European legal requirements relating to work-related musculoskeletal disorders (MSDs)

Summary

Various European legal requirements concern to work-related musculoskeletal disorders (MSDs).

At the **international** level, International Labour Organisation (ILO) conventions:

- **C127** – Maximum weight (loads)
- **C148** – Working environment (air pollution, noise, vibration)
- **C155** – Occupational safety and health (obliging employers to ensure that workplaces, machinery and equipment are safe)
- **C167** – Safety and health in construction
- **C184** – Safety and health in agriculture

At **European** level, EU Directives:

- **89/391/EEC** - General Framework Directive, obliging employers to safeguard workers' safety and health
- **89/654/EEC** - Minimum safety and health requirements for workplaces
- **89/655/EEC - 89/656/EEC** - Work equipment and personal protective equipment
- **90/269/EEC** - Employers' obligations concerning the manual handling of loads when there is a risk of back injury
- **90/270/EEC** - Minimum safety and health requirements for work with display screen equipment
- **93/104/EC** - Organisation of working time
- **98/37/EC** – Laws relating to machinery
- **2002/44/EC** - Exposure limits and values for hand-arm and whole-body vibration
- **2006/42/EC** – Directive on machinery

International Organisation of Standardisation (ISO) and European EN standards, adding detail to Directives and enabling them to be implemented:

- EN 614: Safety of machinery – Ergonomic design principles
- EN 1005: Safety of machinery. Human physical performance Musculoskeletal risks associated with work tasks, and ways of reducing them
- EN ISO 9241: Ergonomic requirements for office work with visual display terminals.
- prEN 13921: Personal protective equipment – Ergonomic principles
- EN ISO 12100: Safety of machinery. Basic concepts, general principles for design

Implementing regulations in each **Member State** interpret Directives in a variety of ways, in many cases going beyond minimum safety and health requirements.

Introduction

European legal requirements relating to musculoskeletal disorders (MSDs) include international conventions and standards, European Directives and European standards.

At the **international level**, the International Labour Organisation (ILO) has issued several **conventions** that relate to MSDs. Before these conventions became legal obligations, they had to be ratified by a certain number of states.

At **European level**, several **Directives** have been published, relating directly or indirectly to MSDs. A European Directive requires national implementing legislation in each Member State before it comes into effect there. Generally, a Directive fixes the agreed objectives to be pursued by the EU Member States, but leaves freedom of choice in how to reach them. These Directives are supplemented by a series of European EN **standards**, which fill out the details and enable them to be implemented.

The International Organisation of Standardisation (ISO) has published international standards which deal with ergonomic requirements for work stations, methods of risk assessment and other aspects related to MSDs.

International conventions

ILO conventions related to MSDs (June 2006)

Convention	Topic	Adoption date
C127	Maximum weight	28/06/1967
C148	Working environment (air pollution, noise and vibration)	20/06/1977
C155	Occupational safety and health	22/06/1981
C167	Safety and health in construction	20/06/1988
C184	Safety and health in agriculture	21/06/2001

C127 – Maximum weight convention

Adoption date: 28.06.1967
Most important requirements:

no worker shall transport a load which, by reason of its weight, is likely to jeopardise their health or safety
any worker assigned to the manual transportation of loads must receive adequate training or instruction
where possible, suitable technical devices must be used for the manual transportation of loads.

C148 – Working environment (air pollution, noise and vibration)

Adoption date: 20.06.1977
Most important requirements:
as far as possible the working environment must be kept free from vibration hazards
if necessary, the employer must provide personal protective equipment
all persons concerned must be informed and instructed in ways of minimising vibration risks.

C155 – Occupational safety and health

Adoption date: 22.06.2001
This convention obliges policymakers and employers to ensure that workplaces, machinery and equipment are safe and without risk to health.

C167 – Safety and health in construction

Adoption date: 20.06.1988
This convention only applies to construction workers. It includes requirements for lifting appliances, lifting gear, transport equipment, earth-moving equipment and material-handling equipment in the construction sector.

C184 – Safety and health in agriculture

Adoption date: 21.06.2001
This convention only applies to workers in agriculture. It includes requirements for machinery safety and ergonomics, and for the handling and transportation of materials in the agricultural sector.

European Directives

European Directives relating to MSDs (June 2006)

Directive	Topic	Publication date
89/391/EEC of 12/06/1989	The introduction of measures to encourage improvements in the safety and health of workers at work	29/06/1989
89/654/EEC of 30/11/1989	Minimum safety and health requirements for the workplace	30/12/1989
89/655/EEC of 30/11/1989	Minimum safety and health requirements for the use of work equipment by workers at work	30/12/1989
89/656/EEC of 30/11/1989	Minimum health and safety requirements for the use of personal protective equipment in the workplace	30/12/1989
90/269/EEC of 29/5/1990	Minimum health and safety requirements for the manual handling of loads where there is a risk particularly of back injury	21/06/1990
90/270/EEC of 29/5/1990	Minimum health and safety requirements for work with display screen equipment	21/06/1990
93/104/EC of 23/11/1993	Aspects of the organisation of working time	13/12/1993
98/37/EC of 22/06/1998	Harmonisation of Member State laws relating to machinery	23/07/1998
2002/44/EC of 25/06/2002	Exposure of workers to risks arising from vibration	06/07/2002
2006/42/EC of 17/05/2006	Safety of machinery	09/06/2006

89/391/EEC

This general Framework Directive, on measures to encourage improvements in the safety and health of workers, does not relate directly to MSDs. However, it does oblige employers to take the necessary measures to safeguard workers' safety and health in every aspect of their work.

89/654/EEC

This Directive concerns the minimum safety and health requirements both for workplaces currently in use and workplaces that are used for the first time.

The requirements concerning freedom of movement at workstations are of interest for the prevention of MSDs.

89/655/EEC - 89/656/EEC

Directives 89/655/EEC and 89/656/EEC cover the suitability of work equipment and personal protective equipment, which affects the risk of MSDs. All personal protective equipment must take account of ergonomic requirements and the worker's state of health, and it must fit the wearer correctly after any necessary adjustment.

90/269/EEC

This Directive describes employers' obligations concerning the manual handling of loads when there is a risk of back injury:

- the employer must assess the health and safety risks of manual handling work
- the employer must put in place appropriate organisational measures to avoid the need for manual handling
- if it is not possible to avoid it, the employer must take steps to make manual handling as safe and healthy as possible
- the employer must inform and train his workers in how to handle loads safely.

90/270/EEC

This Directive sets out minimum safety and health requirements for work with display screen equipment. Employers must evaluate the safety and health risks associated with workstations, and take appropriate steps to remedy them. They must also inform and train their workers in using display equipment safely. The general goal of this Directive is to ensure that the use of display screen equipment is not a source of risk for workers. It sets out minimum requirements relating to specific pieces of equipment (display screens, keyboards, work desks, work chairs), the environment (space, lighting, reflection and glare, noise, heat, radiation, humidity), and the operator/computer interface.

93/104/EC

This Directive concerns the organisation of working time. Factors such as repetitive work, monotonous work and fatigue can increase the risk of MSDs. Requirements are set out in this Directive relating to breaks, weekly rest, annual leave, night work, shift work and work patterns.

98/37/EC

This Directive, which deals with machinery, also contains information with regard to MSDs. Machinery design must take into account ergonomic principles, so that the discomfort, fatigue and psychological stress of the

operator is reduced to a minimum. Ergonomic principles must also be applied to control devices, personal protective equipment and driving seats. Machinery must be so designed that risks resulting from vibration are reduced to a minimum. The Directive also includes important information on protection against mechanical hazards, such as uncontrolled movements, the risk of break-up during operation, rollover, falling objects, towing devices and moving transmission parts.

2002/44/EC

This Directive sets out exposure limits and values for hand-arm and whole-body vibration. Employers must assess the risks, avoid or reduce exposure, and inform and train their workers in minimising vibration risks. The Directive also sets out requirements concerning the monitoring of workers' health.

2006/42/EC

This Directive deals with machinery, interchangeable equipment, safety components, lifting accessories, chains, ropes and webbing, removable mechanical transmission devices and partly completed machinery. It also covers essential health and safety requirements relating to the design and construction of machinery.

Standards

International (ISO) and European (EN) standards relating to MSDs (June 2006)

Topic	Standard
General design principles	EN 614-1, EN 614-2, EN ISO 6385, EN ISO 13407, ENV 26385
Safety of machinery	EN 457, EN 547-1, EN 547-2, EN 547-3, EN 563, EN 574, EN 614-1, EN 641-2, EN 842, EN 894-1, EN 894-2, EN 894-3, prEN 894-4, EN 981, EN 1005-1, EN 1005-2, EN 1005-3, prEN 1005-4, prEN 1005-5, EN 13861, prEN 14386, EN ISO 14738
Physical environment	• Noise: EN ISO 9921 • Climate: EN 563, ISO 7243, EN ISO 7726, EN ISO 7730, prEN ISO 7933, prEN ISO 8996, EN ISO 9241-6, EN ISO 9886, EN ISO 9920, EN ISO 10551, ENV ISO 11079, EN ISO 11399, EN 12515, EN ISO 12894, EN 13202, EN ISO 13731, prEN ISO 13732-2, prEN ISO 13732-3, prEN ISO 14505-1, prEN ISO 14505-2, EN ISO 27243, EN 28996

Physical work load	EN 1005-1, EN 1005-2, EN 1005-3, prEN 1005-4, prEN 1005-5
Mental work load	EN 614-2, EN 9241-2, EN ISO 10075-1, EN ISO 10075-2, EN ISO 10075-3
Workplace and equipment design	• General: EN ISO 9241-5, EN ISO 9241-6, EN ISO 11064-1, EN ISO 11064-2, EN ISO 11064-3, EN ISO 11064-4, prEN ISO 11064-6, prEN 14386 • Anthropometry: EN 547-1, EN 547-2, EN 547-3, EN ISO 7250, EN ISO 14738, EN ISO 15535, EN ISO 15536-1, EN ISO 15537, prEN ISO 20685
Visual information, visual display terminals and software	• General: EN ISO 9241-1, EN ISO 9241-2, EN ISO 9241-3, EN ISO 9241-4, EN ISO 9241-5, EN ISO 9241-6, EN ISO 9241-7, EN ISO 9241-8, EN ISO 9241-9, EN ISO 13406-1, EN ISO 13406-2 • Software: EN ISO 9241-10, EN ISO 9241-11, EN ISO 9241-12, EN ISO 9241-13, EN ISO 9241-14, EN ISO 9241-15, EN ISO 9241-16, EN ISO 9241-17, EN ISO 13407, EN ISO 14915-1, EN ISO 14915-2, EN ISO 14915-3, prEN ISO 23973
Displays and controls	EN ISO 9241-4, ISO 9355-1, ISO 9355-2
Personal protective equipment	prEN 13921-1, prEN 13921-3, prEN 13921-4, prEN 13921-6

Source: 'Muskuloskeletal disorders: where we are, and where we could be', Roland Gauthy, 2005

It would go beyond the scope of this summary to describe the content of all the standards related to MSDs. Therefore, only the most relevant are described in more detail.

EN 614: Safety of machinery – Ergonomic design principles

This basic standard sets out rules which should be applied especially in the process of, designing machinery. It deals with the relationship between operator and machinery during assembly, installation, adjustment, operation, maintenance, cleaning, repair and transportation. It sets out ergonomic rules for designers taking into account the health and safety of the operator, in all areas of their activities. The standard consists of two parts:

- **EN 614-1: Safety of machinery – Ergonomic design principles. Terminology and design principles**
  This sets out general rules related to the design process, taking account of anthropometry and biomechanics, control actuators, interactions with the physical work environment, noise, vibration, thermal emissions, illumination, hazardous materials and radiation, as well as interactions in the work process.
- **EN 614-2: Safety of machinery – Ergonomic design principles. Interaction between machinery design and work tasks**
  This sets out the main rules for integrating ergonomics in the design process. It describes characteristics of well-designed work tasks, methods of work process design, and the assessment of work process design.

EN 1005: Safety of machinery. Human physical performance

This standard provides detailed information on the musculoskeletal risks associated with work tasks, and ways of reducing them. The standard consists of five parts: four are already approved, while one is being prepared by the "Ergonomics" Technical Committee CEN/TC 122.

- **EN 1005-1: Safety of machinery. Human physical performance. Terms and definitions**
  This covers terms and definitions, basic concepts and parameters related to all parts of EN 1005. These terms and definitions concern the movement of limbs during work, types of grip, objects found in workstations, posture, work duration and recovery.
- **EN 1005-2: Safety of machinery. Human physical performance. Manual handling of machinery and component parts of machinery**
  This provides ergonomic recommendations for the design of machinery and component parts which involve manual handling in professional and domestic settings. The standard provides data for ergonomic design and risk assessment in relation to the assembly/erection, transportation and commissioning (assembly, installation and adjustment), operation, fault-finding, maintenance, setting, teaching or process changeover and decommissioning, disposal and dismantling of machinery. It applies to the manual handling of machinery, component parts, and objects processed by the machine (input/output) of 3 kg or more, which are carryied less than 2 m. It presents methods for risk assessment in relation to manual handling, using a three zone system. The EN 1005-2 standard does not cover the holding of objects (without walking), pushing or pulling of objects, hand-held machines, or handling while seated. This standard requires machinery designers to minimise manual handling wherever possible, to use technical aids, and to reduce the inherent level of risk associated with handling.

- **EN 1005-3: Safety of machinery. Human physical performance. Recommended force limits when operating machinery**
  This provides guidance to manufacturers of machinery in minimising health risks posed by the exertion of muscular force. Musculoskeletal strain increases the risk of fatigue, discomfort and musculoskeletal disorders. The standard specifies methods of assessing muscle capability in the adult population. Muscle forces are considered both when the body is static and when it is moving. The standard also sets out a procedure for assessing the risk of overload during work, which may result in musculoskeletal disorders. The assessment is based on isometric force values under various conditions, depending on the speed of movement, and the frequency and duration of tasks. A three-zone system is used to guide the machinery manufacturer in risk evaluation.
- **prEN-1005-4: Safety of machinery. Human physical performance. Evaluation of working postures in relation to machinery**
  This provides guidance for designing machinery and its components, helping to assess and control the health risks that are due to machine-related posture and movement. The standard establishes different types and degrees of trunk bending, upper arm posture, neck bending and twisting and gaze direction. Working postures are classified as acceptable, conditionally acceptable and unacceptable, depending on their type and on the frequency of movement.
- **prEN 1005-5: Safety of machinery. Human physical performance. Risk assessment for repetitive handling**
  This provides a method of risk assessment, and guidance on reducing the health risks of repetitive handling. Frequent repetitive handling can cause strain, fatigue and musculoskeletal disorders. These health risks can be minimised, taking into account a variety of risk factors including the frequency of actions, force, posture, duration and recovery time. The standard enables the risk of musculoskeletal disorders to be determined, especially considering the effects of repetitive tasks on the upper limbs.

EN ISO 9241: Ergonomic requirements for office work with visual display terminals (VDTs).

- **EN ISO 9241-4: Ergonomic requirements for office work with visual display terminals (VDTs). Keyboard requirements**
  This standard applies to keyboard designs for stationary use, and provides guidelines on the design of keyboards used for typical office tasks, focusing on the limitations and capabilities of users. It provides guidelines, based on ergonomic factors, for keyboard layout arrangements, physical characteristics of individual keys, and overall design of the housing containing the keys. The standard specifies methods for testing conformance by measuring the physical attributes of a keyboard. It relates to aspects of general keyboard design that can

affect musculoskeletal disorders, such as the slope of the keyboard, its surface profile and material properties as well as keyboard placement.

- **EN ISO 9241-5: Ergonomic requirements for office work with visual display terminals (VDTs). Workstation layout and postural requirements**
  This standard sets out ergonomic guiding principles which apply to the user requirements, design, and procurement of workstation equipment for office tasks using VDTs. In particular, the general principles and requirements specified in this standard apply to the technical design of furniture and equipment in the workplace. The standard provides general information on posture, support surfaces, work chairs and layout in the work space.
- **EN ISO 9241-9: Ergonomic requirements for office work with visual display terminals (VDTs). Requirements for non-keyboard input devices**
  This standard sets out requirements and recommendations for the design of non-keyboard input devices. It deals with devices for which there exists sufficient published ergonomic information, including several types of non-keyboard input devices designed for stationary use. These include mice, pucks, joysticks, trackballs, tablets and overlays, touch-sensitive screens, styli, and light pens. It provides guidance on the design of these devices as they are used for typical office tasks, taking into account the limitations and capabilities of users. The standard specifies methods for determining conformance through observation, performance, and by measuring the physical attributes of the various devices. The standard relates to biomechanical load with special consideration of posture (operation without undue deviation from a natural posture), effort (operation without excessive effort) and user training.

prEN 13921: Personal protective equipment – Ergonomic principles

This standard provides guidance on the generic ergonomic characteristics related to personal protective equipment (PPE). It deals especially with principles relating to the anthropometric characteristics of PPE, and biomechanical interaction between PPE and the human body.

EN ISO 12100: Safety of machinery. Basic concepts, general principles for design

- **EN ISO 12100-1: Safety of machinery. Basic concepts, general principles for design. Basic terminology, methodology**
- **EN ISO 12100-2: Safety of machinery. Basic concepts, general principles for design. Technical principles**
  These standards show how machinery that is ill-suited to human characteristics and capabilities can lead to physiological (musculoskeletal)

disorders, as well as psycho-physiological problems and increased human error. Machines should be designed so that the interaction between operator and machine is a simple one. The standards include guidance on ergonomic aspects such as avoiding uncomfortable positions, noise, ease of use, and vibration.

National regulations of interest

Directive 90/269/EEC on the minimum safety and health requirements for manual handling of loads, where there is a risk particularly of back injury

Most Member State interpretations of the Directive concentrate on setting maximum loads. Some national laws take a more comprehensive approach, however.

The Swedish regulations, for example, cover all work postures and movements. Factory inspectorate guidance on the implementation of the regulations is much wider in scope than the Directive, covering all repetitive work, work postures, ergonomic design of work equipment and areas, and the need for workers to change to different types of work and to take breaks when they feel the need, as well as the more obvious specific matters relating to heavy lifting tasks. Employers have to assess the links between mechanical and psychosocial risk factors for MSDs, and have to provide guidance on how to carry out risk assessments in various situations.

Directive 90/270/EEC on the minimum health and safety requirements for work with display screen equipment

The Directive restricts health surveillance to eye and eyesight tests, but does not focus on other health hazards (especially MSDs). The French and Belgian transposing legislation obliges workers who use display screen equipment to undergo special medical surveillance - the content of which is not specified - which allows the occupational health services to devote more time to preventive health activities for such workers. In Finland the task of medical surveillance has been expressly extended to 'general health' and in **Italy** to 'musculoskeletal disorders'.

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