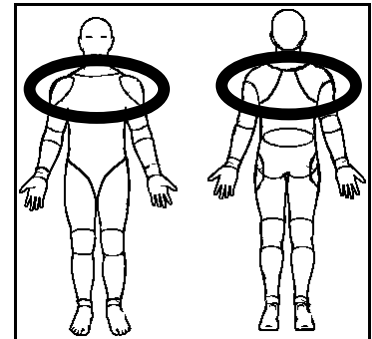
*Body parts within the circled area will be classified as NECK issues.*

## SHOULDER

<b>Force</b>	<b>N</b>	<b>Y</b>	<b>Comments:</b>
Is forceful physical handling performed? Such as: Lifting		S O	
Lowering		S O	
Pushing		S O	
Pulling		S O	
Carrying		S O	
<b>Repetition</b>			
Are identical or similar motions performed over and over again? (e.g., lifting packages onto shelves)		S O	
Ask the worker: Do you spend a large percentage of the day performing one action or task? (e.g., stocking shelves)		S O	
<b>Static Posture</b>			
Ask the worker: Do tasks require your shoulders to be maintained in a fixed or static posture? (e.g., using a computer mouse with the arm unsupported)		S O	
Ask the worker: Do you hold parts, tools, or objects for long periods? (e.g., packing tape dispenser)		S O	




Awkward Posture		N	Y	Comments:
Flexion			S O	
Extension			S O	
Abduction			S O	
Adduction			S O	

Please indicate whether the following direct risk factors were identified at the <b>SHOULDER</b> .		
<b>Direct Risk Factors</b>	Force	<input type="checkbox"/> Yes <input type="checkbox"/> No
	Repetition	<input type="checkbox"/> Yes <input type="checkbox"/> No
	Static Posture	<input type="checkbox"/> Yes <input type="checkbox"/> No
	Awkward Posture	<input type="checkbox"/> Yes <input type="checkbox"/> No
In the <b>Injury Statistics</b> investigation, were there injury reports for the Shoulder or Neck or Upper Back? (see Worksheet 1 in the Implementation Guide)		<input type="checkbox"/> Yes <input type="checkbox"/> No
In the <b>Discomfort Survey</b> investigation, were there reports of discomfort for the Shoulder or Neck or Upper Back? (see Worksheet 2 in the Implementation Guide)		<input type="checkbox"/> Yes <input type="checkbox"/> No



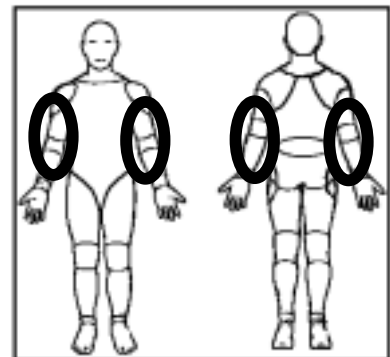
*Body parts within the circled area will be classified as SHOULDER issues.*

## ELBOW

Force		N	Y	Comments:
Is forceful physical handling performed? Such as:			S	
Lifting			O	
Lowering			S	
			O	
Pushing			S	
			O	
Pulling			S	
			O	
Carrying			S	
			O	
Turning materials			S	
			O	
Are objects handled in a power grip? (e.g., drill)			S	
			O	
Are objects handled in a pinch grip? (e.g., nuts, bolts, sheets of metal)			S	
			O	
Are objects handled in a hook grip? (e.g., oil cans, tire rims)			S	
			O	
Ask the worker: Do you wear gloves while performing your job? If the answer is <b>No</b> , check the <b>No</b> box and go to next section.			*	S
				O
*If the answer to the above question is <b>Yes</b> , ask the worker: Are the gloves too large/small?				S
				O
Does the thickness of the gloves cause problems with gripping?				S
				O
Repetition				
Are identical or similar motions performed over and over again? (e.g., hammering)				S
				O
Ask the worker: Do you spend a large percentage of the day performing one action or task? (e.g., using the computer mouse)				S
				O




<b>Static Posture</b>		N	Y	Comments:
Ask the worker: Do tasks require your hand and arm to be maintained in a fixed or static posture? (e.g., using the computer mouse)			S O	
Ask the worker: Do you apply constant pressure on controls/objects with your hand? (e.g., edge of a desk)			S O	
Ask the worker: Do you hold parts, tools, or objects for long periods? (e.g., computer mouse)			S O	
<b>Contact Stress</b>				
Ask the worker: Do <b>any</b> objects, tools or parts of the workstation put pressure on <b>any</b> parts of your hand or arm, such as the backs or sides of fingers, palm or base of the hand, forearm, elbow? (e.g., hand tools that dig into the palm of the hand, metal edges of consoles or workstation digging into elbow)			S O	
<b>Vibration</b>				
Ask the worker: Is vibration transmitted to your hand through a tool or piece of equipment? (e.g., forklift controls)			S O	





Please indicate whether the following direct risk factors were identified at the <b>ELBOW</b> .		
<b>Direct Risk Factors</b>	Force	<input type="checkbox"/> Yes <input type="checkbox"/> No
	Repetition	<input type="checkbox"/> Yes <input type="checkbox"/> No
	Static Posture	<input type="checkbox"/> Yes <input type="checkbox"/> No
	Contact Stress	<input type="checkbox"/> Yes <input type="checkbox"/> No
	Vibration	<input type="checkbox"/> Yes <input type="checkbox"/> No
In the <b>Injury Statistics</b> investigation, were there injury reports for the Elbow or Forearm? (see Worksheet 1 in the Implementation Guide)		<input type="checkbox"/> Yes <input type="checkbox"/> No
In the <b>Discomfort Survey</b> investigation, were there reports of discomfort for the Elbow or Forearm? (see Worksheet 2 in the Implementation Guide)		<input type="checkbox"/> Yes <input type="checkbox"/> No



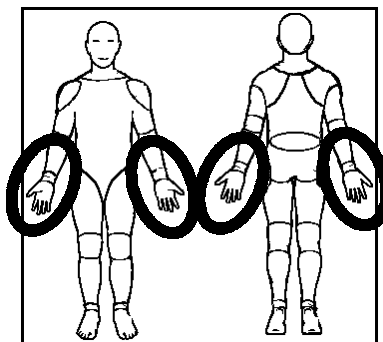
*Body parts within the circled area will be classified as ELBOW issues.*

## WRIST/HAND

Force		N	Y	Comments:
Is forceful physical handling performed? Such as:			S	
Lifting			O	
Lowering			S	
			O	
Pushing			S	
			O	
Pulling			S	
			O	
Carrying			S	
			O	
Turning materials			S	
			O	
Are objects handled in a power grip? (e.g., broom or shovel)			S	
			O	
Are objects handled in a pinch grip? (e.g., saws)			S	
			O	
Are objects handled in a hook grip? (e.g., oil cans, tire rims)			S	
			O	
Ask the worker: Do you wear gloves while performing your job? If the answer is <b>No</b> , check the <b>No</b> box and go to next section.			*	S
				O
*If the answer to the above question is <b>Yes</b> , ask the worker: Are the gloves too large/small?				S
				O
Does the thickness of the gloves cause problems with gripping?				S
				O
Repetition				
Are identical or similar motions performed over and over again? (e.g., typing)				S
				O
Ask the worker: Do you spend a large percentage of the day performing one action or task? (e.g., typing or using the computer mouse)				S
				O

Static Posture		N	Y	Comments:
Ask the worker: Do tasks require any part of your arm or hand to be maintained in a fixed or static posture? (e.g., arranging items on shelves)			S O	
Ask the worker: Do you apply constant pressure on controls/objects with your hand? (e.g., forklift controls)			S O	
Ask the worker: Do you hold parts, tools, or objects for long periods? (e.g., computer mouse)			S O	
Contact Stress				
Ask the worker: Do <b>any</b> objects, tools or parts of the workstation put pressure on <b>any</b> parts of your hand or arm, such as the backs or sides of fingers, palm or base of the hand, forearm? (e.g., hand tools that dig into the palm of the hand)			S O	
Ask the worker: Do you use your hand like a hammer for striking? (e.g., moving items on shelves)			S O	
Awkward Posture				
Flexion			S O	
Extension			S O	
Ulnar Deviation			S O	
Radial Deviation			S O	
Vibration				
Ask the worker: Is vibration transmitted to your hand through a tool or piece of equipment? (e.g., pneumatic drill)			S O	





Please indicate whether the following direct risk factors were identified at the <b>WRIST/HAND</b> .		
<b>Direct Risk Factors</b>	Force	<input type="checkbox"/> Yes <input type="checkbox"/> No
	Repetition	<input type="checkbox"/> Yes <input type="checkbox"/> No
	Static Posture	<input type="checkbox"/> Yes <input type="checkbox"/> No
	Contact Stress	<input type="checkbox"/> Yes <input type="checkbox"/> No
	Awkward Posture	<input type="checkbox"/> Yes <input type="checkbox"/> No
	Vibration	<input type="checkbox"/> Yes <input type="checkbox"/> No
In the <b>Injury Statistics</b> investigation, were there injury reports for the Wrist or Hand/Finger or Forearm? (see Worksheet 1 in the Implementation Guide)		<input type="checkbox"/> Yes <input type="checkbox"/> No
In the <b>Discomfort Survey</b> investigation, were there reports of discomfort for the Wrist or Hand/Finger or Forearm? (see Worksheet 2 in the Implementation Guide)		<input type="checkbox"/> Yes <input type="checkbox"/> No



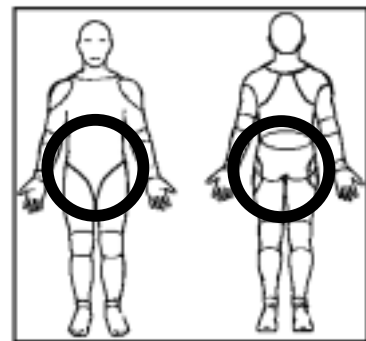
*Body parts within the circled area will be classified as WRIST issues.*

## LOW BACK OR HIP/THIGH

<b>Force</b>	N	Y	Comments:
Is forceful physical handling performed? Such as:			S
Lifting			O
Lowering			S
			O
Pushing			S
			O
Pulling			S
			O
Carrying			S
			O
<b>Repetition</b>			
Are identical or similar motions performed over and over again?			S
			O
Ask the worker: Do you spend a large percentage of the day performing one action or task? (e.g., bending to stock shelves)			S
			O
<b>Static Posture</b>			
Ask the worker: Do tasks require your trunk and upper body to be maintained in a fixed or static posture? (e.g., bending to arrange items on low shelving)			S
			O
Are workers required to sit or stand in a stationary position for long periods of time during the shift? (e.g., sitting at a computer)			S
			O
<b>Contact Stress</b>			
Ask the worker: Do <b>any</b> objects, tools or parts of the workstation put pressure on <b>any</b> parts of your hip/thigh? (e.g., shelving that dig into the hip or thigh)			S
			O


Awkward Posture		N	Y	Comments:
Flexion			S O	
Extension			S O	
Lateral Bending			S O	
Twisting			S O	
<b>Vibration</b>				
Ask the worker: Is your whole body exposed to vibration for significant portions of the work shift? (e.g., operating forklift)			S O	

Please indicate whether the following direct risk factors were identified at the <b>LOW BACK</b> or <b>HIP/THIGH</b> .		
<b>Direct Risk Factors</b>	Force	<input type="checkbox"/> Yes <input type="checkbox"/> No
	Repetition	<input type="checkbox"/> Yes <input type="checkbox"/> No
	Static Posture	<input type="checkbox"/> Yes <input type="checkbox"/> No
	Contact Stress	<input type="checkbox"/> Yes <input type="checkbox"/> No
	Awkward Posture	<input type="checkbox"/> Yes <input type="checkbox"/> No
	Vibration	<input type="checkbox"/> Yes <input type="checkbox"/> No
In the <b>Injury Statistics</b> investigation, were there injury reports for the Low Back or Hip/Thigh? (see Worksheet 1 in the Implementation Guide)		<input type="checkbox"/> Yes <input type="checkbox"/> No
In the <b>Discomfort Survey</b> investigation, were there reports of discomfort for the Low Back or Hip/Thigh? (see Worksheet 2 in the Implementation Guide)		<input type="checkbox"/> Yes <input type="checkbox"/> No

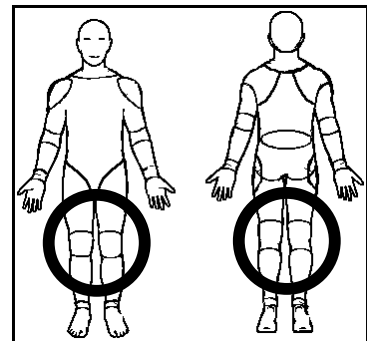


*Body parts within the circled area will be classified as LOW BACK issues.*

# KNEE



Repetition		N	Y	Comments:
Are identical or similar motions performed over and over again? (e.g., climbing stairs, crouching)			S O	
Static Posture				
Ask the worker: Do tasks require you to maintain your knee(s) in a fixed or static posture? (e.g kneeling while doing inventory)			S O	
Are workers required to sit or stand in a stationary position for long periods of time during the shift? (e.g., sitting at a computer)			S O	
Do workers kneel (with one or both knees)? (e.g., while doing inventory of lower shelves)			S O	
Contact Stress				
Ask the worker: Do <b>any</b> objects or parts of the workstation put pressure on your knee(s)? (e.g., kneeling on a hard surface)			S O	
Awkward Posture				
Extreme Flexion			S O	

Please indicate whether the following direct risk factors were identified at the <b>KNEE</b> .		
<b>Direct Risk Factors</b>	Repetition	<input type="checkbox"/> Yes <input type="checkbox"/> No
	Static Posture	<input type="checkbox"/> Yes <input type="checkbox"/> No
	Contact Stress	<input type="checkbox"/> Yes <input type="checkbox"/> No
	Awkward Posture	<input type="checkbox"/> Yes <input type="checkbox"/> No
In the <b>Injury Statistics</b> investigation, were there injury reports for the Knee or Hip/Thigh? (see Worksheet 1 in the Implementation Guide)		<input type="checkbox"/> Yes <input type="checkbox"/> No
In the <b>Discomfort Survey</b> investigation, were there reports of discomfort for the Knee or Hip/Thigh? (see Worksheet 2 in the Implementation Guide)		<input type="checkbox"/> Yes <input type="checkbox"/> No

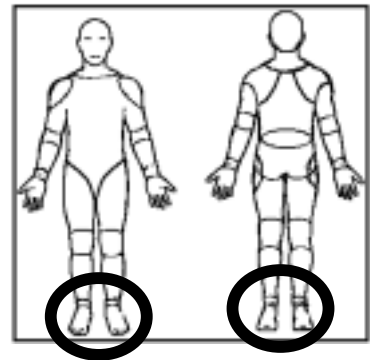


Body parts within the circled area will be classified as KNEE issues.

## ANKLE/FOOT

Repetition		N	Y	Comments:
Are identical or similar motions performed over and over again? (e.g., walking on uneven surfaces)			S O	
Static Posture				
Are workers required to stand in a stationary position for long periods of time during the shift? (e.g., standing while doing inventory)			S O	
Awkward Posture				
Flexion			S O	
Extension			S O	
Vibration				
Ask the worker: Is your whole body exposed to vibration for significant portions of the work shift? (e.g., operating forklift)			S O	

Please indicate whether the following direct risk factors were identified at the <b>ANKLE/FOOT</b> .		
<b>Direct Risk Factors</b>	Repetition	<input type="checkbox"/> Yes <input type="checkbox"/> No
	Static Posture	<input type="checkbox"/> Yes <input type="checkbox"/> No
	Awkward Posture	<input type="checkbox"/> Yes <input type="checkbox"/> No
	Vibration	<input type="checkbox"/> Yes <input type="checkbox"/> No
In the <b>Injury Statistics</b> investigation, were there injury reports for the Ankle or Foot? (see Worksheet 1 in the Implementation Guide)		<input type="checkbox"/> Yes <input type="checkbox"/> No
In the <b>Discomfort Survey</b> investigation, were there reports of discomfort for the Ankle or Foot? (see Worksheet 2 in the Implementation Guide)		<input type="checkbox"/> Yes <input type="checkbox"/> No



*Body parts within the circled area will be classified as ANKLE/FOOT issues.*

## CHARACTERISTICS OF OBJECTS BEING HANDLED

	N	Y	Comments:
Are there problems handling a load due to its size or shape? (e.g., motors, long pipes)			S O
Are there problems handling a load due to its fragile, unbalanced, or non-rigid conditions? (e.g., oil, chains)			S O
Ask the worker: Do you experience situations where mechanical aids or equipment are not readily available to assist with manipulating an object? (e.g., hoists)			S O
Are handles for tools and equipment inappropriate in terms of size or shape? (e.g., hand tools)			S O
Ask the worker: Do any objects that you work with (other than tools or equipment) have handles? If the answer is <b>No</b> , check the <b>No</b> box and go to the next section.			S O
If the answer to the above question is <b>Yes</b> , ask the worker: Are the handles an inappropriate size or shape for the characteristics of the object?			S O

## ENVIRONMENTAL CONDITIONS

<b>Temperature</b>			
Ask the worker: Are your hands or arms exposed to cold from exhaust air, cold liquids or solids? (e.g., when items are stored outside)			S O
Ask the worker: Are you exposed directly to temperature extremes that may cause you to use more force or cause you to fatigue quicker than normal? (e.g., hot or cold, either by equipment or natural environment)			S O
<b>Lighting</b>			
Ask the worker: Do you assume awkward postures to overcome problems associated with glare, inadequate lighting, or poor visibility? (e.g., between shelving)			S O

## ENVIRONMENTAL CONDITIONS [CONTINUED]

Noise	N	Y	Comments:
Have there been complaints on the level of noise in the work area?		S O	
Ask the worker: Are there any distracting or annoying noises at the workstation? (e.g., forklifts)		S O	

## WORK ORGANISATION

	N	Y	Comments:
Is the work externally-paced or controlled by a machine or the process? (e.g., scheduled pick ups)		S O	
Do peak workloads or sudden increases in pace occur with the tasks? (e.g., inventory time)		S O	
Ask the worker: Are there indications of excessive fatigue or pain, or symptoms of adverse health effects due to extended work days or overtime?		S O	
Ask the worker: Are there indications of excessive fatigue or adverse health effects due to shiftwork? (e.g., graveyards)		S O	
Ask the worker: Are rest periods or task variety insufficient to prevent the build-up of fatigue or the risk of adverse health effects?		S O	
Ask the worker: Are tasks in a job rotation program similar to one another, and therefore not providing a variation in movements?		S O	

# **Work Manual**

**Industrial  
Musculoskeletal  
Injury  
Reduction  
Program**



# **Warehouseperson**

This Work Manual contains information about the body parts found to be at risk of musculoskeletal injury (MSI) for the Warehouseperson (Injury Education), and how to reduce the risk of MSIs using various control measures (Injury Prevention). Each Work Manual is intended to help Occupational Health and Safety Committee members establish effective solutions to reduce MSIs, and as a resource for workers to understand the MSI risks that they may encounter on the job.

The Body Manual, referenced throughout the Work Manual, is a separate document that contains information on how to prevent common MSIs through exercise. Please note exercises described in the Body Manual should only be used after consulting a healthcare practitioner.

The General Risk Factor Solutions Manual, referenced throughout the Work Manual, is a separate document that contains general, preventative information on Environmental Conditions and Work Organisation issues.

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## Work Manual

# Warehouseperson

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### **Disclaimer**

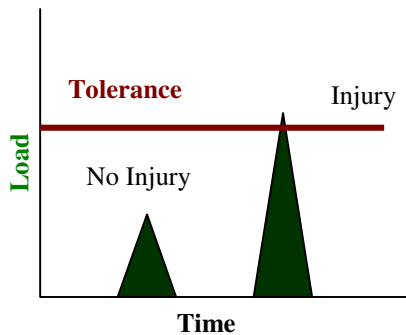
*The BC sawmill IMIRP documents were developed by Advanced Ergonomics Inc. (AEI) based on analyses conducted in a number of voluntary, participating sawmills in British Columbia and should be considered applicable only to the BC sawmill industry. Modification to these documents may reduce their usefulness and/or lead to hazardous situations. Individuals or committees wishing to make Physical Demands Analyses (PDAs) site-specific, or wishing to implement options from the Work Manuals, are advised to first complete the two-day OHSC and Supervisors Ergonomics Training Session. Modifications to a PDA must be within the scope of competence of those individuals making the changes and must be reported to any rehabilitation professional using the PDA. Neither AEI nor the IMIRP Society accepts any responsibility for the use or misuse of these documents.*

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# Injury Education

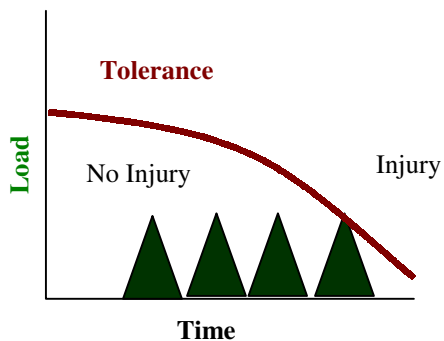
*Injuries occur when ...  
Loads exceed tissue tolerances*



## ***Excessive Force***

This type of injury occurs from a single event, where the loads or forces are so great they exceed tissue tolerances and cause an immediate injury. This type of injury is more common with trips and falls.

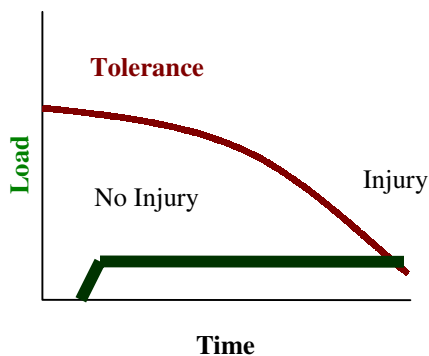
***Example – a worker going over on their ankle and spraining it.***



## ***Excessive Repetition***

This type of injury occurs from repeated loading weakening tissue to the point of failure. It progresses slowly to the point where a subfailure load can cause an injury. This type of injury is more common with repetitive tasks.

***Example – a worker pulling lumber off a chain developing a herniated disc.***



## ***Excessive Duration***

This type of injury occurs from constant loading weakening tissue to the point of failure. This type of injury is more common with tasks that require workers to adopt static or awkward postures for extended periods.

***Example – a Grader developing neck tension.***

## Body Parts at Risk

The previous page on injury education explains how injuries can occur. The Injury Education section of this Work Manual expands on these principles, relating them to the specific body parts at risk of being injured.

After all of the appropriate information is collected during the investigation of the Warehouseperson job (i.e., injury statistics, discomfort surveys, results from the Identification Checklist), the next steps are to:

1. Match the body parts of concern from your investigation to those described in this section of the Work Manual.
2. Note the direct risk factors associated with each body part of concern.
3. Read the information on the page and try to understand why a body part, in combination with each of the direct risk factors, is of concern.
4. Discover which indirect risk factors are associated with a particular body part problem and the headings under which they are found in the Injury Prevention section of the Work Manual.
5. Note the consequences of the direct risk factor relative to a body part.
6. Note where the potential solutions can be found within the Injury Prevention section of the Work Manual. In addition, for many of the body parts, a reference may be provided to refer to specific sections of the Body Manual.

At the end of the Body Parts at Risk Section, there is a summary page of all the body parts of concern for the Warehouseperson. In addition, a reference table, with a summary of the direct and indirect risk factors by body part, is provided.

In the last section on Injury Prevention, the Work Manual discusses specific solution options for each of the body parts at risk.

## Major Risk Identification

IMIRP ergonomists have assessed the Warehouseperson position and found that the shoulders and low back are the body parts of major concern while performing the duties. Focussing on solutions that target the areas of major concern will likely reduce the greatest risks associated with this job.

**Shoulder:** Major risks include awkward, repetitive, and forceful postures of the shoulders while lifting and lowering items on and off shelving and opening and closing bay doors.

The following solutions are targeted at reducing the risk of injury to the shoulder:

1. Step ladder with shelf (page 67)
2. Use hand tools to reduce reaching (page 68)
3. Research workstation layout with workers (page 68)
4. Manual handling heights (page 69)
5. Store heaviest items on pallets (page 70)
6. Mechanical lifting aids (page 73)
7. Carts and dollies (page 73)
8. Open-ended shelves (page 74)
9. Open space in warehouse (page 74)
10. Power positions (page 81)
11. Manual material handling (page 82)
12. Use two arms to move items (page 82)
13. Task variability (page 83)

**Back:** Major risks include awkward, repetitive, and forceful postures of the back while lifting and lowering items on and off shelving, combined with awkward static posture of the back while seated. The combination of the two activities can accumulate, leading to a greater risk of injury.

The following solutions are targeted at reducing the risk of injury to the low back:

1. Step ladder with shelf (page 67)
2. Research workstation layout with workers (page 68)
3. Manual handling heights (page 69)
4. Designated drop-off area (page 70)
5. Store heaviest items on pallets (page 70)
6. Mechanical lifting aids (page 73)
7. Carts and dollies (page 73)
8. Open-ended shelves (page 74)
9. Open space in warehouse (page 74)
10. Trunk support (page 81)
11. Power positions (page 81)
12. Manual material handling (page 82)
13. Task variability (page 83)

For additional stretching and strengthening exercises that would benefit a Warehouseperson, refer to the Shoulder and Back sections of the Body Manual.

**Office tasks** are included in the duties of a Warehouseperson. The body parts of risk associated with office work include the neck, shoulder, wrist/hand, and low back. Since a Warehouseperson has the opportunity to vary tasks throughout the day, the duration of exposure to these risk factors is significantly reduced. Solutions addressing office tasks start on page 75.

# NECK

**Direct Risk Factors:**  
Repetition  
Awkward Postures



**A Warehouseperson may look down and/or up in order to view items stored on shelving in the warehouse. This motion may be repetitive during inventory times, or when rotating stock.**



**A Warehouseperson may hold the head forward, to the side, or in a twisted posture in order to view the computer monitor, use the telephone, and perform deskwork.**

## BACKGROUND INFORMATION

- A number of smaller muscles around the neck produce the forces necessary to support and move the head. These muscles remain relatively relaxed when the head is balanced over the spine (neutral posture). The neutral posture occurs when the head is upright and the ears and shoulders are aligned.

## DIRECT RISK FACTORS

### *Repetition*

- When the head is repeatedly bent or twisted, the muscles of the neck are subjected to repeated stress with little time for recovery. If the repetitive stress is excessive, and recovery is not adequate, the tissues can fatigue to the point of injury.

## ***Awkward Postures***

- Neck muscles must support the weight of the head while in a bent or twisted position. The more the neck bends, the greater the load on the muscles and tendons.

## **INDIRECT RISK FACTORS**

### ***Workstation Design***

#### **Working Heights**

- The height of the shelving in the warehouse will affect the amount of forward/backward neck bending.
- The location of the computer monitor and method of holding the telephone will affect the amount of side bending or twisting of the neck.

#### **Lighting**

- Low lighting levels in the warehouse will increase the degree of forward or backward bending of the neck, due to the difficulty in viewing objects.

## **CONSEQUENCES**

- When the head is held in a bent posture, muscles and soft tissues of the neck may fatigue. Fatigue leads to a decrease in the ability to tolerate additional stress.
- Signs and symptoms include pain, tenderness, muscle spasm in the neck area, and headaches.

## **SUGGESTED SOLUTIONS**

- For specific solutions that may prevent injuries to the Neck, please see the column labelled “Neck” in the Summary of Solutions on pages 84 to 87.
- For exercises that can help to prevent *neck* injuries, see the *Neck section of the Body Manual*.

## SHOULDER

### Direct Risk Factors:

Force  
Repetition  
Awkward Postures



**A Warehouseperson may have to lift, lower, or manipulate heavy objects that are stored on high shelves in the warehouse. This activity is most frequent during inventory times and when rotating stock.**



**A Warehouseperson may work with his/her arms away from the body when performing paperwork or using a computer or telephone at a desk.**

## BACKGROUND INFORMATION

- The shoulder joint is designed for mobility. The joint is held together by muscles and soft tissues. The larger muscle groups around the shoulder are responsible for producing movement (e.g., deltoids). The deeper muscles stabilise the shoulder joint as well as produce movement. These deeper muscles and their tendons are referred to as the rotator cuff.

## DIRECT RISK FACTORS

### *Force*

- The rotator cuff stabilises the shoulder joint when objects are pushed/pulled/manipulated. The heavier the object, or the larger the force required, the greater the load on the rotator cuff.

- If the force placed on the rotator cuff exceeds the tissue tolerances, injury may occur.

### ***Repetition***

- When the arms are repeatedly raised, the rotator cuff is subjected to repeated stress with little time for recovery. If the repetitive stress is excessive, and recovery is not adequate, the tissues may fatigue to the point of injury.

### ***Awkward Postures***

- A rotator cuff tendon may rub up against bone (impingement) when the arms are lifted overhead. The friction between the tendon and the bone increases as the arm is lifted higher. In addition, the rotator cuff must stabilise the weight of the arms when working overhead, increasing the tension in the tendon. The combination of impingement and tension increases the stress on this tendon.

## **INDIRECT RISK FACTORS**

### ***Workstation Design***

#### **Working Heights**

- The height of the shelves in the warehouse can affect the loading on the shoulder muscles.
- The layout of the computer workstation can affect the posture and loading of the shoulder.

### ***Work Organisation***

#### **Task Variability**

- During inventory times, repetition and duration of shoulder movements is significantly increased.

## **CONSEQUENCES**

- When using the arms to push/pull/manipulate large objects, the rotator cuff may fatigue.
- Stressing a fatigued shoulder may lead to degeneration or injury in the rotator cuff muscles.
- Signs and symptoms include pain, tenderness, and decreased range of motion and strength in the shoulder joint.

## **SUGGESTED SOLUTIONS**

- For specific solutions that may prevent injuries to the Shoulder, please see the column labelled “Shoulder” in the Summary of Solutions on pages 84 to 87.
- For exercises that can help to prevent *shoulder* injuries, see the ***Shoulder section of the Body Manual***.

# LOW BACK

**Direct Risk Factors:**  
Force  
Repetition  
Awkward Postures

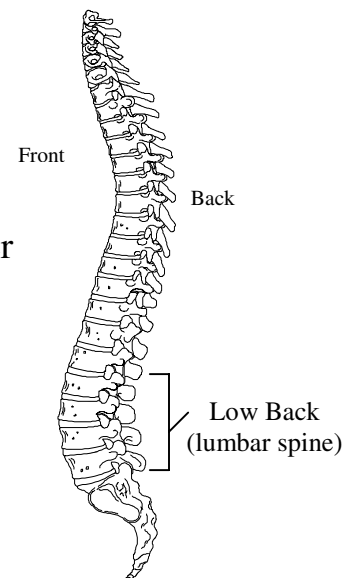


**A Warehouseperson may bend forward in order to stock or remove items that are stored on the lower shelves of the warehouse. This task may become repetitive during inventory time or when rotating stock.**

## BACKGROUND INFORMATION

- The spine is made up of 33 bones called vertebrae. Each of these vertebrae is specially designed to protect the spinal cord and provide support for the back. Between each of the vertebrae are discs. Discs have tough elastic walls that are filled with a watery gel-like substance. These discs are like jelly donuts; when they are pressed down on one side, the other side bulges and puts increased pressure on the wall of the disc. To maintain an even distribution of pressure across the discs, the spine has to be kept in the neutral posture.

*Neutral Spine*



## DIRECT RISK FACTORS

### *Force*

- Lifting increases the loading on the spine. Loads held in the hands are transmitted to the low back. The greater the weight, the greater the loading on the structures of the low back.

### *Repetition*

- Repeated forward bending and/or lifting can gradually fatigue the structures of the low back. If the repetitive stress is excessive, and recovery is not adequate, the disc walls may fatigue to the point of injury.

### ***Awkward Postures***

- Back muscles must support the weight of the upper body when leaning forward. Increased bending of the back increases the loading on the spine and increases the pressure on the walls of the discs.

## **INDIRECT RISK FACTORS**

### ***Workstation Design***

#### **Working Heights**

- Storing heavy items on low shelves in the warehouse can increase the loading on the low back.

### ***Characteristics of Objects Being Handled***

#### **Size and Shape**

- Many items in the warehouse are heavy and awkward to lift, increasing the risk of injury to the low back.

## **CONSEQUENCES**

- Repeatedly bending forward may lead to damage in the disc walls or fatigue in the tissues of the back.
- Signs and symptoms may include muscle spasm and sharp or radiating pain in the back and/or lower extremities.

## **SUGGESTED SOLUTIONS**

- For specific solutions that may prevent injuries to the Back, please see the column labelled “Back” in the Summary of Solutions on pages 84 to 87.
- For exercises that can help to prevent ***back*** injuries, see the ***Back section of the Body Manual***.

# LOW BACK

**Direct Risk Factors:**  
Awkward Postures  
Static Postures  
Vibration



**A Warehouseperson may continually sit on a vibrating surface while using the forklift to move items around the warehouse.**

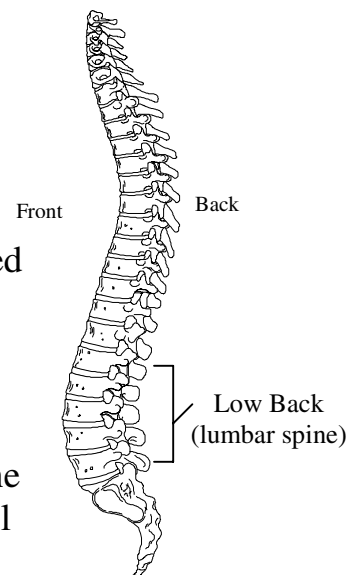


**A Warehouseperson may sit for long periods when doing office work.**

*Neutral Spine*

## BACKGROUND INFORMATION

- The spine is made up of 33 bones called vertebrae. Each of these vertebrae is specially designed to protect the spinal cord and provide support for the back. Between each of the vertebrae are discs. Discs have tough elastic walls that are filled with a watery gel-like substance. These discs are like jelly donuts; when they are pressed down on one side, the other side bulges and puts increased pressure on the wall of the disc. To maintain an even distribution of pressure across the discs, the spine has to be kept in the neutral posture. Sitting will cause the pelvis to rotate out of a neutral posture, as the lumbar spine will flatten.



## DIRECT RISK FACTORS

### *Awkward Postures*

#### *Static Postures*

- Sitting increases the loading on the walls of the discs. If the duration of sitting is excessive, and the recovery is not adequate (e.g., spine not returned to neutral posture), the tissues may deform to the point of injury.

#### *Vibration*

- Whole body vibration is usually transmitted through the seat into the low back. Exposure to whole body vibration introduces a unique mechanical stress to the structures of the spine that can significantly increase the loading on the low back. Prolonged sitting on a vibrating surface may contribute to the gradual weakening of the lumbar discs.

## INDIRECT RISK FACTORS

### *Work Organisation*

#### *Task Variability*

- A Warehouseperson has the ability to rotate between tasks throughout the day. This flexible work can reduce the static effects of sitting.

## CONSEQUENCES

- Continually sitting on a vibrating surface may lead to deformation in the disc walls and accelerated degeneration of the tissues.
- Signs and symptoms include muscle spasm and sharp or radiating pain in the back and/or lower extremities.

## SUGGESTED SOLUTIONS

- For specific solutions that may prevent injuries to the Back, please see the column labelled “Back” in the Summary of Solutions on pages 84 to 87.
- For exercises that can help to prevent *back* injuries, see the *Back section of the Body Manual*.

# KNEE

## Direct Risk Factors:

Awkward Postures

Static Postures

Contact Stress



**A Warehouseperson may squat and/or kneel in order to retrieve or store items on the lower shelves of the warehouse.**

## BACKGROUND INFORMATION

- At the knee joint, the kneecap (patella) is held in place over the thighbone (femur) by connective tissue. When the leg is straight, there is little or no contact between these two bones. However, as the knee bends, the kneecap can come into contact with the thighbone.

## DIRECT RISK FACTORS

### *Awkward Postures*

### *Static Postures*

- Bending the knee increases the contact stress between the kneecap and the thighbone. Contact stress increases significantly when the knee is bent over 90 degrees.

### *Contact Stress*

- Kneeling on a hard surface increases the contact stress between the kneecap and the thigh bone.

## INDIRECT RISK FACTORS

### *Workstation Design*

#### Floor Surfaces

- Workers typically kneel on hard floor surfaces like concrete, which increases contact stress on the knee.

## CONSEQUENCES

- Repeated squatting and kneeling could cause inflammation under the kneecap, which may cause pain and change the mechanics of kneecap tracking. Changes in kneecap tracking may lead to premature wear of the kneecap and/or the thighbone.
- Signs and symptoms include muscle wasting around the inner knee, creaking in the knee and chronic pain if left unchecked.

## SUGGESTED SOLUTIONS

- For specific solutions that may prevent injuries to the Knee, please see the column labelled “Knee” in the Summary of Solutions on pages 84 to 87.
- For exercises that could help to prevent *knee* injuries, see the *Knee section of the Body Manual*.

# Summary of Body Parts at Risk

## NECK

- A Warehouseperson may look down and/or up in order to view items stored on shelving in the warehouse. This motion may be repetitive during inventory times, or when rotating stock.
- A Warehouseperson may hold the head forward, to the side, or in a twisted posture in order to view the computer monitor, use the telephone, and perform deskwork.



## SHOULDER

- A Warehouseperson may have to lift, lower, or manipulate heavy objects that are stored on high shelves in the warehouse. This activity is most frequent during inventory times and when rotating stock.
- A Warehouseperson may work with his/her arms away from the body when performing paperwork or using a computer or telephone at a desk.



## LOW BACK

- A Warehouseperson may bend forward in order to stock or remove items that are stored on the lower shelves of the warehouse. This task may become repetitive during inventory time or when rotating stock.
- A Warehouseperson may continually sit on a vibrating surface while using the forklift to move items around the warehouse.
- A Warehouseperson may sit for long periods when doing office work.



## KNEE

- A Warehouseperson may squat and/or kneel in order to retrieve or store items on the lower shelves of the warehouse.



# Risk Factors by Body Part

Direct Risk Factors		Neck	Neck/ Shoulder	Shoulder	Elbow/ Wrist	Wrist	Wrist/ Hand	Low Back	Hip	Knee	Ankle/ Foot	Foot
Force				✓				✓				
Repetition		✓		✓				✓				
Awkward Postures		✓		✓				✓		✓		
Static Postures								✓		✓		
Contact Stress										✓		
Vibration – Whole body*								✓				
Vibration - Hand Transmitted*												
Indirect Risk Factors		Neck	Neck/ Shoulder	Shoulder	Elbow/ Wrist	Wrist	Wrist/ Hand	Low Back	Hip	Knee	Ankle/ Foot	Foot
Duration*	Duration	✓		✓				✓		✓		
Workstation Design	Working Reaches											
	Working Heights	✓		✓				✓				
	Seating											
	Floor Surfaces									✓		
Characteristics of Objects Being Handled	Size and Shape							✓				
	Load Condition and Weight Distribution											
	Container, Tool and Equipment Handles											
Environmental Conditions	Heat Exposure	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
	Cold Exposure	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
	Lighting	✓◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
	Noise	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
	Vibration**	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Work Organisation	Work-Recovery Cycles	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
	Task Variability	◆	◆	✓◆	◆	◆	◆	✓◆	◆	◆	◆	◆
	Work Rate	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆

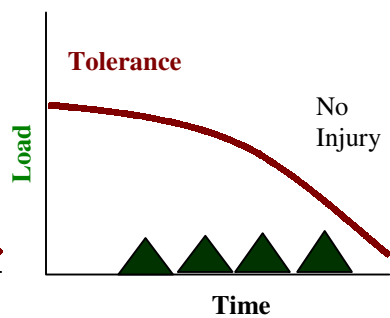
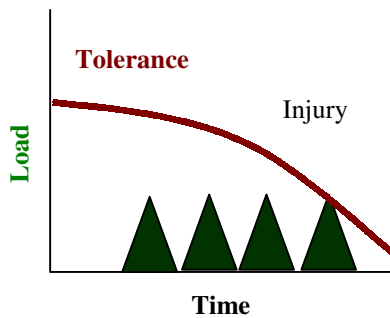
\* Extended exposure to any risk factor can increase the likelihood of injury. For solutions designed to decrease the duration of exposure to any risk factor please refer to the Work Organisation section of the General Risk Factor Solutions Manual

\*\* Vibration is categorised under both direct and indirect risk factors. Vibration can directly increase the likelihood of injury to the back and wrist as well as indirectly (environmental conditions) promote injuries in other parts of the body.

- = Indicates that the risk factor was assessed and was not found to be a contributor to the body part problem.
- ◆ = Indicates that the risk factor assessed is commonly found in sawmills, and may need to be addressed at your mill. See the appropriate section of the General Risk Factor Solutions Manual for more information.
- ✓ = Indicates that the risk factor was assessed as a contributor to the body part problem. Please see the Summary of Solutions Table on pages 84 to 87 for specific problem/solution information. Additional information on some risk factors can be found in the General Risk Factor Solutions Manual.

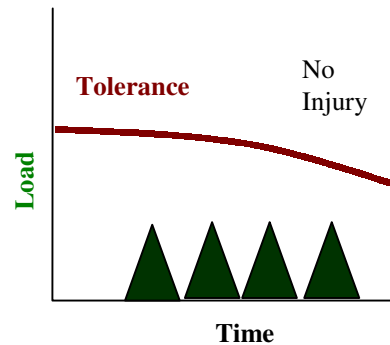
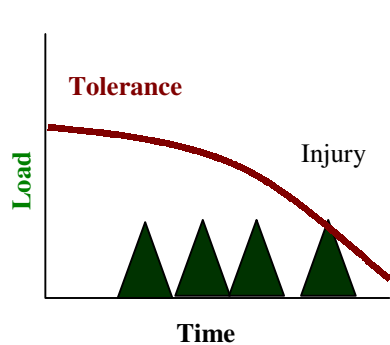
# Injury Prevention

*Injuries are prevented by ...  
Decreasing loads and increasing tissue tolerances*



Injuries may be avoided by decreasing the size of the loads on the tissue.

*Example – using a torque multiplier wrench to loosen bolts.*



Injuries may be avoided by increasing tissue tolerances, and allowing the body to endure more loading.

*Example – using maintenance exercises to strengthen tissues.*

## Suggested Solutions

The previous page explains how injuries may be prevented by decreasing the load on a tissue or by increasing the tissue tolerances. The Injury Prevention section of the Work Manual provides possible solutions that can be implemented to decrease the size of the loads on the tissues.

Each of the solutions described in the Work Manual has a risk control icon. The Risk Control Key provides guidelines on how to distinguish between different types of risk controls. Generally, engineering, administrative, and work practice controls are considered more effective than the use of personal protective equipment to decrease the risk of musculoskeletal injuries.

The focus of the Injury Prevention section is on solutions developed following the ergonomic investigation of the Warehouseperson job. The solutions are presented under the headings of Workstation Design, Characteristics of Objects Being Handled, Environmental Conditions, and Work Organisation.

The Summary of Solutions table provides a quick reference guide to solutions for specific body part problems.

Please note that the information provided in the Body Manual addresses the issue of injury prevention in terms of increasing tissue tolerances through exercise. This information is not provided in the Work Manual.

# Risk Control Key

Risk control measures (solutions) are commonly grouped into four categories:

E

## **ENGINEERING CONTROLS**

These include physical changes to workstations, equipment, materials, production facilities, or any other relevant aspect of the work environment, that reduce or prevent exposure to risk factors.

A

## **ADMINISTRATIVE CONTROLS**

These include any change in procedure that significantly limits daily exposure to risk factors, by control or manipulation of the work schedule or manner in which work is performed. Administrative controls include, but are not limited to, job rotation, rest breaks, alternative tasks, job enlargement, redesign of work methods, and adjustment of work pace or output. Some models of risk control include work practice controls within this category.

WP

## **WORK PRACTICE CONTROLS**

These include techniques used to perform the tasks of a job, such as reaching, gripping, using tools and equipment, or discarding objects, etc. Education and training are an integral part of work practice controls.

PPE

## **PERSONAL PROTECTIVE EQUIPMENT**

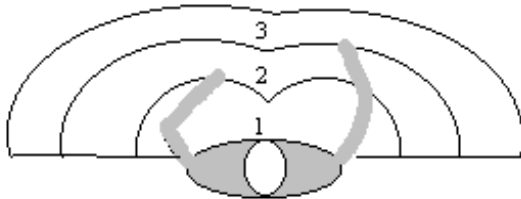
These are devices worn by a worker to reduce the risk of injury, including gloves, kneepads, hearing protection, and leather aprons.

**On the following pages, the icons next to the solution options indicate the type of risk control.**

# Workstation Design

## WORKING REACHES

A working reach that is too far for the worker will require stressful shoulder, elbow, wrist, and back postures. Reaching to the side, behind, or too far in front of the body can put stress on the smaller muscles. Ideally, working reaches should be within a normal reach envelope, as laid out below, with the controls and materials that are handled most often closest to the body. It is also ideal to have controls that perform similar or combined functions grouped together to decrease awkward postures that may otherwise occur.



- |  |
|--|
| 1 = Controls/items most frequently used  |
| 2 = Controls/items less frequently used  |
| 3 = Controls/items least frequently used |

Generally, the most frequently used items should be placed within a forearm's reach, with less frequently used items placed within a comfortable arm's reach, and infrequently used items placed within a fully extended arm's reach. For more specific recommendations on working reaches, please consult anthropometric tables or an ergonomist.

### *Step ladder with shelf*

E WP	In order to reduce awkward postures of the neck, shoulder and back, have a moveable stepladder with an attached shelf to use when stocking shelves or during inventory.
---------	---



***Use hand tools to reduce reaching***

E WP	In order to decrease awkward postures from reaching for objects, use a lightweight long pike pole or picaroon to reach items that are stored high in the warehouse (e.g., rubber tubing hung on pegs). Provide various lengths of pike poles for different situations.
---------	--

***Research workstation layout with workers***

A	A Warehouseperson can effectively identify potential challenges with awkward postures by being part of the warehouse layout team. Allowing the end user to be involved with the layout will increase the usability of the warehouse.
---	--

For office-related solutions relating to working reaches, see the **Guidelines for Office Work** section starting on page 75.

## WORKING HEIGHTS

A working height that is too high for the worker will require stressful shoulder and arm postures, while a height that is too low will require stressful bending of the neck and trunk. The height of a work surface should allow room to change position and move the legs and feet (WCB Draft Ergonomic Regulations, 1994).

The ideal workstation is height adjustable, allowing a large percentage of the population to adjust the work surface height to suit their dimensions

To determine the appropriate work height specific for the Warehouseperson, identify the body part of most concern. If the main concern is the:

**Neck** - minimise forward bending of the neck by increasing working height.

**Shoulders** - minimise elevation of the arms by lowering working height.

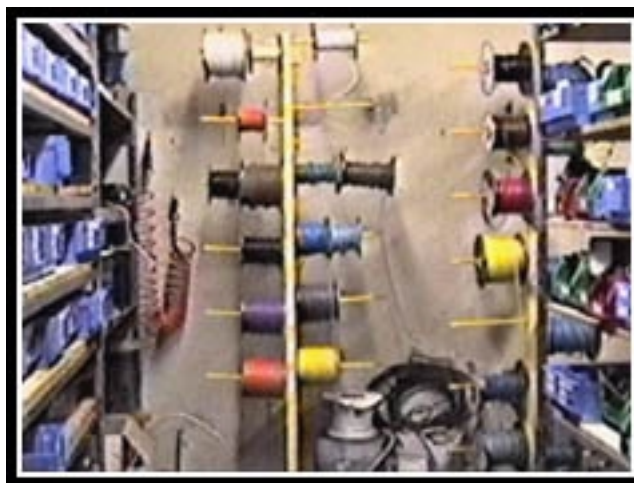
**Low Back** - minimise forward bending of the back by increasing working height.

For more specific guidelines on matching the working heights with the tasks performed please consult anthropometric tables or an ergonomist.

### *Manual handling heights*

A  
WP

In order to reduce awkward postures and forceful movements of the shoulder and back, store large, heavy, and frequently used items at approximately waist level. Providing storage at this height can help prevent back injuries.



### *Designated drop-off area*

- E In order to reduce awkward postures of the back, have a designated drop-off area with a counter at knuckle height. This layout will allow the Warehouseperson to retrieve items from knuckle height instead of from the floor, reducing back bending.

### *Store heaviest items on pallets*

- WP In order to reduce awkward and forceful postures of the shoulder and back, store the largest and heaviest items on pallets. This system will allow the items to be moved using a mechanical lifting aid.

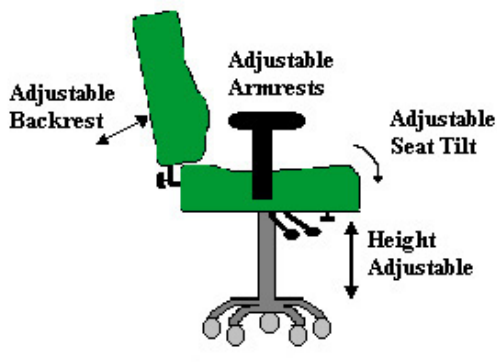


For office-related solutions relating to working heights, see the **Guidelines for Office Work** section starting on page 75.

## SEATING

### *Adjustable seating*

**E**  
**WP** To avoid awkward and static postures of the body, seating should have several adjustable features (see list below) to allow for continual postural adjustments. Workers should also be trained on how and why to use the adjustable features. Poor chairs can contribute to back stress, circulation problems, fatigue, and discomfort. A good chair should have the following:



- Adjustable height
- Adjustable backrest
- Adjustable backrest height
- Adjustable arm rests
- Adjustable seat tilt
- Waterfall front edge
- Five legs
- Swivel seat
- Durable/breathable fabric

### *Lumbar support*

**E** In order to reduce awkward postures in the low back while seated, adjustable lumbar support should be provided. Seats that wrap around the low back and allow the curve in the low back to be maintained are preferred. Padded lumbar cushions can also be added to existing seats.

### *Vary body posture*

**WP** In order to reduce awkward and static postures of the back, workers should get up from the seated posture throughout the day – at least once an hour is recommended. This posture change alleviates the load on the spine, allows the discs to equalise, and allows ligaments to regain their stiffness after being stretched out from sitting.

### *Vary chair position*

**WP** Seated postures can contribute to fatigue and discomfort of the body, due to the awkward and static nature of the posture. A trunk-to-leg angle of  $110^{\circ}$  to  $120^{\circ}$  is needed for minimum compression of the spine. Adjust chair features, such as seat pan tilt and back tilt, 2 to 3 times a day to allow muscles a chance to recover from static postures. It is also important to occasionally get up and stretch for a few minutes. This will help reduce the risk of injury by restoring tissue tolerances.

## FLOOR SURFACES

### *Padding for kneeling*

**WP** To reduce contact stress on the knees, use a protective pad when kneeling for long duration.



### *Kneepads*

**PPE** In order to minimise contact stress in the knee, workers can wear kneepads to provide cushioning in this area. External kneepads can be worn when required, while coveralls with kneepad inserts provide permanent protection.

## ADDITIONAL WORKSTATION DESIGN OPTIONS

### *Mechanical lifting aids*

**E**  
**WP** In order to reduce forceful movements and awkward postures of the shoulder and back use lifting aids when feasible and available.

- Forklifts can be used to move large items that are stored on pallets. Considerations: space to manoeuvre forklift around the warehouse, quality of air in the warehouse
- Pallet lifters can be used to move large items stored on pallets. This solution is preferable for warehouses with less space
- Mechanical or chain hoists can be used to move heavy, awkward items. Considerations: need overhead I-beams to support hoist, object needs to have an area to attach the hoist

### *Carts and dollies*

**E**  
**WP** In order to reduce forceful use of the arms and back, as well as awkward postures of the arms, use a cart or dolly to safely handle large or awkward loads. Large pneumatic wheels and an extended load tongue can make dollies more versatile for handling large objects and manoeuvring up and down stairs.

### *Labelling rows*

**A** Labelling the rows in the warehouse will improve organisation and help reduce the mental demands on the worker.

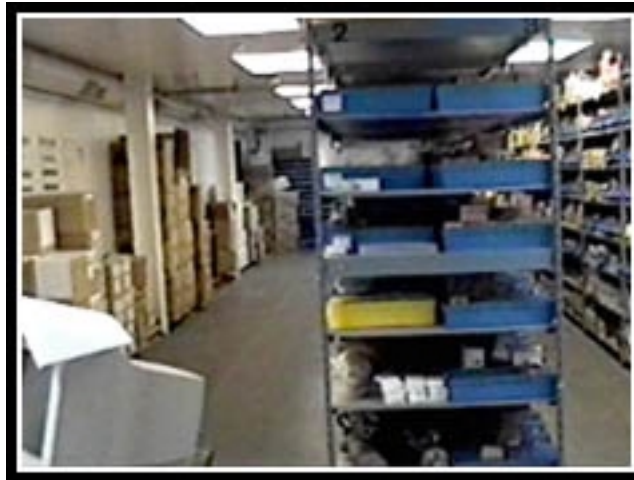


### ***Labelling items***

- A There is often considerable shadowing of boxes within the shelves. If reading codes is required, consider strategies to reduce visual stress. To reduce/minimise awkward postures of the neck make the box labels larger with better contrast and use additional spot lighting (e.g., flashlight).

### ***Open-ended shelves***

- E Rotating stock greatly increases physical demands of a Warehouseperson. Having shelves open on both sides, so that new stock can be added to one side and old stock removed from the other, will reduce the physical demands on the Warehouseperson.



### ***Open space in warehouse***

- E Organise the warehouse so that there is enough space to manoeuvre a forklift or other lifting device. This layout will help promote the use of mechanical aids when handling heavy items.

# Guidelines for Office Work

The following office work guidelines are recommended for workers who have office duties in addition to their tasks throughout the sawmill.

## WORKSTATION LAYOUT

### *Computer workstation layout*

**E**  
**WP** In order to reduce awkward postures of the neck, orient the workstation so that the computer can be accessed straight on (Figure 1). This positioning will reduce the need for the worker to twist while working at the computer (Figure 2), which causes awkward postures of the neck and upper body.



*Figure 1 – computer in front of worker*



*Figure 2 – computer off to the side*

### *Keyboard placement*

**E**  
**WP** Place the keyboard in the appropriate position based on use. If the lettered section is used most frequently, centre the middle of the letter keys in front of the worker, leaving the numeric pad out to the right-hand side. If the numeric pad is used more frequently, move the keyboard so that it is in line with the right shoulder. This positioning will reduce awkward postures of the neck/shoulder and low back.

### *Adjustable keyboard and mouse trays*

E  
WP

An adjustable keyboard and mouse tray may help to decrease awkward postures of shoulders by allowing the operator to adjust the keyboard and/or mouse to the most comfortable height and reach distance. Ideally the keyboard will be at a height where the wrists are straight when the fingers are on the middle row of keys. This is also a good position for “hunt-and-peck” typists.

If the work surface does not adjust up or down, raise or lower the chair to a height where the worker can maintain neutral wrist postures. Keeping the wrists neutral will reduce the risk of wrist discomfort or injury.



### *Armrests*

E  
WP

To reduce static postures of the shoulder when mousing, use the armrests to support the weight of the arm. It is important that armrests are adjustable, or at a height that allows the worker to mouse with a relaxed shoulder (e.g., using the armrest does not cause the shoulder to be elevated/shrugged, or depressed/lowered).

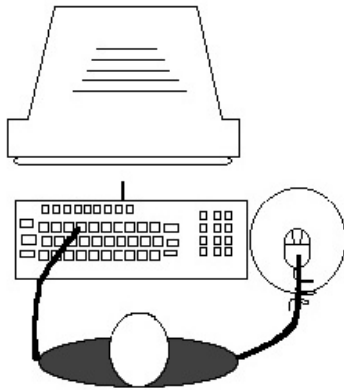
If armrests are not available or not at the appropriate height, an alternative is to move the keyboard and mouse back on the desk, and rest the forearms on the desk for support. However, with this workstation configuration, it is important to consider the following points:

- Proper monitor positioning (refer to page 78)
- Ensure enough space on the desk so that the whole forearm can be supported without placing contact stress on any soft tissues

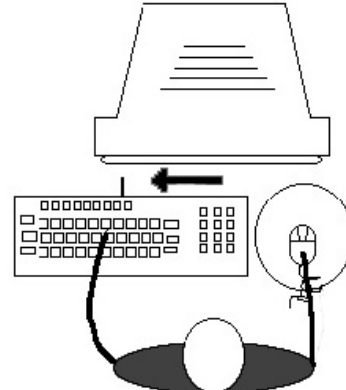
### ***Mouse placement***

E  
WP

In order to reduce awkward and/or static postures of the shoulder, position the mouse so that it is close to, and at the same height as, the keyboard. If the mouse is used more frequently than the keyboard, position the mouse so that it is on the desk directly in front of the arm that uses the mouse.



*Position for mainly keyboard use*



*Position for mainly mouse use*

### ***Desk workstation layout***

E

In order to reduce awkward postures of the upper body, organise items on the desk to correspond with the frequency of daily tasks. The most frequently used items (e.g., keyboard and mouse) should be placed within forearm's reach. Less frequently used items (e.g., phone) should be placed within a comfortable arm's reach, and infrequently used items (reference books, papers used once per month) can be placed farther away. See Working Reaches on page 67 for more information.

### ***Monitor positioning***

Proper positioning of the monitor can reduce several ergonomic risk factors:

E WP	To reduce eyestrain and awkward postures of the neck, position the monitor so that it is approximately an arm's length distance from the worker.
---------	--

**Note:** Larger monitors may need to be positioned farther away from the worker for proper viewing.

E WP	In order to reduce awkward postures of the neck, adjust the monitor height so that the top line of text, or the top of the screen is at eye level.
---------	--

**Note:** Bifocal wearers may want to position the screen lower so that it is more easily viewed through the bottom of the lenses.

Suggestions for lowering the monitor:

- Take it off the central processing unit and place it directly on the desk
- Raise the height of the chair

Suggestions for raising the monitor:

- Put a book or other flat object under the screen
- Place the monitor on an adjustable arm

WP	To minimise glare on the monitor due to overhead lights, tilt the monitor downward and locate it perpendicular to windows. Minimising glare helps to reduce eyestrain.
----	--

### ***Phone placement***

E	In order to reduce awkward postures of the upper body, place the phone on the non-dominant side. For example, a right-handed worker should place the phone on the left side of the workstation. This positioning allows the worker to write while on the phone without the phone cord getting in the way.
---	---

### ***Phone options***

E

In order to minimise awkward postures of the neck while talking on the phone, consider investing in a headset for the phone, or a phone that has speakerphone options.

Headsets will eliminate the need for awkward postures of the neck while talking on the phone. Before considering a purchase, evaluate several types of headsets and consider the amount of time it may be worn.

Speakerphones will also eliminate the need for awkward postures of the neck and wrist, but are not ideal for environments where background noises may prevent clear communication.

### ***Footrest***

E

WP

A footrest may prevent awkward postures of the back, and contact stress of the knee, if the chair and work surfaces are too high. Supporting the feet on the ground or on a footrest helps a worker to maintain proper postures while seated.

## **OTHER CONSIDERATIONS**

### ***Focus eyes***

WP

In order to minimise eyestrain from computer use, look up from the monitor every 20 minutes and focus on something in the distance. Focusing on a distant object causes the eye muscles to change position, relaxing the muscles that have been focussed on the computer for long periods.

### ***Colour of computer screen***

E

To minimise awkward neck postures due to glare, use a light background with darker lettering on computer screens to reduce glare. Monitor settings to avoid include:

- Using too many colours on your screen at once. This can be confusing.
- Extreme colour contrasts such as red and blue. These extreme contrasts may make your eyes fatigue more quickly.
- Colours with minimal contrast, such as white on yellow.
- The combination of yellow on green can create a vibrating effect on the screen.

# Additional Work Practices

## Stretches

**WP** In order to minimise awkward and static postures of the body related to warehouse work, use these stretches throughout the day to enhance tissue tolerance for those muscle groups. For additional stretches see the Body Manual.

### Chin Tuck

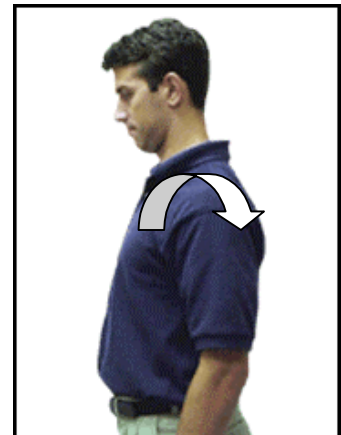
With your head upright, tuck chin in. You should feel a gentle stretch, in the back of the neck.

**Hold for 20 seconds and then relax. Repeat 3 times.**



### Shoulder Circles

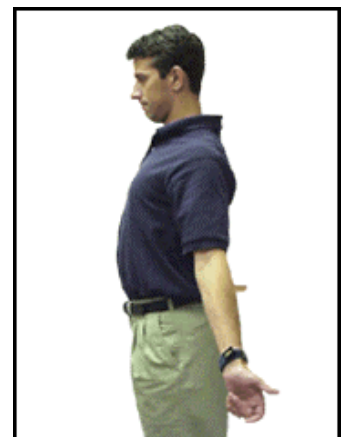
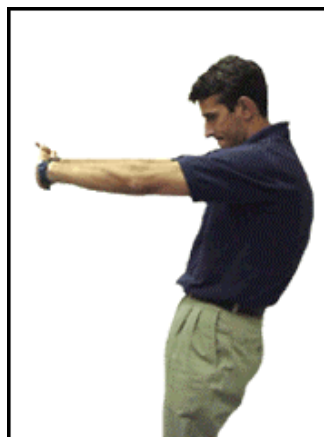
Rotate the shoulders in forward circles for 5 rotations. Repeat rotating the shoulders backward.



### Upper Back & Chest Stretch

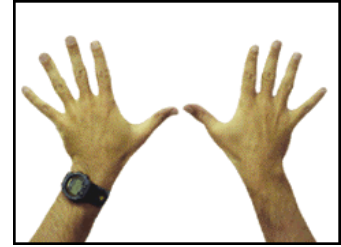
Place the hands together in front of the body and push them outwards. Bring the arms behind the body and squeeze the shoulder blades together while pressing the shoulders down and keeping the chin tucked in.

**Repeat 5 times.**



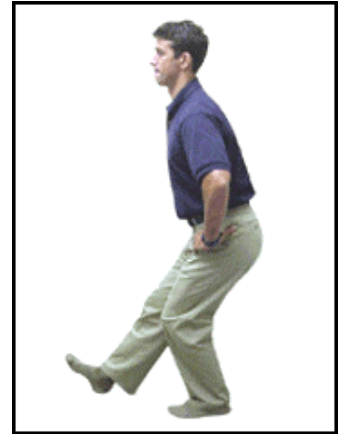
### **Hands and Fingers Stretch**

Clench both fists and hold for 3 seconds. Then open your hands and spread fingers apart. Hold for 3 seconds. Repeat.



### **Hamstring Stretch**

Place one foot in front of the other and squat down. Hold for 5 seconds. Repeat 3 times with each leg.



### ***View with eyes***

**WP** In order to reduce awkward postures of the neck, move the eyes and neck, not just the neck, to view the items on the shelving when taking inventory.

### ***Trunk support***

**WP** In order to reduce forces generated in the low back while maintaining awkward static trunk postures, use a free hand to support the upper body. Using one arm to brace yourself while in a forward flexed position (e.g., reaching for light items on low shelves) can minimise the load on the back.

### ***Power positions***

**WP** Use power positions when handling loads or exerting force on objects. Using larger and stronger muscles when doing heavy or forceful work reduces the risk of muscle strain. For lifting, a power position is adopted when a worker remembers to ‘lift with the legs, not the back’. This phrase is based on the fact that the muscles of the thighs are larger and more powerful than the muscles of the low back. Other examples of using power positions include using leverage to help move heavy objects and lumber when possible, and using the hips and legs to push debris on the floor when sweeping.

# Characteristics of Objects Being Handled

## *Manual material handling*

WP

The following work practices refer specifically to manual material handling tasks. These tasks include lifting, lowering, pushing, pulling, carrying, and holding objects.

- Use the entire body, especially the large muscle groups of the lower body, to perform a movement.
- To reduce loading on the soft tissues of the back, lift heavy objects with a neutral back posture while maintaining the 3-point curve (the natural “S” shaped curve of the back – see the Injury Education section for more information). Do not use pelvic tilt to position the trunk for lifting.
- Do not twist while holding or moving a load. This places the back in a weaker posture that can lead to injury.
- When possible, balance loads being carried on each side of the body. This minimises loading on the soft tissues of the back and hips.
- When lifting, carrying, or holding objects, keep them as close to the body as possible. The farther the load is away from the body, the more stress it puts on the back.
- When load is too heavy, ask for help.

## SIZE AND SHAPE

### *Use two arms to move items*

WP

In order to reduce loading on shoulders, use both arms to push, pull, lift, or lower freight. This coupling will significantly decrease the load on one shoulder when doing the same task.



## Environmental Conditions

Please refer to the General Risk Factor Solutions Manual for solutions regarding environmental conditions.

### LIGHTING

#### *Increase lighting between the shelves*

E To minimise awkward neck postures, lighting between shelves should be installed to allow workers to view items better. If shelves are not permanent, mount the fixtures on tracks perpendicular to the aisles and make the wires plug-in instead of permanent.

Mounting lights above the aisles instead of above the shelves will help to cast more light into the shelf areas.

#### *Type of lighting*

E To minimise awkward neck postures there should be adequate lighting between the shelves in order to view items better. The uses of high racks makes high-intensity discharge (HID) lamps preferable to fluorescent lighting, as HID lamps have better directional characteristics.

A large number of low-watt sources will give a more even distribution than a small number of high-watt sources (Work Design, 2000).

## Work Organisation

Please refer to the General Risk Factor Solutions Manual for solutions regarding work organisation risk factors.

#### *Task variability*

A  
WP A Warehouseperson has a variety of tasks to complete during the shift. Alternating between these tasks on a regular basis can reduce the duration of exposure to the risk factors of individual tasks.

## Summary of Solutions

Refer to the table below to help determine which solution alternatives will aid in addressing risk factors in the particular body parts of concern.

SOLUTIONS	Page	Injury Prevention Potential										
		Neck	Neck/ Shoulder	Shoulder	Elbow/Wrist	Wrist	Wrist/ Hand	Low Back	Hip	Knee	Ankle/Foot	Foot
Step ladder with shelf	67	A		A				A				
Use hand tools to reduce reaching	68			A								
Research workstation layout with workers	68	R A		F R A				F R A S V				
Manual handling heights	69			F A				F A				
Designated drop-off area	70							A				
Store heaviest items on pallets	70			F A				F A				
Adjustable seating	71							A S				
Lumbar support	71							A				
Vary body posture	71							A S				
Vary chair position	71							A S				
Padding for kneeling	72									C		
Kneepads	72									C		
Mechanical lifting aids	73			F A				F A				

### Direct Risk Factors

**F** = Force

**S** = Static Postures

**R** = Repetition

**C** = Contact Stress

**A** = Awkward Postures

**V** = Vibration

# Summary of Solutions

Refer to the table below to help determine which solution alternatives will aid in addressing risk factors in the particular body parts of concern.

		<b>Injury Prevention Potential</b>										
<b>SOLUTIONS</b>	<b>Page</b>	Neck	Neck/ Shoulder	Shoulder	Elbow/Wrist	Wrist	Wrist/ Hand	Low Back	Hip	Knee	Ankle/Foot	Foot
<b>Carts and dollies</b>	<b>73</b>			<b>F</b> <b>A</b>				<b>F</b>				
<b>Labelling rows</b>	<b>73</b>	<b>A</b>										
<b>Labelling items</b>	<b>74</b>	<b>A</b>										
<b>Open-ended shelves</b>	<b>74</b>			<b>F</b> <b>R</b> <b>A</b>				<b>F</b> <b>R</b> <b>A</b>				
<b>Open space in warehouse</b>	<b>74</b>			<b>F</b> <b>A</b>				<b>F</b> <b>A</b>				
<b>Computer workstation layout</b>	<b>75</b>	<b>A</b>		<b>A</b>								
<b>Keyboard placement</b>	<b>75</b>	<b>A</b>		<b>A</b>				<b>A</b>				
<b>Adjustable keyboard and mouse trays</b>	<b>76</b>			<b>A</b>								
<b>Armrests</b>	<b>76</b>			<b>A</b>								
<b>Mouse placement</b>	<b>77</b>			<b>A</b> <b>S</b>								
<b>Desk workstation layout</b>	<b>77</b>			<b>A</b>								
<b>Monitor positioning</b>	<b>78</b>	<b>A</b>										
<b>Phone placement</b>	<b>78</b>			<b>A</b>								

## Direct Risk Factors

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		<b>Injury Prevention Potential</b>										
<b>SOLUTIONS</b>	<b>Page</b>	Neck	Neck/ Shoulder	Shoulder	Elbow/Wrist	Wrist	Wrist/ Hand	Low Back	Hip	Knee	Ankle/Foot	Foot
Phone options	79	A										
Footrest	79							A		C		
Focus eyes	79	A S										
Colour of computer screen	79	A										
Stretches	80	directly reduces risk of injury to the body										
View with eyes	81	A										
Trunk support	81							F				
Power positions	81			F A				F A				
Manual material handling	82			F A				F A				
Use two arms to move items	82			F								
Increase lighting between the shelves	83	A										
Type of lighting	83	A										

### Direct Risk Factors

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<b>SOLUTIONS</b>	<b>Page</b>	Neck	Neck/ Shoulder	Shoulder	Elbow/Wrist	Wrist	Wrist/ Hand	Low Back	Hip	Knee	Ankle/ Foot	Foot
<b>Task variability</b>	<b>83</b> ♦	indirectly reduces risk of injury to the body										
<b>Heat Exposure</b>	♦	indirectly reduces risk of injury to the body										
<b>Cold Exposure</b>	♦	indirectly reduces risk of injury to the body										
<b>Lighting</b>	♦	indirectly reduces risk of injury to the body										
<b>Noise</b>	♦	indirectly reduces risk of injury to the body										
<b>Vibration</b>	♦	directly reduces risk of injury to the back and wrist										
<b>Rest breaks</b>	♦	indirectly reduces risk of injury to the body										
<b>Job Rotation</b>	♦	indirectly reduces risk of injury to the body										
<b>Work Pace</b>	♦	indirectly reduces risk of injury to the body										
<b>Scheduling</b>	♦	indirectly reduces risk of injury to the body										

### Direct Risk Factors

♦ = *See General Risk Factor Solutions Manual*





CHECK IF THIS APPLIES	ACTIVITY OF RISK	DIRECT RISK FACTOR(S)	POTENTIAL HAZARDS	SUGGESTED SOLUTIONS
	<p><b>Shoulder</b></p> <p>A Warehouseperson may have to lift, lower, or manipulate heavy objects that are stored on high shelves in the warehouse. This activity is most frequented during inventory times and when rotating stock.</p>	<p><b>Force</b></p> <p><b>Repetition</b></p> <p><b>Awkward Postures</b></p>	<ul style="list-style-type: none"> <li>• The rotator cuff stabilises the shoulder joint when objects are pushed/pulled/manipulated. The heavier the object, or the larger the force required, the greater the load on the rotator cuff.</li> <li>• If the force placed on the rotator cuff exceeds the tissue tolerances, injury may occur.</li> <li>• When the arms are repeatedly raised, the rotator cuff is subjected to repeated stress with little time for recovery. If the repetitive stress is excessive, and recovery is not adequate, the tissues may fatigue to the point of injury.</li> <li>• A rotator cuff tendon may rub up against bone (impingement) when the arms are lifted overhead. The friction between the tendon and the bone increases as the arm is lifted higher. In addition, the rotator cuff must stabilise the weight of the arms when working overhead, increasing the tension in the tendon. The combination of impingement and tension increases the stress on this tendon.</li> </ul>	<ul style="list-style-type: none"> <li>• In order to reduce or minimise awkward postures of the shoulder and back, have a moveable stepladder with an attached shelf to use when stocking shelves or during inventory.</li> <li>• In order to reduce loading on shoulders, use both arms to push, pull, lift, or lower freight. This coupling will significantly decrease the load on one shoulder when doing the same task.</li> <li>• In order to reduce forceful use of the trunk and arms, as well as awkward static arm postures, alternate arms when carrying loads in one hand. Alternating arms will distribute the load evenly between both sides.</li> <li>• For exercises that can help prevent <b>Shoulder</b> injuries, <i>see the Shoulder section of the Body Manual.</i></li> </ul>

CHECK IF THIS APPLIES	ACTIVITY OF RISK	DIRECT RISK FACTOR(S)	POTENTIAL HAZARDS	SUGGESTED SOLUTIONS
	<p><b>Low Back</b></p> <p>A Warehouseperson may bend forward in order to stock or remove items that are stored on the lower shelves of the warehouse. This task may become repetitive during inventory time or when rotating stock.</p>	<p><b>Force</b></p> <p><b>Repetition</b></p> <p><b>Awkward Postures</b></p>	<ul style="list-style-type: none"> <li>• Lifting increases the loading on the spine. Loads held in the hands are transmitted to the low back. The greater the weight, the greater the loading on the structures of the low back.</li> <li>• Repeated forward bending and/or lifting can gradually fatigue the structures of the low back. If the repetitive stress is excessive, and recovery is not adequate, the disc walls may fatigue to the point of injury.</li> <li>• Back muscles must support the weight of the upper body when leaning forward. Increased bending of the back increases the loading on the spine and increases the pressure on the walls of the discs.</li> </ul>	<ul style="list-style-type: none"> <li>• In order to reduce awkward postures and forceful movements of the shoulder and back, store large, heavy, and most frequently used items at approximately waist level. Providing storage at this height can help prevent back injuries.</li> <li>• In order to reduce or minimise awkward and forceful postures of the shoulder and back, store the largest, heaviest items on pallets. This will allow them to be moved using a mechanical lifting aid.</li> <li>• In order to reduce forces generated in the low back while maintaining awkward static trunk postures, use a free hand to support the upper body (See the solution, “Power positions” in the solutions section of the Work Manual).</li> <li>• In order to reduce forceful use of the trunk, try to distribute loads across both arms when possible. Carrying loads in this balanced posture will reduce compression and required muscle force in the low back.</li> <li>• For exercises that can help prevent <b>Low Back</b> injuries, <i>see the Back section of the Body Manual.</i></li> </ul>

CHECK IF THIS APPLIES	ACTIVITY OF RISK	DIRECT RISK FACTOR(S)	POTENTIAL HAZARDS	SUGGESTED SOLUTIONS
	<p><b>Low Back</b></p> <p>A Warehouseperson may continually sit on a vibrating surface while using the forklift to move items around the warehouse.</p> <p>A Warehouseperson may sit for long periods when doing office work.</p>	<p><b>Awkward Postures/ Static Postures</b></p> <p><b>Vibration</b></p>	<ul style="list-style-type: none"> <li>• Sitting increases the loading on the walls of the discs. If the duration of sitting is excessive, and the recovery is not adequate (e.g., spine not returned to neutral posture), the tissues may deform to the point of injury.</li> <li>• Whole body vibration is usually transmitted through the seat into the low back. Exposure to whole body vibration introduces a unique mechanical stress to the structures of the spine that can significantly increase the loading on the low back. Prolonged sitting on a vibrating surface may contribute to the gradual weakening of the lumbar discs.</li> </ul>	<ul style="list-style-type: none"> <li>• In order to reduce awkward and static postures of the back, workers should get up from the seated posture throughout the day. At least once an hour is recommended. This alleviates the load on the spine, allows the discs to equalise, and allows ligaments to regain their stiffness after being stretched out from sitting.</li> <li>• Seated postures can contribute to fatigue and discomfort of the body, due to the awkward and static nature of the posture. A trunk to leg angle of 110<sup>o</sup> to 120<sup>o</sup> is needed for minimum compression of the spine. Adjust chair features, such as seat pan tilt and back tilt, 2 to 3 times a day to allow muscles a chance to recover from static postures</li> <li>• For exercises that can help prevent <b>Low Back</b> injuries, <i>see the Back section of the Body Manual.</i></li> </ul>

CHECK IF THIS APPLIES	ACTIVITY OF RISK	DIRECT RISK FACTOR(S)	POTENTIAL HAZARDS	SUGGESTED SOLUTIONS
	<p><b>Knee</b></p> <p>A Warehouseperson may squat and/or kneel in order to retrieve or store items on the lower shelves of the warehouse.</p>	<p><b>Awkward Posture/ Static Posture</b></p> <p><b>Contact Stress</b></p>	<ul style="list-style-type: none"> <li>• Bending the knee increases the contact stress between the kneecap and the thighbone. Contact stress increases significantly when the knee is bent over 90 degrees.</li> <li>• Kneeling on a hard surface increases the contact stress between the kneecap and the thighbone.</li> </ul>	<ul style="list-style-type: none"> <li>• To reduce contact stress on the knees, use a kneeling pad for long duration.</li> <li>• External kneepads can be worn when required, while coveralls with kneepad inserts provide permanent protection.</li> <li>• For exercises that can help prevent <i>Knee</i> injuries, <i>see the Knee section of the Body Manual.</i></li> </ul>