



GUIDE FOR ASSESSING THE QUALITY OF RISK ASSESSMENTS AND RISK MANAGEMENT MEASURES WITH REGARD TO PREVENTION OF MSDs

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Inspectors*

*Senior Labour Inspectors' Committee
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(EMEX)*

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*N.B. All suggestions to labour inspectors in this document are only recommendations.
The respective member states' national legislation applies.*

1. Introduction

The Senior Labour Inspectors' Committee (SLIC) decided in May 2017 to form a working group (WG) to consider new and emerging risks, called the WG Occupational Health and Safety Emerging Risks (WG EMEX). Its purpose was to address musculoskeletal disorders (MSDs), psychosocial risks, and the demographic challenges that all EU Member States face. The original background to WG EMEX was the communication from the European Commission in January 2017 that identified new and emerging risks as growing concerns for European employers and thus for national labour inspectorates (NLIs).

The main objective assigned to WG EMEX is to strengthen the enforcement of regulations governing ergonomics and psychosocial working conditions conducive to sustainable working environments for women and men, as well as young and old workers.

Representatives from Cyprus, Denmark, Finland, Greece, Poland, Romania, and Sweden (chair) formed WG EMEX in September 2017.

The purpose of this guide is to help NLIs develop inspection procedures and to increase the confidence of labour inspectors when addressing the quality of risk assessments and risk management measures with regard to MSD prevention.

2. Legal requirements

The Framework Directive (89/391/EEC) obliges employers to implement preventive measures to encourage improvements in the safety and health of workers. The obligation in the Framework Directive to assess risks covers all ergonomic conditions and risks, including repetitive work, pushing and pulling, work positions and movements, and manual handling.

The general principles of prevention listed in the Framework Directive are:

- avoiding risks
- evaluating risks that cannot be avoided
- combating risks at source
- adapting work to the individual, especially as regards workplace design, choice of work equipment, and choice of working and production methods, with a particular view to alleviating monotonous work and work at a predetermined rate and to reducing their effects on health
- giving appropriate instructions to workers
- developing a coherent overall prevention approach that covers technology, work organisation, working conditions, social relationships, and the influence of factors related to the working environment

The main specific European OSH directives related to the prevention of MSDs are the following:

- 90/269/EEC on the minimum health and safety requirements for the manual handling of loads where there is a risk particularly of back injury to workers;
- 89/654/EEC concerning minimum safety and health requirements for the workplace;
- 89/655/EEC concerning the minimum safety and health requirements for the use of work equipment by workers at work;
- 89/656/EEC on the minimum health and safety requirements for the use by workers of personal protective equipment at the workplace;
- 90/270/EEC on the minimum health and safety requirements for work with display screen equipment; and
- 2002/44/EC on minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents (vibration).

Other EU directives that influence the manual handling of loads by workers are the following:

- 93/104/EC concerning certain aspects of the organisation of working time; and
- 2006/42/EC on machinery.

Additionally, specific national legal provisions regarding the prevention of MSDs may also apply.

3. General perspective on MSDs

3.1 Definitions

For the purposes of this guide, the following definitionsⁱ apply:

Musculoskeletal disorders

MSDs are impairments of bodily structures such as muscles, joints, tendons, ligaments, nerves, bones, and the localised blood circulation system; these impairments are caused or aggravated primarily by work and by the effects of the immediate environment in which work is carried out. They encompass all forms of ill-health of the musculoskeletal system that may be connected with working conditions. These disorders may be caused by work or may be caused by something else, but be aggravated by work. They mainly affect the back, neck, shoulders, and upper/lower limbs. Some MSDs are specific because of their well-defined signs and symptoms (e.g., carpal tunnel syndrome in the wrist); others are nonspecific because pain or discomfort exists without evidence of a clear specific disorder.

The term MSDs includes everything from mild, temporary disorders to lifelong injuries. The two main groups of MSDs are back pain/injuries and repetitive strain injuries (i.e., work-related upper limb disorders).

Musculoskeletal system

Comprises the parts of the body and the structures (e.g., muscles, tendons, bones, cartilage, ligaments, and nerves) that allow the body to assume various postures and to move.

Workplace ergonomics

Represents the part of the broader field of ergonomics dealing with how loads in work affect the musculoskeletal system.

Manual handling

Refers to any transporting or supporting of a load by one or more workers, including lifting, putting down, pushing, pulling, carrying, or moving a load, including lifting or moving people.

Repetitive work

Refers to work that entails the repetition of similar working movements over and over again. The duration of each operation is short, and the movements are repeated to such an extent that the worker may be affected by MSDs.

3.2 Working conditions and MSDs

Ergonomics for preventing MSDs deals with working postures, working movements, physical *and psychological* loads, and other conditions that can influence muscles and joints of the human body. This involves, for example: the design of work premises, work stations, work tools, and work surroundings; how work is organised; and the psychological and social conditions in the workplace. It is important to use the available aids in order to prevent MSDs. The risks of MSDs can be both acute, such as muscle burst or back pain, or wear-and-tear injuries in joints and muscles after month/years of exposure.

According to the 6th European Working Conditions Survey,ⁱⁱ the most reported occupational health problem in the EU is backache (43%), followed by muscular pain in the neck or upper limbs (42%), headache/eyestrain and overall fatigue (35% each),

muscular pain in the hips or lower limbs (29%), anxiety (15%), injuries and skin problems (8% each), and hearing problems (6%).

An ageing population in Europe might increase the burden on old-age and health-care workers, who will especially be subject to ergonomic risks when managing and lifting patients. It is also worth mentioning that the traditional ergonomic risks still remain (e.g., in agriculture, construction, and transport).

The current high-technology age entails new advances in communication and IT devices that are being constantly developed and improved, facilitating knowledge sharing and access to valuable information and support, especially for businesses. This means that workers are now experiencing modern working equipment/tools, high-tech work environments, and new work rhythms (e.g., always being online, answering phone calls, serving customers, and addressing emergency issues).

The modern world of micro/nanotechnologies and new communication devices entails new ergonomic challenges for users. New ergonomic risks also appear in modern working life, such as the overuse of smartphones, tablets, laptops, and other mobile devices.

When focusing on the prevention of MSDs in workplaces, labour inspectors must take into account the fact that there are often easy solutions, which can be found by correct applications of one of the methods described in chapter 4.2. For unusual or serious problems the use of internal experts or external occupational safety and health services should be recommended. A holistic approach is necessary in addressing MSDs.

3.3 Examples of ergonomic risks

Health-endangering loads are high loads, repeated loads, static muscle loading, and one-sided loads. Even very low loads may be health endangering or unnecessarily fatiguing. A fatiguing physical load is not necessarily health endangering, but entails serious risks if it is repeated frequently and for a prolonged time. Prolonged and recurrent work with a bent or twisted trunk should be avoided, as should work with the hands above shoulder height or below knee level. The same applies to work that entails the application of force in unfavourable work postures. It is possible to rectify an unnecessarily fatiguing load. Heavy manual handling involving a lot of lifting and carrying still occurs in, for example, health care and caring services, transport and warehousing, building and construction, the hospitality industry, the food industry, and cleaning services.

Repetitive work is still too common, including in certain display-screen jobs, assembly jobs, and manipulative and repetitive jobs along conveyor belts. It is important that such work be substantially reduced and that all occupational categories or industries reduce the number of workers engaging in repetitive work. Repetition of a single movement imposes a constant physical stress. The object handled need weigh hardly anything at all to cause MSDs – even the weight of the arms alone can be enough to impose a harmful load on muscles and joints, possibly resulting in the gradual onset of injuries requiring a long recovery time. Once injured in this way, a worker can easily suffer a relapse when exposed to similar repetitive practices. If this kind of work cannot be avoided completely, the risks of overloading must be avoided by means of task variation, task diversification, breaks, and other measures. Injuries caused by repetitive work can be prevented by taking appropriate measures.

Pushing and pulling are involved in moving an object that is either wholly or partially resting on a surface or is suspended, for example, from a ceiling hoist. The force

needed to start and keep an object in motion depends on the object's weight, the friction between the object and the surface, and the gradient of the surface. If workers are to exert great force on the object, they must be able to gain traction, i.e., the friction between the shoes and the surface is important. There should be low friction between the object and the surface and high friction between the individual and the surface. It is important to avoid thresholds and other variations in level along transport routes.

In modern workplaces, the division between working time and leisure time has become blurred. In many situations, a 24/7 working life has emerged, which introduces new ergonomic risks, such as the prolonged use of cell phones, tablets, and laptops in awkward positions.

According to guidanceⁱⁱⁱ issued by Stanford University, the use of mobile computing equipment such as laptops, which provide convenient, portable work platforms for users, is unsuitable and stimulates the occurrence of MSDs. Additionally, work practices should be altered to allow the interruption of continuous computer use by short breaks at regular intervals.

The regular use of mobile phones and tablets has introduced the following musculoskeletal risks: repetitive, awkward finger movements (especially of thumbs); static, awkward postures of the neck and shoulders while reading small phone and tablet screens; awkward neck, shoulder, and wrist postures from protracted phone calls; and excessive gripping of devices.

The human body is made for movement. Sitting still for many hours of work in a day has proven to be a serious health risk.^{iv} An appropriate mixture of movement, load, and recovery is needed to maintain the body's functions and achieve favourable loading. This happens because when humans sit, they use less energy than when standing or moving. Research has linked sitting for long periods with a number of health concerns. These include obesity as well as the various conditions – i.e., increased blood pressure, high blood sugar, excess body fat around the waist, and abnormal cholesterol levels – that together constitute metabolic syndrome. Various studies have concluded that extended sitting at a desk, in front of a screen, or behind the wheel of a vehicle can be harmful. Less sitting and more physical activity have been proven to contribute to better health.

3.4 Aggravating factors concerning MSDs

Factors that may contribute to the development of MSDs^v are:

- a) Physical factors
 - force application: lifting, carrying, pulling, pushing, use of tools, etc.;
 - repetition of movements;
 - awkward and static postures (e.g., with hands above shoulder level) or prolonged standing and sitting;
 - local compression of tools and surfaces;
 - vibration;
 - cold or excessive heat;
 - poor lighting or eyesight ergonomics; and
 - high levels of noise.

b) Organisational and psychosocial factors

- stress, which can have numerous repercussions for the body and mind (e.g., headaches, muscle pain, muscle tension, tight muscles, and stiffness); for example, if the back muscles become and stay contracted, this will increase the pressure on the intervertebral discs and can eventually have a detrimental effect on their condition;
- inappropriate workplace design;
- insufficient rest periods;
- unsuitable personal protective equipment;
- demanding work, lack of control over the tasks performed, and low levels of autonomy;
- low levels of job satisfaction;
- repetitive, monotonous work at a high pace; and
- lack of support from colleagues, supervisors, and managers.

c) Individual factors

- prior medical history;
- physical capacity;
- age and gender;
- obesity;
- smoking; and
- use of narcotic/psychotropic drugs.

Studies carried out in the UK^{vi} have demonstrated that exposure to both physical and psychosocial risk factors can result in the greatest likelihood that musculoskeletal complaints will be reported.

4. The quality of risk assessment of ergonomic risks conducted by an employer

4.1 Process of risk assessment

A high-quality risk assessment must be appropriate to the tasks being carried out by workers on a daily basis. The risk assessment must be suitable and sufficient, and should cover the whole undertaking. It should also be broad enough that it remains valid for a reasonable period and should be reviewed and updated whenever necessary. This requires careful observation of all the attributes of the work setting, such as the load(s) being handled, type of handling (e.g., lifting, pushing, and pulling), frequency of operations, and workers' physical abilities and characteristics.

A high-quality assessment of ergonomic risks should contain the following steps:



Figure 1. Steps of risk assessment.

4.1.1 Identifying ergonomic risks and the workers who may be exposed to them

The employer should investigate the work environment and assess and document any risk factors discovered. Risk factors relevant to the workplace should be assessed. The risk assessment should be carried out in a systematic way. It should be planned in advance and performed in cooperation with workers. Investigations should be based not only on the experiences of the individual worker but also on objective descriptions of the working conditions. It is important to include the entire workforce in the risk assessment (e.g., both women and men) and to take into account the age distribution at the workplace. In the case of ergonomic risk factors to be assessed, the frequency, duration, and intensity of the work should be considered as well as the number of workers exposed to risk factors.

If protective and preventive measures cannot be organised due to lack of competent personnel in the enterprise, the employer shall enlist competent external services or persons (Framework Directive 89/391/EEC art. 7.3).

4.1.2 Evaluating and prioritising risks

The identified risks should be listed in order of importance. Whoever is to conduct the risk assessment at work must be competent for the task. They should understand the general approach to risk assessment and have the capacity to apply this understanding to the workplace and tasks being addressed. In the risk assessment of occupational health issues, medical, ergonomic, and psychological expertise is needed and useful.

Questions to consider are:

- How often are workers exposed to the risk?
- How many workers are exposed?
- Do employers as well as workers have knowledge of suitable work positions and work movements, and of how to use technical aids?

Aggravating factors

Aggravating factors are always weighed in the total assessment. Some factors that aggravate the risk of musculoskeletal injuries are:

- work that makes high demands for the development of force, precision, or speed of movement;
- heavy and difficult-to-grasp work objects;
- reward systems that put a premium on quantity;
- frequent unexpected disruptions in production over which the worker has no control; and
- weak social relationships and social support in the workplace.

4.1.3 Deciding on preventive and protective measures and taking action

When the risks have been assessed, the employer should draw up an action plan with a time schedule. It is essential to communicate the findings of the assessment to all workers and ensure the commitment of all parties. Measures to prevent or diminish the ergonomic risks might be needed at different levels of the organisation. Interventions to prevent and manage ergonomic risks and work-related ergonomic issues might also cover:

- ✓ rotating jobs or modifying tasks (e.g., to avoid routine and reduce time pressure);
- ✓ allowing enough time for workers to perform their tasks;
- ✓ minimising physical risks such as inadequate lighting, noise, and vibrations.;
- ✓ designing shift schedules ergonomically if shift work cannot be avoided;
- ✓ allowing workers to take part in decisions that affect them;
- ✓ providing information and support for workers;
- ✓ enabling workers to make complaints and giving them due consideration;
- ✓ changing the physical characteristics of the load or the design of the working process (addressing collective physical measures first);
- ✓ providing mechanical or technical equipment;
- ✓ matching workloads to the abilities and resources of each worker;
- ✓ delivering knowledge to workers and instructions about proper ways of working and early signs of muscle and joint overload; and
- ✓ giving feedback and rewarding workers who follow good ergonomic practices.

4.1.4 Monitoring and reviewing

The actions taken to minimise or prevent MSDs should be systematically evaluated to establish what works, to assess the effectiveness of the actions, and to prescribe suitable improvements where necessary. As far as is practically possible, the employer shall establish and design workplaces/workstations and tasks so that the workers can use ergonomic postures at work and use working movements that are favourable to the body.

The labour inspector should check whether the employer applies a holistic understanding of the ergonomic changes and improvements made to particular workstations, to confirm that they do not cause unwanted effects on other workstations, along a production line or in a production flow.

4.2 Methods for assessing risks in order to prevent MSDs

The employer is obliged to investigate whether workers are performing work using work postures, work movements, manual handling, and repetitive actions that may be health endangering or unnecessarily fatiguing. Labour inspectors should be aware that there are many assessment methods for identifying work situations that can affect workers' health. Some of them are the following:

– Key Indicator Method Manual Handling Operations (KIM MO)

This method was developed and published by the German Federal Institute for Occupational Safety and Health in 2012. KIM MO focuses on determining the physical workloads of workers involved in manual handling operations by addressing seven parameters linked to the work activity, work organisation, working conditions, worker posture, and forces used in carrying out tasks.

It is noted that the KIM MO can only assess a small range of similar manual handling operations, such as lifting, carrying, pushing, and pulling operations.

For more information, labour inspectors can consult the following website:

https://www.baua.de/EN/Topics/Work-design/Physical-workload/Key-indicator-method/Key-indicator-method_node.html

– Manual Handling Assessment Charts (the MAC tool)

This method was published by the Health and Safety Executive (HSE), United Kingdom, in 2014, to assess the most common risk factors in lifting (and lowering), carrying, and team handling operations and to help in identifying high-risk manual handling.

The MAC tool is not appropriate for some manual handling operations, such as those that involve pushing and pulling. Also, it is not designed to assess risks associated with workplace upper limb disorders. Its use does not comprise a full risk assessment.

This method uses a score sheet to assess the risks posed by manual handling operations. A total of 11 risk factors are used, but the individual and psychosocial factors should be considered separately. The method does not take into account the frequency of operations. For more information, labour inspectors can consult the following website: <http://www.hse.gov.uk/pubns/indg383.pdf>

As MSDs are significant risks to those working in the health and social care sector who must move and handle patients, sector-specific guidance has been issued by HSE at <http://www.hse.gov.uk/healthservices/moving-handling.htm> and www.hse.gov.uk/pUbns/hsis3.pdf (HSIS3 – Getting to grips with hoisting people).

– Assessment of repetitive tasks of the upper limbs (the ART tool)

This method, published by the Health and Safety Executive (HSE), United Kingdom, in 2010, is for assessing tasks that require repetitive moving of the upper limbs (e.g., arms and hands). The ART tool helps to identify those tasks that involve significant risks and where to focus risk-reduction measures. Also, it is helpful in assessing some of the common risk factors in repetitive work that contribute to the development of upper limb disorders.

ART is most suited for: tasks that involve actions of the upper limbs; tasks repeated every few minutes, or even more frequently; and tasks that occur for at least 1–2 hours per day or shift. These tasks are typically found in assembly, production, processing, packaging, packing, and sorting work, as well as in work involving the regular use of hand tools.

For more information, labour inspectors can consult the following website:
<http://www.hse.gov.uk/MSd/art-tool.htm>

– Risk Assessment for Pushing and Pulling (RAPP) tool

This method, published by the Health and Safety Executive (HSE), United Kingdom, in 2016, is for assessing the key risks in manual pushing and pulling operations involving whole-body effort, for example, moving loaded trolleys or roll cages, or dragging, hauling, sliding, or rolling loads. The RAPP tool should be used alongside the MAC tool, and follows an approach similar to that of the MAC tool. It is helpful in identifying high-risk pushing and pulling activities, and in checking the effectiveness of any risk-reduction measures.

The RAPP tool is helpful in assessing the moving of loads on wheeled equipment (e.g., hand trolleys, pump trucks, carts, or wheelbarrows) and the moving of loads without the use of wheeled equipment, which might involve actions such as dragging/sliding, churning (e.g., pivoting and rolling), and rolling.

For more information, labour inspectors can consult the following website:
<http://www.hse.gov.uk/msd/pushpull/index.htm>

Various standards have been developed at the European and international levels to deal with ergonomic-related issues. For more details, please see 'Further information' in this guide.

5. Examples of good practices

5.1 Good practices applying a holistic perspective

- Examining the various handling sequences that make up a task with a view to improving the overall layout can make a significant difference to the worker performing lifting operations. For example, manual handling problems in a keging room where the kegs have to be pushed, pulled, and lifted to clean them could be reduced by, for example, installing a roller conveyor to allow the kegs to be moved more easily.
- Not having enough space when lifting leads to awkward postures with increased risks of injury. Employers must take into account the available space for human body movements, bearing in mind that additional space is necessary when carrying out lifting tasks. Areas with restricted headroom and storage areas where items are stored at all levels in narrow aisles must be avoided, since it is difficult for workers to manipulate items in them. In such cases, mechanical equipment (or automation) is necessary for lifting and carrying.
- For example, as early as the design phase of building a retirement home, ergonomically sound workspaces, hygiene facilities, and bedrooms should be planned for the residents, on the one hand, and for the staff, on the other, so that technical equipment and lifts for persons can easily be used.
- Make changes in workplaces, such as modifying workstations and/or working equipment, implementing job rotation, providing visual aids to enable favourable work postures and working movements, and giving OSH instructions to workers to prevent risks of lower back and shoulder injuries, for example, in a laundry. Tasks carried out by workers in a laundry put them at risk because of the combination of excessive forward bending to lift dry and wet linen, forceful exertion, and work in awkward postures.
- Uneven, slippery, or unstable floors are usually found in the food industry, where food and fat accumulation can contaminate surfaces. Good housekeeping is essential, but additional measures are needed, such as the use of special floor coatings and grips to stop surface contamination from becoming a slipping hazard.
- Variations in floor levels or work surfaces can pose a risk. Carrying loads up steps can be made easier by using various lifting aids. In facilities with a few steps, ramps may allow the use of wheeled handling aids. Where there are longer flights of stairs, narrow ramps within the steps can help reduce the manual handling of loads, though brakes are necessary on downward slopes. A variety of mechanical aids can be used to minimise lifting between work surfaces of different heights.
- One prerequisite for avoiding MSDs is that workers should know how to perform their work in a suitable manner, especially in health care, where staff must handle and assist patients with or without technical aids. To ensure this, employers need to have competence in assessing and providing information on the risks of MSDs and how to minimise them, either themselves or by accessing such competence in other ways. Here, OSH services or other external work environment and ergonomic expertise can be very helpful.
- It is also important to provide instructions and, in some cases, training in work techniques when introducing new workers and changing work practices. Instructions and information should be repeated at regular intervals. Employers need to check whether current procedures for implementing these instructions are relevant and adequate, and that the instructions are being followed.

5.2 Manual handling

- Workers should be provided with technical aid equipment, such as high-lift trucks, for which manual handling is required to transfer loads, but hydraulic power is normally used to raise and lower them. These trucks can be used in fairly congested and confined areas and are designed to move different types of loads. Stackers can be manually operated or powered, and pedestrian-controlled and ride-on versions are available. Stackers are a high-lift type of pallet truck typically used for placing and removing loads on storage racks and on vehicles.
- It is important for workers to know the approximate weights of burdens in order to adapt their force input when handling them. Both unexpectedly light and unexpectedly heavy burdens can cause problems. Employers must ensure that workers receive general indications and, when possible, precise information on the weight of a load and the centre of gravity of the heaviest side when a package is eccentrically loaded.
- For carrying a laptop, a bag should be chosen that properly accommodates the weight of the laptop and its accessories. Rolling carrying cases are recommended for weights over 5 kg. Laptop bags should have wide, padded shoulder straps and a waist belt to distribute some of the load to the hips.

5.3 Repetitive work

- Make the laptop like a desktop computer by using an ergonomically designed office chair, using separate input devices to allow the shoulders to relax and the hands to be at elbow level, and placing the laptop on a riser (or using a separate monitor) to allow the screen to be at/slightly below eye level.
- To avoid glare, position the laptop screen to be perpendicular to windows, close shades and blinds to block bright outside light, and avoid working under bright sources of light.
- For mobile phones, use hands-free devices to eliminate awkward, static postures during long phone calls.
- Link the tablet to a compatible computer monitor or screen to improve neck posture and increase screen size. Place the tablet keyboard in a position that allows the shoulders to relax and the elbows to rest at the sides.
- Store cashiers should have a schedule that allows them to work for a maximum of two hours in the checkout. The worker can then undertake other duties for at least half an hour or take a short break to have motion variation before returning to the checkout. This can be applied to similar repetitive jobs in other sectors, such as the manufacturing and food industries.

5.4 Prolonged sitting

Some simple measures that can be taken to reduce sitting time are the following:

- take a break from sitting every 30 minutes;
- stand while talking on the phone or working on a computer;
- use work stations that are easy to adjust in height according to individual needs; and
- walk with colleagues during meetings rather than sitting in a conference room.

6. How to carry out an inspection using a MSD preventive approach

6.1 Planning an inspection

Before the inspection, the labour inspector should plan the goals, themes, and expected time needed for the inspection. Inspections focusing on MSDs/ergonomic risks may sometimes be more time consuming than other inspections. It might therefore sometimes be necessary for more than one labour inspector to take part in the inspection, for example, when the workplace inspected is large.

The inspector should get acquainted with the particular ergonomic risks workers are likely to be exposed to in the sector (see examples cited in section 3.3) and gather information about the workplace and past performance, for example, from inspection, and accident reports. If, according to NLI procedures, the labour inspector can give notice of the inspection in advance, this might be an advantage. Notifying makes the inspection transparent and expedient. It is recommended that the following information be provided to the employer:

- time and place of the inspection;
- what personnel the labour inspector would like to meet;
- who will participate from the NLI side;
- what documentation should be available and what information should be sent to the labour inspector before the inspection; and
- information on specific methods to be used during the inspection (if relevant).

6.2 During an inspection

The inspection is carried out according to national practice. A recommended procedure is to divide the inspection into an initial meeting, a workplace round, and a final meeting.

In the initial meeting, the risk assessment documentation should be checked, especially to ensure that all ergonomic risks have been covered. It is also important to determine whether women and men, as well as young and old workers, have different tasks, and are therefore exposed to different ergonomic risk factors. In assessing the ergonomic risks there are often national methods especially prepared for labour inspectors, such as checklists, questionnaires, group interviews, individual interviews, and remarks. With the help of these, the labour inspector can assess what ergonomic risk factors there seem to be at a certain workplace.

A non-exhaustive list of questions about ergonomic risk assessment suitable for use in any inspection is presented below:

1. Has the employer conducted a risk assessment?
2. Were work-related ergonomic risks identified and assessed?
3. Were all groups of workers (e.g., migrant workers, temporary agency workers, young workers, elderly workers, women, men, part-time workers, and shift workers) included in the risk assessment?
4. Which ergonomic risks were identified and assessed? (Manual handling, repetitive work, pushing and pulling, etc.)
5. Were aggravating factors included? (Physical, organisational, psychosocial factors, etc.)

6. How were the risks identified and how were they assessed?
7. Was a checklist or another method used?
8. Who participated in the risk assessment?
9. Did the employer use internal experts or external OSH services?
10. Was an action plan drawn up and were responsibilities determined?
11. What actions (e.g., preventive and protective measures) were taken after the risk assessment?
12. Have the actions been effective?
13. Have the workers received information and training on how to prevent ergonomic risks?

Appendix 1 contains an extended version of the above list of questions about how to assess the quality of risk assessments and measures concerning ergonomic risks.

Appendix 2 contains a number of assessment models that can be used if the labour inspector needs to deepen the assessment of the risk assessment carried out by the employer, e.g., to explore whether the risk assessment and measures taken or planned are adequate or not.

It is important to note that it is the employer's responsibility, not the labour inspector's, to examine and assess work-related ergonomic risks in the workplace. The labour inspector assesses whether the risk assessment has been carried out according to the legislation and whether it is comprehensive and adequate.

The labour inspector will face different situations depending on the employer's answers. If the risk assessment, measures taken, and the actual action plan seem of sufficient quality, the labour inspector could decide simply to check the work environment at one workstation. However, if the labour inspector believes that there is a lack of quality, he/she should visit a number of workstations. In doing this, the labour inspector may use the assessment models presented in Appendix 2.

When visiting workstations/workplaces, the labour inspector observes the actual work environment. It is necessary to talk with a range of people from managers to workers. It is important for the labour inspector to obtain information about the working conditions in order to assess whether the risk assessment covers the risks present in the workplace.

In addition, statistics about work-related sickness absence, worker turnover, work-related accidents, and illnesses, as well as information from the occupational health-care provider or other external experts are useful sources of information.

Certain indications, such as information from individuals, complaints or anonymous reports, and impressions gained during the inspection, may point to the existence of work-related MSDs/ergonomic risks.

In the final meeting, the labour inspector should communicate his/her remarks and findings and the stipulations, injunctions, or advice to be given to the employer. In addition, OSH instructions and guidance may be given to the employer via relevant web pages, specially designed toolkits, training, and models of good practice.

6.3 After an inspection

The labour inspector should consider whether:

- the risk assessment is in accordance with national legislation and whether the relevant ergonomic risks have been identified;
- all involved fields of work (e.g., workplaces, organisational areas, and external work locations) and groups of workers were covered by the risk assessment of the company; and
- appropriate measures, timetables, and responsibilities have been decided on.

Labour inspectors in Europe have various ways of taking action to ensure that a workplace complies with occupational safety and health legislation. The labour inspector may draft an inspection report, issue an improvement/prohibition notice, and give instructions and/or guidance to the employer. The labour inspector can also impose measures with deadlines if he/she finds noncompliance with national legal obligations.

Examples of shortcomings and measures:

- If the risk assessment has not been carried out at all, the labour inspector could impose measures according to national legislation (e.g., an improvement notice), obliging the employer to carry out the risk assessment.
- If a risk assessment has been carried out but ergonomic risks have not been assessed, the labour inspector could impose measures, according to national legislation, on the employer to supplement the risk assessment. This also applies to situations in which other essential elements of the risk assessment are missing or incomplete, for instance, the ergonomic risks have not been assessed thoroughly enough. In the event of such shortcomings, the inspector could require the use of external OSH services.
- If the risk assessment is not up to date, the labour inspector could impose measures, according to national legislation, to update the risk assessment.
- If no measures have been taken even though ergonomic risks have been identified, the labour inspector could require the employer to take preventive and protective measures.
- If the measures taken are not adequate to tackle the risks, the labour inspector could require new measures that are more effective.
- If the workers have not been instructed on how to avoid the risks, the labour inspector could require the employer to give relevant instructions.

According to national procedures, the labour inspector will decide whether a follow-up inspection will be necessary in order to check the implemented measures and to verify that the action plan has been implemented in due time.

References

- ⁱ *Ergonomics for the Prevention of Musculoskeletal Disorders (AFS 2012:2)*, Provisions and General Recommendations of the Swedish Work Environment Authority on Ergonomics for the Prevention of Musculoskeletal Disorders.
- ⁱⁱ *Sixth European Working Conditions Survey – Overview report (2017 update)*, Publications Office of the European Union, Luxembourg, Eurofound, 2017.
- ⁱⁱⁱ *Ergonomics Guidance for Mobile Devices, OHS 12-063-4/2012*, Stanford University, California USA
- ^{iv} *What are the risks of sitting too much?*, Edward R. Laskowski, M.D, Mayo Clinic, United States, <https://www.mayoclinic.org/healthy-lifestyle/adult-health/expert-answers/sitting/faq-20058005>
- ^v *FACTS no. 71 Introduction to work-related musculoskeletal disorders*, EU-OSHA, 2007.
- ^{vi} *The role of work stress and psychosocial factors in the development of musculoskeletal disorders*, 2004, Roben Centre for Health Ergonomics, University of Surrey, UK.

Further information

- EN 1005-2:2003+A1:2008 Safety of machinery – Human physical performance, Part 2: Manual handling of machinery and component parts of machinery;
- EN 1005-3:2002+A1:2008 Safety of machinery – Human physical performance, Part 3: Recommended force limits for machinery operation;
- EN 1005-4:2005+A1:2008 Safety of machinery – Human physical performance, Part 4: Evaluation of working postures and movements in relation to machinery;
- EN 1005-5:2007 Safety of machinery – Human physical performance, Part 5: Risk assessment for repetitive handling at high frequency;
- EN ISO 14738:2008 Safety of machinery – Anthropometric requirements for the design of workstations at machinery;
- ISO 11228-1:2003 Ergonomics – Manual handling, Part 1: Lifting and carrying;
- ISO 11228-2:2007 Ergonomics – Manual handling, Part 2: Pushing and pulling;
- ISO 11228-3:2007 Ergonomics – Manual handling, Part 3: Handling of low loads at high frequency;
- ISO 45001:2018 Occupational health and safety management systems – Requirements with guidance for use;
- Ergonomics for the Prevention of Musculoskeletal Disorders (AFS 2012:2), Provisions and General Recommendations of the Swedish Work Environment Authority on Ergonomics for the Prevention of Musculoskeletal Disorders, <https://www.av.se/en/work-environment-work-and-inspections/publications/foreskrifter/ergonomics-for-the-prevention-of-musculoskeletal-disorders-afs-20122/>;
- HSG6 Upper limb disorders in the workplace (<http://www.hse.gov.uk/pubns/books/hsg60.htm>); INDG143(rev3) Manual handling at work: A brief guide (www.hse.gov.uk/pubns/indg143.pdf); INDG398 Making the best use of lifting and handling aids (www.hse.gov.uk/pubns/indg398.pdf);
- Manual Handling Solutions You Can Handle, HSG115-HSE, UK Health and Safety Executive, 2010;
- Factsheet 78 – Work-related musculoskeletal disorders: prevention report – A summary, EU-OSHA, 08.02.2008, <https://osha.europa.eu/en/tools-and-publications/publications/factsheets/78>;
- Factsheet 5 – Work-related neck and upper limb musculoskeletal disorders, EU-OSHA 03.02.2000, <https://osha.europa.eu/en/tools-and-publications/publications/factsheets/5>;
- Factsheet 10 – Work-related low back disorders, EU-OSHA, 01.10.2000, <https://osha.europa.eu/en/tools-and-publications/publications/factsheets/10>;
- Factsheet 4 – Preventing work-related musculoskeletal disorders, EU-OSHA, 02.02.2000 <https://osha.europa.eu/en/tools-and-publications/publications/factsheets/4>; and
- Factsheet 6 – Repetitive strain injuries in EU Member States, 04.02.2000, <https://osha.europa.eu/sv/tools-and-publications/publications/factsheets/6>.

Appendix 1 – List of questions for assessing the quality of risk assessments and measures concerning ergonomic risks

Questions from the labour inspector to the employer and workers' representative(s).

Part	Question	Yes	To some extent	No	Explanations/Comments
1.	Identifying risks and those at risk				
	Has the employer conducted a risk assessment?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Was the risk assessment methodically planned?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Did the management participate?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Which level?
	What method was used?	<input type="checkbox"/> interviews <input type="checkbox"/> questionnaire <input type="checkbox"/> group discussions <input type="checkbox"/> other			
	Was the method used suitable and effective?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Were internal or external OSH services used?	<input type="checkbox"/> internal <input type="checkbox"/> external		<input type="checkbox"/>	
	Did a competent person with experience in ergonomics take part in the work?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Did the risk assessment cover the following groups of workers?				
	▪ young and old	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	▪ women and men	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	▪ migrant workers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	▪ temporary-agency workers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	▪ part-time workers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	▪ shift workers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	▪ teleworkers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	▪ multicultural working groups	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Did the risk assessment cover all areas of work?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	A company can have many workplaces separate from each other.

Part	Question	Yes	To some extent	No	Explanations/Comments
	<p>Did the risk assessment cover existing ergonomic risks, in terms of frequency, duration, and intensity, concerning:</p> <ul style="list-style-type: none"> ▪ repetitive work; ▪ manual handling, lifting, and carrying; ▪ pushing and pulling; ▪ work postures and movements; ▪ prolonged standing; ▪ knowledge of ergonomically correct working methods and how to use technical aids; ▪ and prolonged sitting? 	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	<p>Were other physical hazards considered, such as:</p> <ul style="list-style-type: none"> ▪ vibration and loud noise; ▪ high or low temperatures; and ▪ visual ergonomics and lighting? 	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	<p>Aggravating factors of musculoskeletal injuries should always be considered in the total risk assessment. Were they included? Factors that aggravate the risk of injuries are:</p> <ul style="list-style-type: none"> ▪ the work makes high demands for the development of force, precision, or speed of movement; ▪ the work object is heavy and difficult to grasp; ▪ workstations are not individually adjustable; ▪ a reward system is applied that puts a premium on quantity; ▪ there are frequent unexpected disruptions in production over which the employees have no control; ▪ there are weak social relationships and social support in the workplace; ▪ tools are not individually adjustable; ▪ not enough breaks are provided (recovery); ▪ PPEs are unsuitable (e.g., gloves are too big); and ▪ high precision is required (e.g., in assembling small appliances). 	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Part	Question	Yes	To some extent	No	Explanations/Comments
	Were all relevant aspects of the risk assessment properly documented?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Have all workers received instructions about how to work in an ergonomically safe way?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2.	Evaluating and prioritizing				
	Was an action plan documented?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
3.	Deciding on preventive measures and taking action				
	Have measures been decided on regarding the different levels of ergonomic risks?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Risk = probability × consequence
	Have responsible persons and timelines been decided on?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Did the workers' representative(s) participate?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Has the hierarchy of hazard controls been used when deciding measures?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Collective and organisational measures should be prioritised over individual ones.
	Was timing indicated on the action plan?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Has the action plan been carried out?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4.	Monitoring and reviewing				
	Have actions taken been evaluated?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Final evaluation of the labour inspector:

5.	Question	Yes	To some extent	No	Comments Advice/ stipulation
	The risk assessment process is easy to follow and fit for purpose.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	The workers' representative(s) participated to a sufficient extent in the process.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	The main ergonomic risk factors were collected and assessed in an appropriate way.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Were aggravating factors included?
	All groups of workers were covered.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	The documentation is appropriate in terms of form and content.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Measures have been taken or initiated and their effectiveness checked.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	The workers receive enough instruction in order to avoid MSDs.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Appendix 2 – Models for assessing MSD risks*

Purpose

There is sometimes need for a practical, systematic and simple method/tool for labour inspectors when they shall assess the risk assessment done by the employer regarding risks for MSDs, e.g., to decide whether the risk assessment carried out by the employer, including measures taken or planned, is or is not good enough. Using one or more of these models when visiting a number of work stations, it should be possible for a labour inspector to gain an initial indication of the work done by the employer.

Principles of the models

The relationships between work and the risk of musculoskeletal disorders are often difficult to detect. These models have been simplified to enable them to be used in practice. They only assess a few aspects of one load type at a time, so they cannot be used as exact limit values for loads. But they should provide sufficiently sound guidance for labour inspectors. Due to this simplification, applying the models uncritically may entail both overestimating and underestimating the actual risks. Comprehensive assessments will require the consideration of more factors and the use of more accurate models, which calls for a sound knowledge of ergonomics. Knowledge is also required for activities where a risk of vocal cord disorders can arise.

The models are designed according to a system with three zones (red–yellow–green) that give a clear indication of working conditions where the risk is great or negligible.

The colours in the models have the following meanings:

Red area = unsuitable

The loads in the work are of such a magnitude and character that all or most of the employees risk being affected by musculoskeletal disorders in the short or long term.

The employer must rectify the conditions immediately in order to eliminate or reduce the risk, unless there are special reasons to postpone measures. Such reasons might include very great practical difficulties in quickly rectifying the deficiencies entailing risks, or employees specially chosen to receive specific knowledge of the risks and of the skill required to avoid them.

Yellow area = evaluate more closely

The loads in the work are of such a magnitude and character that several employees risk being affected by musculoskeletal disorders in the short or long term. The employer should carry out more precise investigations and assessments with the help of an expert in ergonomics in order to determine the degree of risk. Above all, time factors (tempo, frequency, duration, etc.) need to be investigated in more detail.

Green area = acceptable

The loads in the work are of such a magnitude and character that no or a few employees risk being affected by musculoskeletal disorders.

Thus, for most employees, the loads present no risk of injury. However, the employer must be cautious with regard to specific risk groups (e.g., pregnant women, minors, or employees who have recently been ill). General measures do not normally need to be taken, but individual ones should be taken when necessary.

Models for the assessment of sitting, standing, and walking work postures

It is impossible to determine the degree of harmfulness in each individual work posture because it is often difficult to distinguish them from each other. Usually, however, there are one or a few predominant work postures that influence the load more than others, such as those occurring most often during the working day or those involving extreme positions, even if these only occur for short periods. It is these work postures that are assessed in the model. First is the determination of what work postures are involved. The model is then used to see if the work postures can be classified as red, yellow, or green for one or more parts of the body.

In principle, only one item in a box needs to be true in order for that box to be considered red or yellow. The more assessment items that are considered in a red area, the greater the need for measures.

The body parts mentioned in the model are observation points and not necessarily those that are injured. For example, unstable surface in the model refers to the risk of back disorders rather than the risk of leg disorders.

The model assumes a full shift. A shift normally consists of 7–8 hours per day. The term a substantial part of the shift here means that the work posture occurs without interruption, or with very short interruptions, for more than half the shift. Periodically means alternation of the work posture with other work postures to such an extent that the total duration of the work posture does not exceed half the shift.

Note that the model does not take into account whether the work requires great or little application of force. Where there are high force requirements, any of the yellow and green jobs can become red. The time aspect is always important: no work posture that can be assumed naturally is health endangering in itself; rather, risks arise if it is assumed too often or too long.

Work posture	Red	Yellow	Green
Sitting	One of the following occurs during a significant part of the shift:	One of the following occurs periodically during the shift:	The following applies to a significant part of the shift:
Neck	<ul style="list-style-type: none"> ▪ Flexed ▪ Twisted ▪ Simultaneously flexed and twisted ▪ Heavily restricted freedom of movement 	<ul style="list-style-type: none"> ▪ Flexed ▪ Twisted ▪ Simultaneously flexed and twisted ▪ Heavily restricted freedom of movement 	<ul style="list-style-type: none"> ▪ In a central position ▪ Opportunity for free movements
Back	<ul style="list-style-type: none"> ▪ Flexed ▪ Twisted ▪ Simultaneously flexed and twisted ▪ Heavily restricted freedom of movement ▪ No backrest 	<ul style="list-style-type: none"> ▪ Flexed ▪ Twisted ▪ Simultaneously flexed and twisted ▪ Heavily restricted freedom of movement 	<ul style="list-style-type: none"> ▪ Opportunity for free movement ▪ Well-designed backrest ▪ Opportunity to change to standing position
Shoulder/arm	<ul style="list-style-type: none"> ▪ Hand at or above shoulder height ▪ Hand beyond forearm distance unsupported 	<ul style="list-style-type: none"> ▪ Hand at or above shoulder height ▪ Hand beyond forearm distance unsupported 	<ul style="list-style-type: none"> ▪ Working height and reach adapted to task and individual ▪ Good arm support

Legs	<ul style="list-style-type: none"> Inadequate legroom No support for the feet Heavily restricted freedom of movement Leg- or foot-operated pedal work ^{a)} 	<ul style="list-style-type: none"> Inadequate legroom No support for the feet Heavily restricted freedom of movement Leg- or foot-operated pedal work ^{a)} 	<ul style="list-style-type: none"> Free legroom Good footrest Seldom leg- or foot-operated pedal work ^{a)} Opportunity to change to standing position
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Picture 1. Model for the assessment of sitting work postures.

^{a)} Leg-operated pedal work = using the brake or clutch pedal of a car; foot-operated pedal work = using the accelerator pedal of a car.

Work posture	Red	Yellow	Green
Standing/walking	One of the following occurs during a significant part of the shift:	One of the following occurs periodically during the shift:	The following applies to a significant part of the shift:
Neck	<ul style="list-style-type: none"> Flexed Twisted Simultaneously flexed and twisted Heavily restricted freedom of movement 	<ul style="list-style-type: none"> Flexed Twisted Simultaneously flexed and twisted Heavily restricted freedom of movement 	<ul style="list-style-type: none"> Upright posture Opportunity for free movement
Back	<ul style="list-style-type: none"> Flexed Twisted Simultaneously flexed and twisted Heavily restricted freedom of movement Unstable or inclined surface 	<ul style="list-style-type: none"> Flexed Twisted Simultaneously flexed and twisted Heavily restricted freedom of movement Unstable or inclined surface 	<ul style="list-style-type: none"> Upright posture Opportunity for free movement Opportunity to change to sitting position
Shoulder/arm	<ul style="list-style-type: none"> Hand at or above shoulder height Hand below knee level Hand beyond $\frac{3}{4}$ arm's length 	<ul style="list-style-type: none"> Hand at or above shoulder height Hand beyond forearm distance unsupported Inadequate room for legs 	<ul style="list-style-type: none"> Working height and reach adapted to task and individual Freedom of movement on stable, non-slip, even and level surface
Legs	<ul style="list-style-type: none"> Inadequate legroom No support for the feet Heavily restricted freedom of movement Leg- or foot-operated pedal work ^{b)} 	<ul style="list-style-type: none"> Inadequate legroom No support for the feet Heavily restricted freedom of movement Leg- or foot-operated pedal work ^{b)} 	<ul style="list-style-type: none"> Free legroom Good footrest Seldom leg- or foot-operated pedal work ^{b)} Opportunity to change to standing position

Picture 2. Model for the assessment of standing work postures.

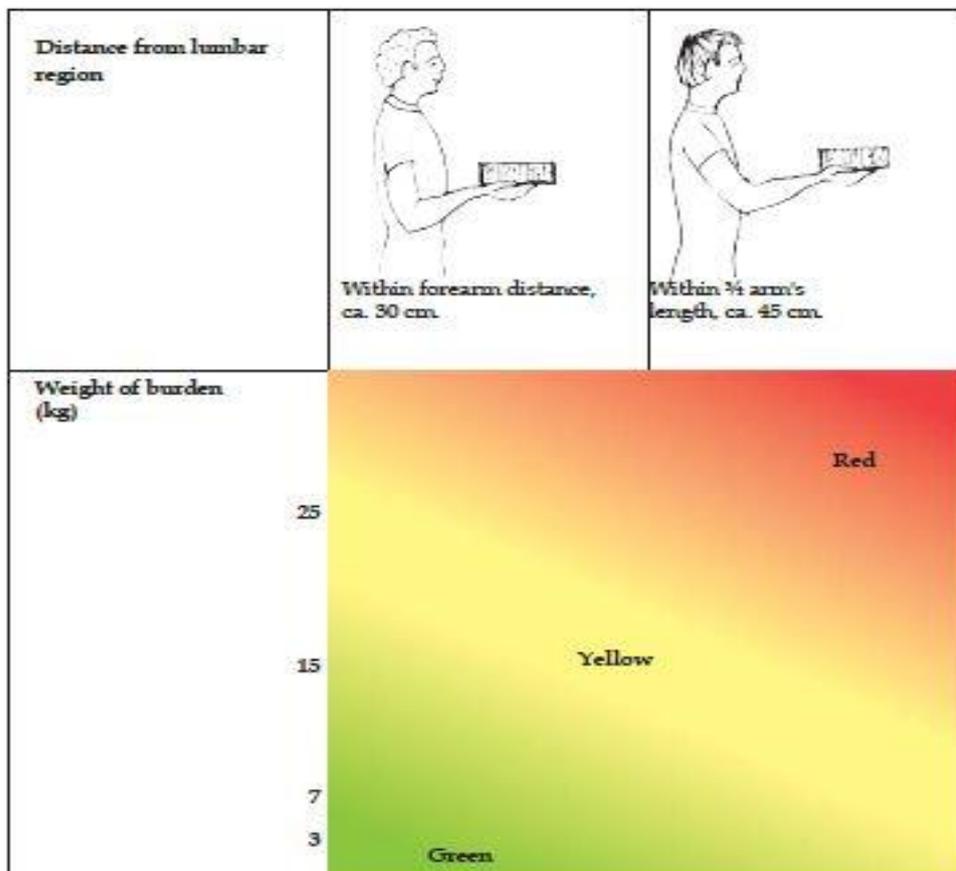
b) Leg-operated pedal work = using the brake or clutch pedal of a car; foot-operated pedal work = using the accelerator pedal of a car.

Model for the assessment of lifting

The model for the assessment of lifting concentrates on two main factors: the weight of the burden and how far in front of the body the burden's centre of gravity is. Thus the model does not include important factors such as lifting frequency, duration of lifting work, lifting height, and the ability of the load to be grasped. In order to include the effects of these and other factors in the analysis, supplementary assessments have to be made. The model is valid for both men and women.

Model for the assessment of a symmetrical lift with two hands, standing, under ideal conditions. Horizontal distance = the distance between the lumbar region and the burden's centre of gravity during the lift.

The model shows that it is unsuitable to handle burdens that are heavier than 25 kg in most cases. Many factors should be taken into account in the risk assessment, especially if the first assessment comes in the yellow area. The greater the number of "aggravating" factors, the lower the recommended maximum weight compared with ideal lifting conditions.



Picture 3. Model for lifting.

Model for pushing and pulling

The model for assessing pushing and pulling work relates to good ergonomic conditions, e.g., a symmetrical two-handed grip, well-designed handles positioned at a suitable height, and good ambient conditions. If the object is moved far, if the operation is repeated frequently or for a prolonged period, or if the grasping height deviates noticeably from about elbow height, the values in the model should be correspondingly reduced. This also applies if the work is being done using only one hand. Most of the influencing factors in the assessment model for lifting work can also be used for pushing and pulling work.

The unit of force is the newton [N] and is measured using a dynamometer.

Force (N)	Red	Yellow	Green
Starting	>300	300–150	<150
Continuously	>200	200–100	<100

Remark: It can be difficult for labour inspectors to assess this because they are not in possession of a dynamometer. The most important indicators for pushing and pulling are time, distance, load, push/pull, work position, floor, technical aids, etc. The employer should assess these indicators.

Model for identifying and assessing repetitive work

The model supports the identification and assessment of repetitive work. In the final assessment of risk, it is always important to weigh the total time the work is performed and how it is distributed over the day.

	Red	Yellow	Green
Work cycle	The work cycle is repeated several times a minute for at least half the shift.	The work cycle is repeated several times a minute for at least one hour of the shift or many times an hour for at least half the shift.	The work cycle is repeated a few times every hour.
Work postures and working movements	Constrained or uncomfortable work postures and working movements.	Limited opportunities to change work postures and working movements.	Well-designed workplace. Good opportunities to change work postures and working movements.
Job decision latitude	The work is completely controlled by other things or persons.	The work is partly controlled by other things or persons.	Good opportunities to adapt the work to one's own ability. Influence over the planning and arrangement of the work.
Work content, training, and competence requirements	The employee performs an isolated task in a production process. Short training.	The employee performs several tasks in a production process. Job rotation can occur. Training for several areas.	The employee participates in several tasks or in the entire production process, including planning and control. Continuous competence development.

Picture 4. Model for repetitive work.

Remark: Perspectives on recovery are not included in this model for assessing repetitive work, so they were added from the Ocra checklist (<https://www.scribd.com/doc/28576078/The-Ocra-Checklist>).

Red: 1 break /8 h, Yellow: 2–3 breaks /8 h, Green: ≥ 4 breaks /8 h.

Assessment

The work cycle is the most important factor – if this is in a red area, the work is assessed to be repetitive. Such work is harmful, and it is very important to implement measures in the near future. The risk of adverse effects increases even more if one or more of the other factors are also in a red area. If the work cycle is in a yellow area, the conditions should be evaluated more closely. If one or more other factors are in a red or yellow area, the work is unsuitable and measures should be taken. If the work cycle is in a green area, the work is no longer repetitive. For other factors, the working conditions improve when these move towards a green area. The aggravating factors are always weighed in the total assessment.

Explanations concerning the model

The model assumes a full shift. A shift normally consists of 7–8 hours per day.

Work cycle: The time from beginning to process an object until the same operation recurs with the next object. It is not unusual for the same working movements to be repeated several times within such a work cycle. Fingers and wrists can handle a higher frequency of movement than can elbows and shoulder joints without suffering injury. A more serious assessment should be made if large parts of the body are involved.

Work postures and working movements: Assessments of working movements should take into account the body parts that are used. Assessments of work postures should refer to the assessment model for taxing work postures and these can be combined with the model for lifting.

Job decision latitude: Job decision latitude can be limited by sitting at a conveyor belt, where the employee is unable to affect the speed of the machine. Long queues of customers may also lead to mental stress that limits job decision latitude. Piecework entails a certain measure of autonomy in that employees can themselves decide how much is to be produced. In practice, however, it often has the opposite effect, because there are always minimum requirements with respect to production volume. The concept of job decision latitude is treated in Section 8 and in the general recommendations.

Work content, training, and competence requirements: Work content includes viewing the production process as a whole and how one's own work fits into the whole. Good work content means that the work is made up of parts that are different in character, yet clearly fit together, for example, by including planning, implementing, and controlling operations. Workers have the opportunity to use all their skills and develop in their work. A job with little work content means that it only consists of one simple task.

There are jobs with markedly limited work content, whose sole stimulation consists in the amount the individual can produce or the incentive pay associated with this. The mental stimulation of feeling "competent" entails a risk to physical health, since the

load on the body increases with increased performance while the time for breaks and recovery decreases.

Training and competence requirements are the induction, introduction, and continuing training that workers need to perform the task. More complicated tasks give employees opportunities to use their physical, mental, and creative abilities. Jobs with varied work content usually require longer training and continuous competence development.

*) Developed based on: *Ergonomics for the Prevention of Musculoskeletal Disorders* (AFS 2012:2), Provisions and General Recommendations of the Swedish Work Environment Authority on Ergonomics for the Prevention of Musculoskeletal Disorders, 2012, <https://www.av.se/en/work-environment-work-and-inspections/publications/foreskrifter/ergonomics-for-the-prevention-of-musculoskeletal-disorders-afs-20122/>

Appendix 3 – Ergonomic risks and workers who may be exposed to them**

Problems to look for when making an assessment	Ways of reducing the risk of injury
<p><i>The tasks, do they involve:</i></p> <ul style="list-style-type: none"> ▪ holding loads away from the body? ▪ twisting, stooping, or reaching upwards? ▪ large vertical movements? ▪ long carrying distances? ▪ strenuous pushing or pulling? ▪ repetitive handling? ▪ insufficient rest or recovery time? ▪ a work rate imposed by a process? 	<p><i>Can you:</i></p> <ul style="list-style-type: none"> ▪ use a lifting aid? ▪ improve workplace layout to improve efficiency? ▪ reduce the amount of twisting and stooping? ▪ avoid lifting from floor level or above shoulder height, especially for heavy loads? ▪ reduce carrying distances? ▪ avoid repetitive handling? ▪ vary the work, allowing one set of muscles to rest while another is used? ▪ push rather than pull?
<p><i>The loads, are they:</i></p> <ul style="list-style-type: none"> ▪ heavy or bulky? ▪ difficult to grasp? ▪ unstable or likely to move unpredictably (e.g., animals)? ▪ harmful (e.g., sharp or hot)? ▪ awkwardly stacked? ▪ too large for the handler to see over? 	<p><i>Can you make the load:</i></p> <ul style="list-style-type: none"> ▪ lighter or less bulky? ▪ easier to grasp? ▪ more stable? ▪ evenly stacked? <p>If the load comes in from elsewhere, have you asked the supplier to help (e.g., by providing handles or smaller packages)?</p>
<p><i>In the work environment, are there:</i></p> <ul style="list-style-type: none"> ▪ restrictions on posture? ▪ bumpy, obstructed, or slippery floors? ▪ variations in floor levels? ▪ hot/cold/humid conditions? ▪ gusts of wind or other strong air movements? ▪ poor lighting conditions? ▪ restrictions on movements from clothes or personal protective equipment (PPE)? 	<p><i>Can you:</i></p> <ul style="list-style-type: none"> ▪ remove obstructions to free movement? ▪ provide better flooring? ▪ avoid steps and steep ramps? ▪ prevent extremes of hot and cold? ▪ improve lighting? ▪ provide protective clothing or PPE that is less restrictive? ▪ ensure that your employees' clothing and footwear are suitable for their work and body dimensions (for both women and men)?

<p><i>Individual capacity, does the job:</i></p> <ul style="list-style-type: none"> ▪ require unusual capability (e.g., above average strength or agility)? ▪ endanger those with a health problem or learning/physical disability? ▪ endanger pregnant women? ▪ call for special information or training? 	<p><i>Can you:</i></p> <ul style="list-style-type: none"> ▪ pay particular attention to those who have a physical weakness? ▪ take extra care of pregnant workers? ▪ give your employees more information (e.g., about the range of tasks they are likely to face)? ▪ provide more training (see 'What about training?') ▪ get advice from an occupational health advisor if you need to?
<p><i>Handling aids and equipment:</i></p> <ul style="list-style-type: none"> ▪ is the device the correct type for the job? ▪ is it well maintained? ▪ are the wheels on the device suited to the floor surface? ▪ do the wheels run freely? ▪ is the handle height between the waist and shoulders? ▪ are the handle grips in good condition and comfortable? ▪ are there any brakes? If so, do they work? 	<p><i>Can you:</i></p> <ul style="list-style-type: none"> ▪ adjust the work rate? ▪ provide equipment that is more suitable for the task? ▪ carry out planned preventive maintenance to prevent problems? ▪ change the wheels, tyres, and/or flooring so that equipment moves easily? ▪ provide better handles and handle grips? ▪ make the brakes easier to use, more reliable, and more effective?
<p><i>Work organisation factors:</i></p> <ul style="list-style-type: none"> ▪ is the work repetitive or boring? ▪ is the work machine or system paced? ▪ do workers feel that the demands of the work are excessive? ▪ have workers little control over the work and working methods? ▪ is there poor communication between managers and employees? ▪ are there enough recovery breaks? ▪ are workers working alone? 	<p><i>Can you:</i></p> <ul style="list-style-type: none"> ▪ change tasks to reduce the monotony? ▪ make more use of workers' skills? ▪ make workloads and deadlines more achievable? ▪ encourage good communication and teamwork? ▪ involve workers in decisions? ▪ provide better training and information? ▪ incorporate more recovery breaks? ▪ let workers ask a colleague for help?

**) Developed based on: *Manual handling at work: A brief guide*, INDG 143. Health and Safety Executive, UK.

Appendix 4 – List of SLIC EMEX Working Group member organisations

Member state	Representative
CYPRUS	Department of Labour Inspection P.O. 24855 1304 Nicosia Cyprus
DENMARK	The Danish Working Environment Authority Landskronagade 33 DK-2100 København Ø Denmark
FINLAND	Ministry of Social Affairs and Health Department for Work and Gender Equality P.O. Box 33, FI-00023 Government Finland
GREECE	Greek Labour Inspectorate Directorate for OSH Inspection of Athens-East Attica-Crete Coordination Department 10, Agisilaou Street, 10437, Athens Greece
POLAND	Chief Labour Inspectorate UL. Barska 28/30 02-315 Warszawa Poland
ROMANIA	Labour Inspection 14, Matei Voievod Street, 2nd district RO - 021455 Bucharest Romania
SWEDEN	Swedish Work Environment Authority International Affairs and Department of Inspections SE-112 79 Stockholm Sweden