

M7-EN.4 WORKING CONDITIONS

M7-EN.4.1 Introduction - ergonomics

M7-EN.4.2 Manual handling

M7-EN.4.3 Strain of working positions and movements

M7-EN.4.4 Mental stress

M7-EN.4.5 Noise

M7-EN.4.6 Lighting

M7-EN.4.7 Night work

M7-EN.4.8 Vibration

 M7-EN.4.8.1 Hand and Arm Vibration

 M7-EN.4.8.2 Whole Body Vibration

M7-EN.4.9 Weather Conditions

 M7-EN.4.9.1 Cold

 M7-EN.4.9.2 Heat

M7-EN.4.10 Electrical Hazards

 M7-EN.4.10.1 Overhead power lines

 M7-EN.4.10.2 Underground power lines

 M7-EN.4.10.3 Accidents with electricity

M7-EN.4.11 Falls

 M7-EN.4.11.1 Trenching

 M7-EN.4.11.2 Cave-ins

 M7-EN.4.12 Runovers and backovers

M7-EN.4.1 Introduction - ergonomics

Ergonomics means adapting working conditions and tools to man's conditions and needs. Injuries causing reduced mobility and increased feeling of being worn out can be prevented if the work is planned and organized carefully. The workplace must be organized, machines and tools must be chosen so they correspond to the work to be done and to the person that will use them. It is possible to get ergonomically designed tools, hand tools and other good technical appliances, which increase safety, reduce harmful impact and increase quality and efficiency.

This chapter provides a description of a number of working conditions, which are typical of building projects and their impact on the health and safety of the employees.

General risk factors

- Inappropriate and heavy lifts, pulls and pushes – added risk by sudden and heavy loads
- Inappropriate working positions

- Cold, draught, vibrations, etc. can increase the impact

Impact on human health

- Suffering of muscles, tendons and joints, particularly of the back
- Myalgia in neck and shoulders
- Osteoarthritis, circulatory disturbance, infection of synovial sheath

M7-EN.4.2 Manual handling

Manual handling means lifting, carrying, tipping, pushing and pulling being done by means of muscle power. Jobs, which involve manual handling, should always be considered carefully. Manual handling of heavy loads, which may involve a risk, should always be avoided when planning the work or use technical aids. If this is not possible, other effective measures should be taken. (M7-EN6-1.jpg)

Risk factors

- Lifting of even light loads may become hazardous, especially when it takes place from the side with one hand in narrow places, on uneven or slippery surfaces, on ladders and stairs.
- Unmanageable loads, awkward working positions and sudden, unexpected loads are hazardous

Impact on human health

- Especially the back is vulnerable in connection to heavy or wrong lifting postures
- Carrying dislocates and puts further strain on the back
- Fall or imbalance can cause acute injuries
- Repetition of minor injuries are hazardous to the worker's well being in the long run

Safety measures

- Make sure that there is enough space and that the surface is cleared and safe to walk on
- Avoid unmanageable lifting. Use the right lifting technique
- Avoid carrying heavy loads on ladders and stairs. Use technical aids instead.

For more information on manual handling, please refer to M0-EN.7

M7-EN.4.3 Strain of working positions and movements

Work-related strain is often caused by badly organized workplaces, a work area that is either too low or too high. Work-related strain can also be caused by badly designed tools or the wrong work equipment in connection with the job or the person. Lack of space often results in awkward working positions, which may cause back injuries and overuse of muscles and joints.

Risk factors

- Inflexible work; lying, kneeling and other awkward work positions (such as

raking asphalt)

- Heavy work (i.e. concrete formwork)
- Repetitive work (i.e. rebar tying)
- Using vibrating tools like a pavement breaker, resulting in whole body vibration for operators

The above risk factors can cause:

- Hand and wrist problems
- Back injuries
- Sprains, strains, and overexertion
- Overuse of muscles and joints
- Accumulation of fluid in legs
- Strain to the mobility of muscles and circulation, and injuries because of monotonous work. This kind of work can also cause mental suffering

Safety measures

- Plan the work and organize the workplace to avoid strain injuries from work position
- Plan the work so repetitive work is avoided as much as possible, by providing an opportunity to alternate between different tasks
- Use knee protection, pillows and footstools to support the body – take care that circulation is not impeded during work
- Change work positions frequently
- When walking while working, tools and means of transportation must be of an adequate length to be able to do the job in an upright position
- Use proper lifting technique. Minimise manual handling by using hoists, or other lifting equipment
- Store materials for easy access
- Use tools that are comfortable and easy to handle
- Use PPE, like kneepads and shoulder pads
- Take breaks when possible, rotate difficult and easier tasks

M7-EN.4.4 Mental stress

During building projects mental strain is often felt in connection to time pressure, working at a high pace, contrasting demands, and lack of influence on planning and organizing of work, working alone, victimization or harassment.

Risk factors

- Piecework may result in increased work pace and ensuing stress, fatigue and inattentiveness. Risk of accidents

Impact on human health

- Mental fatigue, lack of energy, headache, insomnia, anxiety, low self-esteem
- Long-term impact may result in stress, depression, ulcer or cardiovascular diseases
- A stressed person will run a greater risk of making mistakes which can cause accidents

Safety measures

- Make sure that the work is organized in a way that prevents frustrations and negative mental experiences

For more information on mental stress, please refer to M0-EN.8

M7-EN.4.5 Noise

Being exposed to continuous noise of more than 75-80 dB, (A) may lead to permanent hearing impairment. Impulsive noise with peak values of more than 130-140 dB (A) even for a limited exposure can damage the hearing

Earplugs provide only a temporary solution, and only under special circumstances may be used as the sole measure.

Risk factors

Noise is produced because of the use of:

- heavy equipment
- pile driving
- pavement breakers
- traffic

Impact on human health

- Risk of permanent hearing impairment, depending on the intensity and duration of the noise
- Short-term, but loud noise may also cause permanent injury
- Tinnitus and abnormal hypersensitivity to noise
- Raised pulse and blood pressure
- Stress

Safety measures

- Avoid unnecessary noise – even if below exposure limit values
- Stop machines that are not being used
- Install noise insulation on noisy machines
- Use PPEs if the noise is inevitable. Remember that even the best earplugs hardly yield any protection if they are taken off. Always follow the manufacturer's instructions for its use
- Keep equipment well maintained
- Move noisy equipment away from workers, where possible

- Place sound barriers around equipment
- Workers must undergo a hearing test once a year

M7-EN.4.6 Lighting

Insufficient lighting – i.e. too little, too much or lighting in the wrong places – can result in bad viewing and working conditions

Risk factors

- Increased probability of falling and other accidents
- Awkward working positions

Impact on human health

- Straining of eyes, eye genes, headache, muscle tension in neck and shoulders

Safety measures

- Make sure that roads of access, transport roads and areas of transportation are lighted at all times by at least 25 lux at ground, floor or scaffold level.
- Make sure there is adequate lighting in the workplaces
- Close down unlighted areas where there may be a risk of falling, etc.

M7-EN.4.7 Night Work

Night work is not normal or easy. Workers should not be required to work long hours at the works area. Tiredness leads to inattention and accidents.

Risk Factors

- Poor visibility for drivers
- Poor visibility for workers
- Impaired or drowsy drivers
- Physical and social disruptions, such as:
 - Sleep deprivation and disruption
 - Risk of injury from drowsiness
 - Impaired family or social relationships

Safety precautions

- Increase visibility by:
 - Wearing retro-reflective clothing
 - Wearing flashing lights on the body or clothing
 - Placing retro-reflective tape on equipment
 - Using good work area lighting
- Get familiar with the surroundings by:
 - Knowing the vehicle and equipment paths

- Knowing the assigned work areas
- Knowing the safe paths to and from work
- Watching out for equipment, when on foot
- Watching out for workers, when on equipment
- Provide clear signage
- Inspect the traffic control set up by test-driving it. Inspect it frequently

M7-EN.4.8 Vibration

M7-EN.4.8.1 Hand and Arm Vibration

It is the employer's responsibility to reduce vibration strains to less than 130 dB (HA).

Risk factors

- Risk of vibration injuries depending on the force and duration of the impact
- Risk of accidents during attacks of numbness or white fingers

Impact on human health

- Tingling and numbness of the fingers
- Long-term impact can result in white fingers
- Permanently reduced sensitivity and handgrip force. Constant tingling of the fingers, pains in the shoulder and joints and increased risk of osteoarthritis

Safety measures

- Stop the work if your hands start tingling or become numb
- Find other work methods
- Be aware that gloves only reduce vibrations of high frequency. The risk of getting white fingers is not diminished by using gloves!

M7-EN.4.8.2 Whole Body Vibration

Whole body vibration occurs when the entire body is exposed to by standing, sitting or lying on a vibrating surface. The stronger the force of vibrations and the longer the exposure, the highest the risk for injuries, while periods of rest reduce the risk.

Drivers of vehicles and construction machines are the ones mostly exposed to whole body vibration.

Impact on human health

- Back problems, pains in the groin, slipped disc and early degeneration of the spine

Safety measures

- Levelling the roadway, avoid solid wheels and avoid vehicles without springs
- Choose seats with adjusting devices compared to the weight of the driver

M7-EN.4.9 Weather Conditions

M7-EN.4.9.1 Cold

When you are cold, the sensitivity and ability to work precisely is reduced. This increases the risk of accidents

Risk factors

- Work by lying down, kneeling or sitting directly on cold or damp surfaces
- Cold or cool temperatures, wet weather and/or conditions, high winds, and inadequate clothing

Impact on human health

- Cooling strains circulation and metabolism
- Cold stress can lead to hypothermia and frostbite.

Safety measures

- Use appropriate warm working clothes and limit the working hours during awkward weather conditions
- Use a suitable support if the work is done lying down, sitting down or kneeling
- Wear head cover, warm gloves, and wool socks
- Have breaks in warm areas and hot liquids
- Keep in good physical shape
- Keep dry

M7-EN.4.9.2 Heat

Strong solar radiation combined with high humidity can be a strain, especially for elderly people

Risk factors

- Working with heat producing machines under strong sunshine, e.g. asphaltting
- High humidity
- Non-breathing synthetic clothing
- Insufficient fluids intake
- Hard work, under strong solar heat

Impact on human health

- Skin cancer because of exposure to the sun
- Fluid loss, rising body temperature
- Heat rash, cramps, exhaustion, and stroke
- Heat exhaustion (extreme weakness or fatigue, dizziness, confusion, nausea, clammy moist skin, pale or flushed complexion, slightly elevated body temperature)

- Heat stroke that may lead to hallucinations and death. Symptoms are red or spotted hot dry skin, no sweat, chills, high body temperature, mental confusion, and slurred speech

Safety measures

- Use appropriate light working clothes (long-sleeved shirt and pants in neutral colours, broad-brimmed hat with a neck flap) that help to maintain the body temperature
- Take frequent breaks from work in cool surroundings. Drink plenty of water
- Use safety glasses with tinted polarizing lenses
- Have frequent checks of skin for early signs of cancer and seeing a dermatologist for check-ups
- Gradually build up to heavy work
- Schedule heavy work during the coolest periods of the day
- Take more breaks during extreme heat and humidity weather conditions

M7-EN.4.10 Electrical Hazards

During road works, accidental contact with electricity or equipment carrying a live current can cause explosion, fire, and electrocution. Electricity can cause severe burns and death. Workers must work around electricity only if they are trained in all aspects of the job

M7-EN.4.10.1 Overhead power lines

Extreme caution is needed when working near overhead power lines.

Safety precautions

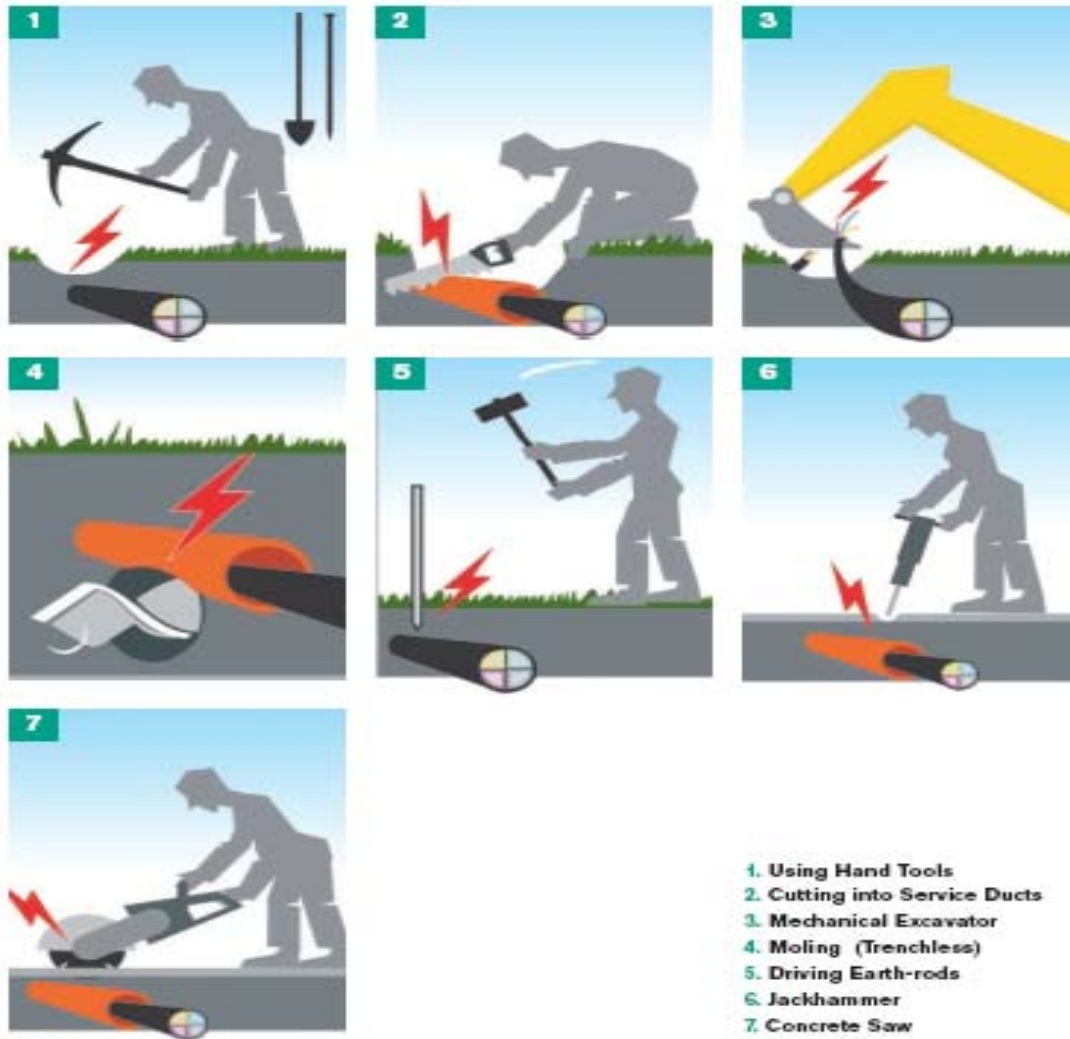
Operators near the overhead power lines must have in mind to:

- Keep distance from overhead power lines
- Place clear marking, flags
- Shield the lines if possible
- Keep the equipment at least 3,5m away from energised lines
- Put warning signs at ground level
- Any person that enters the site must be aware of the overhead power lines
- Mark a safe route for repeated travel

M7-EN.4.10.2 Underground power lines

Risk Factors

The following figures give examples of cases where contact with live underground electricity cables, can occur:



Source :

http://www.esb.ie/esbnetworks/downloads/esb_networks_avoidances_of_electrical_hazards_when_digging.pdf

Safety Precautions

Prior any excavation, the electrical, gas, communications services must be contacted.

- When digging, workers must look for:
 - foreign debris in excavation,
 - changes in mixed-up soil types,
 - asphalt patches or depressions indicating previous digging, and
 - concrete, plastic, or gravel
- Use Plans correctly, in order to make it easy to locate power cables. Before starting work, workers must have every information and up-to-date records for the location of the cables, and keep these on site at all times while working

- Use suitable cable locating devices, to determine the position of underground cables around the proposed work area, as accurately as possible. The position of all cables should be marked on the ground using waterproof paint or crayon
- Use safe digging practice, assuming always that there are more underground cables present than those that have been located. Prior the use of a mechanical excavator near cables, it is advisable to dig trial holes first, using insulated hand tools to confirm the position and depth of underground cables. In addition, wear gloves for extra protection. All cables that are found anywhere must be treated as ‘live’ until proven otherwise. In case that cables have been exposed, workers must take appropriate precautions for the prevention of damage while other works take place (use of physical means such as timber boarding or sand bags)

M7-EN.4.10.3 Accidents with electricity

If a vehicle contacts with electricity, workers must stay in the vehicle without touching any metal. If they must exit, they should jump clear and shuffle away slowly (their feet must be kept together to help prevent current from running through their body).

If someone contacts with electricity, the workers must:

- not touch the equipment or the person who has contacted electricity
- de-energized the line
- ask medical help instantly, in case of a serious accident
- not get close to the injured person unless it is well clear of the electrical hazard
- not move the injured person unless they are in further immediate danger
- ensure that nobody can touch exposed cables or tools/machinery in case they are still live
- ensure that nobody (other members of personnel, contractors and/or the public) can enter into the danger area
- have a First Aid kit always available on work area

It is important that only trained medical personnel must treat any burns. In case of severe burns, urgent attention is essential, as they may prove fatal

M7-EN.4.11 Falls

Falls can happen either on the same level or from one level to another. In road services or construction, the majority of falls are slips or trips on one level. Falls on walking and working surfaces include:

- Trips over materials
- Falls on embankments
- Slips or trips in muddy, wet, or icy surfaces
- Stepping in holes or walking on irregular ground
- Stumbling while carrying loads that block vision

Some less common falls from elevations include falls:

- from the equipment
- from bridges
- into excavations

Safety precautions

Workers must:

- Use footwear with ankle support and soles that grip
- Maintain good housekeeping at the work area (e.g. removing tools and materials when not in use, filling in or marking any hidden hole in the ground)
- Keep all walking and working surfaces clear of tripping hazards
- Place guardrails around large excavations
- Try to avoid muddy, wet, or icy surfaces
- Use hauling equipment instead of carrying heavy loads by themselves
- Wear seatbelts or restraints when riding in cars, trucks, and personnel carriers

M7-EN.4.11.1 Trenching and Cave-ins

Trenches are excavations with a depth larger than their width. Falls to trenches can be fatal, because:

- Workers can be buried alive
- Water can be gathered in the bottom of the trench
- Flammable and toxic gases can build up
- Gas from nearby sewer or gas lines can seep into the trench

Workers must remember:

- Use the provided equipment with extreme caution
- Be aware that trenches more than 1,2m deep meet OSHA's definition of a confined space. In addition, trenches 1,5m or deeper require support unless they are in stable rock

Cave-ins can result from stresses in walls, nearby moving vehicles and equipment, or spoil piles. Workers can be protected from cave-ins by using protective systems. A protective system must suit the soil type, the depth of the excavation, and other site conditions. It must resist without failure all loads intended or reasonably expected to be placed on it.

Types of protective systems can be:

- Sloping - which is soil angled to increase stability
- Benching - steps in the trench wall
- Shoring - a support system made of posts, wales, struts, and sheeting or hydraulic shoring

- Trench Shielding - a protective frame or box to protect rescue workers after a cave-in

Employers are responsible to indicate a “competent person” in every trench job. A “competent person” is the person that is skilled of identifying existing and predictable hazards in the surroundings or working conditions and who has authorisation to take prompt corrective measures to eliminate them."

The “competent person” is responsible for an inspection:

- At least daily and at the beginning of each shift
- After precipitation, a thaw, and other events that could increase hazard
- For disturbed ground, water, toxics, and other hazards
- If walls sag or crack or if the bottom bulges
- To keep spoil at least 0,6m from trench edge
- If there are nearby vibration sources such as railroads or pile driving
- That no worker is more than 7,6m from an exit ladder

In case that a hazard exists, the “competent person” must be able to stop the work being performed.

M7-EN.4.12 Runovers and Backovers

Runover/backover is a major hazard in road work.

Safety Precautions

Workers on road works must:

- Always remain alert
- Check surroundings often
- Listen for warnings
- Keep a safe distance from traffic
- Stay behind barriers where possible
- Look out for each other and warn their co-workers in case of an emergency

Employers must provide their employees with proper personal protective equipment (e.g. safety vests, high-visibility clothing and headgear), and ensure that workers are wearing it.

From the other hand, workers must follow the safety policy of their company:

- Follow all safety rules and practices
- Avoid horseplay and reckless behaviour
- Ask for further explanation if the instructions are not clear
- Join in safety discussions. Ask questions. Share knowledge and experience