



WORKSAFE VICTORIA

MANUAL ORDER PICKING

October 2005

A GUIDE TO MANUAL ORDER PICKING

WorkSafe's expectations for
safe work practice.



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The information presented in A Guide to Manual Order Picking is intended for general use only. It should not be viewed as a definitive guide to the law, and should be read in conjunction with the Occupational Health and Safety Act 2004.

Whilst every effort has been made to ensure the accuracy and completeness of the Guide, the advice contained herein may not apply in every circumstance. Accordingly, the Victorian WorkCover Authority cannot be held responsible, and extends no warranties as to:

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A GUIDE TO MANUAL ORDER PICKING

Over 280 claims from manual order picking injuries occur in Victoria each year, at a cost of \$11.5 million. And that's just the recorded claims. The true figures are much higher.

Given the size of the problem and the nature of the risk, WorkSafe Victoria is determined to help reduce accidents and provide clarity around the general principles of manual order picking and the work practices, workplace layout and equipment you need to comply with to meet WorkSafe requirements. These requirements apply not only to your employees, but also to any temporary staff and labour hire person you employ – whose safety you are equally responsible for.

In June 2003 an Order Picking Solutions Workshop was held, involving 140 people from the warehousing industry – including representatives from industry associations, employers, employees and employee organisations, suppliers, labour hire companies, safety inspectors, ergonomists and health and safety representatives.

This Guide shows WorkSafe's expectations and includes the results of that Solutions Workshop. It's designed for employers, employees and employee organisations, subcontractors, labour hire staff, warehouse managers, suppliers, customers, designers and installers, logistics and operations managers, health and safety representatives, employee representatives, industry consultants, rehabilitation providers, legal practitioners, auditors, WorkSafe inspectors and others.

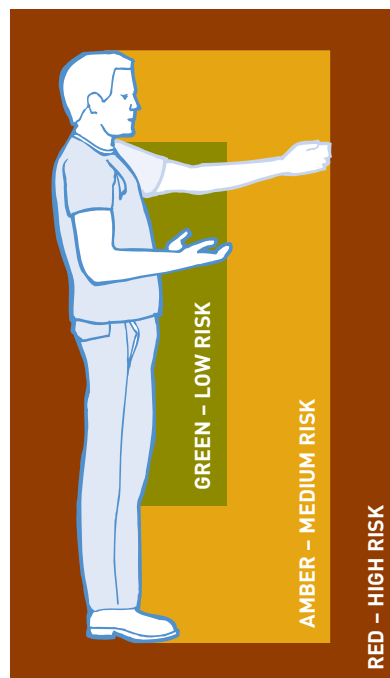
INTRODUCTION

THE BEST WORKING ZONE – BETWEEN THE SHOULDERS AND KNEES

The key to safe manual order picking is to design your workplace and provide the necessary equipment, to ensure your employees are able to lift items from locations between shoulder and knee height at all times.

This, together with ensuring the item is close to their body, is the optimal position when lifting. And can help significantly reduce the number of injuries.

In addition to the height at which the load is presented to the employee, other risk factors include picking frequency, the weight of the object, the shape of the object and over-reaching.



THE 7 KEY PRINCIPLES FOR MANUAL ORDER PICKING

- high volume picking and packing should be done predominantly by mechanical means
- physical changes to workplace design, layout and plant are more effective than administrative controls to make the workplace safer
- high frequency picking and replenishing should occur within the Best Working Zone
- heavy objects should be handled within the Best Working Zone
- no employee should be required to routinely pick, replenish, manually stretch-wrap or palletise objects above their head height
- where employees work at height, then the equipment used to raise them should provide close access to the objects at heights and help ensure protection against the risk of falls
- adequate access to objects should be provided when picking, replenishing, palletising and stretch-wrapping – so awkward postures are minimised.

PICK RATES AND OTHER WAREHOUSE MANAGEMENT PRACTICES

Warehouse management practices (such as setting work rates, shift lengths including overtime and use of engineered standards or bonus systems) must not promote excessive work rates, poor manual handling or discourage the taking of appropriate breaks.

RISK ASSESSMENT

The Comparative Charts on the following pages are a summary of identified hazards and an assessment of risks in regard to manual order picking work practice.

The green, amber and red format assists you to identify high risk activities and assess your workplace to implement safer work practices. The rationale is simple. To reduce injury rates and compensation claims, high risk situations must be addressed. Companies whose work practices fall into the red high risk area are liable for prosecution.

If high risk practices are used in your workplace, you should first see if you can implement the practices in the green column straight away. If that isn't practicable, you should immediately put in place the comparable practices in the amber column as an interim solution.

RED – HIGH RISK	AMBER – MEDIUM RISK	GREEN – LOW RISK
The practices in the red column should not be used in workplaces; an employer who allows those practices to be used is likely to be in breach of OHS legislation.	The practices in the amber column are less effective in reducing risk, as compared to the green column, and should be treated as interim solutions only.	The practices in the green column should be regarded as the target for all workplaces.

PRACTICABLE TAKES INTO CONSIDERATION THE FOLLOWING:

- the severity of the hazard or risk in question
- the state of knowledge about that hazard or risk and any ways of removing or mitigating it
- the availability and suitability of ways to remove or mitigate the hazard or risk
- the cost of removing the hazard or risk.

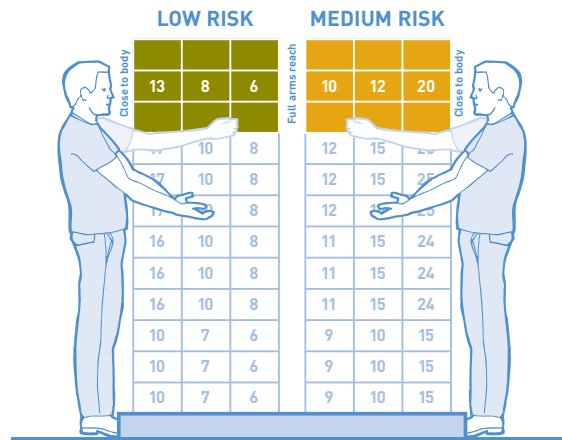
These factors qualify the extent to which an employer's obligation under provisions such as Section 21 of the Occupational Health and Safety Act must be met.

Many employers and other stakeholders have contributed to the state of knowledge captured in this Guide. This information has been prepared using the best information available to WorkSafe Victoria. Any information about legislative obligations or responsibilities included in this material is only applicable to the circumstances described in the material.

You should always check the legislation referred to in this material and make your own judgement about what action you may need to take to ensure you have complied with the law. Accordingly, the Victorian WorkCover Authority extends no warranties as to the suitability of the information for your specific circumstances.

At www.worksafe.vic.gov.au you'll find more information on the revised NIOSH lifting equation 1991 assumptions upon which the values in the diagrams have been based.

WORK ABOVE SHOULDER HEIGHT



Weight values shown (kilogram maximums) are based on 60 lifts over a 2 hour period.

Manual order picking above shoulder height is a high risk activity compared with working within the Best Working Zone between shoulder and knee.

1. Order picking above shoulder height commonly occurs where employees working from floor level must obtain objects stored on pallet racking beams installed at shoulder or head height.
2. Reaching above shoulder height also occurs when employees stand on temporary platforms or other items which are not high enough to enable access within the Best Working Zone.
3. Work above shoulder height may also occur when compiling an order on a pallet that is stacked too high.

SOLUTIONS INVOLVE

- lowering the goods
- raising the employee
- reducing object size and weight
- reducing picking frequency and duration
- moving goods forward to the front.

Applying the low-risk 'green' solutions will result in manual order picking above shoulder height being eliminated.

WORK ACTIVITY	HIGH RISK	MEDIUM RISK	LOW RISK
<p>Above head height –</p> <p>Picking or lifting objects from a pallet or bin</p> <p>Lifting to replenish a pallet or bin</p> <p>Stacking items onto a pallet.</p>	<p>Frequent manual lifting of small objects i.e. at a rate of 1 item every two minutes or less.</p> <p>One-off lifting objects from above head height, such as:</p> <ul style="list-style-type: none"> • Compact loads whose weight exceeds the values in green zone of the table above for lifting at shoulder height • Large, awkward loads irrespective of their weight. 	<p>Occasional manual lifting of small easily handled objects and none of their weights exceed the lowest value in the green zone for lifting at shoulder height.</p>	<p>Objects stored above head height are obtained by mechanical means.</p> <p>Methods are used to safely raise employees so that order picking of objects stored at height can be carried out within the Best Working Zone.</p> <p>Objects are relocated to an area where Best Working Zone access occurs when lifting is required.</p>

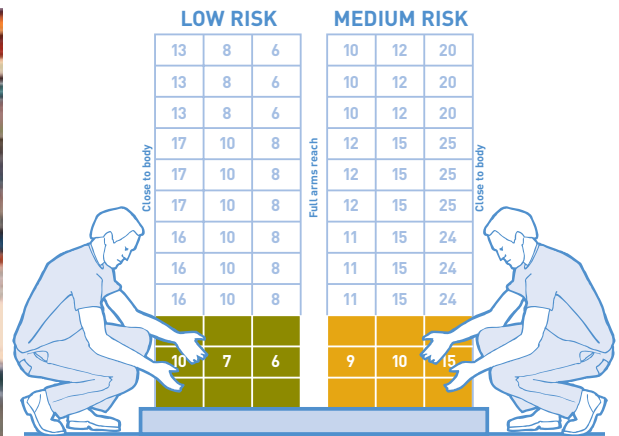
WORK ABOVE SHOULDER HEIGHT

WORK ACTIVITY	HIGH RISK	MEDIUM RISK	LOW RISK
<p>Between shoulder and head height –</p> <p>Picking or lifting objects from a pallet or bin</p> <p>Lifting to replenish a pallet or bin</p> <p>Stacking items onto a pallet.</p>	<p>Frequent manual lifting of any object whose weight exceeds the highest value in the amber zone for lifting at shoulder height.</p> <p>Occasional manual lifting of any object weighing 25kg or more.</p> <p>Occasional manual lifting of any large or awkward load whose weight exceeds the highest value in the amber zone for lifting at shoulder height.</p>	<p>Occasional manual lifting of small easily handled objects and none of their weights exceed the values in the amber zone for lifting at shoulder height.</p> <p>Occasional lifting of any large or awkward object whose weight does not exceed the values in the green zone for lifting at shoulder height.</p> <p>Objects being reached for above shoulder height and are able to be grasped close to the body, irrespective of picking style (layer or pyramid picking).</p> <p>Employee exposure to above shoulder height manual order picking is infrequent, due to methods such as:</p> <ul style="list-style-type: none"> • Job rotation • Set-up of the software that generates pick lists. <p>Two-person lifting of large, heavy or awkward objects at above shoulder height.</p> <p>Single-person dragging of large, heavy or awkward objects at above shoulder height where resistance (friction coefficient) is low.</p> <p>Dragging of custom lightweight or smaller pallets or bins where manual handling of pallets or bins above shoulder height cannot be avoided and high force is not required.</p> <p>Suppliers reduce weight of packages and pallets. For example, lightweight pallets, smaller-sized unit load devices.</p>	<p>Frequent lifting of objects and none of their weights exceed the values in the green zone for lifting at shoulder height.</p> <p>Objects for picking are slid close to the body prior to being lifted.</p> <p>Objects for replenishment are lowered close to the body and then slid into position.</p> <p>Employee exposure to above shoulder height manual order picking is eliminated by methods such as:</p> <ul style="list-style-type: none"> • Racking beams are raised considerably above shoulder height to eliminate the bay as a possible location for manually picking orders • Set-up of the software that generates pick lists. <p>There is no manual lifting or dragging of large, heavy or awkward objects above shoulder height.</p> <p>Objects are moved using mechanical aids such as an order picking forklift, crane, chain hoist, derrick, purpose-built mobile work platform.</p> <p>Automatic removal of pallets or bins, for example by a gravity roller system.</p> <p>Forklift or other purpose-built device removes pallets, bins, etc without manual handling.</p> <p>Above-shoulder rack locations are used as a storage area for "reserve stock" not "order picking objects".</p> <p>Procedures ensure that the pick-face is at the front of the pallet for objects being picked above shoulder height. For example: Pallet rotation where pyramid stacks are turned around by forklift.</p>

WORK ABOVE SHOULDER HEIGHT

WORK ACTIVITY	HIGH RISK	MEDIUM RISK	LOW RISK
<p>Above head height –</p> <p>Activities, other than lifting, of items from a pallet, shelf or bin</p> <p>Handling items on a pallet</p>	<p>Using high force, making it difficult for people to perform activities such as:</p> <ul style="list-style-type: none"> • Applying or removing packaging, stretch wrap, etc • Breaking glue to separate boxes or product • Dragging heavy or sticking objects • Opening boxes. 		<p>There is no manual pushing, pulling, holding, throwing, or handling of objects above head height.</p>
<p>Between shoulder and head height –</p> <p>Activities, other than lifting, of items from a pallet, shelf or bin where the person's hands are between shoulder and head height</p> <p>Handling items on a pallet</p>	<p>Using high force when performing such activities as:</p> <ul style="list-style-type: none"> • Applying or removing packaging, stretch wrap, etc • Breaking glue to separate boxes or product • Dragging heavy or sticking objects • Opening boxes • Using heavy tools. <p>Frequently reaching beyond arms length in order to pull or handle objects stored at shoulder height.</p> <p>Use of picking stick or similar tool for heavy or unstable goods above shoulder height.</p>	<p>Objects at rear of pallet are able to be easily reached and then dragged forward without impediment. Dragging stock forward on the pallet is made easier by methods such as:</p> <ul style="list-style-type: none"> • Pallets redesigned to reduce friction e.g. plastic pallets with solid tops • Packaging design • Slip-sheets • Using a well designed lightweight pick stick • Inspection program to remove splintered and snagging pallets. 	<p>There is no manual pushing, pulling, holding, throwing, or handling of objects between shoulder and head height.</p> <p>Mechanical methods reliably ensure that the pick-face is at the front of the pallet. Methods include:</p> <ul style="list-style-type: none"> • Load elevation & pallet tilting by way of inclined shelving to gravity feed product to front of shelf (carton live storage) (gravity feed forward) • Forklifts rotate pallets • Turntables rotate pallets. <p>Methods of moving objects forward are done without risk of objects falling.</p>

WORK BELOW THE KNEE



Weight values shown (kilogram maximums) are based on 60 lifts over a 2 hour period.

Manual order picking below knee level is a high risk activity compared with working within the Best Working Zone between shoulder and knee.

1. Shelving may require the employee to crawl or bend awkwardly to reach objects at the back.
2. In walk-in bays work rules such as 'don't stand on pallets' may require the employee to over-reach.

Pallet movers may have their tynes at ankle level, requiring products to be placed on pallets located below knee level.

SOLUTIONS INVOLVE

- raising the height of the work
- bringing the work forward to the employee
- reducing object size and weight
- Reducing picking frequency and duration, and improving access to the rear.

WORK ACTIVITY	HIGH RISK	MEDIUM RISK	LOW RISK
<p>Below knee height –</p> <p>Picking or lifting objects from a pallet, bin or shelf while the person's hands are below knee height</p> <p>Lifting to replenish a pallet, shelf or bin</p> <p>Stacking items onto a pallet</p>	<p>Frequent manual lifting of any object whose weight exceeds the highest value in the amber zone of the table above for lifting below knee height.</p> <p>Occasional manual lifting of any object weighing 25kg or more.</p> <p>Occasional manual lifting of any large or awkward load whose weight exceeds the highest value in the amber zone for lifting below knee height.</p>	<p>Occasional manual lifting of small easily handled objects and none of their weights exceed the values in the amber zone for lifting below knee height.</p> <p>Occasional lifting of any large or awkward object whose weight does not exceed the values in the green zone for lifting below knee height.</p> <p>Low volume (i.e. infrequent occurrence and short duration) picking of small objects from lower levels of gravity feed racking so that bending below knee level is minimal.</p>	<p>No storage of objects for picking below knee level.</p> <p>Frequent lifting of objects and none of their weights exceed the values in the green zone for lifting below knee height.</p> <p>Objects for picking are slid close to the body prior to being lifted.</p> <p>Objects for replenishment are lowered close to the body and then slid into position.</p>

WORK BELOW THE KNEE

WORK ACTIVITY	HIGH RISK	MEDIUM RISK	LOW RISK
<p>Below knee height –</p> <p>Picking or lifting objects from a pallet, bin or shelf while the person's hands are below knee height</p> <p>Lifting to replenish a pallet, shelf or bin</p> <p>Stacking items onto a pallet</p>	<p>Frequent manual lifting of small objects.</p> <p>One-off lifting objects from below ground level, such as:</p> <ul style="list-style-type: none"> • Compact loads whose weight exceeds the values in green zone of the table above for lifting below knee height • Large, awkward loads irrespective of their weight. 	<p>Manual picking leaves the base layer of a storage pallet which can then be used for the base of a subsequent order.</p> <p>Occasional manual lifting of small easily handled objects and none of their weights exceed the lowest value in the green zone for lifting below knee height.</p>	<p>Employee exposure to below knee height manual order picking is eliminated by methods such as:</p> <ul style="list-style-type: none"> • Racking beams are raised to eliminate the storage below knee height • Using height adjustable pallet lifter to raise the base of the pallet. <p>Carousel storage methods are used for smaller objects, replenished from within the Best Working Zone.</p> <p>Automatic pallet levellers are in use.</p> <p>Objects stored on spring loaded pallets at walk-in level so that lifting occurs at waist height.</p> <p>Walk-in pick slots.</p> <p>Packaging allows walk-in, eg perforation of disposable cardboard bins so the front can be removed, removing the need to bend into the bin.</p> <p>Objects stored below ground level are obtained by mechanical means.</p> <p>Objects are relocated to an area where Best Working Zone access occurs when lifting is required.</p>

WORK BELOW THE KNEE

WORK ACTIVITY	HIGH RISK	MEDIUM RISK	LOW RISK
<p>Below knee height –</p> <p>Activities, other than lifting, of items from a pallet, shelf or bin where the person's hands are below knee height</p> <p>Handling items on a pallet</p>	<p>Using high force when performing such activities as:</p> <ul style="list-style-type: none"> • Applying or removing packaging, stretch wrap, etc • Breaking glue to separate boxes or product • Dragging heavy or sticking objects • Opening boxes • Using heavy tools • Using picking stick for heavy or unstable objects. <p>Frequently reaching beyond arm's length in order to pull or handle objects stored below knee height.</p>	<p>Objects at rear of pallet are able to be easily reached and then dragged forward without impediment. Dragging stock forward on the pallet is made easier by methods such as:</p> <ul style="list-style-type: none"> • Pallets redesigned to reduce friction e.g. plastic pallets with solid tops • Packaging design • Slip-sheets, cardboard or other material placed between layers • Using a well designed lightweight pick stick • Inspection program to remove splintered and snagging pallets. <p>Pallets regularly rotated by forklift operator to allow access to objects at rear of pallet.</p> <p>Use well designed picking sticks or hooks to slide large, sticking or awkward objects to the front of pallet.</p> <p>Use picking sticks or hooks to frequently retrieve small, easily slid objects from the rear of the pallet to the front.</p>	<p>There is no manual pushing, pulling, holding, throwing, or handling of objects below knee height.</p> <p>Mechanical methods reliably ensure that the pick-face is at the front of the pallet. Methods include:</p> <ul style="list-style-type: none"> • Load elevation & pallet tilting by way of inclined shelving to gravity feed product to front of shelf (carton live storage) (gravity feed forward) • Forklifts place empty pallets beneath stock to raise height • Turntables rotate pallets. <p>Forklift moves pallets into aisle to allow picking of heavy object from rear of pallet.</p> <p>Turntables allow rotation of pallets to reach objects at rear of pallet.</p> <p>Walk-in pick slots with space around each side of the pallet or bin.</p> <p>Objects provided in smaller or lighter packages.</p>

RAISING THE EMPLOYEE TO A HEIGHT



Equipment such as order picking forklifts, work platforms, ladders and similar equipment are often considered as ways to ensure that work is done within the Best Working Zone (by raising the employee to the work point). Some methods are safer than others. The table below provides WorkSafe's view of common methods of lifting employees in warehouses.


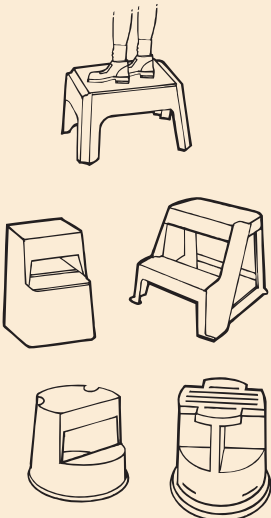

The Occupational Health and Safety (Falls Prevention) Regulations 2003 apply to employees where the person may fall more than two metres.

The principles in the Regulations however are relevant for order picking, irrespective of the height, and the state of knowledge about the hazard includes evidence that:

- the higher the person when they fall, in general the more severe the injury; however fatalities have occurred with falls from low heights, eg. one metre
- risk increases with frequency of exposure
- work platforms are better than ladders, and work from floor level is best of all.

The Regulations place solutions to prevent the risk of falls from height into a hierarchy from most to least preferred. The Regulations require the highest practicable control measure to be used, i.e. must work from floor level; if this is not practicable then use a work platform, etc.

The following Comparative Chart uses the same hierarchy to classify solutions used in warehouses and recognising the state of knowledge about falls from height, the working position, and manual handling of objects when moving to/from height.

WORK ACTIVITY	HIGH RISK	MEDIUM RISK	LOW RISK
Raising the employee to within the Best Working Zone.	<p>Step ladder</p>  <p>Using these devices where the load is carried down the steps by the employee, preventing three points of contact at all times.</p> <p>Use of a platform ladder with a safety rail less than 900mm above top deck.</p>	<p>Shelf step</p> 	<p>Manual order picking performed standing at floor level.</p> <p>Platform ladder with load lifter</p>  <p>No carrying of loads while moving up or down a ladder.</p>

RAISING THE EMPLOYEE TO A HEIGHT

WORK ACTIVITY

Raising the employee to within the Best Working Zone.

HIGH RISK

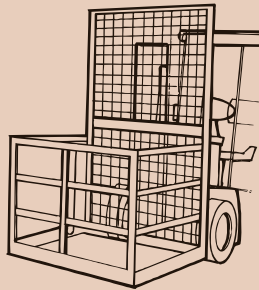
Straight ladder



Other methods

Using racking or objects such as a ladder (climbing up racking or pallets of objects).
Jumping from height.

Forklift with cage and harness

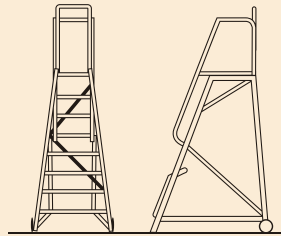


Order picking from a cage mounted on the fork-arms of a forklift is an unacceptable practice.

Clause 3.8 of Australian Standard AS 2359.2 provides guidance on the necessary safeguards and correct use of these work platforms.

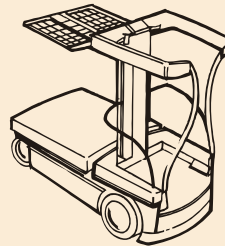
MEDIUM RISK

Platform ladder

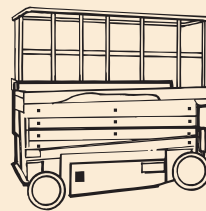


Placing objects onto shelves below the picking point and within the Best Working Zone. For example, retrieving shoes from a rack and placing the box on lower shelves as the employee returns to floor level. In this case, if a ladder is used for gaining access to height, objects are able to be grasped with one hand, allowing three points of contact with the ladder.

Elevating work assist vehicle



Scissor lift

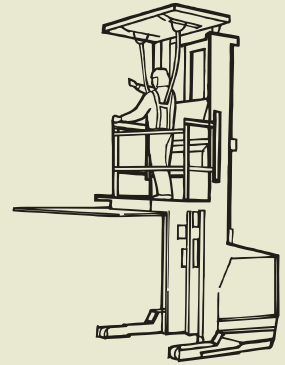


LOW RISK

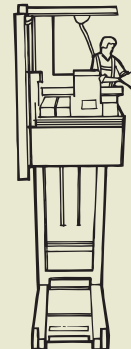
Powered pallet mover with fall protection

Operators of stock pickers, reach trucks, turret trucks, scissor lifts and elevating work assist vehicles must wear an appropriate safety harness at all times while working at height.

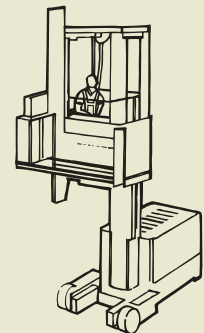
Stock picker



Narrow aisle turret truck



A fall rescue plan is in writing, employees are trained and rescue equipment available so people stranded or injured at height can be safely and promptly rescued (refer to Prevention of Falls Regulations).



ON THE WEB

ON THE WEB

At www.worksafe.vic.gov.au you'll also find information on relevant case studies, other warehouse issues, the NIOSH lifting equation 1991 assumptions and a bibliography of sources for this Guide.



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