

Checklist for the prevention of manual handling risks

Part A: Introduction

Manual handling of loads (MHL) includes lifting, holding, putting down, pushing, pulling, carrying and moving a load. It is one of the major causes of musculoskeletal disorders (MSDs). These are impairments of the bodily structures such as muscles, joints, tendons, ligaments and nerves, or localised blood circulation systems that are caused or aggravated primarily by the performance of work and by the effects of the immediate environment where the work is carried out. MHL should be avoided as much as possible, but sometimes it is impossible to avoid entirely in the workplace. It is then the responsibility of management to minimise the risks. More information on MHL is available in the European Agency for Safety and Health at Work's factsheet (<http://osha.europa.eu/en/publications/factsheets/73/view>) and the E-fact (<http://osha.europa.eu/en/publications/e-facts/efact14/view>).

There are several risk factors that make manual handling tasks hazardous and therefore increase the risk of injury. The risk factors for MSDs are: length of the MHL, posture of the body, exerted force during the manual handling and frequency of movements.

The risk factors are related to the different aspects of manual handling:

- weight and specific characteristics of the loads
- task and organisation of work
- workplace layout and equipment
- work environment
- individual capacity, skills and training level.

This checklist includes questions related to all aspects of manual handling and offers examples of preventive measures that can help to improve handling and therefore reduce risks. The preventive measures follow the general principles of prevention in the Council Directive concerning health and safety at work (89/391/EEC).

How to use a checklist

- A checklist can help identify hazards and potential prevention measures and, used in the right way, forms part of a risk assessment.
- This checklist is **not intended to cover all the risks** of every workplace but to help you put the method into practice.
- A checklist is only a **first step in carrying out a risk assessment**. Further information may be needed to assess more complex risks and in some circumstances you may need an expert's help.
- For a checklist to be effective, you should **adapt it to your particular sector or workplace**. Some extra items may need to be covered, or some points omitted as irrelevant.



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- For practical and analytical reasons, a checklist presents problems/hazards separately, but in workplaces they may be intertwined. Therefore, you have to take into account the interactions between the different problems or risk factors identified. At the same time, a preventive measure put in place to tackle a specific risk can also help to prevent another one; for example, air conditioning put in place to combat high temperatures can also prevent stress, given that high temperatures are a potential stress factor.
- It is equally important to check that any measure aimed at reducing exposure to one risk factor does not increase the risk of exposure to other factors; for example, reducing the amount of time a worker spends reaching above shoulder level may also increase the time spent working in a stooped posture, which may lead to back disorders.
- Although the checklist may state some numerical limits, such as working in a particular manner for two hours during a shift, these values should not be seen as exact safety limits but as an indication of an increase in the size of the exposure to risk, and to identify priorities for action.

Important issues that need to be addressed

- Are managers and workers aware of the potential risks caused by MHL and committed to their prevention?
- Has a practical **participative approach** (worker involvement) to problem-solving been adopted within the organisation?
- Have risk assessments been undertaken by appropriately trained staff?
- How is the effectiveness of the measures taken to prevent MHL risks being evaluated and monitored?



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Part B: Checklist for the prevention of manual handling risks

Do uncontrolled hazards related to MHL that can affect workers' health and safety exist at the workplace?

Answering `YES' to the following questions indicates a **need for improvements** to be made in the workplace.

Questions	YES	NO
The weight and specific characteristics of the load		
<p>Is the load too heavy when it is being handled from a standing position?</p> <p><i>The weight limit during a certain task can be determined by the NIOSH lifting equation. NIOSH determines the recommended weight limit based on seven factors:</i></p> <ul style="list-style-type: none"> o load constant (23 kg) o horizontal location o vertical location o travel distance o asymmetry angle o lifting frequency o hand-to-object coupling. <p><i>Consult the NIOSH lifting equation (http://www.cdc.gov/niosh/94-110.html).</i></p>	<input type="checkbox"/>	<input type="checkbox"/>
<p>Is the load too heavy when it is being handled from a sitting position?</p> <p><i>The weight should not exceed 4.5 kg. The recommended weight limit decreases in case of reaching and frequent lifting, and depending on the characteristics of the load.</i></p>	<input type="checkbox"/>	<input type="checkbox"/>
<p>Is the load difficult to grasp and/or hold because of its</p> <ul style="list-style-type: none"> o instability? o volume (bulky)? o shape? o surface material? 	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
<p>Is the load harmful because of its</p> <ul style="list-style-type: none"> o sharp edges? o high or low temperature? o dangerous substance? 	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
<p>Is the carried load unstable or does it force the worker to make sudden movements to assert control?</p>	<input type="checkbox"/>	<input type="checkbox"/>
<p>Does the load block the worker's view?</p>	<input type="checkbox"/>	<input type="checkbox"/>



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.....	<input type="checkbox"/>	<input type="checkbox"/>
Task and organisation of work		
Is the load being lifted/carried/pushed or pulled in a repetitive manner?	<input type="checkbox"/>	<input type="checkbox"/>
Do the workers often have to carry out manual handling tasks urgently?	<input type="checkbox"/>	<input type="checkbox"/>
Can the task be defined as monotonous?	<input type="checkbox"/>	<input type="checkbox"/>
Does a machine or production process impose the activity speed or frequency?	<input type="checkbox"/>	<input type="checkbox"/>
Is the recovery and/or rest time insufficient?	<input type="checkbox"/>	<input type="checkbox"/>
Have workers little control over the work and working methods?	<input type="checkbox"/>	<input type="checkbox"/>
Does the task require awkward postures like twisting the trunk, bending the back forwards or backwards, reaching, holding objects far from the body?	<input type="checkbox"/>	<input type="checkbox"/>
Does the task require a great amount of force?	<input type="checkbox"/>	<input type="checkbox"/>
Is the pulling/pushing activity done without using the body's own weight?	<input type="checkbox"/>	<input type="checkbox"/>
.....	<input type="checkbox"/>	<input type="checkbox"/>
Workplace layout and equipment		
General		
Is the working space too narrow? <i>The space available has to be sufficient to allow both worker and load to pass</i>	<input type="checkbox"/>	<input type="checkbox"/>
Are handling devices for lifting, carrying and pushing/pulling activities missing?	<input type="checkbox"/>	<input type="checkbox"/>
Are movements and postures of workers complicated by clothing or personal protective equipment?	<input type="checkbox"/>	<input type="checkbox"/>
Are there obstacles, such as boxes or pallets, in the working area or on the carrying route?	<input type="checkbox"/>	<input type="checkbox"/>
Lifting		
Does the position of the load provoke bad postures: <ul style="list-style-type: none"> <input type="checkbox"/> above shoulder height (provoking reaching/backward bending)? <input type="checkbox"/> beneath knuckle height (provoking forward bending)? <input type="checkbox"/> on the left or right side of the body (provoking twisting)? 	<input type="checkbox"/>	<input type="checkbox"/>
Are the objects awkwardly stacked?	<input type="checkbox"/>	<input type="checkbox"/>
Carrying		
Are loads being carried over long distances? (more than 2 metres in case of repetitive handling and more than 10 metres in other circumstances)	<input type="checkbox"/>	<input type="checkbox"/>
Does the carrying activity impose bad posture and movement?	<input type="checkbox"/>	<input type="checkbox"/>
Pushing/pulling		
Does the pulling/pushing task provoke bad posture, such as a handling	<input type="checkbox"/>	<input type="checkbox"/>



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height above the shoulder or below the waist ?		
.....	<input type="checkbox"/>	<input type="checkbox"/>
Work environment		
Does the task occur in adverse environmental conditions:		
o at extreme temperatures (too high or too low)?	<input type="checkbox"/>	<input type="checkbox"/>
o in inadequate lighting conditions (too dark, too high contrast)?	<input type="checkbox"/>	<input type="checkbox"/>
o in windy conditions (air movement)?	<input type="checkbox"/>	<input type="checkbox"/>
o that are too humid or too dry?	<input type="checkbox"/>	<input type="checkbox"/>
o that are too noisy?	<input type="checkbox"/>	<input type="checkbox"/>
Is the floor of bad quality:		
o rough?	<input type="checkbox"/>	<input type="checkbox"/>
o too soft?	<input type="checkbox"/>	<input type="checkbox"/>
o slippery?	<input type="checkbox"/>	<input type="checkbox"/>
o variation in levels?	<input type="checkbox"/>	<input type="checkbox"/>
o cluttered?	<input type="checkbox"/>	<input type="checkbox"/>
o any other tripping hazard?	<input type="checkbox"/>	<input type="checkbox"/>
Are there edges on surfaces along the carrying route or working area that may cause cuts, abrasion or burns to the hands or body?	<input type="checkbox"/>	<input type="checkbox"/>
.....	<input type="checkbox"/>	<input type="checkbox"/>
Individual capacity, skills and training level		
Is the worker inexperienced, untrained or unskilled? <i>The employee should know and use the proper manual handling techniques.</i>	<input type="checkbox"/>	<input type="checkbox"/>
Is the task dangerous for pregnant women?	<input type="checkbox"/>	<input type="checkbox"/>
Is the task dangerous for workers with health problems such as back pain?	<input type="checkbox"/>	<input type="checkbox"/>
Does the worker have any loose clothing that may get entangled in the handling device?	<input type="checkbox"/>	<input type="checkbox"/>
.....	<input type="checkbox"/>	<input type="checkbox"/>
.....		

Actions to be taken to control MHL risks

.....



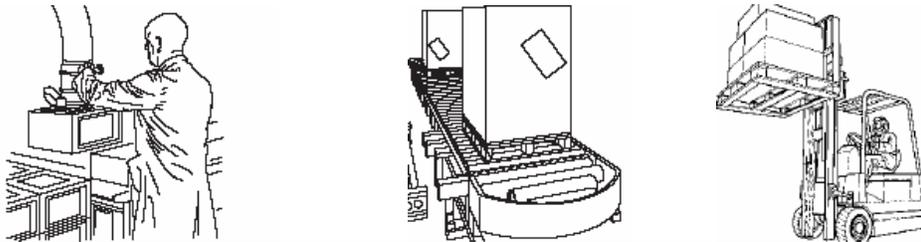
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Part C: Examples of preventive measures

Avoid manual handling

- Reduce the number of transshipment points of the goods.
- Avoid high frequency lifting, carrying, pulling or pushing by providing lifting and handling aids and/or by task automation so that the worker only performs a control task. Avoid lifting by using vacuum lifting devices and avoid carrying by using powered trucks, conveyors, roller balls, etc (see figure 1).

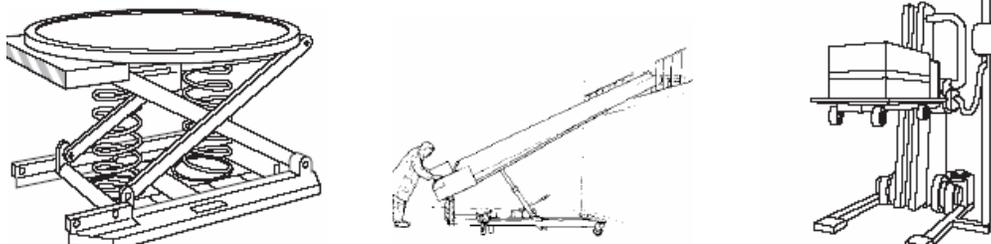
Figure 1: Vacuum hoist, conveyor with turntable, fork truck – source: Health and Safety Executive, *Are you making the best use of lifting and handling aids?* UK, 2005.



Reduce risks by taking technical measures

- Provide lifting and handling aids so that awkward working postures are eliminated or reduced to a minimum. Make sure these aids do not cause new risks or take preventive measures to avoid these risks. Mechanical aids can also be used when the object is unstable, sharp or too hot or cold.
- Use mechanical aids to bring loads closer to the body and at waist height during lifting; for example, rotary and tilt tables, auto-leveller, etc (see figure 2).
- The carrying distance can be reduced by using powered and non-powered conveyors (see figure 2).

Figure 2: Rotary and tilt table; mobile belt conveyor; auto-leveller – source: Health and Safety Executive, *Are you making the best use of lifting and handling aids?* UK, 2005.



- Handling devices must be used for carrying loads over long distances or periods, and to reduce the forces required during pulling/pushing (see figure 3). The handling devices must have handles/hand grips



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so that hands can be used to exert force. These handles/grips should be placed between 90 cm and 120 cm from the floor. The wheels of the handling devices must be of an appropriate size and well-maintained in order to run smoothly.

Figure 3: Keg truck, pallet truck, shelf trolley – source: Health and Safety Executive, *Are you making the best use of lifting and handling aids?* UK, 2005.



- Divide the load into two or more separate loads to reduce weight.
- Reduce the dimensions of the object to 60 cm long, 35 cm deep and 60 cm high so workers can take the object close to their bodies and keep an optimal view of the environment.
- Make bulky loads or containers easier to handle by providing handles or hand-grips. Avoid sharp edges, greasy or oily parts.

Figure 4: Make sure the load doesn't block your view during carrying, pushing or pulling activities – Source: Commissariat général à la promotion du travail du Ministère de l'Emploi et de Travail, *Manutentions manuelles: Guide pour évaluer et prévenir les risques*, Bruxelles, 1998.

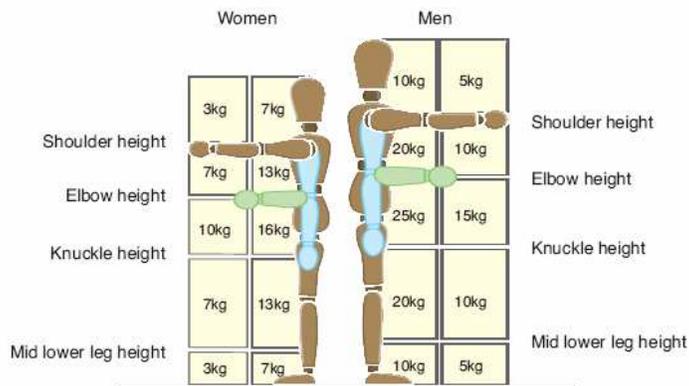


- The ideal zone for lifting objects is between knuckle and elbow height, and close to the body. When lifting in a different zone, the weight of the object should be adjusted (see figure 5).

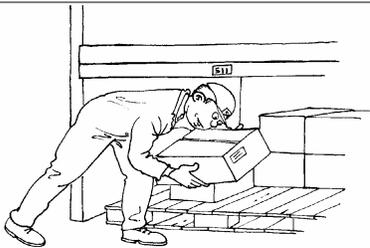
Figure 5: Ideal weight for lifting and lowering in different zones - Source: Health and Safety Executive, *Getting to grips with manual handling: A short guide*, UK, 2006.



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- The weight of the load should be adapted to the zone in which you are lifting and to the other characteristics of the task and load. The NIOSH standard can help you to determine the maximum weight that can be safely lifted by workers. The NIOSH lifting equation does not apply if any of the following occur: lifting/lowering with one hand; working more than eight hours, while seated or kneeling, in a restricted work space or with unstable objects; carrying/pushing/pulling with wheelbarrows or shovels, with high speed motion or with unreasonable foot/floor coupling; and in an unfavourable environment (outside 19-26°C and 35-50% humidity). (Source: <http://www.cdc.gov/niosh/94-110.html>)
- Provide an open working space for employees who have to handle loads. Confined spaces and narrow passages can cause workers to trip, be trapped and suffer abrasions. Confined spaces make workers exert force in awkward postures, which increases the risk of discomfort, pain and strain (see figure 6).
- **Figure 6:** Avoid narrow working spaces – source: Commissariat général à la promotion du travail du Ministère de l'Emploi et de Travail, *Manutentions manuelles: Guide pour évaluer et prévenir les risques*, Bruxelles, 1998.



- Remove obstructions from the working area and carrying route. The route should be sufficiently wide and clear of obstacles so that the carrying activity is performed in an upright posture without the need for body bending or twisting. Obstacles should also be removed to avoid falling.
- Frequently used objects should be within easy reach to avoid bad postures. Place these objects on shelves between knee and shoulder



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height. Products that are not frequently handled should be stored.

- When a load is on the left or right side of the body, turn by moving the feet instead of twisting the upper body. Organise the workplace in such a way that employees are forced to move their feet instead of twisting their trunk. For example, instead of using tables in an L-shape, which leads to twisting of the trunk, place the tables next to each other, forcing the employees to move their feet.
- Avoid performing carrying tasks under adverse environmental conditions since this will impose an extra effort on the worker, increasing the risk of injury. Provide sufficient visibility for the task (such as sufficient light and no reflections) so the worker can perform the work safely. Poor lighting increases the risk at falling or running into something. Working in a cold environment changes the precision of movements, while working in a hot environment can lead to excessive tiredness. Optimal conditions are:
 - temperature of 19-21°C
 - humidity of 35-50%
 - lighting of + 200 Lux.
- The floor where the manual handling activity is performed must be hard, even, clean and clear of obstacles that may cause workers to trip or slip. The floor where the pulling/pushing activity is performed must provide a good grip to allow the worker to lean backward and forwards.
- Avoid rough surfaces or sharp edges along the carrying route in order to prevent cuts, abrasion or burns.

Reduce risks by taking organisational measures

- The carrying distance can be reduced by moving the receiving, storage, or shipping areas closer to the production areas.
- Rearrange the workplace to eliminate unnecessary materials movement.
- Use shelving at waist height to avoid handling loads from the floor or above shoulder. If work above shoulder level is unavoidable, the duration of the work must be limited and regular breaks must be taken.
- If possible, handle heavy or bulky objects with two or more persons; this will help to reduce worker's individual effort and the risk of damage to property. The recommended weight limit can be multiplied by 1.5 when lifting with two persons and by two when lifting with three persons.
- Assign a set of tasks to a group of workers so that it is possible for them to take a short break to recover mentally and physically.
- Adapt the organisation and the technical procedures in order to minimise the frequency of urgent situations. The urgency of a task can cause an employee to neglect his personal physical limits and the rules concerning proper manual handling techniques. Provide assistance in urgent cases.
- The production process and transport of the goods must be flexible (with buffer



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zones) so that operators can take (micro)breaks.

- Introduce job rotation and job enlargement to avoid monotonous tasks and to make variations of posture possible. Altering postures is important so that the same muscles do not become too stressed. Job rotation can also help to increase work motivation.
- Make sure that workload and deadlines are feasible and involve employees in decisions about setting deadlines.
- Prolonged or repetitive material handling activities require short breaks to recover, or changes to the task so that the effort exerted by workers affects different sets of muscles.
- Design tasks to minimise twisting, bending and reaching during lifting especially with heavy loads. The task must be organized so that pulling/pushing activity can be done at waist level, without too much bending, reaching or twisting. Handle height must be between the shoulder and waist so that pulling/pushing activity can be performed in a good, neutral posture.

Isolate danger

- Isolate or wrap the load when it is too hot or too cold, has sharp edges that can cause a wound or has a rough surface.
- Make sure that objects cannot fall from the shelves; wrap objects that might fall or lock the shelves.
- Install acoustic screens in noisy areas.

Isolate/protect employee

- Wear adapted gloves when a load is too cold or too hot, when it has sharp edges or a rough surface.
- Provide suitable and protective clothing. The use of unsuitable clothing, footwear or other personal effects may increase the occupational risks. For instance loose sleeves may get caught on the load, or a worker wearing nice clothes without an apron might hold the load too far from the body because he does not want to make his clothes dirty. Not using protective footwear can lead to injuries if the load falls.
- Workers should wear a safety helmet, safety shoes and safety glasses in areas where there is a risk of falling objects.
- Provide appropriate clothing for cold and hot temperatures but make sure clothing does not restrict the workers in performing their tasks safely.
- Provide ear protection as personal protective equipment.

Training/education and instructions

- Organise training sessions to train employees in proper manual handling techniques. The training should demonstrate how to avoid risks arising from manual handling and how to use mechanical aids, team carrying and personal protective equipment such as gloves, footwear and aprons. Supervisors and managers, health and safety representatives and staff responsible for work organisation and job and task design should also receive training. Pay extra attention to workers with back problems and pregnant women. Workers that suffer from back problems need to recover fully from the injuries and take the necessary time to build up their skills and abilities.



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- Provide on-the-job training so that workers can easily apply the manual handling techniques to their own tasks.
- Give instructions about how a load should be handled and which protective clothing they should wear when handling hot, cold or sharp objects. Instruct employees to wear protective equipment such as earplugs and protective clothing against heat and cold.
- If carrying harmful loads is unavoidable, define the safety procedures to observe and provide workers with the necessary instructions and training.
- Provide information sheets on "the best way to do it", which describe the safest and most ergonomic way to perform a certain task.
- Instruct workers to observe the object before lifting, carrying or pulling/pushing. They should assess the weight of the object that they will lift and the force that needs to be exerted, before starting the activity.

Signing

- Mark the weight of the load or demand the supplier to mark the weight on the objects.
- Mark certain harmful features as very cold, very hot, sharp edges, unstable, etc.
- Mark where goods should be stored and how they should be piled up.
- Mark cold and hot areas.
- Mark slippery, rough and bumpy floors.
- Put up signs reminding employees to wear protective equipment.

Further information

Ergonomic standards concerning the maximum load weight during lifting and carrying tasks:

- ISO 11228-1: International standard organisation (ISO), May 2003. *Ergonomics – Manual handling. Part 1: Lifting and carrying*. ISO 11228-1;
- MMH: Mital, A., Nicholson, A.S., and Ayoub, M.M. *A guide to manual materials handling (MMH)*. Second edition. Taylor & Francis. 1997;
- NIOSH lifting equation:
 - Water, T.R., Putz-Anderson, V., Garg, A., and Fine, L.J. 'Revised NIOSH equation for the design and evaluation of manual lifting tasks'. *Ergonomics*, 1993, 36 (7), 749-776
 - *Applications Manual for the Revised NIOSH Lifting Equation*: <http://www.cdc.gov/niosh/94-110.html>

References

Commissariat général à la promotion du travail du Ministère de l'Emploi et de Travail, *Manutentions manuelles: Guide pour évaluer et prévenir les risques*, Bruxelles, 1998.

Council Directive 89/391/EEC, *Introduction of measures to encourage improvements in the safety and health of workers at work*, Office for Official Publications of the European Communities, June 1989.



Checklist for the prevention of manual handling risks

Council Directive 90/269/EEC, *Minimum health and safety requirements for the manual handling of loads where there is a risk particularly of back injury to workers*, Office for Official Publications of the European Communities, May 1990.

Demaret JP & Gavray F., *Fiche d'évaluation des facteurs de risques des maux de dos*, Prevent 2005 (unpublished).

European Agency for Safety and Health at Work, *Hazards and Risks associated with manual handling of loads in the workplace*, Facts n. 73, 2007.

Health and Safety Executive, *Are you making the best use of lifting and handling aids?* UK, 2005. Available at: <http://www.hse.gov.uk/pubns/indg398.pdf>

Health and Safety Executive, *Getting to grips with manual handling: A short guide*, UK, 2006. Available at: <http://www.hse.gov.uk/pubns/indg143.pdf>

Health and Safety Executive, *What is pushing and pulling?* UK, 2007. Available at: <http://www.hse.gov.uk/msd/pushpull/index.htm>

National Institute of Occupational Safety and Health, *Elements of ergonomics programs. A Primer Based on Workplace Evaluations of Musculoskeletal Disorders*, NIOSH Publication No. 97-117, 1997. Available at: <http://www.cdc.gov/niosh/97-117pd.html>

National Occupational Health and Safety Commission, *Guidance note for manual handling in the retail industry*, NOHSC: 3014, Australian Government Publishing Service, Canberra, 1992.

National Occupational Health and Safety Commission, *Manual Handling*, Australian Government Publishing Service, Canberra, ISBN 0644245247, 1990.

National Occupational Health and Safety Commission, *National code of practice for manual handling*, NOHSC, 1990.

Op De Beeck, R. & Hermans, V., European Agency for Safety and Health at Work, *Work-related low back disorders*, Luxembourg, Office for Official Publications of the European Communities, 2000. Available at:

<http://osha.europa.eu/en/publications/reports>)

Op De Beeck, R., 'Manueel hanteren van lasten', *Promosafe*, No 94/1, 1994.

Patenaude S., 'Manual Handling: not only a matter of weight', *Preventex*, No 20 (4), 2004.

Swartz G., 'Warehouse safety: A comprehensive review', *Professional safety*, July 1998, pp. 20-25.

Waters, T.R., Putz-Anderson & V., Garg, A., Centers for Disease Control & Prevention, *Applications Manual For the Revised NIOSH Lifting Equation*, 1994. Available at: <http://www.cdc.gov/niosh/94-110.html>

Workplace Health, Safety and Compensation Commission of New Brunswick, *Manual handling: ergonomics guidelines*, September 1999. Available at: <http://www.whscc.nb.ca/docs/MANUALEdist.pdf>



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Douwes M, Miedema MC, Dul J. 'Methods based on maximum holding time for evaluation of working postures'. *The Occupational Ergonomics Handbook* (Ed. Karwowski W, Marras WS), CRC Press, 1999.

EN-1005-4: 2005. *Safety of machinery – human performance – part 4: Evaluation of working postures and movements in relation to machinery*. Brussels: CEN, may 2005.

European Social Dialogue working group, Prevent, *Prevention of musculoskeletal disorders within Telecommunication sector, 2005*, available at: www.msdonline.org

ISO 11226. *Ergonomics, evaluation of static working postures*. Geneva Switzerland: ISO, 2000.

Miedema M.C., Douwes M., Dul J. (1997). '[Recommended maximum holding times for prevention of discomfort of static standing postures](#)', *International Journal of Industrial Ergonomics* 19 (1), 9-18.

Op De Beeck, R. and Hermans, V., European Agency for Safety and Health at Work, *Research on work-related low back disorders*, Luxembourg, Office for Official Publications of the European Communities, 2000, available at <http://osha.europa.eu/en/publications/reports>

Queensland government, *Workplace Health and Safety, 'Manual Task Code of practice 2000 – Working postures'*, available at:

<http://www.dir.qld.gov.au/workplace/law/codes/manualtasks/riskfactor/posture/index.htm>

Queensland government, *Workplace Health and Safety, 'Manual Task Code of practice 2000 – Work area design'*, available at:

<http://www.dir.qld.gov.au/workplace/law/codes/manualtasks/riskfactor/workarea/index.htm>

Taylor & Francis, *Ergonomics for Beginners – A quick reference guide*, 1993

US Department of Labour, Occupational Safety & Health Administration, 'Good working positions', available at:

<http://www.osha.gov/SLTC/etools/computerworkstations/positions.html>

Pictures developed by Prevent, Institute for Occupational Safety and Health, Belgium, 2007.