

Managing Physical Hazards

Lecture 6 : Noise, Vibration & Thermal Physical Hazards

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11th June 2026



**Undergraduate Diploma in
Occupational Health and Safety**

Lecture Overview

- **Focus on occupational noise, vibration, and thermal hazards**

This lesson examines the main physical hazards found in many workplaces: occupational noise, vibration, and thermal stress. It explains how excessive sound levels from machinery, prolonged use of vibrating tools, and exposure to extreme heat or cold environments can affect workers. Understanding how these hazards arise, where they are commonly encountered, and how they are measured is essential for identifying risks and implementing effective preventive strategies.

- **Long-term health effects of exposure**

Prolonged exposure to noise, vibration, and thermal extremes can result in serious and often irreversible health conditions. Continuous high noise levels may cause noise-induced hearing loss and tinnitus. Long-term vibration exposure can lead to hand-arm vibration syndrome and circulatory problems. Extended heat or cold stress may contribute to chronic fatigue, cardiovascular strain, or frostbite injuries. Recognizing these long-term effects highlights the importance of early intervention and consistent monitoring.

- **Importance of legal compliance and control measures**

Adhering to occupational health and safety legislation ensures employers actively protect workers from preventable harm. Regulations set exposure limits, require risk assessments, and mandate appropriate control measures such as engineering controls, administrative procedures, and personal protective equipment. Compliance not only reduces legal liability but also fosters a safer, more productive workplace. Implementing effective control measures demonstrates a commitment to employee wellbeing and sustainable organisational practices.



Learning Objectives

- **Identify noise, vibration, and thermal hazards**

Learners will be able to identify common workplace sources of harmful noise, mechanical vibration, and thermal stress. This includes recognising high-risk equipment, environmental conditions, and work practices that may expose employees to physical hazards requiring assessment and appropriate control measures.

- **Recognise affected sectors and work activities**

Participants will explore industries and job roles most exposed to these hazards, such as construction, manufacturing, agriculture, and hospitality. Understanding high-risk activities helps learners anticipate exposure scenarios and supports proactive hazard identification in diverse workplace environments.

- **Understand Maltese legislation**

Learners will gain an overview of Maltese occupational health and safety laws relevant to noise, vibration, and thermal risks. This includes legal responsibilities of employers and employees, exposure limits, and the importance of compliance with national regulations and enforcement requirements.

- **Apply control and monitoring measures**

By the end of the lesson, learners should be able to suggest practical control strategies to reduce exposure risks. This includes applying the hierarchy of controls, selecting suitable protective equipment, and understanding the importance of monitoring, inspections, and ongoing workplace risk assessments.



Physical Hazard - Noise

Noise is one of the most common occupational hazards and can have serious consequences when not properly managed. Workplace noise is typically generated by machinery, tools, vehicles, alarms, and industrial processes. In sectors such as construction, manufacturing, aviation, and entertainment, employees may be exposed to prolonged or sudden high noise levels that exceed safe limits. Continuous exposure to excessive noise can lead to noise-induced hearing loss, which is often gradual and irreversible. Workers may not notice early symptoms, making regular monitoring essential. In addition to hearing damage, noise exposure can cause tinnitus, stress, fatigue, and reduced concentration, which may increase the likelihood of workplace accidents. High noise levels can also interfere with communication, preventing workers from hearing warnings or instructions, thereby compromising overall safety.

The risks associated with workplace noise depend on both intensity and duration of exposure. Even moderate noise can be harmful over long periods, especially without adequate rest breaks or hearing protection. Employers must assess noise levels through risk assessments and sound measurements to identify hazardous environments. Once identified, control measures should follow the hierarchy of controls. Engineering controls, such as installing quieter equipment, sound barriers, or vibration dampening materials, are the most effective solutions. Administrative controls may include limiting exposure time, rotating staff, and implementing quiet zones. Where risks remain, personal protective equipment like earplugs or earmuffs should be provided and properly used.



Health Effects of Noise Exposure

- **Hearing loss and tinnitus**

Prolonged exposure to high noise levels can cause permanent damage to the delicate hair cells within the inner ear, leading to noise-induced hearing loss (NIHL). This condition typically develops gradually, often going unnoticed until significant hearing ability is lost. Early signs may include difficulty understanding speech, especially in noisy environments, or needing higher volumes on devices. Tinnitus, commonly described as ringing, buzzing, or hissing in the ears, is another frequent consequence. It can be temporary or permanent and may worsen with continued exposure. Both conditions are largely irreversible, making prevention through early intervention, regular hearing assessments, and effective noise control measures critically important in occupational settings.

- **Stress, fatigue, and reduced concentration**

Excessive workplace noise does not only affect hearing; it also has significant psychological and cognitive impacts. Persistent noise can act as a chronic stressor, triggering elevated cortisol levels and increasing irritability and anxiety. Workers exposed to constant noise often report fatigue, even when physical demands are low, due to the mental effort required to filter sounds and maintain focus. Noise can impair concentration, memory, and task accuracy, especially in environments requiring attention to detail or clear communication. This reduction in cognitive performance may increase the likelihood of errors and workplace accidents. Over time, continuous exposure to disruptive noise can contribute to burnout and reduced overall job satisfaction.

- **Long-term cardiovascular implications**

Chronic exposure to high noise levels has been linked to adverse cardiovascular outcomes. Persistent noise stress can stimulate the body's fight-or-flight response, leading to prolonged increases in heart rate and blood pressure. Over time, this physiological strain may contribute to hypertension, a key risk factor for heart disease and stroke. Studies suggest that workers in consistently noisy environments may face a higher risk of cardiovascular disorders due to long-term activation of stress pathways. Night shift workers or those exposed to noise during rest periods may experience additional risks due to disrupted sleep patterns. Recognising noise as both an auditory and systemic health hazard reinforces the need for comprehensive workplace noise management strategies.



Noise Exposure Limits (Actions) 1/2

Noise exposure limits are established to protect workers from harmful sound levels that can damage hearing and overall health. These limits are typically defined using daily or weekly exposure values measured in decibels (dB), taking into account both intensity and duration. Occupational regulations commonly set three main thresholds: a lower action value, an upper action value, and an exposure limit value. Each threshold triggers specific employer responsibilities and control measures.

The **lower exposure action value** is usually set around 80 dB(A) over an 8-hour working day. When noise levels reach this point, employers must assess risks and provide information and training to workers. Hearing protection should be made available, although its use may not yet be mandatory. At this stage, awareness and early prevention are the key objectives. Workers should understand the risks of noise exposure and how to protect themselves effectively.



Noise Exposure Limits (Actions) 2/2

- The **upper exposure action value**, typically around 85 dB(A), requires stronger intervention. Employers must implement a structured noise control programme to reduce exposure as much as reasonably practicable. Hearing protection becomes mandatory, and clearly marked hearing protection zones may be required. Additional measures include engineering controls such as quieter equipment, sound insulation, and administrative controls like rotating workers to limit exposure duration. Health surveillance, such as regular hearing tests, is also introduced at this stage.
- The **exposure limit value** represents the maximum permissible noise exposure, often set at 87 dB(A), taking into account the attenuation provided by hearing protection. This limit must never be exceeded. If measurements show exposure above this level, immediate corrective action is required. Employers must identify the cause, implement urgent controls, and restrict access to high-noise areas until risks are reduced.



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Noise Assessment

Noise assessment is the process of evaluating workplace sound levels to determine whether they pose a risk to workers' health and safety. It involves identifying noise sources, measuring exposure levels, and comparing results against legal limits and action values. A proper assessment helps employers understand where harmful noise exists, who is exposed, and how long exposure occurs during a working day.

The process typically begins with identifying noisy tasks, equipment, or environments, such as machinery, tools, or production areas. Measurements are then taken using sound level meters for area readings or personal noise dosimeters to assess individual exposure over time. Both peak noise levels and average daily exposure are considered, as short bursts of loud noise can also be harmful.

A noise assessment should also evaluate factors that influence risk, including duration of exposure, number of workers affected, existing control measures, and the availability of quiet areas. Employers must document findings, identify workers at risk, and determine whether exposure action values are exceeded. If risks are identified, appropriate control measures must be introduced following the hierarchy of control.

Regular reassessment is important, especially when changes occur in equipment, work processes, or workplace layout.



LN 158/2006 WORK PLACE (MINIMUM HEALTH AND SAFETY REQUIREMENTS FOR THE PROTECTION OF WORKERS FROM RISKS RESULTING FROM EXPOSURE TO NOISE) REGULATIONS

Purpose

The legislation aims to prevent or reduce risks to workers' health and safety arising from exposure to noise, particularly the risk of noise-induced hearing loss and other related health effects.

Scope

The regulations apply to all workplaces where workers may be exposed to risks from noise as a result of their work activities. Employers have a legal duty to assess and manage these risks.

Exposure Limits and Action Values

The law establishes:

Lower Exposure Action Value: 80 dB(A) daily/weekly exposure

Upper Exposure Action Value: 85 dB(A)

Exposure Limit Value: 87 dB(A) (taking into account hearing protection)

These values trigger specific employer obligations.



LN 158/2006 WORK PLACE (MINIMUM HEALTH AND SAFETY REQUIREMENTS FOR THE PROTECTION OF WORKERS FROM RISKS RESULTING FROM EXPOSURE TO NOISE) REGULATIONS

Employer Responsibilities

Employers must:

Carry out noise risk assessments where exposure is suspected.

Eliminate or reduce noise risks at source where reasonably practicable.

Implement a programme of technical and organisational measures if upper action values are exceeded.

Provide suitable hearing protection and ensure its use where required.

Designate and mark hearing protection zones.

Provide workers with information, instruction, and training regarding noise risks.

Health Surveillance

Where exposure exceeds the upper action value, employers must provide appropriate health surveillance, including audiometric testing, to detect early signs of hearing damage.

Worker Duties

Employees must correctly use hearing protection and cooperate with safety measures introduced by the employer.



Noise Control Measures

1. Elimination

Intro: Remove the noise hazard completely by eliminating the source or the need for the noisy activity. This is the most effective control as it removes the risk entirely rather than managing exposure.

- Redesign processes to avoid noisy operations
- Automate high-noise manual tasks
- Remove unnecessary noisy equipment
- Replace mechanical systems with quieter alternatives

2. Substitution

Intro: Replace noisy equipment or processes with quieter options to reduce noise at the source while maintaining operational effectiveness.

- Purchase low-noise machinery and tools
- Use electric instead of pneumatic equipment
- Select quieter materials or methods
- Consider noise output during procurement decisions



Noise Control Measures

3. Engineering Controls

Intro: Reduce noise through physical modifications to equipment or the workplace. These controls act on the source or transmission path and provide consistent protection.

- Install acoustic enclosures around machinery
- Fit silencers, mufflers, or dampeners
- Use vibration isolation mounts
- Add sound-absorbing wall and ceiling materials
- Isolate noisy areas from main workspaces

4. Administrative Controls

Intro: Limit worker exposure by changing how work is organised. These controls manage duration and frequency of noise exposure.

- Rotate workers to reduce exposure time
- Schedule noisy work during low occupancy
- Establish quiet zones
- Display noise warning signage
- Provide noise awareness training



Noise Control Measures

5. Personal Protective Equipment (PPE)

Intro: Provide hearing protection when noise cannot be controlled by higher-level measures. PPE acts as the last line of defence.

- Provide suitable earplugs or earmuffs
- Ensure correct fit and comfort
- Train workers on proper use and care
- Replace damaged or worn PPE
- Monitor compliance with hearing protection use

Hearing PROTECTION



- Disposable Hearing Protection Device
- Earplugs
- Ear Canal Cap- covers
- Earmuffs

Noise Monitoring

Noise Exposure Monitoring

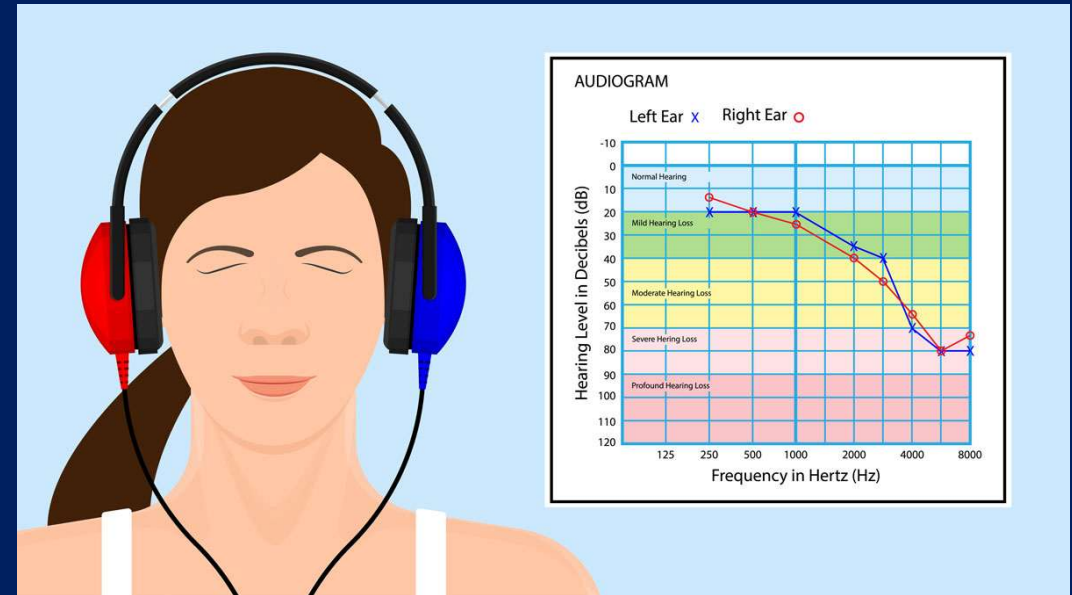
Noise exposure monitoring involves measuring sound levels in the workplace to determine whether workers are at risk. This includes using sound level meters and personal dosimeters to assess both intensity and duration of exposure. Monitoring helps identify high-risk tasks, evaluate compliance with legal exposure limits, and guide control measures. Regular assessments ensure changes in equipment, processes, or work patterns do not increase risk, supporting proactive noise management and worker protection strategies.



Noise Health Surveillance

Health Surveillance

Health surveillance (hearing tests) focuses on detecting early signs of hearing damage caused by occupational noise exposure. It typically includes baseline and periodic audiometric testing to track changes in hearing over time. Early identification of hearing loss allows timely intervention, such as improving controls or adjusting work practices. Health surveillance also helps evaluate the effectiveness of existing noise controls and ensures employers meet their duty of care in protecting workers' long-term auditory health.



Noise Hazard – Workplace Scenario

In a metal manufacturing plant, workers operate press machines, grinders, and stamping equipment for 8–10 hours daily, where noise levels reach 90–100 dB, exceeding safe limits and causing symptoms like ringing in the ears and headaches. To control exposure, the company installs acoustic enclosures and vibration-damping mounts, rotates workers between noisy and quieter tasks, and schedules regular breaks. Workers are provided with earplugs or earmuffs, trained in their proper use, and undergo regular hearing tests to monitor for early signs of hearing loss. Noise level assessments, warning signs, and safety training further ensure that exposure stays within safe limits, reducing the risk of Noise-Induced Hearing Loss and promoting a safer work environment.



Vibration – Physical Hazard

“Vibration at the workplace” refers to the **mechanical oscillations or repetitive movements** that are transmitted from **machinery, equipment, or vehicles to the human body** during work activities. These vibrations are essentially **energy waves** produced by moving parts, engines, or motors, which can be felt when operating, riding, or even standing near certain types of industrial equipment.

Workplace vibrations can arise from a variety of sources, including:

Engines and motors: Vehicles such as trucks, buses, and construction machinery transmit vibrations through their seats or floors.

Construction equipment: Excavators, bulldozers, cranes, and jackhammers create vibrations that travel through both the operator’s hands and the ground.

Power tools: While some tools primarily produce hand-arm vibration, large stationary machines like presses or lathes can transmit vibrations to the entire body.



Vibration – Physical Hazard

- **Industrial machinery:** Conveyor belts, generators, and compressors can generate vibrations that affect workers in direct contact or even those standing nearby.
- The **nature of workplace vibration** depends on several factors, such as:
 - **Frequency:** High-frequency vibrations usually affect the hands and arms, while low-frequency vibrations affect the whole body.
 - **Amplitude and intensity:** Stronger vibrations have a greater potential to cause discomfort or health problems.
 - **Duration and exposure time:** Long-term or continuous exposure can lead to chronic health issues.
 - **Transmission path:** Vibrations can reach the body through **hands, feet, or the seat** depending on the equipment.
- Prolonged exposure to workplace vibration, especially whole-body vibration, can result in **fatigue, musculoskeletal disorders, lower back pain, and other long-term health effects**. Understanding the **sources, types, and effects** of vibration is therefore essential for maintaining worker safety, improving ergonomics, and implementing proper control measures.



Vibration – Physical Hazard (1/2)

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Hand and Arm Vibration (HAV) (1/3)

Hand-Arm Vibration (HAV) is mechanical vibration transmitted from **hand-held or hand-guided tools into the hands and arms** during work. It is common in industries like construction, forestry, metalworking, and manufacturing, where power tools and vibrating equipment are frequently used.

Sources of Hand-Arm Vibration

- **Power tools:** drills, grinders, sanders, jackhammers, chainsaws
- **Hand-held machinery:** lawn mowers, plate compactors, pneumatic tools
- **Other vibrating equipment:** electric screwdrivers, metal stamping machines
- These vibrations are transmitted through **rotating, reciprocating, or oscillating parts**, affecting the **hands, wrists, and arms**.

Characteristics of HAV

- **Frequency:** Most harmful vibrations are between 8–1000 Hz.
- **Amplitude and intensity:** Stronger vibrations increase the risk of injury.
- **Exposure duration:** Even low-intensity vibration can be harmful if exposure is prolonged.



Hand and Arm Vibration (HAV) (2/3)

Health Effects of HAV

Prolonged exposure can lead to **Hand-Arm Vibration Syndrome (HAVS)**, which includes:

- **Vascular effects:** Reduced blood flow in fingers, causing **white finger disease (Raynaud's phenomenon)**, with whitening, tingling, or numbness.
- **Neurological effects:** Tingling, numbness, and reduced sensation in fingers, affecting grip and dexterity.
- **Musculoskeletal effects:** Pain, stiffness, weakness, and damage to joints, tendons, and muscles of hands and arms.

Exposure Limit Values

Occupational safety standards define **daily exposure limits** to reduce HAV risk. These are expressed as **A(8)**, the **8-hour energy-equivalent vibration exposure**, measured in meters per second squared (m/s^2).

- **Exposure Action Value (EAV):** 2.5 m/s^2 . If workers are exposed at or above this level, the employer must take **action to reduce exposure**, such as introducing breaks, rotating tasks, providing training, and monitoring vibration levels.
- **Exposure Limit Value (ELV):** 5.0 m/s^2 . This is the **maximum daily vibration exposure** that must not be exceeded under any circumstances. Exceeding this limit is considered unsafe and requires immediate control measures.



Hand and Arm Vibration (HAV) (3/3)

Hand-Arm Vibration (HAV) – Control Measures

1. Tool Selection and Design

Use low-vibration and lightweight tools with ergonomic or cushioned handles.

2. Work Practices

Limit exposure duration and rotate tasks.

Take frequent breaks and use proper gripping technique.

3. Personal Protective Equipment (PPE)

Wear anti-vibration gloves and thermal protection in cold conditions.

4. Tool Maintenance

Inspect, service, and replace worn or damaged tools regularly.

5. Workplace Measures

Conduct vibration risk assessments and monitor workers' health.

Provide training and raise awareness about HAV risks.



Whole Body Vibration (WBV) (1/4)

Whole-Body Vibration (WBV) is the transmission of mechanical vibration from the **surface on which a worker is seated or standing**—such as a vehicle seat or floor—into the **entire body**. WBV is common in occupations involving vehicles, heavy machinery, or equipment that move or vibrate during operation. Unlike hand-arm vibration, WBV affects the **spine, pelvis, and lower extremities**, rather than just the hands and arms.

- **Sources of Whole-Body Vibration**

WBV is typically caused by **low-frequency vibrations** (usually 0.5–80 Hz) generated by:

- **Vehicles:** Trucks, buses, tractors, and construction vehicles.
- **Forklifts and material-handling equipment:** Vibrations transmitted through the seat or floor of the operator's cab.
- **Heavy machinery:** Excavators, bulldozers, loaders, cranes, and other equipment operating on uneven surfaces.
- The vibration is transmitted through the **seat, feet, or floor**, affecting the spine, pelvis, and internal organs. Prolonged exposure can also cause fatigue and impair concentration.



Whole Body Vibration (WBV) (2/4)

Characteristics of WBV

- **Frequency:** Low-frequency vibrations (typically 0.5–80 Hz) are most harmful to the spine and internal organs.
- **Amplitude and intensity:** The severity of health effects depends on vibration strength, exposure duration, and operator posture.
- **Duration of exposure:** Long hours operating vehicles or machinery without breaks increase the risk of chronic disorders.

Health Effects of WBV

- Prolonged exposure to WBV can lead to **serious health issues**, including:
- **Musculoskeletal effects:**
 - Lower back pain and stiffness
 - Degeneration of spinal discs and vertebrae
 - Chronic posture-related problems



Whole Body Vibration (WBV) (3/4)

Circulatory and neurological effects:

- Impaired blood circulation in lower extremities
- Tingling or numbness due to nerve compression

Other effects:

- Fatigue, motion sickness, and reduced concentration
- Potential impact on internal organs due to vibration transmission through the torso

Exposure Limits for WBV

- Occupational safety standards define WBV exposure using the **8-hour daily vibration exposure value (A(8))**, measured in meters per second squared (m/s^2). Reference values (from **ISO 2631-1** and **EU Directive 2002/44/EC**) are:
- **Exposure Action Value (EAV):** 0.5 m/s^2 . At or above this level, employers must implement measures to **reduce exposure**, such as limiting operating time, improving seat suspension, or providing training.
- **Exposure Limit Value (ELV):** 1.15 m/s^2 . This is the **maximum daily vibration exposure** that should not be exceeded. Exceeding this limit requires immediate corrective actions to prevent health hazards

Whole Body Vibration (WBV) (4/4)

Whole-Body Vibration (WBV) – Control Measures

1. Equipment Design

Use vehicles and machinery with **low-vibration seats** and **good suspension systems**.
Ensure tires and tracks are properly maintained.

2. Work Practices

Limit continuous operation of vibrating equipment.
Rotate tasks among operators and schedule **regular breaks**.
Maintain correct posture while seated or standing.

3. Maintenance

Regularly inspect and service machinery, seats, and suspension systems to minimize vibration.

4. Workplace Measures

Conduct **vibration risk assessments** and monitor exposure levels.
Provide **training** on safe operation and posture.



WORK PLACE (MINIMUM HEALTH AND SAFETY REQUIREMENTS FOR THE PROTECTION OF WORKERS FROM RISKS RESULTING FROM EXPOSURE TO VIBRATION) REGULATIONS LN 371/2025- SL 646.21

These Regulations establish **minimum health and safety requirements** to protect workers from the **risks to their health and safety arising from exposure to mechanical vibration** while performing their job. They were made under national occupational health and safety law and **transpose the key elements of European Directive 2002/44/EC on vibration at work** into Maltese law.

Scope and Purpose

Applies to all **work activities where workers are, or are likely to be, exposed to mechanical vibration** — including *hand-arm vibration (HAV)* and *whole-body vibration (WBV)*.

Aims to **prevent adverse health effects** by ensuring that vibration exposure is **assessed, controlled, reduced, and monitored**.

Key Concepts in the Regulations

Risk assessment: Employers must assess the level, type, duration, and sources of vibration exposure and determine whether workers may be at risk.

Exposure action values and limit values: The Regulations incorporate defined action values and limit values (as set out in the EU Directive) for both HAV and WBV. When vibration exposure exceeds the action value, employers must take steps to reduce it; exposure above the limit value must not occur.



WORK PLACE (MINIMUM HEALTH AND SAFETY REQUIREMENTS FOR THE PROTECTION OF WORKERS FROM RISKS RESULTING FROM EXPOSURE TO VIBRATION) REGULATIONS LN 371/2025- SL 646.21

Employer Duties and Control Measures

Employers are required to:

Assess risks from vibration exposure.

Reduce exposure through technical and organisational measures (tool choice, improved machinery, task rotation, breaks, etc.).

Provide **training and information** to workers about vibration risks and safe working practices.

Monitor and measure vibration levels when necessary.

Implement **health surveillance** where exposure poses a risk to workers' health.

Health Surveillance and Worker Protection

Workers exposed to vibration risks should receive **appropriate health checks** to detect early signs of vibration-related disorders.

Records of assessments and health surveillance should be maintained, and **workers informed promptly** if health effects are detected.



Vibration Hazard Workplace Scenario

In a construction site, operators use forklifts, excavators, and jackhammers for extended periods, exposing them to whole-body and hand-arm vibration, leading to fatigue, lower back pain, and tingling in the hands. To reduce risk, the company provides low-vibration machinery and anti-vibration hand tools, implements task rotation and regular breaks, and ensures proper posture and ergonomic seating. Workers are trained on safe tool handling, provided with anti-vibration gloves, and undergo health monitoring for early detection of musculoskeletal or circulatory issues. Regular equipment maintenance and vibration assessments help maintain exposure below legal limits, ensuring a safer and healthier working environment.



Thermal Physical Hazards

Thermal hazards refer to the risks posed to workers by extreme temperatures, including both excessive heat and severe cold. Exposure to high temperatures can lead to heat stress, heat exhaustion, heat cramps, or potentially life-threatening heat stroke. Workers may also experience dehydration, fatigue, and reduced concentration, increasing the likelihood of accidents. In contrast, extreme cold can cause frostbite, hypothermia, numbness, and reduced dexterity, making tasks more difficult and unsafe. These hazards not only affect physical health but also impact overall productivity, comfort, and well-being in the workplace.

Thermal hazards are relevant in both indoor and outdoor work environments. Outdoor workers, such as those in construction, agriculture, or road maintenance, are directly exposed to sun, wind, rain, or snow, increasing their risk. Indoor workers can also face thermal hazards in areas such as furnaces, ovens, cold storage rooms, and poorly ventilated spaces. Recognizing and managing thermal hazards through risk assessment, protective clothing, environmental controls, and training is essential to ensure a safe and healthy work environment for all employees.



Heat Stress

Heat stress hazards occur when the body is unable to maintain a safe internal temperature due to exposure to high environmental heat or heat generated by work processes. Common sources include hot machinery or processes in factories, direct sunlight for outdoor workers, and poorly ventilated or confined spaces. Additional contributing factors can include high humidity, physical exertion, and inadequate hydration. Workers performing heavy labor or wearing protective clothing are particularly at risk because the body struggles to dissipate heat efficiently.

Exposure to heat stress can lead to a range of health effects, starting with dehydration, fatigue, and dizziness. Prolonged or intense exposure may result in heat cramps, heat exhaustion, or life-threatening heat stroke, which can cause confusion, loss of consciousness, and even death if not treated promptly. Heat stress also reduces concentration and physical performance, increasing the likelihood of workplace accidents.



Heat Stress (Control Measures)

1. Engineering Controls:

Improve ventilation in indoor workplaces and use fans or air conditioning.

Install heat shields or barriers around hot machinery or processes.

Provide cooling areas or shaded rest zones for outdoor workers.

2. Administrative Controls:

Schedule heavy work during cooler hours, such as early morning or late afternoon.

Implement work-rest cycles, allowing frequent breaks to prevent overheating.

Rotate workers between high- and low-heat tasks to reduce exposure.

3. Hydration and Nutrition:

Ensure workers have ready access to drinking water.

Encourage electrolyte replacement for physically demanding tasks.

4. Personal Protective Equipment (PPE):

Use lightweight, breathable clothing to reduce heat retention.

Provide cooling vests where applicable.

5. Training and Monitoring:

Train workers to recognize early signs of heat stress such as dizziness, fatigue, or nausea.

Monitor workers in hot environments and take immediate action if symptoms appear.



Heat Stress (Workplace Scenario)

In a construction site, workers spend long hours outdoors during summer operating machinery and handling materials under direct sunlight. The combination of high temperatures, physical exertion, and limited shade puts them at risk of heat stress, causing dehydration, fatigue, dizziness, or even heat stroke. To manage this, the company provides shaded rest areas, fans, and access to drinking water, implements work-rest cycles and task rotation, and schedules heavy work during cooler hours. Workers are trained to recognize early signs of heat stress and wear lightweight, breathable clothing. Supervisors monitor conditions and ensure immediate intervention if symptoms appear, effectively reducing the risk of heat-related illnesses and maintaining a safe, productive workplace.



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OHSA/ADMIN INST/02-2025 – Heat Stress on Construction Sites

Purpose: Protect construction workers from **heat stress** under Malta's occupational health and safety framework.

Scope: Applies to all **construction sites** where workers are exposed to **high temperatures or direct sunlight**.

Key Requirements:

Conduct **risk assessments** for heat hazards.

Provide **hydration stations, shaded rest areas, and regular breaks**.

Supply **light, breathable clothing and sunscreen**; shirtless work prohibited.

Implement **temperature-triggered measures** when ambient temperatures reach 40 °C.

Responsibility & Enforcement:

Employers and supervisors must comply and maintain records.

Non-compliance may be referred to the **Health and Safety Tribunal**



Cold Stress

Cold stress hazards occur when workers are exposed to extremely low temperatures that overwhelm the body's ability to maintain a safe core temperature. Common sources include cold storage facilities, refrigerated warehouses, and outdoor work during winter months, especially in windy or wet conditions. Prolonged exposure can lead to serious health effects, including hypothermia, where body temperature drops dangerously low, and frostbite, which damages skin and underlying tissues. Cold conditions also impair dexterity, grip, and coordination, increasing the risk of accidents when handling tools or machinery. Workers exposed to cold may experience shivering, fatigue, numbness, and reduced alertness, which can compromise both health and workplace safety. Recognizing these hazards and implementing protective measures is essential to prevent injury, maintain productivity, and ensure a safe working environment.



Cold Stress (Control Measure)

To protect workers from cold stress, employers should implement a combination of engineering, administrative, and personal measures. Engineering controls include insulating workspaces, providing heated shelters or break areas, and reducing drafts in cold storage or outdoor areas. Administrative measures involve rotating tasks, limiting exposure duration, scheduling work during warmer hours, and allowing frequent warm-up breaks. Workers should be provided with appropriate protective clothing, such as insulated gloves, thermal layers, hats, and waterproof boots, to retain body heat. Personal measures include encouraging adequate nutrition and hydration to support body temperature regulation. Training workers to recognize early signs of cold stress, such as numbness, shivering, or fatigue, and monitoring their condition throughout the shift are essential. Implementing these controls reduces the risk of hypothermia, frostbite, impaired dexterity, and workplace accidents, ensuring a safer and healthier working environment in cold conditions.



Cold Stress (Workplace Scenario)

At a refrigerated warehouse, workers spend long shifts handling frozen goods, while outdoor employees perform winter maintenance and construction tasks in low temperatures and windy conditions. Prolonged exposure to the cold puts them at risk of hypothermia, frostbite, and reduced hand dexterity, making tasks like operating machinery or handling tools more dangerous. To manage this, the company provides insulated gloves, thermal clothing, and waterproof boots, implements rotating tasks and scheduled warm-up breaks, and ensures heated rest areas. Workers are trained to recognize early signs of cold stress, and supervisors monitor conditions closely. These measures maintain worker safety, prevent cold-related injuries, and ensure productivity even in extreme winter conditions.



LN 44/2002 SL 646.08 Workplace Minimum Health & Safety Requirements Regulations

11.(1) It shall be the duty of the employer to maintain in every workplace inside buildings or other structures in which people are employed, a thermal environment which is reasonably practicable and comfortable, having regard to the working methods being used and the physical demands placed on the workers, other than for short periods, in conformity with accepted standards.

(2) The employer shall ensure that no person is employed for regular and prolonged work:(a) in a thermal environment which is unsuitable for the type of work being carried out, or which may be harmful to health;(

b) where there is in use equipment or material which radiates intense heat or which causes intense cooling of the working environment and which is harmful to health, unless suitable and effective measures are taken to remove unnecessary risk or unless suitable and effective protective equipment or clothing and rest facilities are provided.

(3) The employer shall provide and maintain wherever necessary, fixed or movable screens, deflectors or other suitable devices in order to protect the worker against intense cold or heat.



LN 44/2002 SL 646.08 Workplace Minimum Health & Safety Requirements Regulations

- (4) The employer shall ensure that no person is allowed to use any method of heating or cooling which is to be harmful to human health or which may liberate obnoxious or toxic fumes.
- (5) The employer shall ensure that workplaces containing workstations are adequately thermally insulated, taking into consideration the type of undertaking involved and the physical activity of the workers.
- (6) The employer shall ensure that the temperature in rest areas, rooms for duty staff, sanitary facilities, canteens and first aid rooms is appropriate to the particular purpose of such areas
- (7) Where windows, skylights and glass partitions are installed, they should allow excessive effects of sunlight in workplaces to be avoided, having regard to the nature of the work and the workplace.



Lesson Summary

1. Identify noise, vibration, and thermal hazards
2. Recognise affected sectors and work activities
3. Understand Maltese legislation
4. Apply control and monitoring measures





**Undergraduate Diploma in
Occupational Health and Safety**