



HEALTH AND SAFETY
AUTHORITY

Guide to the Safety, Health and Welfare at Work (General Application) Regulations 2007



Chapter 4 of Part 2:
Manual Handling of Loads

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**Guide to the
Safety, Health and Welfare at Work
(General Application)
Regulations 2007**

**Chapter 4 of Part 2:
Manual Handling of Loads**

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Guide to Chapter 4 of Part 2 of General Application Regulations 2007

Chapter 4 of Part 2: MANUAL HANDLING OF LOADS

Introduction

This Guide is aimed at safety and health practitioners, employers, managers, employees, safety representatives and others to give guidance on Chapter 4 of Part 2 (Regulations 68 and 69) and the related Schedule 3 to the Safety, Health and Welfare at Work (General Application) Regulations 2007 (S.I. No. 299 of 2007) relating to the manual handling of loads. The objective of the Guide is to give general guidance aimed at the prevention of occupational accidents or ill health. *It is not intended as a legal interpretation of the legislation.*

Chapter 4 of Part 2 of the General Application Regulations 2007 transpose EU Directive 90/269/EEC on the Manual Handling of Loads.

From 1 November 2007, Chapter 4 of Part 2 of the General Application Regulations 2007 replaces Part VI, Regulations 27 to 28, and the Eighth Schedule to the Safety, Health and Welfare at Work (General Application) Regulations 1993 (S.I. No. 44 of 1993) relating to Manual Handling of Loads, which are revoked from that date.

The General Application Regulations 2007 are made under the Safety, Health and Welfare at Work Act 2005 (No. 10 of 2005) referred to elsewhere in this Guide as the “2005 Act” or “the Act”.

In this Guide the text of the Regulations and Schedule is shown in italics.

The Regulations set out a framework for employers to avoid or reduce the risk of injury resulting from manual handling activities. The basic principle enshrined in this Part is that where manual handling of loads which involves a risk of injury (particularly to the back) is present, the employer must take measures to avoid or reduce the need for such manual handling.

The definition of manual handling in Regulation 68 refers to activities where the characteristics of the load pose a risk and the ergonomic conditions of the activity are unfavourable. Regulation 69(c) requires that a risk assessment be carried out on all work tasks which involve manual handling activity. The risk assessment process should ensure that these activities are assessed to identify risk factors and to decide on appropriate control measures, including both engineering and organisational, to avoid or reduce the risk of musculoskeletal injury. This assessment should critically review manual handling operations.

Full compliance with the requirements of Regulation 69 means that the employer completes a risk assessment of manual handling tasks in consultation with relevant staff, records the results of the risk assessment in a suitable documented format, puts appropriate control measures in place to avoid or reduce manual handling

activities and communicates the findings of the risk assessment to relevant staff.

Under the 2005 Act, employees are entitled to be consulted when protective measures related to manual handling are taken; this could include the provision of information and training on the use of new mechanical aids which are to be used to handle heavy loads. The provision of manual handling training on its own will not reduce injury rates. Manual handling training needs to be specific to the tasks involved. It should aim to ensure that employees understand the reasons for doing the job with least risk, that they can recognise the risks and decide the best way to go about it and can perform the task in that way. However, it is not a substitute for the reduction or avoidance of manual handling activities which involve risk. Manual handling training is only one part of an intervention approach which is primarily focused on the implementation of ergonomic control measures to avoid or reduce risk of musculoskeletal injury.

For further detailed guidance, please refer to the Health and Safety Authority's *Management of Manual Handling in the Workplace* (2005).

Regulation 68: Interpretation for Chapter 4 (of Part 2)

68. *In this Chapter, “manual handling of loads” means any transporting or supporting of a load by one or more employees and includes lifting, putting down, pushing, pulling, carrying or moving a load, which, by reason of its characteristics or of unfavourable ergonomic conditions, involves risk, particularly of back injury, to employees.*

These Regulations apply only to the manual handling of loads which involves risk of injury to employees. There will be situations where handling will not involve risk, an example would include the handling of a light load (5 kg) at waist height. In other situations a risk assessment of a manual handling activity may result in changes to a work system which eliminates the need for handling above shoulder height but still requires handling loads at a safe height. The term “load”, in addition to covering any object requiring to be lifted, moved etc. includes any person or animal.

Regulation 69: Duties of employer

69. *An employer shall—*

- (a) take appropriate organisational measures, or use the appropriate means, in particular mechanical equipment, to avoid the need for the manual handling of loads by the employer's employees,*

This Regulation requires the employer to organise the work to allow the use of mechanical or other means to avoid the need for the manual handling of loads by employees in the workplace.

Organisational measures may include designing or automating a work activity to eliminate the need for manual handling (e.g. arrange for wrapping or packaging in situ or bringing treatment to a patient rather than vice versa). It may also mean giving special consideration to the bulk purchase or movement of raw materials so as to eliminate the need to lift sacks or bags (e.g. flour, grain, powdered chemicals and animal feedstuffs or cement) and to introduce new arrangements (e.g. cement silos on building sites).

Employers must consider whether manual handling may be eliminated or reduced in the design of systems of work. At the outset the employer will need to carry out a full risk assessment of existing

manual handling tasks before making an informed decision on what manual handling tasks need to be avoided or reduced.

Where organisational measures alone cannot eliminate manual handling, the use of mechanical handling equipment must be considered. Where the weight of a load to be moved is too great or too awkward for the individual, and organisational measures are unsuitable, mechanical equipment must be used. The distance which a load needs to be carried and the frequency of lifting must also be considered. While the weight to be lifted may be well within the lifting capacity of the individual, the frequency of lifting or the distance involved may cause excessive strain on the body. All these factors must be considered as part of the risk assessment process, which is described in detail later in this Guide.

Table 1: Examples of solutions used to address manual handling

Issue	Risk factors	Solution
Manually raising beef carcass portions to a ceiling rail using a rope.	The load is too heavy.	Install an air-operated quartering hoist.
A maintenance task involved the handling of large 75 kg units from one machine to another.	The load is too heavy. The load is difficult to grasp.	Purchase a new unit to eliminate the need to transfer from one machine to the other and introduce a hoist.
A pallet, which is made up of 60 sacks of potatoes, is moved from one location to another with the aid of a hand pallet truck.	The load is too heavy.	Purchase an electric pallet truck to eliminate unnecessary manual handling.

Regulation 69(b): Duties of employer (continued)

- (b) *where the need for the manual handling of loads by the employer's employees cannot be avoided, take appropriate organisational measures, use appropriate means or provide the employer's employees with such means in order to reduce the risk involved in the manual handling of such loads, having regard to the risk factors specified in Schedule 3,*

When the manual handling of loads is unavoidable, steps must be taken, either by organisational or other means, to reduce the risk involved, taking account of the factors in Schedule 3 to the Regulations. These factors cover the characteristics (e.g. weight, shape, stability etc.) of the load, the physical effort required, the working environment, the requirement of the activity and individual risk factors.

Again as part of the risk assessment process, the emphasis will be on gaining an understanding of the tasks, collecting all relevant information and assessing the range of risk factors inherent in the task by considering the factors in Schedule 3. The risk factors present in a task will depend on the nature of the job and where it is performed. Weight is a very important factor but because of the variation in size, strength, age etc. of individual employees, it is not advisable to give examples of

maximum weights. Any risk of injury should be assessed in relation to the capacity of the individual employee.

Well-organised systems of work can reduce much of the need for manual handling of loads. Examples of control measures that can minimise the amount of manual handling include using forklift trucks to bring loads to and from the workstation, using scissor lifts or tables to raise loads to a comfortable working level or using trolleys to move heavy materials within the work area. Particular attention should be paid to ensuring systems of work and means to reduce manual handling in both fluid and changing workplaces (e.g. hospitals, supermarkets, building sites, mines or on board fishing vessels).

Table 2: Examples of solutions used to address manual handling

Issue	Risk factors	Solution
Operator has to remove product from a caged container.	This requires repetitive bending and over-stretching.	Source a container with a removable side, which allows the operator to reach the bottom without over-stretching or source a mechanical aid that allows the container to be raised at an angle thus reducing the bending activity.
Manually handling 50 kg sacks to hoppers.	The load is too heavy. The effort is made with the body in an unstable posture.	Provide scissors lifts with rotating turntables and reduce sack weight to 25 kg.
Nursing staff have to help infirm patients by supporting them to the bathroom and helping them in and out of the bath. The patients were awkward to handle and were heavy, presenting a considerable risk of back injury. There was not enough room to use a patient hoist.	Physical effort too strenuous. The physical effort is made with the body in an unstable posture.	After consultation, present proposed changes to the bathroom layout that create more space by replacing partitions with curtains, moving the bath away from the wall giving room to use the patient hoist and enabling staff to get to both sides of the bath.

Care should be taken when selecting equipment, containers, packaging etc., which are to be manhandled in the workplace and account taken of the physical capabilities of employees expected to handle them. The employer must consult with employees before purchasing equipment, containers, packaging etc., which are to be used in the workplace.

If a control measure such as the introduction of a mechanical aid is put in place, it is important that a risk assessment is completed to identify potential hazards in the use of the mechanical aid.

Suitable controls for the safe use of mechanical aids might include the provision of information and training on the use of aids, development of a preventive maintenance schedule to include all new mechanical aids and the development of safe traffic management procedures. The introduction of a

mechanical aid to avoid or reduce the risk of a musculoskeletal injury should not lead to other risks. This can be addressed by carrying out a risk assessment of new systems of work involving the use of mechanical aids or other organisational measures.

Regulation 69(c)(i): Duties of employer (continued)

- (b) *wherever the need for manual handling of loads by the employer's employees cannot be avoided, organise workstations in such a way as to make such handling as safe and healthy as possible, and—*
- (i) *taking account of the risk factors for the manual handling of loads specified in Schedule 3, assess the health and safety conditions of the type of work involved and take appropriate measures to avoid or reduce the risk, particularly of back injury, to the employer's employees,*

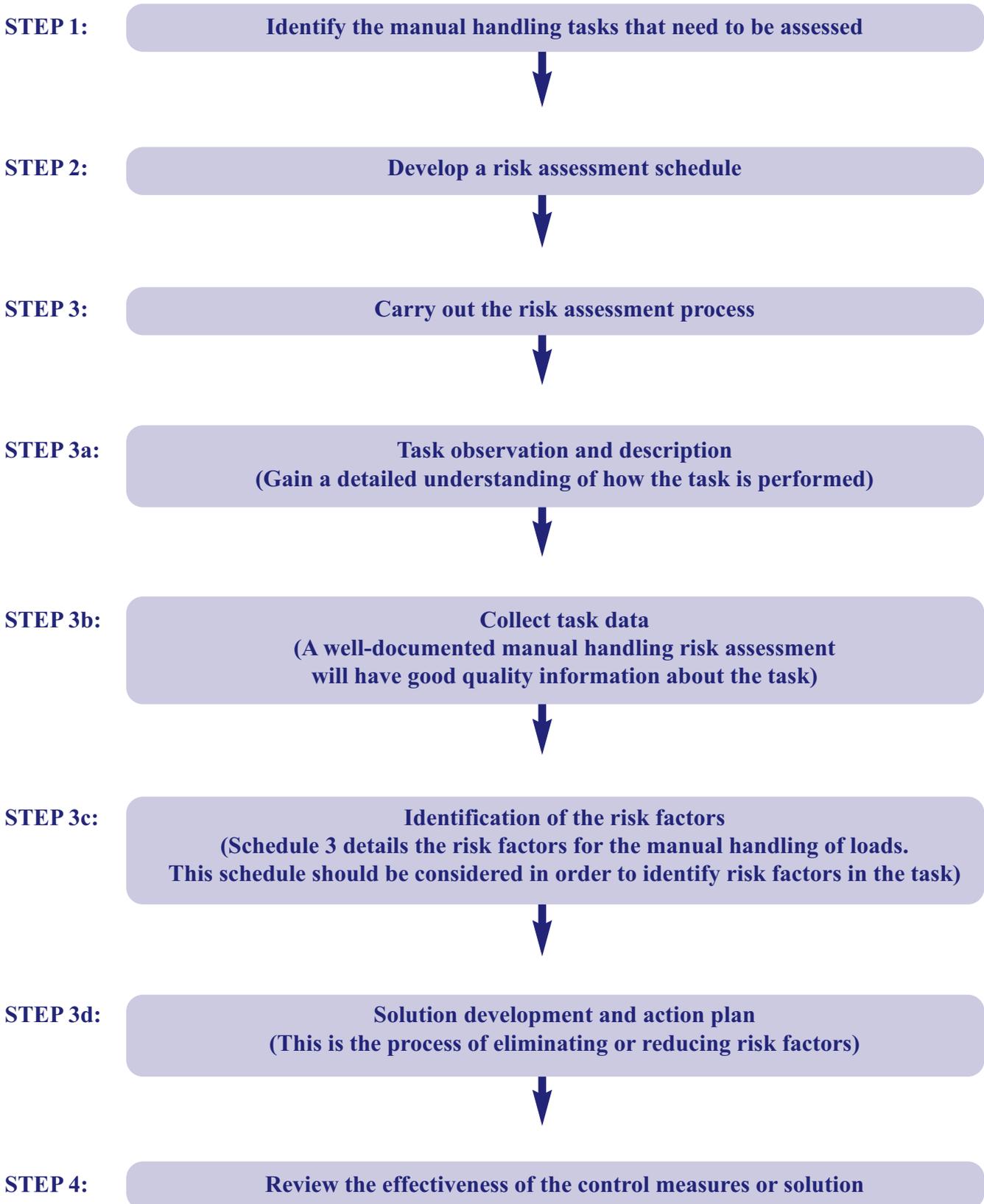
The Regulations set out a framework for employers to avoid or reduce manual handling activity. Employers must assess their manual handling operations and take steps to avoid or reduce the risk of injury. The risk may be avoided or reduced through the introduction of appropriate organisational measures, such as improved layout of work area to reduce unnecessarily long carrying distances, or the use of appropriate means, in particular mechanical equipment.

Risk assessment is a process which involves gaining a detailed understanding of a task being carried out, collecting all relevant technical details of the task, identifying if there are risk factors/hazards present, exploring what options or solutions are available to reduce or eliminate the risk factors/hazards and putting a plan in place to introduce the agreed control measures.

As already stated, the risk assessment process should ideally be completed at the design stage of a project so that efforts can be made at that stage to put appropriate measures in place to eliminate potential risk factors.

The process below incorporates hazard identification, assessment of risk and implementation of control measures. It supports the view that to assess manual handling activities effectively, it is necessary to study the task in detail, collect relevant information, identify and assess the risk factors/hazards having regard to Schedule 3 to the General Application Regulations and then implement appropriate solutions or control measures.

Table 3: Summary of the risk assessment process



Step 1: Identify the manual handling tasks that need to be assessed

A list should be put together of all tasks being performed on site where manual handling activity is a key component of the task. Consultation with workers and safety representatives may provide further information about key tasks that need to be assessed. Finally, a walk-through audit should be carried out at the workplace to become familiar with the tasks that are performed and to identify any further task to be assessed that was not already identified.

Step 2: Develop a risk assessment schedule

A plan should be put in place that will identify what tasks are going to be assessed and when the assessments are going to be completed. The plan should also identify why the assessments are being carried out. For example:

“A full risk assessment is being carried out in Plant A to address manual handling, to ensure that reasonable efforts are being made to avoid or reduce manual handling activity which involves risk. A schedule is enclosed which details when these assessments are to be completed. There will be widespread consultation during this process to invite feedback from relevant parties in identifying problem tasks, learning more about how tasks are performed and exploring possible improvement.”

Step 3: Carry out the risk assessment process

This Guide intends to give general advice on how a manual handling risk assessment should be conducted. The key stages in this process are outlined below.

Step 3a: Task observation and description

The objective at this stage is to gain a detailed understanding of how the task is performed and to identify the sub-tasks that contribute to the completion of the overall task. Invariably it is these sub-tasks which will give valuable information about any manual handling activity component in the task.

For example, a task described as only involving a single manual handling activity – removing a device from a machine for maintenance – turned out on closer examination to involve six manual handling activities when the sub-tasks had been identified:

- Manually lift transfer unit from machine onto floor.
- Manually lift replacement unit from trolley onto the machine.
- Manually lift transfer unit from floor onto trolley.
- Manually push trolley into the workshop for maintenance.
- Manually lift transfer unit from trolley onto the worktable.
- Manually lift transfer unit onto trolley after completion of maintenance.

Each of these sub-tasks is likely to have its own pattern of risk factors which should be examined and addressed.

A study of the task should be a team effort and should include input from the worker as well as those conducting the assessment. Workers have first-hand knowledge and a unique understanding about particular aspects of the task.

In most cases employers should be able to carry out the assessment themselves or to delegate it to others in their organisation. A meaningful assessment can only be based on a thorough practical understanding of the type of manual handling tasks to be performed. Employers and managers should know about the manual handling that takes place in their organisation.

While one individual may be able to carry out an assessment in a straightforward case, it may be necessary to draw on the knowledge and expertise of others. The team conducting the risk assessment must be properly trained in the performance of manual handling risk assessments, be familiar with basic ergonomic principles, understand the legislation, be able to recognise risk factors and be able to decide on appropriate control measures.

Where expertise is not available within the company to assess manual handling tasks or to decide on the most appropriate control measures, the employer is obliged to obtain the services of a competent person while maintaining an involvement in the risk assessment process.

Step 3b: Collect task data

A well-documented manual handling risk assessment will have good quality information about the task, which will include both technical information and general information. It is likely that much of this data will already be available as a result of the task observation stage. The form in Appendix 1 could be used to document the findings of a manual handling risk assessment and the checklist in Appendix 2 may be used as an *aide-mémoire* when carrying out the assessment of risk. Appendix 3 gives examples of how to avoid or reduce the risk factors for the manual handling of loads.

Examples of technical information include data on load weights, physical measurements of a work area, dimensions of load, number of manual lifts in a task, light levels, noise levels, frequency of activity (lifts per min/hour/day) and duration. It is not an exhaustive list and a good understanding of the task will produce good quality technical information about the task.

Examples of other information that may be collected include the type of personal protective equipment provided, level of consultation with workers, postures observed (bending, reaching or twisting), quality of work surface, number of staff performing the task, types of aids provided if any, and drawings of the layout of the work area.

The quality of information collected at this stage of the risk assessment process will depend on how well the process was planned and what procedures were used to collect information. Procedures for collecting such information include direct observation of workers performing the task, special questionnaires or interviews, use of video recorders or camera, and direct measurement of key data with appropriate equipment including weighing scales, noise meters, light meters and tape measure.

Photographs of key sub-tasks should be included in the risk assessment documentation as this will be of assistance during the process of identifying risk factors.

Step 3c: Identification of the risk factors

A great deal of ergonomic research has been conducted to identify workplace factors that contribute to the development of musculoskeletal disorders including back injury. (*Elements of Ergonomics Programmes*, NIOSH, 1997). The National Institute of Occupational Safety and Health (NIOSH) has summarised the epidemiological scientific studies that show a relationship between specific work activities and the development of back injuries and other musculoskeletal disorders.

Schedule 3 to the General Application Regulations, details the risk factors for the manual handling of loads. The manual handling Regulations require the employer to have regard to the factors specified in Schedule 3 when assessing manual handling activities. This allows the employer to identify what risk factors are present in the manual handling activity being assessed. Schedule 3 includes individual risk factors that need to be considered, for example whether the person is physically suited to carry out the task in question and if he or she is wearing unsuitable clothing, footwear or other personal effects. It is important to highlight that a combination of risk factors can be observed in an activity, for example an individual may be required to lift a very heavy load above shoulder height in a restricted space which requires a twisting motion.

A number of risk factors in Schedule 3 are outlined below and guidance is given on how to interpret the risk factor through the use of examples.

(i) The characteristics of the load

The manual handling of a load may present a risk particularly of back injury if:

- The load is too heavy
- The load is too large
- The load is unwieldy or difficult to grasp
- The load is unstable or has contents likely to shift
- The load has to be held at a distance from the trunk.

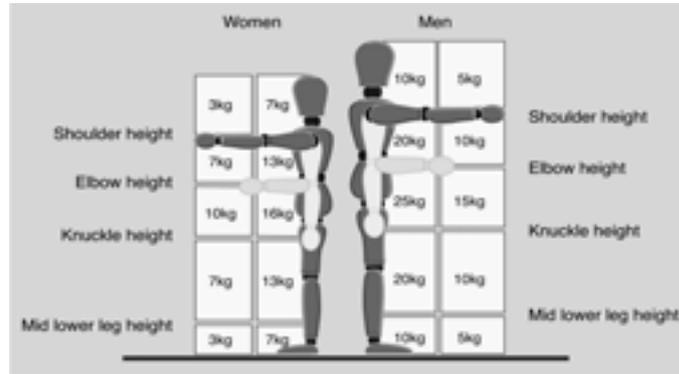
Risk factor: The load is too heavy.

The Regulations set no specific requirements such as weight limits; the ergonomic approach shows clearly that such requirements are based on too simple a view of the problem. However, this Guide does offer numerical guidelines, which take into account weight, repetition and location of lift as a means of identifying activities which involve risk. In using the guideline weights in Figure 1, the assessor should take account of the nature of the work activities and have an appreciation of what realistic improvements can be put in place to avoid or reduce risk. In some situations it may not be possible to use a mechanical aid and other interventions should be considered.

When assessing manual handling activities it is important to keep in mind that weight is not the only factor that needs to be considered. Other factors that should be considered include repetition, individual capacity, posture and the work environment.

The guideline weights can be used to determine if the load is too heavy. Working outside these guidelines is likely to increase the risk of injury. In Figure 1, each box contains a guideline weight for lifting and lowering in that zone; if the load weight is greater than the guideline weight within the specific work zone then there is an increased risk of injury. As can be seen the guideline weights are reduced if handling is done with the arms extended, or at high or low levels, as this is where injuries are most likely to occur.

Figure 1: Guideline lifting and lowering weights by work zone



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Observe the work activity being assessed and compare it to the diagram. Decide which box the lifter’s hands pass through when moving the load. Then assess the load weight being handled. If the load weight is less than the figure given in the box, the operation is within the guidelines. If the load weight is greater than the figure in the box then there is an increased risk of injury. If the lifter’s hands enter more than one box during the operation, then the smallest weight figure applies.

For example, a man is lifting a load weight of 40 kg: The man is lifting it close to his body and he lifts the load from floor level to knuckle height. In looking at the guideline weights it is evident that the lifter’s hands enter more than one box during the operation, therefore the smallest weight figure applies. In this case the smallest weight is 10 kg. Therefore the conclusion is that there is an increased risk of injury as the load weight is greater than the guideline figure and it is not a safe load in any of the categories given. It is important to look at the activity in more detail to identify what control measures can be put in place to avoid or reduce the risk of injury.

Key points on the use of the guideline weights:

- The guideline weights assume that the load is readily grasped with both hands and that the operation takes place with the lifter in a stable body position
- The guideline weights are for infrequent operations up to about thirty operations per hour, where the pace of work is not forced, adequate pauses to rest or use different muscles are possible and the load is not handled by the lifter for any length of time.

Table 4: Reduction of weights for repeated operations

Where operations are repeated	Weight guidelines should be reduced by
Once or twice per minute	30%
Five to eight times per minute	50%
More than twelve times per minute	80%

Source: Health and Safety Executive, 2004

Risk factor: The load is too large.

A load, which was 90 centimetres had to be lifted down a stairwell to another store location. In general, if any dimension of the load exceeds about 75 cm, its handling is likely to pose an increased risk of injury and is too large for one person to handle.

Risk factor: The load is unwieldy or difficult to grasp.

The shape of the load will affect the way it can be held. For example, if the bottom front corners of the load are not within reach when carried at waist height it will be harder to get a good grip. Loads which are unwieldy or difficult to grasp include loads with dimensions which exceed 75 cm, loads with sharp edges, loose contents and loads which require the use of gloves or which do not have designated handles with adequate clearance. The bulk of the load can also interfere with vision; the risk assessment needs to take account of the increased risk of slipping, tripping or falling.

Risk factor: The load is unstable or has contents likely to shift.

If the load is unstable, lacks rigidity or has contents likely to shift, the stresses arising during the manual handling will be less predictable and the instability may impose sudden additional stresses for which the handler is not prepared. This is particularly true if the handler is unfamiliar with the load and there is no cautionary mark on it.

Risk factor: The load has to be held at a distance from the trunk.

For example, a tool weighing 20 kg was placed in a machine and this required the individual to over-reach when positioning the tool and fixing it in position in the machine. As the load was moved away from the trunk the level of stress increased on the lower back. As a guide, holding a load at arm's length imposes about five times the stress experienced when holding the load close to the trunk.

(ii) Physical effort required

A physical effort may present a risk particularly of back injury if:

- The physical effort is too strenuous
- The physical effort involves a twisting movement of the trunk
- The physical effort is likely to result in sudden movement
- The physical effort made with body in an unstable posture.

Risk factor: The physical effort is too strenuous.

A meat carcass weighing 120 kg is manually lifted from a truck and carried to a wash area where it is hooked onto a scale. The physical effort would be considered too strenuous if the weights being handled are outside the guideline weights detailed in Figure 1 and the system of work requires the handling of a load with the back bent or twisted.

Risk factor: The physical effort involves a twisting movement of the trunk.

Stress on the lower back is increased significantly if twisted trunk postures are adopted or where a person twists while supporting a load.

Risk factor: The physical effort is likely to result in sudden movement.

Product has to be removed from a stock location, the operator starts to remove the initial load from the racking, and the load is jammed and is difficult to remove. The load suddenly becomes free and the handler is unprepared or cannot retain complete control of the load. In the health care sector there is also the associated risk factor, which can be described as a momentary lapse of physical co-ordination. A typical example would be:

“I was doing a lift I do every day but I was distracted and did it awkwardly and felt my back give”.

Risk factor: The physical effort made with body in an unstable posture.

This refers to the posture which a person must maintain when carrying out a manual handling activity. A load may have to be lifted above shoulder height for a prolonged period of time, an operation may require a person to bend repetitively to take a product from a cage or a person may have to stand on a stool while carrying out a manual handling operation.

(iii) Characteristics of the working environment

The characteristics of the work environment may increase a risk particularly of back injury if:

- There is not enough room, in particular vertically, to carry out the activity or the place of work prevents the handling of loads at a safe height or with good posture
- The floor is uneven, thus presenting tripping hazards or is slippery in relation to the employee’s footwear. The floor or footrest is unstable
- The place of work or the work environment prevents the handling of loads at a safe height or with good posture by the employee
- There are variations in the level of the floor or the working surface requiring the load to be manipulated on different levels
- The temperature, humidity or ventilation is unsuitable.

Risk factor: There is not enough room, in particular vertically, to carry out the activity or the place of work prevents the handling of loads at a safe height or with good posture.

An operator has to transfer product from one room to another and has to lift product through a narrow aisle which requires her to continuously manipulate the load. The importance of maintaining good postures during the lifting and handling of a load has already been highlighted. However, the working environment may interfere with the postures adopted by the operator which in turn may increase risk when he or she attempts to move an object. Minimal space either around or above an operator will make the movement difficult.

Risk factor: The floor is uneven, thus presenting tripping hazards or is slippery in relation to the employee’s footwear. The floor or footrest is unstable.

An example could include a floor surface which has cracks and small potholes that do not allow safe movement of materials or mechanical aids. A floor on which there is oil, powder or granules may cause problems when handling loads. It also relates to the need for good housekeeping in order to reduce the risk of slips, trips and falls.

Risk factor: The place of work or the work environment prevents the handling of loads at a safe height or with good posture by the employee.

The task may require the employee to reach upwards to handle a load which places more stresses on the arms and back and will result in less control of the load. The environment may require the employee to bend repetitively to obtain a load; this posture will result in undue stress on the lower back. In such cases the environment prevents the handling of loads at a safe height, also low work surfaces or restricted headroom will result in a stooping posture. Furniture or other obstructions may increase the need for twisting or leaning and constricted work areas will hinder the movement of bulky loads.

Risk factor: There are variations in the level of the floor or the working surface requiring the load to be manipulated on different levels.

The presence of steps or steep slopes may increase the risk of injury by adding to the complexity of movement when handling loads. Excessive variation between the heights of work surfaces will increase the range of movement, especially if the variation is large and requires movement of the load from floor level to shoulder height or beyond.

Risk factor: The temperature, humidity or ventilation is unsuitable.

As long as a hot work climate is not uncomfortable, the warm environment will not affect light physical work or mental task performance. However, as the temperature rises above the comfort level, problems may arise which could impair workers efficiency. It may be assumed that at 18 to 24 degrees Celsius the relative humidity can fluctuate between 30% and 70% without creating thermal discomfort. Table 5 gives guidance on recommended room temperatures for various activities.

Table 5: Recommended room temperature for various types of work

Type of work	Temperature (°C)
Sedentary mental work	21
Sedentary light manual	19
Standing light manual	18
Standing heavy manual	17

Source: Grandjean, 1997

(iv) Requirements of the activity

The activity may present a risk particularly of back injury if it entails one or more of the following requirements:

- Over-frequent or over-prolonged physical effort involving, in particular, the spine
- There is insufficient bodily rest or recovery period
- There is excessive lifting, lowering or carrying distances
- A rate of work imposed by a process which cannot be altered by the employee.

Risk factor: Over-frequent or over-prolonged physical effort involving, in particular, the spine.

As stated already, the effects of repetitive motions from performing the same work activities are increased when awkward postures and forceful exertions are involved. Ideally, efforts should be made to avoid or reduce the handling of loads from floor level or above shoulder height and to store heavier loads at waist height. The activity is considered repetitive if cycle time is two minutes or less and is repeated throughout a shift and highly repetitive tasks have cycle times of thirty seconds or less.

Risk factor: There is insufficient bodily rest or recovery period.

Rest or recovery in a job is not synonymous with full cessation of activity or a scheduled work break. A rest phase may be any period of light activity, such as record-keeping, that alternates with more demanding activities.

Risk factor: There is excessive lifting, lowering or carrying distances.

The lift and lowering distance can be important; large distances are more physically demanding. Lifting over a large distance necessitates a change of posture and involves moving through different zones. Lifting capacity changes due to moving from one zone to another. Lifts beginning or ending at floor level or above shoulder height are in the least preferred zones where lifting capacity is at the lowest level.

Carrying activities, even though less pervasive than manual lifting, are still being performed routinely in the workplace. If a load may be safely lifted and lowered it may also be carried without endangering the back. As a guide, if a load is carried further than 10 metres, the physical demands of the carrying activity will predominate and lifting capacity will be reduced (Health and Safety Executive, 1992 Manual Handling. Manual Handling Operations Regulations 1992 (as amended) HSE Books).

Risk factor: A rate of work imposed by a process which cannot be altered by the employee.

Care is needed where the handler cannot vary the rate of work. Mild fatigue, which might quickly be relieved by a momentary pause or a brief spell doing another operation using different muscles, can soon become more pronounced, leading to an increased risk of injury.

(v) **Individual risk factors**

The employee may be at risk if:

- He or she is physically unsuited to carry out the task in question
- He or she is wearing unsuitable clothing, footwear or other personal effects
- He or she does not have adequate or appropriate knowledge or training.

The outcome of the risk assessment under Regulation 69 and its relationship to an individual employee

is the required basis for judging individual risk factors. Reference must be made to the guideline weight template in determining whether or not load weights are potentially hazardous.

The clothing, footwear etc. worn by employees must not impede safe manual handling, i.e. avoid slippery gloves, very light footwear and loose clothing that may snag during lifting but ensure clothing does not limit movement by being too tight

The provision of manual handling training on its own does not meet the requirements of Regulation 69. Manual handling training needs to be specific to the tasks involved. It should aim to ensure that the employee understands the reasons for doing the job with least risk, can recognise the risks and decide the best way to go about it and can perform the task in that way. However, it is not a substitute for the reduction or avoidance of manual handling activities which involve risk.

The following should also be considered when assessing the capacity of the individual employee to handle goods manually. Before starting manual handling:

- Has the employee had any back pain in the past?
- Is the employee pregnant?
- Does the employee lack musculoskeletal mobility/flexibility?
- Has the employee any reservations about his or her lifting ability?
- Is the employee generally fit?
- Does the employee appear to be physically capable of doing the manual handling jobs assigned to them?
- Does the employee experience any pains or other discomfort during or after manual handling?
- Has back pain been a cause of absenteeism?

If the employer has any doubt about any of the above issues reference should be made to a competent health professional for further assessment.

Step 3d: Solution development and action plan

The risk factors which are inherent in the task that has been assessed need to be documented and evidence of each risk factor should be outlined. Appendix 4 gives a worked example of a manual handling risk assessment.

The development of solutions is the process of eliminating or reducing assessed risk factors. The employer should carry out this process in consultation with the workers doing the task.

It is necessary to evaluate the controls that are feasible for each problem. The rationale for deciding on a control measure must be clearly documented in that it should outline why other control measures were not possible and how the suggested control measure will avoid or reduce risk of injury.

The introduction of any control measure such as a mechanical aid or a new work

layout means the introduction of a new system of work. Therefore the new system of work must also be assessed to ensure that any new hazards are identified and controlled.

Finally, a plan of action must be put in place to identify what changes are planned, to allow people time to adjust to the changes and to communicate all the changes to all relevant personnel. Consultation is necessary at this stage to ensure that all parties are working together to determine whether the recommended control measures are practical, to solicit feedback on other possible controls and to ensure the effective implementation of the plan of action.

Step 4: Review the effectiveness of the control measures or solution

Effectiveness is the degree to which the control measures have avoided or reduced the risk of injury. This will depend on how timely the changes were implemented and the level of worker acceptance. The timeliness is the time before the risk factors are reduced or eliminated. This is usually the time it will take to implement a control measure fully, including the time required for the control measure to work effectively (e.g. with a work methods change, the workers may not fully embrace the new method). Whether or not the workers accept and use the solution is a key measure of the effectiveness of a control measure.

Below is a worked example which demonstrates a manual handling risk assessment process.

Task observation and description:

An assessor gains a detailed understanding of how the task is performed:
An employee prepares to move a large barrel (80 kg) manually, he grips the barrel and tilts the barrel slightly and rolls the barrel into position.

Collect task data:

The assessor collects technical information related to this task:
Weight of load: 80 kg
Frequency of lift: 3 lifts/hour.

Identification of risk factors:

The assessor consults with those doing the job and other relevant staff in identifying the risk factors:
The load is too heavy: 80 kg
The physical effort is too strenuous
The load is difficult to grasp.

Solution development and plan of action:

The assessor in consultation with others agrees on the development of a new system of work and a plan is put in place to identify what follow-up action is required.
In the new system of work the worker uses a mechanical aid to move the barrel.

Action Plan:

Source new mechanical aid	Safety Manager	April 07
Carry out a risk assessment of the new system of work	Safety Manager	April 07
Train staff in use of new mechanical aid	Training Co-ordinator	April 07

Review the effectiveness of control measures:

The assessor will review the new system of work to ensure it is operating effectively.

Further examples of manual handling case studies can be viewed on the Health and Safety Authority's website at www.hsa.ie

Regulation 69(c)(ii): Duties of employer (continued)

(iii) ensure that particularly sensitive risk groups of employees are protected against any dangers which specifically affect them in relation to the manual handling of loads and the individual risk factors, having regard to the risk factors set out in Schedule 3,

Manual handling has significant implications for the health of a pregnant worker, particularly if combined with long periods of standing. As pregnancy progresses, and particularly during the last three months, it becomes more difficult to achieve and maintain good postures and this further reduces manual handling capability. Particular care should also be taken for women who may handle loads during the three months following a return to work after childbirth.

When assessing the needs of sensitive risk groups of employees, and depending on the degree of risks involved, special attention needs to be given to groups such as:

- Young workers who through lack of experience may be at higher risk
- Pregnant woman (see also Chapter 2 of Part 6 of the General Application
- Regulations relating to the protection of pregnant, post-natal and breastfeeding employees)
- People with reduced mobility
- New or inexperienced workers, who may be less agile or alert
- Persons with particular serious problems.

Regulation 69(c)(iii): Duties of employer (continued)

(iii) ensure that where tasks are entrusted to an employee, his or her capabilities in relation to safety and health are taken into account, including, in relation to the manual handling of loads by employees, the individual risk factors set out in Schedule 3, and

The outcome of the risk assessment under Regulation 69 and its relationship to an individual employee is the required basis for judging individual risk factors. Reference must be made to the guideline weight template in determining whether or not load weights are potentially hazardous.

Clearly an individual's state of health, fitness and strength can significantly affect the ability to perform a task safely.

Regulation 69(c)(iv): Duties of employer (continued)

- (iv) when carrying out health surveillance in relation to the manual handling of loads by employees, take account of the appropriate risk factors set out in Schedule 3, and*

Health surveillance means monitoring an employee's state of health having regard to the type of work involved and the risks to the employee's health arising from the work. The risk assessment of manual handling activities should put appropriate control measures in place to avoid or reduce the risk of back injury.

Health surveillance monitoring may include consideration of the following:

- Has the employee any musculoskeletal pain?
- Is the employee pregnant?
- Does the employee lack musculoskeletal mobility/flexibility?
- Has the employee any reservations about his or her lifting ability?
- Is the employees generally fit?
- Do employees experience any pains or other discomfort during or after manual handling?
- Has back pain been a cause of absenteeism?

If the employer has any doubt about any of the above issues reference should be made to a competent doctor for further assessment.

Regulation 69(d): Duties of employer (continued)

- (d) without prejudice to section 9 of the Act, ensure that those of the employer's employees who are involved in manual handling of loads receive general indications and, where possible, precise information on—*
- (i) the weight of each load, and*
 - (ii) the centre of gravity of the heaviest side when a package is eccentrically loaded.*

The requirements under section 9 of the Act to provide information to employees and safety representatives on safety and health matters are made more explicit here with regard to information to be provided on loads which are manually handled. Where practical, the precise information on the weight of each load should be given to employees.

In practice, this information is mostly available from the weight markings on the load itself. Otherwise the employer must determine and indicate the weights. Where precise weights are not available, as a minimum, general indications must be given through instruction or information or by using warning signs. Heavy weights, out of the ordinary, should in general carry a warning sign. The result of the risk assessment of manual handling tasks needs to be shared with relevant employees. This may involve the provision of information and training appropriate to the implementation of control measures. It could include instruction on the safe use of mechanical aids and information on organisational measures to be put in place.

In addition, when a package is eccentrically loaded its centre of gravity should be indicated to employees, e.g. boxes containing goods where the centre of gravity is off centre, boxes of bottles or glasses, mechanical equipment which has to be pushed, pulled or carried, motorised hedge cutters, washing machines, televisions.

SCHEDULE 3

Regulation 69

RISK FACTORS FOR MANUAL HANDLING OF LOADS

1. *Characteristics of the load*
The manual handling of a load may present a risk particularly of back injury if it is:
 - : too heavy or too large,*
 - unwieldy or difficult to grasp,*
 - unstable or has contents likely to shift,*
 - positioned in a manner requiring it to be held or manipulated at a distance from the trunk, or with a bending or twisting of the trunk, or*
 - likely, because of its contours or consistency (or both), to result in injury to employees, particularly in the event of a collision.*

2. *Physical effort required*
A physical effort may present a risk particularly of back injury if it is:
 - too strenuous,*
 - only achieved by a twisting movement of the trunk,*
 - likely to result in a sudden movement of the load, or*
 - made with the body in an unstable posture.*

3. *Characteristics of the working environment*
The characteristics of the working environment may increase a risk particularly of back injury if:
 - there is not enough room, in particular vertically, to carry out the activity,*
 - the floor is uneven, thus presenting tripping hazards, or is slippery in relation to the employee's footwear,*
 - the place of work or the working environment prevents the handling of loads at a safe height or with good posture by the employee,*
 - there are variations in the level of the floor or the working surface, requiring the load to be manipulated on different levels,*
 - the floor or foot rest is unstable, or*
 - the temperature, humidity or ventilation is unsuitable.*

4. *Requirements of the activity*
The activity may present a risk particularly of back injury if it entails one or more of the following requirements:
 - over-frequent or over-prolonged physical effort involving in particular the spine, an insufficient bodily rest or recovery period,*
 - excessive lifting, lowering or carrying distances, or*
 - a rate of work imposed by a process which cannot be altered by the employee.*

5. *Individual Risk Factors*
The employee may be at risk if he or she:
 - is physically unsuited to carry out the task in question,*
 - is wearing unsuitable clothing, footwear or other personal effects, or*
 - does not have adequate or appropriate knowledge or training.*

APPENDIX 1

Manual Handling Risk Assessment Document

A Guide on the Key Aspects of Manual Handling Risk Assessment

This document outlines examples of the type of information which may be collected when putting together a risk assessment. Each risk assessment is unique and not all information is applicable in each situation. However, the headings given should act as an aid in trying to follow a structure in the risk assessment process.

Note: This is not an exhaustive list.

Task description:

This involves obtaining a detailed description of the job and a breakdown of the key stages of the job.

Technical details:

This involves collecting all relevant technical data. Examples include:

- Information on physical heights of workstations, reach distances, load weights and load dimensions and environmental aspects such as temperature/humidity/noise etc.
- Information on equipment used, including the type of guarding, availability of an instruction manual or the training needed to operate the equipment safely.
- Information on duration of task, frequency and number of staff involved.
- Photos of critical aspects of the job and video analysis of stages of the job.

Note: This is not an exhaustive list.

Photographs/drawings/schematics:

Photographs should demonstrate the activities in each stage of the job. Drawings/schematics should be clear and simple and detail the physical dimensions of the work area.

Assessment of the task:

(Use the checklist in Appendix 2 as an *aide-mémoire*)

This is where the job is analysed in detail to identify relevant risk factors at each stage of the task. There is a need to refer to Schedule 3 to the General Application Regulations and the template of guidance weights in figure 1.

Once risk factors are identified it is then necessary to ask: *Can they be avoided?*

If risks can be avoided one needs to detail how they can be avoided and also determine if the control measures will introduce new risks. The control measures need to be assessed to avoid or reduce the likelihood of new risks.

For example, provide training in use of machinery, ensure machinery is guarded and its use is supervised and also ensure maintenance of the machinery.

If the risk cannot be avoided it is then necessary to explore if the risk factors can be reduced. If the risks can be reduced, one needs to identify suitable controls and assess any risks which might result from the introduction of such controls.

Manual handling training must be provided for relevant staff and must meet the requirements as set out previously in this Guide.

Other factors to consider include the role of designers, manufacturers and suppliers in providing control measures to avoid or reduce risk factors.

Solution development and plan of action:

The appropriate solutions need to be assessed and approved prior to developing a plan of action. Once the appropriate solutions are identified one needs to document clearly all the actions needed to implement the solution. This should identify who is responsible and what is the expected completion date.

Communication and consultation is critical in dissemination of information such as specifications of changes needed, training needs, maintenance requirements for equipment, instructions for in-house purchasers of equipment, instructions to designers/engineers on issues raised and information supplied to medical people.

Review of effectiveness of changes:

This involves checking to ensure changes are in place and working well, and regular supervision.

APPENDIX 2

Risk Assessment Checklist

Risk factor	Example
The load is too heavy.	A person has to lift manually a machine part weighing 70 kg from floor level to waist height. See Figure 1: Guideline weights (see p. 12)
The load is too large.	A load, which was 90 Centimetres long had to be lifted down a stairwell.
The load is unwieldy or difficult to grasp.	This includes loads with dimensions which exceed 75 cm, loads with sharp edges and loose contents. Another example could be a patient who has the potential to fall over while being escorted in a hospital setting.
The load has to be held a distance from the trunk.	A person had to over-reach when lifting a heavy load and positioning it into a machine.
The physical effort is too strenuous.	A meat carcass weighing 120 kg is manually lifted from a truck.
The physical effort is only achieved by a twisting movement of the trunk.	A person has to lift a load from a pallet onto a conveyor with restricted room for movement, which only allows a twisting movement of the trunk.
The physical effort is likely to result in a sudden movement.	A person starts to remove a load from racking which is jammed. The load suddenly comes free and the handler is unprepared and cannot control the load.
The physical effort is made with the body in an unstable posture.	A person stands on a stool while carrying out a manual handling activity.
There is not enough room, in particular vertically, to carry out the activity. The place of work prevents the handling of loads at an unsafe height.	A person has to lift product through a narrow aisle. A person has to stack a pallet with product, which requires lifting loads above shoulder height to position them on the pallet.
The floor is uneven or is slippery or the floor or footrest is unstable.	A floor surface with cracks which makes it difficult to move loads with a pallet truck.
The temperature, humidity or ventilation is unsuitable.	See guidelines in Table 5 (see p. 16).
Over-frequent or over-prolonged physical effort involving in particular the spine.	A person is involved in a task which involves scooping product into a container while bending the back for long periods of time.
There is insufficient bodily rest or recovery period.	A rest phase may be any period of light activity, such as record-keeping, that alternates with more demanding activities.
There is excessive lifting, lowering or carrying distances.	Lifts of heavy loads beginning or ending at floor level or above shoulder level height should be avoided.

APPENDIX 3

Examples of How to Avoid or Reduce the Risk Factors for Manual Handling of Loads

1. Characteristics of the load

Where a manual handling hazard and a risk particularly of back injury has been identified, the control measures necessary to reduce the risk may be evident from the answers to the following questions:

- (a) Can being packaged in smaller containers or packages make the load lighter?
- (b) Can the load be made less bulky so that it can be handled closer to the employee's body?
- (c) Can the shape or surface texture of the load be changed to make it easier to grip?
- (d) Could the surface be cleaner or cooler, or the edges less sharp, so that the employee can hold the load against the body?
- (e) Can handles be provided, or some type of sling used to move the load?
- (f) Is the load designed, or the material packaged, so that it will not shift unexpectedly while it is being moved?

Note that particular attention should be paid to the handling of live animals or humans. Persons or animals can either hinder or aid the manual handler (e.g. cooperative patients as against disturbed patients). Additional forces and control measures may need to be applied (e.g. team handling).

2. Physical effort required

Where the physical effort required poses a risk of injury, the following control measures should be helpful in reducing it .

Lifting and lowering forces can be reduced by:

- (a) Using lifting tables, forklifts, cranes, hoists, balances, drum and barrel dumpers, work dispensers, elevating conveyors and similar aids, raising the work level, lowering the position of the employee and using gravity dumps and chutes.
- (b) Reducing the weight involved by reducing load size (specifying to suppliers, for example, in regard to size of packaging), reducing capacity of containers, reducing the weight of the container, reducing the load in each container and reducing the number of objects lifted or lowered at one time.

- (c) Reducing the extent of the holding position away from the body by changing the object shape, providing suitable grips or handles, providing greater access to the load and improving workplace layout.
- (d) Converting to pushing or pulling.

Pushing and pulling forces can be reduced by:

- (a) Eliminating the need to push or pull by using powered conveyors, powered trucks, movers, slides, rollers or chutes.
- (b) Using non-powered conveyors, air bearings, ball castor tables, monorails and similar aids; wheel hand trucks, hand trolleys with good bearings and large diameter wheels or castors appropriate to the particular surfaces on which mechanical pushers or pullers are used.
- (c) Reducing the distance of push or pull by improving work area layout, relocating production or storage area or similar change in the system of work.

Carrying forces can be reduced by:

- (a) Converting to pushing or pulling by use of conveyors, air bearings, ball castor tables, monorails, slides, chutes and similar aids, forklifts, two or four-wheel hand trucks, trolleys and similar equipment.
- (b) Reducing the capacity of containers, container weight, container load and the number of objects carried at one time.
- (c) Reducing carrying or transport distance by improving work area layout, relocating storage or production area, or similar changes in the system of work.

Holding forces can be reduced by:

- (a) Reducing weight or size of load.
- (b) Reducing holding time.
- (c) Eliminating holding by using, for example, jigs and fixtures.
- (d) Using mechanical loading and unloading.

Principles involved in minimising the risk of injury when applying force include:

- (a) Pushing/pulling is more efficient if applied at or around waist level.
- (b) Pushing in/pulling out is stronger than left/right (across the body).
- (c) For manual handling, significantly higher push/pull forces are possible standing rather than seated and the use of body weight in pushing/pulling is preferred.

Twisting movements can be reduced by:

- (a) Positioning all tools and materials in front of the employees.
- (b) Using conveyors, chutes, slides or turntables to change the materials flow direction.
- (c) Providing adjustable swivel chairs.
- (d) Providing sufficient work space for the employee's whole body to turn.
- (e) Improving the layout of the work area.

Reaching motions can be reduced by:

- (a) Positioning tools and machine controls close to the employee.
- (b) Positioning materials, work pieces and other heavy loads as near to the employee as possible.
- (c) Enabling the load handled to be kept close to the body.
- (d) Reducing load or container size.
- (e) Enabling the employee to walk around the load or to rotate it.

Bending movements can be reduced by:

- (a) Using lift tables, work dispensers and similar mechanical aids.
- (b) Raising the work level.
- (c) Positioning all material at work level.
- (d) Keeping materials at work level, for example avoid lowering objects which must be lifted later.
- (e) Eliminating large horizontal reaches.

3 Characteristics of the working environment

Factors in the work environment which influence risk include climate, lighting, space, floors and other surfaces underfoot.

Housekeeping and footwear are associated factors that have particular relevance for risk of slips, trips and falls while handling loads.

Answering **YES** to any of the following questions indicates an increased risk, particularly of back injury:

- (a) Are the floors and surfaces underfoot uneven or slippery?
- (b) Are there different floor levels in the workplace?
- (c) Is the workplace untidy with a lack of attention to housekeeping details?
- (d) Are there extremes of heat, cold, wind and humidity?
- (e) Are there high levels of fumes, dusts, gases or vapours?
- (f) Is there excessive vibration?
- (g) Is the task performed in a confined space?
- (h) Is the lighting inadequate?

4. Requirements of the activity

The risk of injury arises with the increasing frequency, repetition and duration of manual handling activity by any one employee in a work period. How often a task is performed and for how long are key risk factors to be considered.

Problems with frequency and duration are not restricted to lifting or lowering of

loads. Pushing, pulling, carrying and holding of loads may also be a problem if performed frequently or for prolonged periods.

There are several factors which influence a person's ability to continue prolonged exertion. These include available energy reserves, the employee's physical fitness and the relative workload (i.e. the proportion of the employee's physical capacity engaged by the task).

Distances over which loads are manually handled should be as short as possible. The longer the distance the lighter the load that may be carried without increased risk. If the load is located above the employee's shoulder height or below mid-thigh height or otherwise requires extended reach, the risk of injury is increased. An increased risk also occurs when a load must be manoeuvred to be placed accurately into position.

When a process is dictating the pace of manual handling as well as there being continuous and repetitive movements, the employee may be exposed to the risk of upper limb pains and discomfort.

Individual risk factors

The outcome of the risk assessment under Regulation 69 and its relationship to an individual employee is the required basis for judging individual risk factors. Reference must be made to the guideline weight template in determining whether or not load weights are potentially hazardous.

The clothing, footwear etc. worn by employees must not impede safe manual handling, for example avoid slippery gloves, very light footwear and loose clothing that may snag during lifting but ensure clothing does not limit movement by being too tight.

The provision of manual handling training on its own does not meet the requirements of Regulation 69 and will not reduce injury rates. Manual handling training needs to be specific to the tasks involved. It should aim to ensure that the employee understands the reasons for doing the job with least risk, can recognise the risks and decide the best way to go about it and can perform the task in that way. However, it is not a substitute for the reduction or avoidance of manual handling activities which involve risk.

APPENDIX 4

A Guide to the Key Aspects of Manual Handling Risk Assessment

Note: This is not an exhaustive list

Task Description:

Maintenance of Moulding Machine

Part A is taken from the machine shop and placed on a trolley. The trolley is then pushed out to the moulding machine. Part B is disassembled and manually lifted from the moulding machine and placed on the ground. Part A is then lifted from the trolley onto the machine and assembled. Part B is lifted onto the trolley and transferred into the machine shop for maintenance.

Technical Details:

Load Weight	75 kg
Trolley Height	508 mm
Load Dimensions	1244 mm x 381 mm x 406 mm
Number of manual lifts in changeover	6 manual lifts

The part has to be loaded onto the moulding machine at shoulder height.

Photographs/Drawings/Schematics:

Photographs may be placed in this section.

Assessment of the Task:

(Use the checklist in Appendix 2 as an *aide-mémoire*)

Risk Factors:

The load is too heavy for manual handling (75 kg).

The load is unwieldy and difficult to grasp.

The load has to be held at a distance from the trunk and there is repetitive bending posture when placing load on the ground.

There is strenuous physical effort when lifting such a load.

The load is not handled at a safe height (above shoulder height).

Comments:

These risks can be avoided by introducing a mobile hoist.

Solution Development and Plan:

Solution development and approval	Management Team	16 April 2007
Review maintenance procedures	Facilities Manager	28 April 2007
Source a mobile hoist	Safety Manager	30 April 2007
Assess new system of work	Safety Manager	3 May 2007
Train people in use of hoist	Training Co-ordinator	6 May 2007
Communicate changes to all relevant staff	Safety Manager	10 May 2007

Review of Effectiveness of Changes:

A review of the activity was carried out in June 2007.
The new system of work is in place and the hoist is working effectively.

REFERENCES

- Eastman Kodak, 1986. *Ergonomic Design for People at Work* (Vol. 2). John Wiley & Sons.
- Health and Safety Authority, 2005. *Management of Manual Handling in the Workplace*. Health and Safety Authority.
- Health and Safety Executive, 1998. *A Pain in Your Workplace: Ergonomic Problems and Solutions*: HS (G) 121. HSE Books.
- Health and Safety Executive, 1998. *Manual Handling: Guidance of Regulations: L23*. HSE Books.
- Health and Safety Executive, 1998. *Manual Handling in the Health Services*. HSE Books.
- Health and Safety Executive, 2000. *Backs for the Future, Safe Manual Handling in Construction*: HSE (G) 149. HSE Books.
- Health and Safety Executive, 2000. *Moving Food and Drink, Manual Handling Solutions for the Food and Drink Industries*: HSG196. HSE Books.
- Health and Safety Executive, 2002. *Manual Handling Assessment Charts*. HSE Books.
- Health and Safety Executive, 2003. 'Press Release: New HSE research on principles of good manual handling'. HSE.
- Health and Safety Executive, 2004. *Getting to Grips with Manual Handling, A Short Guide*. HSE.
- Hignett, Sue, 2003. 'Intervention strategies to reduce musculoskeletal injuries associated with handling patients: A systematic review'. *Occupational Environmental Medicine*.
- International Labour Office, 1998. *Work Organisation and Ergonomics*. ILO.
- Kroemer, K.H.E. and Grandjean, E., 2000. *Fitting the Task to the Human*. Taylor & Francis.
- Mital, A., and Ayoub M. M., 1997. *A Guide to Manual Materials Handling* (2nd edn). Taylor & Francis.
- National Authority for Occupational Safety and Health, 2000. *Guide to the Safety, Health and Welfare at Work Act, 1989 and the Safety, Health and Welfare at Work (General Application) Regulations, 1993*. Government Publications.
- Pheasant, S., 1999. *Bodyspace*. Taylor & Francis.
- Safety, Health and Welfare at Work Act, 1989. Government Publications.
- Safety, Health and Welfare at Work (General Application) Regulations, 1993. Government Publications.
- Sanders, M.S. and McCormick, J., 1992. *Human Factors in Engineering and Design*. McGraw Hill International.

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