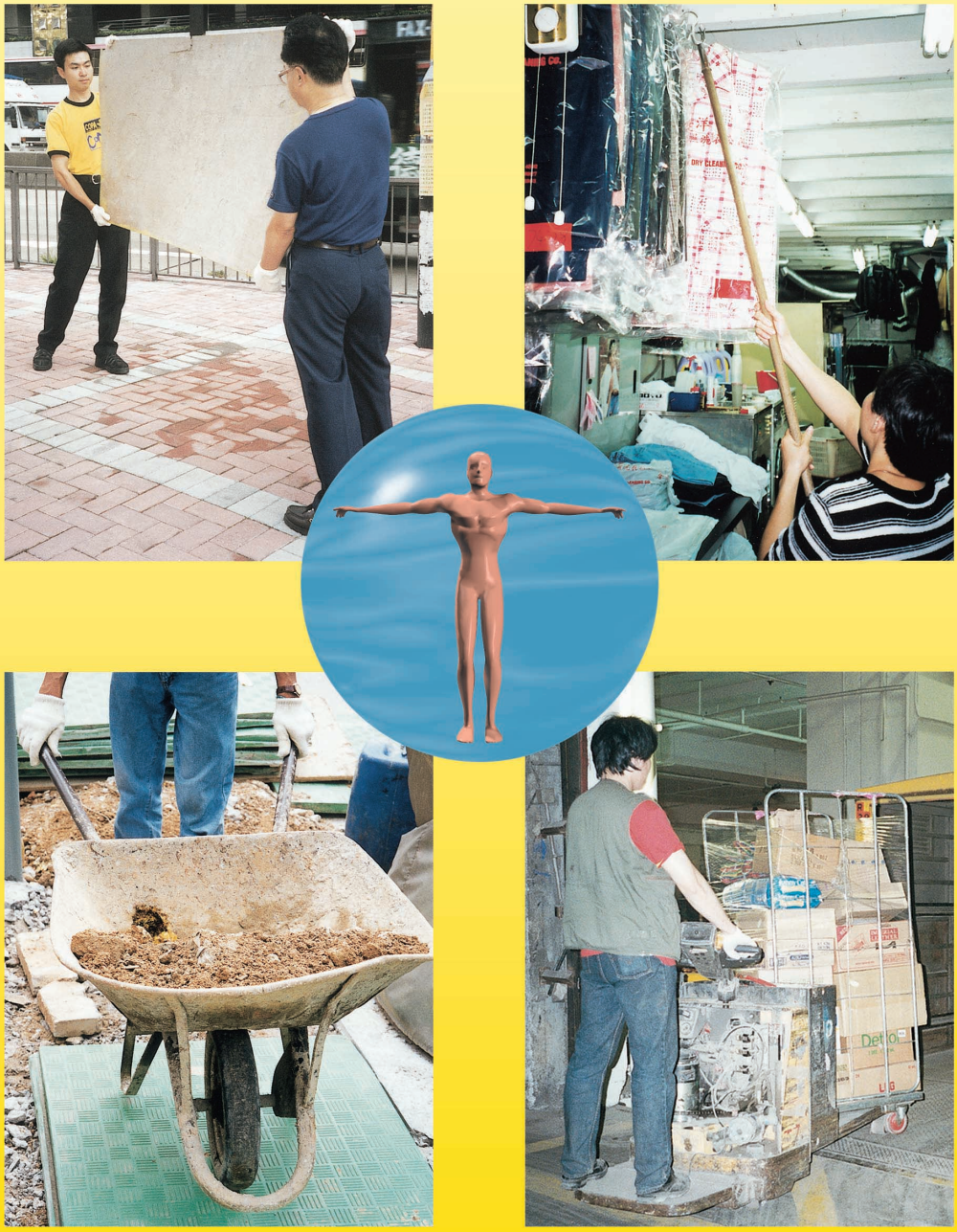
GUIDANCE NOTES ON MANUAL HANDLING OPERATIONS



Occupational Safety and Health Branch
Labour Department

Occupational Safety & Health Council

Guidance Notes on Manual Handling Operations

Contents

1. Introduction

This guidance uses concise text and illustrations to explain the various sections on manual handling operations in the Occupational Safety and Health Regulation. There are many ways to protect the safety and health of employees and to minimise the risk involved in manual handling operations. These include the provision of satisfactory working conditions, good work practices, the proper use of mechanical aids and protective devices, adequate safety and health information, and sufficient staff training, etc. In addition, employers should have a well-planned management system and have undertaken a proper risk assessment exercise to ensure that their manual handling operations are safe.

Apart from a brief introduction on the sections of manual handling operations under the Occupational Safety and Health Regulation, this guidance also covers the aspects of hazard identification, risk assessment and risk control in manual handling operations and provides checklists and guidelines for preliminary and further assessments. In order to allow fuller understanding of the control measures in manual handling operations, diagrams and real cases[1] have been selected from various trades and industries to show how to improve work practices and the workplace environment to reduce the potential risks in the manual handling operations. For some particular trades with specific and hazardous manual handling risks, readers are advised to refer to specialist guides for relevant information.

Readers should also refer to Part VII of the Occupational Safety and Health Regulation for the details of the legislation.

[1] The incorrect postures and poor work practices illustrated in some photos of this publication help the readers understand the problems on manual handling. It does not imply the related organisations, companies or persons are adopting such postures and practices in their work activities.

2. What Are Manual Handling Operations

A manual handling operation takes place every time a load is moved or supported by a person's hands or arms, or by some other forms of bodily effort. It includes lifting, lowering, pushing, pulling and carrying the load. The definition of a load encompasses goods, baggage, humans and other living beings as well as an object that comprises or includes any living beings.

Pushing

Pulling

Lifting / Lowering

Carrying

Holding

3. What the Law Says about Manual Handling Operations

3.1. The person responsible for a workplace is either the employer or the workplace's occupier. For the purposes of the Occupational Safety and Health Ordinance, the person responsible for a workplace is the employer of the employees who are employed to carry out work at the location. Alternatively, if the employer does not exercise any degree of control over the relevant part or aspect of the workplace, the occupier of the workplace is the responsible person. The responsibilities of this *responsible person* include:

(i) Make a preliminary assessment of the risks of manual handling operations

- if that particular operation is first undertaken at a workplace after the commencement of the law, the person responsible for the workplace must ensure that a preliminary risk assessment is made; or
- if that particular operation was being undertaken at a workplace immediately before the commencement of the law and that operation is also undertaken on or after that commencement, the person responsible for the workplace must, within 14 days after that commencement, ensure that a preliminary risk assessment is made;

(ii) Avoid the need for employees to undertake hazardous manual handling operations as far as reasonably practicable;

(iii) Make a **further assessment** of the manual handling risks if the hazardous operations cannot be avoided;

(iv) Reduce the risks as far as reasonably practicable, and arrange for preventive and protective measures;

(v) Review and modify the preliminary or the further assessment if the circumstances have significantly changed or those assessments have become invalid;

(vi) Provide relevant information to employees on the risks as well as preventive and protective measures involved in those hazardous manual handling operations;

(vii) Provide effective planning, organisation, control, monitoring and review of those preventive and protective measures; and

(viii) If 10 or more employees are normally employed at a workplace at any one time to undertake manual handling operations, he/she must

- keep a record of the assessment for a period of not less than 3 years, and;
- appoint sufficient competent persons to assist in carrying out the preventive and protective measures.

3.2. Employers must also:

(i) Assess the respective capabilities of the employees when allocating tasks involving hazardous manual handling operations; and

(ii) Provide adequate training to employees.

3.3 Employees at work must:

(i) Take care of others; and

(ii) Co-operate with the employer in reducing the risks caused by manual handling work by using the mechanical aids and/or protective equipment provided.

4. Hazards in Manual Handling Operations

4.1. How poor manual handling operations can result in injury?

Manual handling operations are very often involved in everyday work. Incorrect manual handling operations involving awkward posture, incorrect application of bodily force, prolonged or frequently repetitive motions, jerky motion or unexpected movements and pressure, etc. can lead to injuries such as sprains, strains, back pain, hernia and damage to the back, joints, ligaments, muscles and intervertebral discs, etc. In most cases, manual handling injuries are cumulative. A person performing routine tasks involving manual handling operations may not feel pain until several hours after an injury has occurred. Therefore, these injuries may not be realized until a certain period from the occurrence of the incident.

4.2. Risk factors in manual handling

The weight of an object although is the major risk factor, it is not the only factor. Several other important factors can also increase the risk of injury. These include the characteristics of the task and the load, the working environment and the individual capability, etc.

4.2.1. Characteristics of the task

(i) Posture

Awkward body movements or postures, e.g. holding loads at a distance from the body, twisting, stooping and reaching upward, excessive lifting or lowering distances, etc. are the common risk factors.

(ii) Load manipulation

Excessive pushing, pulling of loads or excessive carrying distance are some other important risk factors in manual handling.

(iii) Frequent or prolonged manual handling

Frequent or prolonged physical effort or speeding up in order to increase the rate of work, will increase the risk of injury. In the same way, insufficient rest or recovery periods may increase incidence of injury.

4.2.2. Loads

Weight, size and shape of the load or object are risk factors in manual handling. It is obvious that a heavy load is hard to pick up or move, but this applies equally to loads that are not so heavy but bulky. Easy-to-grasp handles should be provided for bulky loads. Unstable loads are another serious risk and thus great care should be taken in manipulating them. For example, when lifting or moving a semi-filled container containing liquid, the centre of gravity changes as the liquid moves. Another example is a box with empty space inside wherein the contents are likely to move during transportation thereby increasing the difficulty in handling or manipulation. If the object being carried is a human being or an animal, their bodily movements impose great difficulty on the handler. Objects with sharp parts, or being hot or cold, can also cause potential risks for their handlers.

4.2.3. Working environment

(i) Space constraints

Space constraints may make it difficult for operators to employ a good posture in manual handling. Examples include manipulating or moving objects in a restricted space or carrying bulky objects along a narrow gangway.

(ii) Floor or other surfaces

Working on uneven, slippery or unstable floors and other surfaces increases the degree of risk. Examples include surfaces on a moving vehicle, moving platforms and stairs, etc.

(iii) Other environmental factors

Extremes of temperature or humidity in the working environment affect a person's ability to sustain work. Sufficient lighting is another essential factor, while strong winds require special consideration when handling a bulky load.

4.2.4. Individual capability

In some particular situations, manual handling operations may require operators to be specially trained, or to possess a strong physique such as firemen.

A person's state of health greatly affects his or her ability to perform manual handling operations. Women who are pregnant or returning from maternity leave should avoid manual handling work that may cause safety or health risks. People recovering from surgery or who have a health problem should consult a doctor before performing certain manual handling work.

4.2.5. Other factors

If operators must use personal protective equipment in the workplace, they shall consider whether such equipment will hinder their postures or movements.

To summarize, the severity of hazards depends on the way the work is organized, how long and how often the tasks are being performed, the weight, size and shape of the loads, the design and layout of the working environment, the individual capability requirements and the provision of protective and preventive measures.

5. Hazard Identification

The **responsible person** of a workplace must carry out a preliminary assessment to evaluate the risks to the safety and health of employees performing manual handling operations.

5.1. What is a preliminary assessment?

The preliminary assessment serves as a hazard-identification tool with a systematic approach by pinpointing the operations that may cause injuries for further assessment. The results obtained from the assessments can help the **responsible person** to design and choose the appropriate preventive and protective measures. A successful preliminary assessment can also help the **responsible person** to give the proper priority to manual handling operations that may require further assessments.

5.2. Preliminary assessment : simple and systematic approach

Making an overall risk assessment can be a complicated process and hence an assessor needs to use the right approach and a suitable standard. In order to help the assessor to make a simple and systematic assessment for manual handling operations, two samples of "Preliminary Assessment Checklist for Manual Handling Operations" are provided in Appendix I and III.

To be successful, it is essential to communicate with the employees, supervisors, and safety and health representatives in the assessment process. Besides, checking the reasons of sickness records will also be useful. All this information will help identify tasks that may lead to physical strain.

5.3. How to do preliminary assessment ?

The **responsible person** should consider the employees' postures, the working environment and the weight of the loads. He/she should also assess the employees' capability to perform the task. After conducting the preliminary assessment, the responsible person should be able to make an initial judgment on the risks involved and judge whether further remedial action is required. When the risk factors concerning safety and health are identified or are uncertain, a further assessment is necessary.

Assessors can use either Appendix I or Appendix III as the preliminary assessment checklist for manual handling operations, or take the "Hints on Assessing the Weight of Loads of Manual Handling Operations" at Appendix IV as a reference, to design a checklist according to the characteristics of the working environment. Guidelines for the preliminary assessment at Appendix II should be read before using the checklist at Appendix I. The completed checklists or assessment documents can serve as a record of making preliminary assessment of risks in manual handling operations.

5.4. Action after preliminary assessment

5.4.1. Avoid hazardous manual handling operations

Don't let employees perform hazardous manual handling operations as far as reasonably practicable.

5.4.2. Further assessment

Make a further assessment of the manual handling risks if the hazardous operations cannot be avoided.

5.4.3. Review

Review and modify the preliminary assessment if the circumstances have changed significantly or when it has become invalid.

5.4.4. Record of preliminary assessment

A record of the preliminary assessment should be kept if 10 or more employees are normally employed at a workplace at any one time to perform manual handling operations. The record shall comprise:

(i) all significant findings resulting from the assessment or review; and

(ii) the particulars of employees who perform hazardous manual handling operations.

6. Risk Assessment

If it is completely unavoidable for employees to carry out manual handling operations involving safety and health risks, the **responsible person** must ensure that a further assessment is made.

6.1. How to do further assessment

Base on the preliminary assessment, tasks requiring further assessment could be selected in proper priority. From this task list, begin with the highest priority tasks and work through to that with the lowest one. If it is a complex task (i.e. involving a sequence of activities), it is easier to divide it into smaller activities, each of which can be checked against all the risk factors.

Risk factors to be considered include:

(i) The tasks;

(ii) The loads;

(iii) The working environment;

(iv) Individual capability; and

(v) Other matters.

Relevant questions are listed in Schedule 3 of the Occupational Safety and Health Regulation. The "Further Assessment Checklist for Manual handling Operations" in Appendix V covers all factors as required in Schedule 3. Appendix VI[2] provides a guideline for completing the form. The responsible person can carry an in-depth evaluation on any particular operations but the whole assessment should include all the factors required in Schedule 3.

6.2. Action after further assessment

To comply with the regulation, the **responsible person** must take the following measures to minimise the risks at work.

6.2.1. Reduce the risk of manual handling operations by:

(i) Taking appropriate steps to reduce the risks of manual handling operations to the lowest level that is reasonably practicable;

(ii) Arranging for the adoption of preventive and protective measures; and

(iii) Ensuring effective planning, organisation, control, monitoring and reviewing of those preventive and protective measures.

6.2.2. Provide relevant information to the employees on the risks of manual handling operations (i.e. the weight and the heaviest side of the load).

[2] The values (including the twisting angle, carrying distance, weight and dimensions of loads, etc.) provided in Appendix VI are solely for reference. They do not represent fine lines between safe and dangerous situations. The assessor could use other values with scientific grounds according to the characteristics of different trades and industries.

6.2.3. Provide mechanical aids and proper personal protective equipment to the employees.

6.2.4. Arrange a team of workers, if reasonably practicable, to carry out the manual handling operations. A team leader should be assigned to coordinate such work.

6.2.5. Review and modify the further assessment if the circumstances have changed significantly or the assessment has become invalid.

6.2.6. Keep a record of the further assessment (Please refer to Appendices V and VI for the relevant checklist and guidelines), provided that 10 or more employees are normally employed at the workplace at any one time to perform manual handling operations. This record must cover:

(i) all significant findings resulting from the assessment or review; and

(ii) the particulars of employees who perform hazardous manual handling operations.

6.2.7. Appoint competent persons to assist in carrying out the preventive and protective measures:

(i) If 10 or more employees are normally employed at a workplace at any one time to perform manual handling operations involving safety and health risks, the **responsible person** must appoint enough competent persons to assist in carrying out the preventive and protective measures.

(ii) The number of competent persons required depends on the number of employees involved in such manual handling operations, the size of the workplace, the risks to which those employees are exposed, and the distribution of those risks within the workplace.

(iii) Sufficient time and resources must be provided to these appointed competent persons to efficiently carry out their responsibilities.

6.3. Who is a competent person?

A competent person is someone who has undergone the relevant training and has the experience and other characteristics necessary to ensure that he/she is capable of assisting the **responsible person** in complying with the requirements under the regulations concerning manual handling operations. For example, a person who has received a Certificate of Competency in Manual Handling Operations or passed any equivalent courses organized by Occupational Safety and Health Council or other appropriate institutes or authorities is considered as having fulfilled the "training" component for a competent person. The **responsible person** should appoint competent person(s) with a lot of experience if complex and risky manual handling operations have to be performed.

7. Risk Control

7.1. Risk Control Objective

The **responsible person** should take measures to prevent employees from performing any hazardous manual handling operations. If the task cannot be eliminated, the risks should be reduced to the lowest level that is reasonably practicable.

7.2. Risk Control Strategy

The **responsible person** should develop a risk control strategy to eliminate or reduce the risk factors with reference to the results of risk assessment. The following control strategies may be considered:

(i) Eliminate the need for the manual handling operations, e.g. introduce automation to replace operations which have significant risks;

(ii) Re-design the manual handling procedures;

(iii) Provide preventive and protective measures such as mechanical aids;

(iv) Ensure that employees are given appropriate information and training to perform the manual handling operations.

7.3. Risk Control Methodology

The best control method is the introduction of preventive and protective measures (e.g. automation) at the design and planning stage of the working processes. However, it will be difficult to achieve this controlling goal for existing processes in a short period. The **responsible person** can adopt various methods to minimise the risks such as those listed below. It should be noted that new risks should never be created when applying these control methods.

7.3.1. Modify the weight or the shape of the object

The object may be modified by changing its shape or by repackaging into smaller sizes to reduce its weight. The size or shape should be designed to provide a good hold or grip.

7.3.2. Modify workplace layout

The layout of the workplace can be re-arranged to provide more space for the manual handling operations. Besides, changing the position of equipment and furniture can also help. The waist-high position is the best one for manual handling operations. A good design of the workstation will also help reduce manual handling risks.

7.3.3. Re-arrange material flow

Minimising the number of times required in moving objects, reducing the distance involved in such movements and placing the objects at a suitable height are some of the means in reducing risks.

7.3.4. Methods of modifying task

(i) Using suitable movements and forces

Look for a different way for a manual handling task to be performed by using a different

method, a different direction and force. A team lifting arrangement should be used whenever necessary to eliminate excessive exertion by an individual.

(ii) Using mechanical aids

Mechanical aids can reduce the risks associated with a task. For example, provision of hoists avoids manual lifting while use of trolleys reduces carrying forces required.

(iii) Re-designing the work pattern

If a task involves repetitive movement that leads to muscle fatigue, job rotation, work-rate regulation and appropriate and sufficient work-rest regime are some effective controlling methods.

7.3.5. Equipment maintenance and workplace management

Regular maintenance of plant and equipment and management of the workplace are necessary. Examples are lubrication of trolley axles, cleaning up obstructions on walk paths and clearing other obstacles that may hinder manual handling operations.

7.3.6. Using suitable tools

Well-designed tools not only increase the work rate, but also reduce or eliminate the risks in manual handling operations. The following points should be considered in selecting tools:

(i) Light tools should be used as far as practicable. Heavy tools should be for two-handed use.

(ii) The handle of tools should be located close to the tool's centre of gravity and the grip should be designed to avoid unnatural bending of hands and arms.

(iii) The handle should also be designed to suit the grip and permit the user to change grips easily.

(iv) The grip surface should not easily conduct heat or cold if the tools have to be used in extreme temperatures.

(v) The grip surface should not have a sharp edge or any projections but should not be so smooth that slipping might occur.

(vi) Tools should be provided with adequate vibration absorption if necessary.

(vii) Tools should fit hands and suit arms of different sizes and lengths. If necessary, different sizes should be provided to meet the individual needs of employees.

(viii) The positioning, direction of movement, force and length of travel should be considered when choosing which tools to use.

7.3.7. Tasks allocation

When allocating work tasks to employees, the employer should consider the following points:

(i) The employer must assess the respective capabilities of the employees to perform manual handling operations that may create safety and health risks;

(ii) In the assessment, the ability of performing the manual handling operations without risks to the safety and health of the employees and other persons must be ensured.

(iii) An employer must not require any of his/her employees to perform any manual handling operations that may create safety and health risks unless he/she has assessed that the employee is capable of doing so.

8. Preventive and Protective Measures

After completing the preliminary or further assessments, the responsible persons should introduce the necessary preventive and protective measures to eliminate or reduce the risks in manual handling operations according to the risk levels identified. The following measures are based on the relevant points considered in Schedule 3:

8.1. Tasks

8.1.1. Holding or manipulating loads at distance from the body trunk

If a task involves holding or manipulating loads at a distance from the body trunk, the best protective measures are to reduce the holding force and the distance of the load from the body. This can be done by:

(i) Reducing object weight;

(ii) Reducing object size;

(iii) Reducing holding time;

(iv) Providing an appropriate handle on the load;

(v) Eliminating holding by using mechanical aids; and

(vi) Improving the working procedures and workplace layout to enable the load to be manipulated close to the body trunk.

HAZARD

Loads piled together prevent the operator from lifting those objects farthest away. Lifting loads at a distance causes great stress to the back.

SUGGESTION

A clear passage should be provided between loads so that workers can get closer to the objects before lifting.

HAZARD

Taking the last and furthermost objects on horizontal shelves requires awkward stretching.

SUGGESTION

Sloped shelves enable objects at the back to be slid forward for easy access.

8.1.2. Unsatisfactory body movements or postures

- Twisting the body trunk

  If a certain task involves twisting the body trunk, the workplace layout should be re-designed and work practices modified to reduce such movements. This can be achieved by:

  (i) Positioning all tools and materials in front of the operator to prevent him/her from twisting the body trunk or extending the body to reach the tools or materials on the two sides of the body;

  (ii) Changing the flow direction of the goods or the height at which they are stored by using conveyors, chutes, slides or turntables;

  (iii) Providing adjustable swivel-chairs for handlers so that they can reach the load without having to twist their trunks; and

  (iv) Creating sufficient work space for the employees so that they can move their bodies around freely instead of twisting their bodies.

HAZARD	*SUGGESTION*
	
Solely twisting the body trunk to manipulate heavy loads is a hazardous manual handling operation.	Move footstep together with the whole body to minimise the risk of injury.

- Stooping

  If a task requires the employee to adopt a stooping posture, it is important to reduce the bending movements. This can be done by:

  (i) Adjusting the height of the loads or the work level to reduce the frequency and degree of stooping;

  (ii) Positioning the heavy or frequently used loads so that they can easily be gripped. The ideal position is around waist level;

  (iii) Eliminating large horizontal reaches; and

  (iv) Using lift tables or other mechanical aids to adjust the height and orientation of the load.

HAZARD

The worker must bend to access the document placed at the bottom part of the book shelf.

SUGGESTION

Documents in heavy demand or of great weight should be placed around the waist level to minimise the frequency and degree of stooping.

HAZARD

The sink is too deep or too low, causing excessive bending to lift up the heavy trays containing water and dishes, etc.

SUGGESTION

A sink of suitable height and of proper depth minimises excessive bending while at work.

- Reaching upward

  If a handler must reach upward to perform a task, it is important to reduce such stretching. This can be done by:

  (i) Placing materials, workpieces and other heavy objects as near and convenient to the worker as possible; and

  (ii) Providing steps, a height-adjustable work platform or other aids.

HAZARD	*SUGGESTION*
	
Reaching upward frequently increases the risk of injury.	Using a footstep avoids unnecessary stretching when reaching upward.

HAZARD

Excessive stretching creates the risk of strains.

SUGGESTION

Using a hook with a long handle avoids excessive stretching.

HAZARD

Over-stacking of goods not only requires excessive reaching but also blocks the view, adding a further risk to manual handling.

SUGGESTION

Handling an appropriate amount of goods each time can reduce injuries and accidents.

8.1.3. Excessive movement of loads

- Excessive lifting or lowering distances

  If a task involves lifting or lowering goods for excessive distances, the risk of injury can be reduced by:

  (i) Substituting sliding or rolling for lifting;

  (ii) Eliminating manual lifting through the use of lift-tables, forklifts, conveyors, hoists and similar mechanical devices;

  (iii) Reducing the weight of the goods/objects;

  (iv) Reducing carrying time; and

  (v) Reducing the variations in work levels.

HAZARD

Using a poor posture to unload goods from a truck increases the risk of injury.

SUGGESTION

Using a truck's extended tailboard makes manual handling much easier for workers.

- Excessive carrying distances

  If a task involves excessive carrying distances, the following suggestions make manual handling much easier for workers:

  (i) Using mechanical aids to carry the load; and

  (ii) Reducing the distance, carrying time and the number of movements by re-arranging and improving the workplace layout.

HAZARD

Excessive carrying distance places extra demands on workers.

SUGGESTION

Using a trolley simplifies the task when a long distance must be covered.

TROLLEYS

TROLLEY WITHOUT HANDRAIL

TROLLEY WITH TWO WHEELS AND HANDRAIL INSTALLED

TROLLEYS WITH FOUR WHEELS AND HANDRAIL INSTALLED

TROLLEYS FOR CARRYING TOOLS

TROLLEYS FOR TRANSPORTATION OF MATERIALS AND CLOTHES

TROLLEY WITH SCISSORS-LIFTS

TROLLEY WITH BRAKE

TROLLEY FOR MASS TRANSPORTATION OF GAS CYLINDERS

PALLET JACK

8.1.4. Other factors

- Excessive pushing or pulling of loads

  When a task demands excessive pushing or pulling of loads, the risks can be reduced by:

  (i) Using conveyors to move a load, or using suitable trolleys to push or pull the load. In the selection and use of trolleys, the size of wheels, the weight limit of the axle, the weight distribution of the trolley frame and the maintenance programme of the trolley should be considered. (If the trolley is pushed or pulled at a very high or low position, the risk arising from manual handling will increase);

  (ii) Reducing the weight of loads;

  (iii) Avoiding rough and uneven floors, and floors with high friction;

  (iv) Providing good maintenance for transport equipment; and

  (v) Improving the workplace layout to reduce the distance and the requirements for pulling or pushing loads.

HAZARD

Moving a trolley which is full of goods can be very difficult and strenuous, especially when starting and stopping.

SUGGESTION

To avoid unnecessary risks, request help from a second person, especially when starting and stopping.

HAZARD

Wheels that are not properly maintained make it much harder for the operator to pull or push.

SUGGESTION

Regular maintenance is required for all mechanical aids in the workplace.

- Risk of sudden movement of loads

  Poorly balanced loading or interruption of a work process causes sudden movement of loads. For example, a trolley will speed up when being moved down a slope. The risk should be reduced by:

  (i) Making a risk assessment when sudden movement of loads is anticipated, and introducing preventive and protective control measures;

  (ii) Piling up the loads in a proper and secure way;

  (iii) Getting co-workers to help;

  (iv) Using appropriate personal protective equipment; and

  (v) Using appropriate mechanical aids.

HAZARD

If a tailgate is used without a guard, trolleys can move suddenly.

SUGGESTION

Installing a guard on the tailgate prevents trolleys from sudden movements.

- Frequent or prolonged physical effort

  If the nature of the work requires frequent or prolonged physical effort, the risk of injury can be minimised by:

  (i) Taking occasional breaks from the work;

  (ii) Practising job rotation, allowing handlers to exercise different groups of muscles at intervals, therefore enabling exhausted muscles to recover; and

  (iii) Minimizing jerky and hurried movements.

HAZARD

Carrying heavy loads freguently or for a long period is exhausting, which increases the chance of injury.

SUGGESTION

Arrange job rotation or vary tasks within a shift to enable heavily-exercised muscles to recover.

- Insufficient rest or recovery periods

  If a task does not include sufficient rest or recovery periods, the problem can be alleviated by:

  (i) Providing sufficient rest breaks for employees; and

  (ii) Varying tasks within a shift to allow employees to use different groups of muscles; such arrangements allow different sets of muscles to rest and recover in succession.

HAZARD

Working under an exhaustive regimen not only decreases the efficiency, but also increases the risk of accident.

SUGGESTION

Short breaks during work hours allow workers to recover, increasing efficiency and decreasing the chance of accidents.

- A rate of work imposed by a process

  If a task involves a rate of work imposed by a process, the following measures can be adopted to reduce the risk of injury:

  (i) Training employees to adjust their rate to optimize safety, health and productivity;

  (ii) Providing sufficient manpower and equipment; and

  (iii) Designing buffer zones to cope with peak work demand periods. If the production line is moving faster than the employees' capabilities, these buffer zones would allow items to be taken off the production line for processing later.

SUGGESTION

Providing sufficient manpower at a production line will reduce the risk of injury.

8.2. Loads

- Heavy loads

  Handling of heavy loads can be made easier by:

  (i) Using mechanical aids such as overhead cranes, hoists, slings or vacuum lifters;

  (ii) Reducing weight by the use of smaller containers;

  (iii) Sorting loads into weight categories so that additional precautions can be applied selectively;

  (iv) Dividing a heavy load into smaller components; and

  (v) Employing team lifting.

HAZARD

Moving a fully loaded tub requires strenuous effort.

SUGGESTION

Using a smaller container makes the task much easier for the worker.

HAZARD

Handling heavy loads increases the risk of injury.

SUGGESTION

Reduce the risk of handling by dividing the loads into packages of smaller weight.

SUGGESTION

Using handling aids reduces back-pain and fatigue for nurses.

HAZARD

Handling heavy loads increases the risk of injury.

SUGGESTION

Use a trolley to transport heavy loads.

Lifting Aids

- Bulky or unwieldy loads

  Consider the following measures before moving bulky or unwieldy loads:

  (i) Make the object less bulky by changing its shape or packaging, so that it can be handled as close to the employee's body as possible;

  (ii) Provide suitable handholds; and

  (iii) Employ team lifting.

HAZARD

Large flat sheets of wooden boards are hard to handle when stored horizontally.

SUGGESTION

Vertical storing of flat materials makes handling easier.

HAZARD

Handling bulky loads without assistance requires special attention.

SUGGESTION

Reduce the risk of injury by team lifting.

- Loads that are difficult to grasp

  Refer to the following suggestions to handle large, round, smooth, wet or greasy loads more safely.

  (i) Change the shape or surface of the object to make it easier to grip;

  (ii) Place the load in a easy-to-grasp container;

  (iv) Provide handles, hand grips, indents, etc. to improve the grip; and

  (v) Use handling aids such as hand-held hooks or suction pads.

HAZARD

Boxes without hand grips are awkward to handle.

SUGGESTION

Adding handholds to opposite sides of the box is an easy and effective improvement.

HAZARD

Stringent precautions should be taken when handling gas cylinders.

SUGGESTION

Use a suitable trolley to transport gas cylinders.

HAZARD

To grip a large piece of breakable glass places stress on the arms.

SUGGESTION

Suction pads simplify the handling of large pieces of glass.

HAZARD

A smooth bottle surface makes handling difficult.

SUGGESTION

Team lifting should be used.

HAZARD

Using an awkward posture to lift a patient from a bed can increase the risk of waist and shoulder injuries.

SUGGESTION

Using a lifting belt permits the nurse to use a good posture in lifting the patient.

- Unstable load or a load whose contents are likely to shift

  Consider the following measures in such cases:

  (i) Pack the objects so that they will not move during transportation;

  (ii) Use slings to maintain effective control while handling non-rigid loads; and

  (iii) Fill liquid containers in such a way that only a small amount of free space is left. This reduces the movement of contents during carrying.

HAZARD

Unstable stacks of weak cartons increase the risks of accidents.

SUGGESTION

Consider the weight limit of the lower cartons before stacking.

HAZARD

Garments being transported are unstable and likely to move. This increases the difficulty in handling.

SUGGESTION

The clothes should be firmly hung on a special clothes-rack before transportation.

- Loads that are sharp, hot or otherwise potentially damaging

  For loads that are sharp, hot or otherwise potentially damaging such as those at low temperature, the employees can reduce the risk of injury by:

  (i) Making sure that the loads are free from dust, oil or corrosive deposits;

  (ii) Employing handling aids or personal protective equipment; and

  (iii) Using a suitable container to handle sharp objects, and using appropriate insulated personal protective equipment such as gloves or a container to handle hot or cold materials.

HAZARD

Handling frozen meat with bare hands may lead to sprains and frostbite.

SUGGESTION

Using suitable protective gloves can reduce the hazards.

8.3. Working Environment

- Space constraints that prevent good posture

  If there are space constraints that prevent good posture, the risk of employee injury increases. Nullify such hazards by:

  (i) Ensuring that obstructions are cleared before attempting to manoeuvre bulky loads through narrow doorways or gangways;

  (ii) Providing sufficient space so that lifting can be done in the work positions with correct postures.

HAZARD

Reaching forward for a load without removing the obstructing chairs is hazardous.

SUGGESTION

Removing the chairs reduces the stretching effort.

HAZARD

Cramped conditions make lifting more strenuous and hazardous.

SUGGESTION

Provide sufficient space for workers to adopt a good posture and use mechanical aids.

- Uneven, slippery or unstable floors

  Uneven, slippery or unstable floors such as ramps increase the likelihood of slips, trips and falls. These risks can be reduced by:

  (i) Providing stable gangways by using suitable coverings on uneven surfaces;

  (ii) Constructing firm and stable temporary work platforms;

  (iii) Promptly clearing up spillage of water, oil, soap, food scraps and other slippery substances;

  (iv) Applying slip-resistant surfacing to floors or ramps which may easily become wet;

  (v) Providing anti-slip shoes.

HAZARD

The kitchen floor is often slippery.

SUGGESTION

Wearing non-slippery safety shoes and cleaning the floor frequently can reduce the risk of slipping.

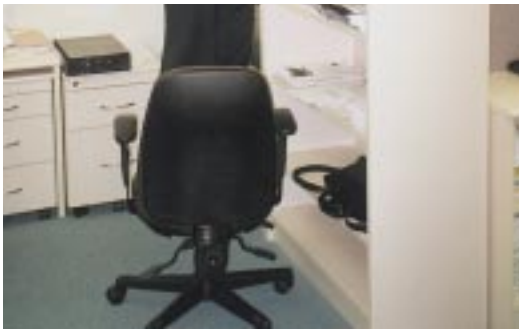
HAZARD

An unstable floor hinders the movement of trolleys.

SUGGESTION

Provide a stable gangway by using a suitable covering.

HAZARD



A chair with wheels is an unstable footstep.

SUGGESTION

Use a stable chair or a suitable footstep.

- Variation in level of floors or work surfaces

  This increases both the complexity of movement and the risk of injury. Counter-measures are to:

  (i) Control floor level variations through the use of ramps;

  (ii) Provide steps of slight slope and of sufficient width; and

  (iii) Arrange tasks to be performed at a uniform height.

HAZARD

Moving trolleys down a staircase is hazardous.

SUGGESTION

Using a ramp or adding a temporary ramp reduces the risk of accidents.

HAZARD

Moving cartons between two different work levels promotes poor postures.

SUGGESTION

Use trucks with a tailboard or transfer from a loading bay.

HAZARD

Working at different levels increases the effort required in manual handling operations.

SUGGESTION

Use a trolley equipped with a scissor-lift and arrange the related works at the same work level.

- Extremes of temperature or humidity

  Working in such conditions can be improved by one or more of these methods:

  (i) Controlling temperature and humidity in the workplace as far as possible;

  (ii) Eliminating or reducing the working hours in extreme conditions;

  (iii) Using proper personal protective equipment; and

  (iv) Providing a work-rest regime with longer rests.

HAZARD

Working in a freezer is strenuous and causes fatigue.

SUGGESTION

Provide appropriate protective equipment for workers and minimise the working hours where the working environment requires additional precautions.

- Conditions causing ventilation problems or gusts of wind

  Such conditions can be minimised by:

  (i) Relocating or taking a different route in carrying out the manual handling operations;

  (ii) Utilizing handling aids to support or give greater control of the load;

  (iii) Using a team of workers to handle the loads; and

  (iv) Reducing the area or size of the load or object.

HAZARD

Carrying bulky loads in gusts of wind increases the difficulty of handling and the risk of accidents.

SUGGESTION

Use of team lifting is a safe and effective measure.

- Poor lighting conditions

  This can create the possibility of falling or tripping. Remedial measures include:

  (i) Providing sufficient well-directed light;

  (ii) Providing auxiliary lighting if the operator has to read the labels on the load, so that the operator does not have to use an awkward posture; and

  (iii) Re-designing the lighting system to minimise contrast between areas of bright light and deep shadow.

HAZARD

Poor lighting condition increases the risks of injuries.

SUGGESTION

The location of the light source affects the lighting condition in the workplace.

8.4. Individual capacity

- Operation requires unusual strength or height, or other abnormal physical characteristics

  In such cases, consider the following factors:

  (i) Arrange for pre-employment and periodic medical examinations; and

  (ii) Allow a certain adjustment period for a worker who has been away from work for a long time. For example, let the employee do a job requiring a comparatively low work rate, then increase the rate gradually. Alternately, let him/her carry lighter loads.

SUGGESTION

Some jobs require unusual strength, height or other special physical characteristics. (This photograph is provided by FSD.)

Arrange pre-employment and periodic medical examinations.

- Operation creates a hazard to persons who are pregnant or have a health problem

  If the manual handling operation creates a hazard to workers with a health problem or to pregnant women, these protective measures can be adopted:

  (i) Allocate such workers less physically demanding tasks;

  (ii) Take special care of women having to handle loads while pregnant or after childbirth;

  (iii) Assess the respective capability of employees to perform strenuous manual handling operations;

  (iv) When changes in the employees' health conditions (for example, hernia, pregnancy, recovery from injury or surgical operation) affect their abilities to perform normal duties, the employer should make special arrangements for them, modifying their workload or allocating other tasks for them as reasonably practicable; and

  (v) In doubtful cases, seek a doctor's assessment of the capability of the individual to perform the manual handling operations, instead of forming generalized conclusions on the worker's capacity to handle the task.

SUGGESTION

Allocate suitable task to worker who is in recovery period and eliminate load transportation.

- Operation requires special information or training for its safe performance

  The responsible person should ensure that appropriate information and a special training programme be provided because the lack of such information increases the risk of injury.

SUGGESTION

Provide information such as the weight and the heavier side of the load.

Provide method and information on proper lifting.

Providing adequate training minimises the risk of accidents.

8.5. Other factors

In some situations, employees should wear special protective clothing to reduce the risk of injury. For example, wearing gloves not only protects the hands from injury but also keeps them warm; wearing the proper shoes not only prevents slipping but lessens the chance of injury by a heavy object. If the movement or posture are hindered by personal protective equipment or by clothing, the following measures may help reduce the risk:

(i) Use personal protective equipment only when engineering or other controls do not offer adequate protection; and

(ii) Wearing the properly fitted clothing allows loads to be carried close to the body and eliminates restricted body movements in manual handling.

HAZARD

Gripping loads becomes difficult if gloves of a wrong size are used.

SUGGESTION

Gloves of a right size can facilitate manual handling operations.

HAZARD

Wearing loose or tight clothes increases the risk of manual handling operations.

SUGGESTION

Clothes of a suitable size can facilitate manual handling operations.

9. Information and Training

The employer must provide adequate training and information to his/her employees so that they can perform manual handling operations safely and without harming their health. For example, information on the weight and the heavier side of a load should be provided to employees.

The employer should provide training to new employees, and re-training to employees transferred to jobs with hazardous potential. When there are significant changes in the working environment, (e.g. new equipment is installed or a new system of work or work practices is introduced that may create manual handling risks to workers), the employer should review the new situation and provide sufficient information and appropriate training to the workers to handle the task in the new environment.

Training programs should be modified as tasks are altered so that employees can learn new techniques to work more safely.

The employer should also provide refresher courses to the employees to revise the manual handling skills and knowledge and exchange experience during the training sessions.

9.1. Types of Training

There are two types of training on manual handling.

9.1.1. General training

General training on manual handling should take place during the job orientation.

This type of training should be provided to everyone who organizes and performs hazardous manual handling operations, and includes managers, supervisors, manual handling operators and health and safety personnel.

Training contents

The level of training should be commensurate with the risk involved. The coverage should be tailored to the needs of the participants. The following contents can be considered in the training course:

(i) Basic function of the spine, body postures, types of muscle work, and principles of levers;

(ii) Manual handling operations regulations;

(iii) The role and responsibilities of the responsible persons and employees;

(iv) Identification of manual handling risks;

(v) Preliminary and further risk assessment;

(vi) Principles of correct manual handling operations;

(vii) Hazardous manual handling operations in the workplace;

(viii) Preventive and protective measures; and

(ix) The risk management of manual handling operations.

9.1.2. Task-specific training

If the employees must undergo specific manual handling tasks, they and their supervisors should attend the task-specific training. This task-specific training should be provided before the manual handling operations are begun. Moreover, such training should be provided when there are changes to the work practices or new procedures are introduced.

Objectives of task-specific training

Participants should acquire the following skills and knowledge after training:

(i) Identify factors affecting individual capability;

(ii) Carry out manual handling operations according to the established safety procedures;

(iii) Use relevant mechanical aids;

(iv) Use proper manual handling techniques;

(v) Build up good co-ordination in team lifting and understand how to reduce associated risks;

(vi) Use proper personal protective equipment; and

(vii) Understand that they have the responsibility to take care of other employees and to use methods with the least risk to perform manual handling operations.

9.2. Training arrangement

In making arrangement for training, the employers can provide general training or task-specific training according to the level and need of the employees. The employers can also combine the general and task-specific training if necessary.

10. References

- Occupational Safety and Health Regulation (Chapter 509)
- WorkSafe Western Australia Commission, Code of Practice for Manual Handling, 1996.
  (http://sage.wt.com.au/safetyline/training/manual/man1_ind.htm)
- National Occupational Health and Safety Commission, National Standard for Manual Handling and National Code of Practice for Manual Handling, Australian Government Publishing Service, Canberra, 1990.
- Manual Handling : Guidance on Regulations : Manual Handling Operations Regulations 1992, Health and Safety Executive, UK, 1992.
- Preventing Manual Handling Injuries - An OSH Training Manual
  (http://sage.wt.com.au/safetyline/training/manual/manl_ist.htm)

11. Enquiries and Complaints

For enquiries about this Guidance Notes or advice on occupational health and hygiene matters, please contact the Labour Department's Occupational Safety and Health Branch through:

Address: 15/F, Harbour Building
38 Pier Road, Central,
Hong Kong

Tel: 2852 4041

Fax: 2581 2049

Home Page Address: http://www.labour.gov.hk

E-mail Address: enquiry@labour.gov.hk

Information on the services offered by the Labour Department and on major labour legislation can also be found on our website.

Information on the services provided by the Occupational Safety and Health Council can be obtained through its hotline 2739 9000 and website http://www.oshc.org.hk.

If you have any complaints about unsafe workplaces and practices, please call the Labour Department's Occupational Safety and Health complaint hotline at 2542 2172. All complaints will be treated in the strictest confidence.

Appendix I:

Preliminary Assessment Checklist for Manual Handling Operations (sample 1)

(Please read the Guidelines in Appendix II before filling in this form. Please put a "✓" in an appropriate box.)

Work locations/Department of the organisation: _____

Job Title: _____

Job/Task description: _____

Date of assessment: _____

Part A: Assessment

	Yes	No	Uncertain	Notes (refer to the Guidelines in Appendix II)
1. Does the manual handling operation involve repeated awkward postures?	☐	☐	☐	Twisting, kneeling, stooping, bending or twisting the wrist & extending the arm above the shoulder, etc.
2. Does the employee require strenuous effort or have difficulties in manipulating the load?	☐	☐	☐	Strenuous effort is usually required to handle load greater than 16 kg without mechanical aids such as trolleys or other simple lifting equipment.
3. Is there any information indicating that this manual handling operation involves a significant risk of injury?	☐	☐	☐	A risky operation in the trades & industries, confirmed complaint of hazardous operation & known case of injuries or death.
4. Are there any conditions in the working environment that may create additional risks to the manual handling operators?	☐	☐	☐	Risks include space constraints, slippery, uneven or unstable floors, & variations in the level of floors or work surfaces.
5. Is the employee unsuitable to perform or physically incapable of performing this manual handling operation?	☐	☐	☐	Temporary or permanent physical injuries, musculoskeletal disorders, health problems or pregnant, etc.

Part B: Findings (Diagrams can be used to indicate the positions & postures of employees at work.)

Number of employees performing this hazardous manual handling operation:

_____

The position(s) of the employees at work: _____

Other significant findings: _____

Part C: Conclusions and Follow-up

1. Stop the hazardous manual handling operation immediately. ☐ (Note: If this operation can be avoided.)
2. Make a further assessment. ☐ (Note: Part or all of the answers in Part A are "Yes" or "Uncertain".)
3. Need NO further assessment. ☐ (Note: All the answers in "Part A" are "No".)
4. Others: _____

_____

Assessor: _____ Signature: _____

Appendix II:

Guidelines for the Preliminary Assessment Checklist for Manual handling Operations (sample 1)

Part A: Assessment

(Please put a "✓" in an appropriate box in Appendix I "Preliminary Assessment Checklist for Manual Handling Operations (sample 1)". Refer to Part A of Appendix I for the questions.)

Question 1

'Repeated awkward postures' refer to the performance of repetitive tasks with the following postures:

(i) Twisting the body trunk;

(ii) Kneeling or stooping;

(iii) Bending or twisting the wrist;

(iv) Extending the arm above the shoulder.

Question 2

Mechanical aids include trolleys or other simple lifting equipment. Manipulation involves lifting, lowering, pushing, pulling and carrying the loads. Strenuous effort is usually required to handle loads greater than 16 kg in a standing position. In addition, it increases the risk of back injury.

Question 3

The following scenarios may indicate a significant risk of injury:

(i) From safety and health publications or other sources of information in the trades and industries, the manual handling operations of the same nature involve a significant risk of injury;

(ii) Complaints on the hazardous manual handling operations are received and confirmed; and

(iii) There are known cases of injuries or death arising from the manual handling operations in the workplace.

Question 4

Conditions in the working environment that may create additional risks are:

(i) space constraints;

(ii) slippery, uneven or unstable floors; and

(iii) variations in the level of floors or work surfaces.

Question 5

The following conditions can be used for a preliminary assessment of whether employees are physically capable of undertaking the manual handling operation concerned:

(i) Employees are found to have visible temporary or permanent physical injuries;

(ii) An employee who has complained of persistent symptoms such as aches and pains in the hands, wrists, arms, shoulders or back which are associated with musculoskeletal disorders;

(iii) An employee has reported to the management that he/she is more susceptible to the hazardous manual handling operations because of his/her health problems;

(iv) An employee has reported to the management that she is pregnant; and

(v) If the information on the employee is not available, please select "Uncertain". Before the manual handling operations are performed, review the situation when the information is available.

Part B: Findings

If TEN or more employees are normally employed at a workplace at any one time to perform manual handling operations which may create safety and health risks, assessment records should be kept. Information on the employees who have performed the manual handling operations and a simple diagram indicating the positions and postures of employees at work and those environmental risk factors can be attached in the assessment records.

Part C: Conclusions and Follow-up

(Please put a "✓" in an appropriate box in Appendix I "Preliminary Assessment Checklist for Manual Handing Operations (sample 1)".)

1. If the manual handling operation is found to have a significant risk and the operation can be avoided as far as reasonably practicable, it should be stopped immediately.
2. If PART or ALL of the answers in Part A are "Yes" or "Uncertain", the manual handling operation concerned has a significant risk. When it is not feasible to stop the operation, a further assessment should be made.
3. If ALL the answers in Part A are "No", the manual handling operation DOES NOT involve a significant risk.

APPENDIX III:

PRELIMINARY ASSESSMENT CHECKLIST FOR MANUAL HANDLING OPERATIONS (SAMPLE 2)

(Please put a "✓" in an appropriate box.)

Work locations/Department of the organisation: _____

Job Title: _____

Job/Task description: _____

Date of assessment: _____

Part A: Assessment

1. Is there any information indicating that this manual handling operation involves a significant risk of injury?
   - Yes ☐: Please go to Q2.
   - No ☐: The assessment need not go any further.
2. Can the manual handling operation be avoided / mechanised / automated at a reasonable cost?
   - Yes ☐: Please proceed and check that the result is satisfactory.
   - No ☐: Please go to Q.3
3. Is the employee unsuitable to perform or physically incapable of performing this manual handling operation?
   - Yes ☐: Please complete "Further Assessment Checklist for Manual Handling Operations".
   - No ☐: Please choose No.4 of Part C.

Part B: Findings (Diagrams can be used to indicate the positions & postures of employees at work.)

Number of employees performing this hazardous manual handling operation:

_____

The position(s) of the employees at work: _____

Other significant findings: _____

Part C: Conclusions and Follow-up

1. This manual handling operation can be avoided / mechanised / automated at a reasonable cost. ☐
2. Make a further assessment. ☐
3. Need NO further assessment. ☐
4. Reduce the risk of this manual handling operation to the lowest level as far as reasonably practicable. ☐
5. Others: _____

_____

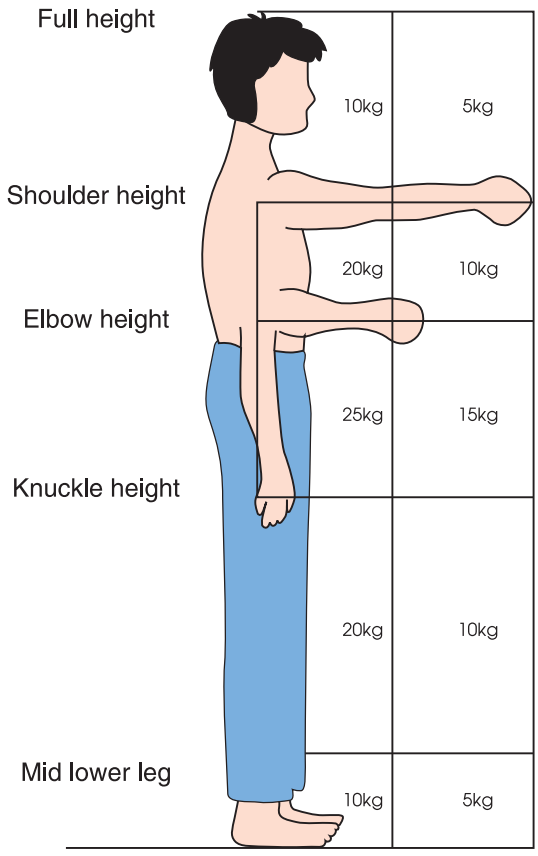
Assessor: _____ Signature: _____

Appendix IV:

Hints on Assessing the Weight of Loads of Manual Handling Operations

Manual handling operations often involve complex movements. The following diagram describes the recommended weights on simple lifting or lowering for an adult male operator who works under optimum conditions. The optimum conditions mean that an operator does not involve twisting, bending or other awkward postures and the operator's hands are at vertical and horizontal position when moving a load. This guildeline assumes that the load is readily grasped with both hands and the operation takes place under reasonable working conditions with the operator at a stable body position.

If the hands enter more than one of the box zones during the operation, the smallest weight figure should be used. An intermediate figure may be chosen where the hands are close to a boundary. Where lifting or lowering with hands beyond the box zones is unavoidable, a further assessment should be made. It should be noted that the given figures are not weight limits. For female operators, as a rough guide, these figures should be reduced by one third.



The above diagram aims at assisting the responsible person to identify which manual handling operations require further assessments. If the weight of a load is over the recommended figures, a further assessment should be performed and controls for reducing the risk of injury should also be adopted. "Absolutely safe" manual handling operations DO NOT exist. What we can do is to make the operations safer.

When manual handling operations involve frequent or repeated movements, the responsible person should conduct a further assessment. The adoption of mechanical aids or other measures should be considered. Even when the operation is performed under optimum conditions, a further assessment is needed if the weight of the load approaches 16 kg.

APPENDIX V:

FURTHER ASSESSMENT CHECKLIST FOR MANUAL HANDLING OPERATIONS

(Please read the Guidelines in Appendix VI before filling in this form. Please put a "✓" in an appropriate box.)

Work locations/Department of the organisation: _____

Job title: _____

Job/Task description: _____

Date of assessment: _____

Part A: Assessment

	Yes	No	Comments
1. **The tasks**			
Do they involve holding or manipulating loads at a distance from the body's trunk?	☐	☐	
Do they involve unsatisfactory bodily movement or posture especially--			
(a) Twisting the body's trunk?	☐	☐	
(b) Stooping?	☐	☐	
(c) Reaching upward?	☐	☐	
Do they involve excessive movement of loads, especially--			
(a) Excessive lifting or lowering distances?	☐	☐	
(b) Excessive carrying distances?	☐	☐	
Do they involve--			
(a) Excessive pushing or pulling of loads?	☐	☐	
(b) A risk of sudden movement of loads?	☐	☐	
(c) Frequent or prolonged physical effort?	☐	☐	
(d) Insufficient rest or recovery periods?	☐	☐	
(e) A rate of work imposed by a process?	☐	☐	
2. **The loads**			
Are they--			
(a) Heavy?	☐	☐	
(b) Bulky or unwieldy?	☐	☐	
(c) Difficult to grasp?	☐	☐	
(d) Unstable, or with contents likely to shift?	☐	☐	
(e) Sharp, hot or otherwise potentially harmful?	☐	☐	

	Yes	No	Comments
3. **The working environment**			
Are there space constraints that prevent good posture?	☐	☐	
Are there uneven, slippery or unstable floors?	☐	☐	
Are there variations in the level of floors or work surfaces?	☐	☐	
Are there extremes of temperature or humidity?	☐	☐	
Are there conditions causing ventilation problems or gusts of wind?	☐	☐	
Are the lighting conditions poor?	☐	☐	
4. **Individual capability**			
Does the operation--			
(a) Require unusual strength or height, or other special physical characteristics?	☐	☐	
(b) Create a hazard to persons with a health problem or to pregnant women?	☐	☐	
(c) Require special information or training for its safe performance?	☐	☐	
5. **Other matters**			
Is movement or posture hindered by personal protective equipment or by clothing?	☐	☐	

Part B : Findings (Diagrams can be used to indicate the positions and postures of employees at work.)

Number of employees performing this hazardous manual handling operation:

_____

The position(s) of the employees at risk: _____

Other significant findings:

_____

_____

_____

_____

_____

Part C: Conclusions and Follow-up

1. Discussion: _____

2. Preventive and protective measures for this process (in the order of their completion dates):

Preventive and Protective Measures	Date for Completion	Date for Follow-up

3. Others: _____

Assessor: _____ Signature: _____

Appendix VI:

Guidelines for the Further Assessment Checklist for Manual Handling Operations[2]

Part A: Assessment

(Please put a "✓" in an appropriate box in Appendix V "Further Assessment Checklist for Manual Handling Operations". Refer to Part A of Appendix V for the questions.)

1. The tasks

☐ *Holding or manipulating loads at a distance from the body's trunk*

In such cases, the stress imposed on the body is much greater than when holding the same load close to the trunk. Therefore the employees should not excessively work under such situations and the employers should arrange suitable breaks for the employees.

☐ *Unsatisfactory bodily movement or posture*

(a) Twisting the body's trunk

The greater the range of body twists, the higher the risk of getting injured. The following method is a simple way to judge whether twisting of the body trunk is excessive: If the arms move away from the body at an angle exceeding 45˚ while manipulating, pulling or pushing loads with two hands, it can be considered as excessive twisting.

(b) Stooping

If frequent bending of the waist or leaning forward is required, the stress on the back increases.

(c) Reaching upward

If frequent reaching over shoulder height is required, additional stresses are placed on the arms and back, making control of the load more difficult. Excessive extending of arms increases the risk of injury.

---

[2] The values (including the twisting angle, carrying distance, weight and dimensions of loads, etc.) provided in Appendix VI are solely for reference. They do not represent fine lines between safe and dangerous situations. The assessor could use other values with scientific grounds according to the characteristics of different trades and industries.

☐ *Excessive movement of loads*

(a) Excessive lifting or lowering distances

If the vertical distance involved is more than 25 cm, it is likely to require a change of grip during the carrying process. This increases the risk of injury.

(b) Excessive carrying distances

Even when a load is held close to the body and carried with a good posture, covering a distance of more than 10 m without a pause might increase the risk of muscle fatigue and injury.

☐ *Other factors*

(a) Excessive pushing or pulling of loads

In pushing or pulling a load, the best position of the hands should be near waist level. Even if this posture is employed, excessive effort should not be required. The situations cited below are considered as excessive:

(i) The use of about 250 Newton (N) for starting or stopping a load that is slid, rolled or supported on wheels. [250 N is approximately equivalent to the weight of a 25 kg object.]

(ii) The use of over 100 N for keeping such a load in motion. [100 N is approximately equivalent to the weight of a 10 kg object.]

If the position of the hands is above the shoulder or below the waist, the effective horizontal force exerted by the hands is gradually reduced. Thus, the employee has to adopt an awkward posture to push or pull the load. If there is an option to either push or pull, pushing is recommended.

(b) A risk of sudden movement of loads

If a load suddenly moves, and the operator is unprepared or is unable to retain complete control of the load, unpredictable stresses imposed on the body would increase the risk of injury.

(c) Frequent or prolonged physical effort

This can create a high risk of injury even if the loads are modest. For example, a repetitive task without rest increases the risk of injury.

(d) Insufficient rest or recovery periods

If the employee does not have enough rest, or if the recovery period is too short, the risk of injury increases. For instance, the same groups of muscles is exerted continuously when performing a task.

(e) A rate of work imposed by a process

When a worker lacks control over the pace of work, mild fatigue can become more pronounced, leading to a greater risk of injury. Moreover, having to meet tight deadlines and work during peak demand periods also contribute to higher risk.

2. The loads

(a) Heavy loads

(i) According to ILO Convention No. 127 and Recommendation No. 128, the maximum permissible weight should normally not be over 55 kg when an adult male worker transports a load without mechanical aids. For women and young workers, the maximum weight of a load should be substantially less than that permitted for an adult male worker.

(ii) The risk of back injury increases when a load over 16 kg is manipulated from a standing position. When a load less than or equal to 16 kg is manipulated without mechanical aids, the frequency of manipulation should be considered in the assessment. The following table gives some numerical guidelines:

Loads (kg)	Manual Handling Risk increases when frequency (in times/min.) exceeds
2-3	12
4-8	5
9-10	2
11-16	1

(If the weight of a load lies between two categories, classify this weight as in heavier category. For example, if the weight of a load is 3.5 kg, the reading of【4-8 kg】should be used.)

(b) Bulky or unwieldy loads

If a load to be lifted is too big or bulky, it will not be possible to handle it close to the body. In addition, a bulky load interferes with vision. When a worker has to carry such a big and bulky load, the size of the load should be reduced to enable the operator to hold it firmly and without difficulty.

The range of sizes of load is as follows:

(i) The object should be shorter than 50 cm;

(ii) The object should be less than 30 cm wide; and

(iii) The sum of any two of the object's dimensions should be less than 75 cm.

(c) Difficult-to-grasp loads

Large or round loads are difficult to grasp. If the surface of a load is smooth, wet or greasy, extra grip strength is also required and the risk of dropping the load and the likelihood of fatigue will increase.

(d) Unstable loads or loads with contents likely to shift

Stacking loads without order affects the stability of the group of loads during movement, and increases the risk of injury. Struggling patients or disturbed animals are examples of unstable loads. When containers are partially filled with liquid, the liquid inside will move in response to the containers' movements. As the centre of gravity changes, it becomes more difficult to carry the load and the risk of injury increases.

(e) Loads which are sharp, hot or otherwise potentially harmful

Such loads may impair grip and discourage good posture.

3. The working environment

☐ *Space constraints that prevent good posture*

A person working in a spatially constrained area is forced to adopt a poor posture. Examples of such areas are:

(i) those with height restriction, which will force the worker to stoop; and

(ii) constricted working areas, narrow doorways and aisles, which will aggravate the difficulty in handling bulky loads.

☐ *Uneven, slippery or unstable floors*

Working on uneven, slippery or unstable floors increases the risk of slipping, tripping and falling. Floors affected by spillage of water, oil, soap or food scraps increase the hazards of slipping. Handling loads on moving vehicles or mobile work platforms also causes difficulty and risks of injury.

☐ *Variations in the level of floors or work surfaces*

When a worker carries a load up or down steps or steep slopes, the risk of injury increases with the movement complexity. In addition, uneven work surfaces place a greater demand on lifting and lowering.

☐ *Extremes of temperature or humidity*

Consideration on the safety and health risks of workers working under extreme temperature and humidity is of utmost importance. The assessment is not solely for assessing the effect of such extreme conditions but also for recognizing the additional risk and effort required of manual handling operators in such conditions. Please refer to other relevant publications concerning the specific methods and information in assessing the risk of extreme temperature or humidity.

☐ *Conditions causing ventilation problems or gusts of wind*

Inadequate ventilation affects the air quality. On the other hand, high winds or powerful ventilation systems make large loads more difficult to manage.

☐ *Poor lighting conditions*

This aggravates tripping hazards. Any marked contrast between areas of bright light and deep shadow hinders the accurate judgment of height and distance. Auxiliary lighting may be required when the operator has to read the labels on the load. Please refer to "*Guidelines for Good Occupational Hygiene Practice in a Workplace*" published by the Labour Department for the Illuminance Standard.

4. Individual capability

(a) Operation requiring unusual strength or height, or other special physical characteristics

(i) In such cases, apart from the general assessment, a special method should be designed to assess the capabilities of the operator and the safety and health effects on the operator performing the task.

(ii) When a worker is away from work for an extended period, there may be a need for a period of adjustment for the worker to return to previous workload capacities and working rates.

(b) Operation creating a hazard to persons with a health problem or to pregnant women

The assessor should ask the manual handlers whether they suffer from back trouble, hernia or other health problems which may hinder their undertaking of manual handling operations. In addition, the assessor should find out whether they are recovering from surgery so that the assessor could ascertain whether such problems might increase the risk of injury of the manual handling operations. A doctor's advice should be sought if necessary. During pregnancy, hormonal changes can affect the ligaments, leading to increased susceptibility of injury. Furthermore, a pregnant woman will experience increased difficulty in holding a load close to her body as the pregnancy progresses.

(c) Operation requiring special information or training for its safe performance

In such cases, the assessor should confirm whether the employees have undertaken appropriate training or got sufficient information, so that they can safely perform the manual handling tasks. For example, employers should provide training on the safe use of mechanical aids.

5. Other matters

☐ *Movement or posture hindered by personal protective equipment or by clothing*

A tight or loose uniform will restrict movements, and adversely affect manual handling operations. Wearing bulky personal protective equipment will also increase stress on the body.

Part B: Findings

If TEN or more employees are normally employed at a workplace at any one time to perform manual handling operations which may create safety and health risks, assessment records should be kept. Information of employees who have performed the manual handling operations and a simple diagram indicating the positions and postures of employees at work and those environmental risk factors can be attached in the assessment records.

Part C: Conclusions and Follow-up

The responsible persons should provide preventive and protective measures according to the assessment result to minimise the risks of injuries after the assessment. In arranging for preventive and protective measures, the responsible persons could consider the allocation of resources and manpower, the problems encountered in providing the measures and the provision of training, etc.

Appendix VII:

Proper Lifting in General

Think First

- devise a safe carrying procedure according to the size, shape and weight of the object;
- clear the corridor or path of obstructions;
- use appropriate personal protective equipment;
- use mechanical aids or get help if there is any doubt.

Use Correct Lifting Posture

- start close to the object;
- bend knees, squat down, straddle the load to some degree, keep the back straight;
- grasp the object firmly so that your grip will not slip;
- hold the object close to the body and lift with the legs, slowly straightening them. After the legs are straight, bring them back to a vertical position;
- always lift smoothly and avoid jerky motions. Turn with the feet and never twist your back.

1. Devise a safe carrying procedure according to the size, shape and weight of the objects.

2. Use mechanical aids or get help if there is any doubt.

3. Start close to the object.

4. Bend knees, squat down, straddle the load to some degree, keep the back straight.

5. Grasp the object firmly so that your grip will not slip.

6. Hold the object close to the body and lift with the legs, slowly straightening them. After the legs are straight, bring them back to a vertical position.

7. Always lift smoothly and avoid jerky motions. Turn with the feet and never twist your back.

10/2010-3a-OHB59