

Managing Physical Hazards

Lecture Title: Lighting, Visibility and Workplace Ergonomics

Lecturer: Chris Camilleri

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**Undergraduate Diploma in
Occupational Health and Safety**

Welcome and Objectives

This lecture discusses, lightning, illumination requirements, lux levels, glare, contrast, flicker, and visibility. Students explore the relationship between lighting and ergonomic performance, including visual strain, posture, error rates, and injury risk. Light measurement tools and workplace lighting standards are reviewed.



Welcome, Module Roadmap & Transition from Risk Management

Lecture 1 — Introduction to Physical Hazards & Regulatory Frameworks

Lecture 2 — Measurement & Monitoring Techniques for Physical Hazards

Lecture 3 — Noise & Vibration Hazards: Exposure, Measurement & Control

Lecture 4 — Thermal Hazards: Heat Stress, Cold Stress, and Thermal Comfort

Lecture 5 — Radiation Hazards: Ionising and Non-Ionising

Lecture 6 — Lighting, Visibility, and Workplace Ergonomics

Lecture 7 — Machinery, Mechanical Hazards & Machine Safeguarding

Lecture 8 — Workplace Environment Hazards: Slips, Trips, Falls, and Confined Spaces

Lecture 9 — Integrated Physical Hazard Management & Continuous Improvement

Lecture 10 — Physical Hazard Control Strategies: Engineering, Administrative & PPE

18th May

This module focuses on physical agents and their technical, physiological, and legal considerations



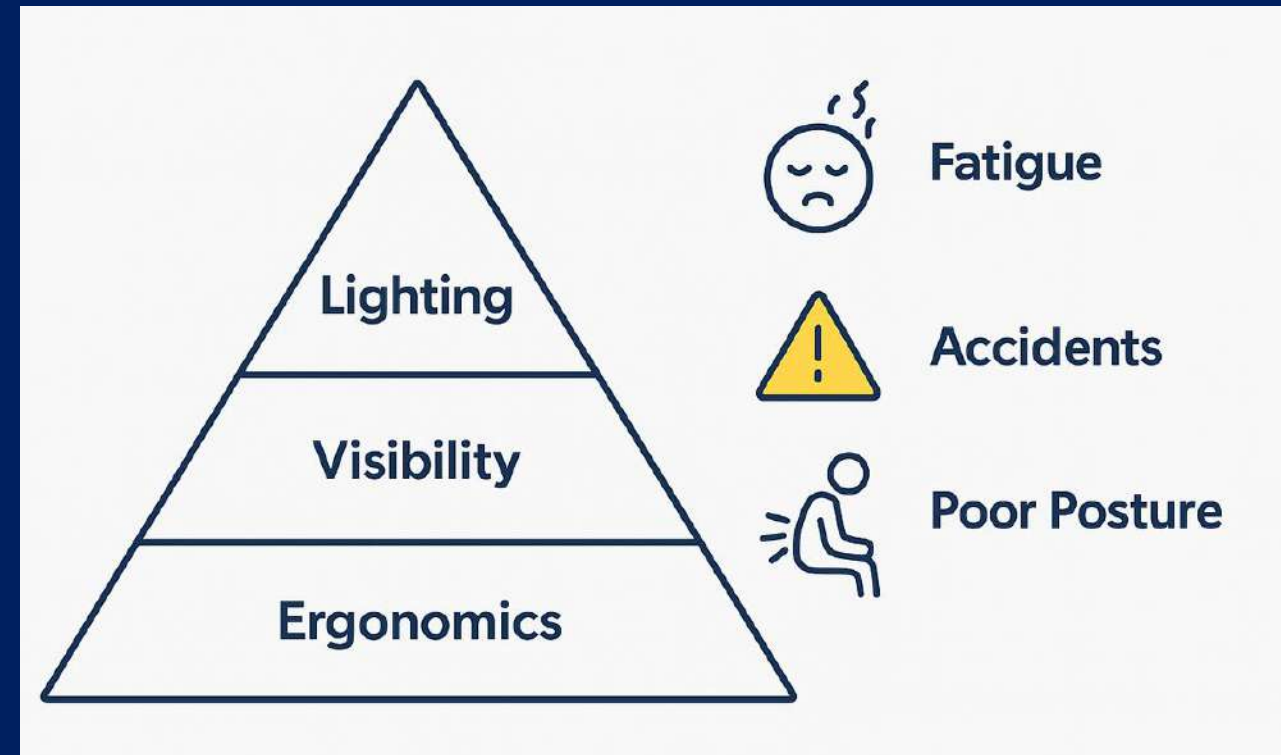
Introduction and Context

Key Concepts

1. Definition of lighting and illumination
2. Difference between lighting quantity and lighting quality
3. Visibility as an essential ergonomic requirement

Why Lighting Matters

1. Relationship between lighting, human performance, and safety
2. Lighting as:
 - A physical environmental hazard
 - An ergonomic risk factor



Introduction and Context

Malta Workplace Context

1. Offices and administrative work
2. Manufacturing
3. Construction and excavation
4. Warehouses, logistics, aviation
5. Healthcare, retail, hospitality, and control rooms

Poor lighting increases errors, fatigue, unsafe postures, and accident risk.



2. Fundamentals of Workplace Lighting

Basic Principles of Lightning

1. Light

- Physical form of energy (electromagnetic radiation)
- Emitted by natural or artificial sources

2. Illumination

- Amount of light reaching a surface
- Measured in lux (lx)

Key Point

Good lighting is not about more light, but appropriate illumination



Basic Principles of Lightning

Natural Light vs Artificial Light

1. Natural Light

- Source: Sunlight
- Varies with time, weather, and building orientation
- Benefits: visual comfort, circadian rhythm support

2. Artificial Light

- Source: Lamps and luminaires
- Controlled and consistent
- Required where natural light is insufficient

Key Point

Most workplaces rely on a combination of both (Natural and Artificial)



Basic Principles of Lightning

Directional vs Diffuse Lighting

1. Directional Lighting

- Light coming from a specific direction
- Creates shadows and contrast
- Useful for task-focused work

2. Diffuse Lighting

- Light spread evenly in all directions
- Reduces shadows and glare
- Suitable for general illumination

Key Point

Effective lighting design balances directional and diffuse light

Basic Principles of Lightning

Summary – Key Takeaways

1. Light $\neq$ illumination
2. Illumination must suit the task and environment
3. Both natural and artificial light play important roles
4. Direction and distribution of light affect safety and comfort



Lightning Quantities

Illuminance (Lux)

1. Definition

- Amount of light falling on a surface
- Measures how well a task area is lit

2. Unit

- Lux (lx)
- 1 lux = 1 lumen per square metre

3. Examples

- Emergency corridors: ~50 lx
- Offices / screen work: ~500 lx
- Precision work: ≥ 1000 lx

Key Point

Illuminance must match the visual task being performed

Lightning Quantities

Luminance (Perceived Brightness)

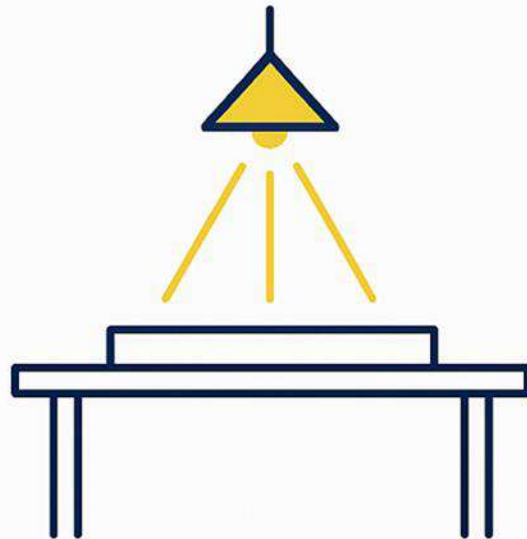
1. Definition

- Brightness of a surface as perceived by the human eye
- Depends on illumination and surface reflectance

2. What Influences Luminance

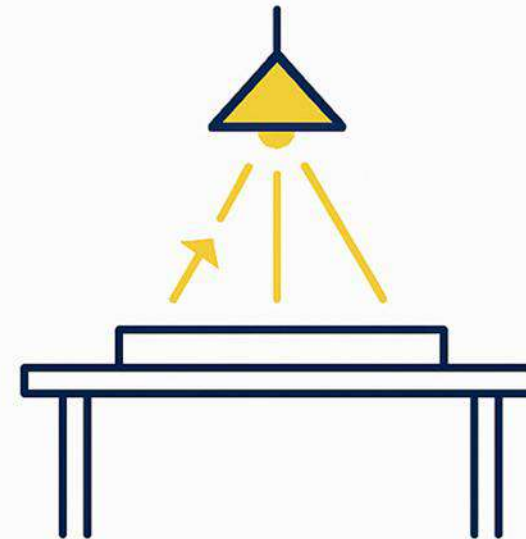
- Surface colour (light vs dark)
- Material finish (matte vs glossy)
- Viewing angle

Illuminance



High lux,
low reflectance

Luminance



Lower lux,
high reflectance

Lightning Quantities

Luminance (Perceived Brightness)

Why It Matters

Excessive luminance differences cause:

1. Visual discomfort
2. Glare
3. Eye strain

People see luminance, not lux

Lightning Quantities

Lighting Uniformity

1. Definition

- Evenness of light distribution across a work area
- Ratio between minimum and average illuminance

2. Good Uniformity

- Reduces shadows
- Improves visual comfort
- Prevents fatigue and errors

3. Poor Uniformity

- Dark spots and over-lit areas
- Increased risk of accidents

Adequate lighting is not only bright
— it must be even

Lighting Quantities

Summary – Key Takeaways

1. Illuminance measures how much light reaches a surface
2. Luminance describes how bright surfaces appear to users
3. Uniformity affects comfort, safety, and task accuracy
4. All three must be considered together in workplace lighting design

Typical Indicative Lux Levels

Circulation areas

1. Typical Areas

- Corridors, Walkways, Staircases, Emergency routes

2. Indicative Illuminance Levels

- General circulation: 100 – 200 lux
- Stairs and changes in level: ≥ 150 lux
- Emergency escape routes: ≥ 50 lux

Typical Indicative Lux Levels

Circulation areas

3. Safety Considerations

- Adequate lighting reduces slips, trips, and falls
- Uniform lighting is critical in stairways

4. Key Point

- Lighting must support safe movement, not task perform

Typical Indicative Lux Levels

Office Environments

1. Typical Activities

- Reading and writing, computer and screen work & meetings

2. Indicative Illuminance Levels

- General office work: 300 – 500 lux
- Detailed desk work: 500 – 750 lux
- Meeting rooms: 300 – 500 lux

Typical Indicative Lux Levels

Office Environments

3. Visual Comfort Factors

- Avoid glare on screens
- Balance luminance between screen and surroundings

4. Key Point

- Offices require lighting that supports visual comfort and concentration

Typical Indicative Lux Levels

Precision and Inspection Tasks

1. Typical Activities

- Quality inspection, Fine assembly Laboratory work & Technical drawing

2. Indicative Illuminance Levels

- General precision work: 750 – 1000 lux
- High-precision inspection: 1000 – 2000 lux



Typical Indicative Lux Levels

Precision and Inspection Tasks

3. Risk Factors

- Poor lighting increases:

Visual fatigue, Errors and defects, Accident potential

4. Key Point

- The higher the visual demand, the higher the illuminance required

Typical Indicative Lux Levels

Task dependent construction activities

1. Typical Tasks

- General site work, Manual handling, Structural assembly, Electrical or mechanical work

2. Indicative Illuminance Levels

- General construction areas: 100 – 200 lux
- Active work zones: 200 – 300 lux
- Detailed or hazardous tasks: 500 lux or more



Typical Indicative Lux Levels

Task dependent construction activities

3. Additional Considerations

- Temporary lighting quality
- Glare, shadows, and uneven lighting
- Weather and time-of-day effects

4. Key Point

- Construction lighting must adapt to changing tasks and environments



Typical Indicative Lux Levels

Summary – Key Takeaways

1. Lux levels must reflect task complexity and risk
2. Circulation areas prioritise safe movement
3. Offices focus on comfort and efficiency
4. Precision tasks demand high illumination
5. Construction lighting must be flexible and task-specific

Types of Workplace Lighting

General Lighting

1. Definition

- Provides overall illumination to an area
- Ensures people can move safely and orient themselves

2. Typical Features

- Ceiling-mounted luminaires
- Uniform light distribution
- Covers the entire workspace



Types of Workplace Lighting

General Lighting

3. Applications

- Offices
- Workshops
- Corridors and common areas

Key Point

General lighting supports overall visibility, not detailed tasks

4. Role in Safety

- Reduces slips, trips, and collisions
- Establishes a visual baseline for all activities

Types of Workplace Lighting

Task Lighting

1. Definition

- Lighting designed to illuminate a specific task or work area

2. Typical Features

- Localised light sources
- Adjustable position or direction
- Higher illuminance than general lighting



Types of Workplace Lighting

Task Lighting

3. Applications

- Desk lamps for office work
- Inspection benches
- Assembly and precision tasks

4. Role in Safety

- Improves accuracy and performance
- Reduces eye strain
- Allows higher light levels without over-lighting the whole area

Key Point

Task lighting is designed to add extra light where detailed work is carried out, but it must never be used as the only source of light in a space.

Types of Workplace Lighting

Emergency Lighting

1. Definition

- Lighting that activates automatically when normal lighting fails

2. Purpose

- Enable safe evacuation
- Allow shutdown of dangerous processes
- Prevent panic during power failure



Types of Workplace Lighting

Emergency Lighting

3. Typical Areas Covered

- Escape routes and exits
- Stairways
- High-risk task areas

4. Key Characteristics

- Independent power supply
- Clearly marked luminaires
- Regular testing required

Key Point

Emergency lighting is a life-safety system, not a convenience feature

Types of Workplace Lighting

Summary – Key Takeaways

1. Workplaces require more than one type of lighting
2. General lighting ensures safe movement
3. Task lighting supports specific visual demands
4. Emergency lighting protects life during failures
5. Poor integration of lighting types increases risk



3. Visibility and Visual Comfort

Factors Affecting Visibility

A. Contrast Between Task and Background

1. Definition

- Difference in brightness or colour between an object and its background

2. Good Contrast

- Task is clearly distinguishable
- Requires less visual effort



3. Visibility and Visual Comfort

Factors Affecting Visibility

3. Poor Contrast

- Task blends into background
- Increases eye strain and error risk

4. Examples

- White text on dark background → good contrast
- Grey objects on grey surfaces → poor contrast

5. Key Point

- Visibility improves more by improving contrast than by simply increasing light

3. Visibility and Visual Comfort

Factors Affecting Visibility

B. Detail size and colour

1. Detail Size

- **Smaller details require:**
 - Higher illuminance
 - Better contrast
 - Longer visual focus

2. Colour

- Dark colours reflect less light
- Similar colours reduce visibility

3. Workplace Relevance

- Fine assembly
- Instrument readings
- Warning labels and signs

Key Point:

Small or low-contrast details demand greater visual support

3. Visibility and Visual Comfort

Factors Affecting Visibility

C. Adaptation of the Eye

The eye adjusts to different light levels over time

Problems Occur When

1. Moving between very bright and very dark areas
2. Sudden lighting changes

Examples

1. Entering a dim warehouse from bright sunlight
2. Poorly lit stairways after bright offices

Key Point

Gradual lighting transitions support safe movement and vision



3. Visibility and Visual Comfort

Glare: Excessive brightness that causes visual discomfort or reduced visibility

Direct Glare

Source

Bright light sources within the field of view

Examples

Unshielded luminaires

Bright lamps at eye level

Effects

Visual discomfort

Eye strain

Reflected Glare

Source

Light reflected off shiny surfaces

Examples

Computer screens

Polished desks or machinery

Glossy floors

Effects

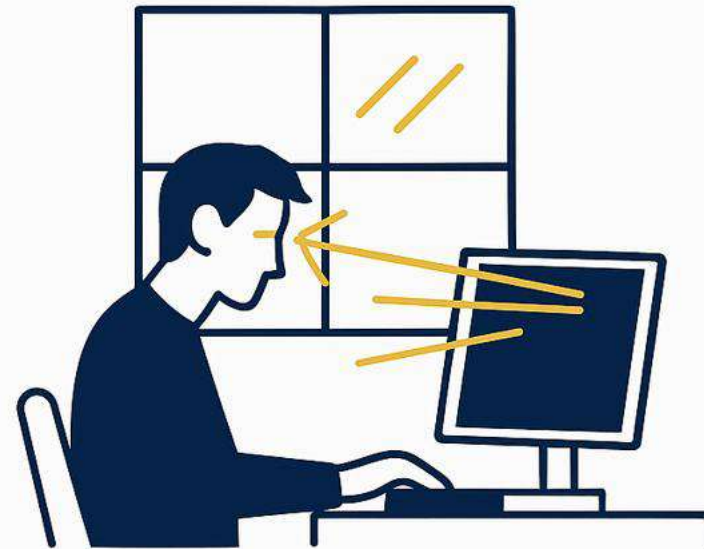
Reduced visibility

Loss of detail

Direct Glare



Reflected Glare



3. Visibility and Visual Comfort

Glare: Excessive brightness that causes visual discomfort or reduced visibility

Discomfort Glare

- Glare that causes annoyance or irritation

May not reduce vision directly

Consequences

- Reduced concentration
- Headaches
- Complaints from workers

Disability Glare

Glare that reduces visual performance

Consequences

- Loss of contrast
- Inability to see hazards
- Increased accident risk

Key Point: Disability glare is a direct safety hazard

3. Visibility and Visual Comfort

Flicker and Lighting Quality

A. Causes of Flicker

Typical Causes

1. Faulty fluorescent lamps
2. Poor quality LED drivers
3. Electrical supply fluctuations
4. **Comment:** Flicker may not always be consciously perceived

B. Stroboscopic Effects

Apparent slowing or stopping of moving objects under flickering light

High-Risk Situations

1. Rotating machinery
2. Conveyors
3. Cutting or drilling equipment

Key Risk

False perception of movement can lead to serious accidents

3. Visibility and Visual Comfort

Flicker and Lighting Quality

Effects on Fatigue, Concentration, and Headaches

Short-Term Effects

Eye strain, Reduced concentration, Visual discomfort

Long-Term Effects

Headaches, Increased fatigue, Reduced productivity

Key Point: Lighting quality affects both health and performance



Visibility and Visual Comfort

Summary – Key Takeaways

1. Visibility depends on contrast, detail, and eye adaptation
2. Glare can cause discomfort or serious visual impairment
3. Flicker and poor lighting quality affect safety and health
4. Effective lighting design focuses on visual comfort, not just lux levels

More light does not automatically mean better visibility



4. Lighting and Ergonomic Performance

Visual Ergonomics

A. Visual Fatigue and Eye Strain

Contributing Factors

1. Insufficient or excessive lighting
2. Glare and reflections
3. Poor contrast
4. Long periods of focused vision

Key Point

Visual fatigue reduces comfort and work accuracy

Common Symptoms

1. Tired or aching eyes
2. Blurred vision
3. Difficulty focusing
4. Headaches

4. Lighting and Ergonomic Performance

Visual Ergonomics

A. Interaction Between Lighting and Screen Work Challenges

1. Glare on screens
2. High brightness contrast between screen and surroundings
3. Reflections from windows or luminaires

Key Point

Screen work requires carefully controlled lighting, not high lux alone

Good Practice

1. Balanced ambient lighting
2. Task lighting positioned to avoid reflections
3. Adjustable screen brightness

4. Lighting and Ergonomic Performance

Performance and Safety Impacts

Increased Error Rates

1. Misreading information
2. Assembly mistakes
3. Data input errors

Reduced Inspection Accuracy

1. Missed defects
2. Inconsistent quality control
3. Increased rework

Slower Reaction Times

1. Delayed hazard recognition
2. Reduced responsiveness to unexpected events

Increased Likelihood of Accidents

1. Trips and falls
2. Contact with moving machinery
3. Incorrect operation of equipment



4. Lighting and Ergonomic Performance

Health Outcomes Associated with Poor Lighting

1. Musculoskeletal Disorders (MSDs)

- Neck and shoulder pain
- Upper back disorders
- Chronic postural strain injuries

Lighting affects both physical health and mental performance

2. Headaches and Migraines

- Linked to: Glare, Flicker, Visual fatigue.
- Increased absenteeism

3. Reduced Cognitive Performance

- Lower concentration & Reduced alertness



Task-Level Lux Measurement



Task-Level Lux

Lighting and Ergonomic Performance

Summary – Key Takeaways

1. Lighting plays a critical role in visual ergonomics
2. Poor lighting increases visual strain and fatigue
3. Visibility problems lead to awkward and static postures
4. Ergonomic performance, safety, and health are directly affected
5. Good lighting is a preventive ergonomic control



5. Lighting Measurement and Assessment

Lux Meters

1. Instruments used to measure illuminance
2. Measure light falling on a surface

Types of Lux Meters

1. Handheld lux meters
 - Portable
 - Used for spot measurements
 - Common in inspections and audits

Integrated / Built-in Sensors

- Part of building management systems
- Used for monitoring or automatic control
- Not always located at task level

All measurements depend on correct positioning and



5. Lighting Measurement and Assessment

Measurement Principles

- **Measurement at Task Level**

1. What This Means?
2. Measure light where the work is actually performed
3. Sensor placed on:
 - Desk surface
 - Workbench
 - Control panel
 - Floor for circulation areas

Common Mistake: Measuring at eye level or ceiling height



5. Lighting Measurement and Assessment

Measurement Principles

- **Consideration of Time of Day and Daylight**
 1. Why It Matters?
 2. Natural light can significantly alter illuminance levels
 3. Lighting conditions change: Morning vs afternoon, Sunny vs overcast days
 4. Good Practice
 - Record Time of measurement
 - Record Presence of daylight
 - Record Weather conditions (if relevant)
 6. A single measurement may not represent worst-case conditions



5. Lighting Measurement and Assessment

Measurement Principles

- **Influence of Glare and Reflections**

1. Limitations of Lux Measurements

- Lux meters measure quantity of light
- They do not measure: Glare, Visual discomfort & Reflections

2. Practical Implication

- Adequate lux levels may still result in:
- Poor visibility
- Visual fatigue
- Complaints from workers

3. Lighting assessment must include visual observation, not numbers alone



5. Lighting Measurement and Assessment

Measurement Principles

- **Reassessment Following Workplace Changes**

Examples of Changes

1. New machinery or equipment
2. Rearranged workstations
3. Different tasks or work processes
4. Changes to walls, surfaces, or layout
5. Lamp replacement or conversion to LED

Lighting assessment is not a one-time activity



5. Practical Emphasis

Real Working Conditions vs Design Intentions

1. Design Intentions

- Based on calculations and assumptions
- Often represent ideal conditions

2. Real Working Conditions

- Workers' posture
- Actual task location
- Presence of glare

Measurements must reflect how work is actually done



Lighting Measurement and Assessment

Summary – Key Takeaways

1. Lux meters measure illuminance, not visual comfort
2. Measurements must be taken at task level
3. Daylight and time of day influence results
4. Glare and reflections must be considered separately
5. Lighting must be reassessed after workplace changes
6. Practical assessment is essential for meaningful result



6. Control Measures and Good Practice

Engineering Controls

Correct Luminaire Selection

1. Appropriate light output (lux level)
2. Colour temperature suitable for the task
3. Good colour rendering (CRI)
4. Compatibility with the work environment

Common Errors

1. Over-powerful luminaires
2. Poor beam control
3. Inappropriate colour temperature

Luminaire choice creates glare and discomfort even at correct lux levels

6. Control Measures and Good Practice

Engineering Controls

Adjustable Task Lighting

1. Localised lighting for specific tasks
2. Adjustable height and direction
3. Allows higher illuminance only where needed

Benefits

1. Improves visibility for demanding tasks
2. Reduces overall lighting energy
3. Minimises glare and shadows

Task lighting complements, not replaces, general lighting



6. Control Measures and Good Practice

Engineering Controls

Anti-Glare Measures

1. Correct luminaire positioning
2. Indirect lighting
3. Matte surface finishes
4. Controlled brightness ratios

Applications

1. Office environments
2. Screen-based work
3. Precision tasks

Anti-glare design protects both comfort and performance



6. Control Measures and Good Practice

Administrative Controls

Maintenance and Cleaning Programmes

Why It Matters?

1. Dust and dirt reduce light output
2. Ageing lamps lose efficiency

Good Practice

1. Regular cleaning of luminaires
2. Planned lamp replacement
3. Prompt repair of failures

Poor maintenance can reduce lighting levels by 30% or more

6. Control Measures and Good Practice

Administrative Controls

Proper Workstation Layout

1. Location of work surfaces
2. Orientation to light sources
3. Avoidance of shadows

Good layout can improve lighting effectiveness without extra luminaires

6. Control Measures and Good Practice

Administrative Controls

Screen Positioning

1. Screens perpendicular to windows
2. Avoid direct view of luminaires
3. Adjustable monitor height and brightness

Many glare problems are caused by poor screen alignment

6. Control Measures and Good Practice

Administrative Controls

Training and Awareness

1. Recognition of glare and poor lighting
2. Correct adjustment of task lights
3. Reporting lighting problems early

Workers are often the first to recognise lighting issues

6. Control Measures and Good Practice

Personal Protective Equipment (Limited Role)

Task-Specific Eyewear Only

1. Magnifying glasses
2. Eye protection with enhanced contrast
3. Filter lenses for specific tasks

Limitations

1. Does not improve workplace lighting
2. Must be task-specific and justified

6. Control Measures and Good Practice

Personal Protective Equipment (Limited Role)

PPE Must Not Compensate for Poor Lighting Design

1. PPE is the last line of defence
2. Using eyewear to compensate for poor lighting:
 - Masks the real problem
 - Increases long-term risk

Lighting problems must be solved at design and organisational level



Control Measures and Good Practice

Summary – Key Takeaways

1. Engineering controls are the most effective lighting interventions
2. Proper luminaire selection and glare control are critical
3. Maintenance and layout strongly influence lighting performance
4. Training improves early detection of problems
5. PPE has a limited, task-specific role
6. Poor lighting design should never be “fixed” with PPE



7. Electrical Considerations

Associated Electrical Risks

Electric Shock from Damaged Luminaires or Wiring

1. Cracked or broken light fittings
2. Exposed cables or terminals
3. Moisture ingress
4. Poor repairs or temporary fixes
5. Risk Scenarios:
 - Maintenance work, Contact during any task or cleaning

Key Point: Lighting faults can create direct electrical hazards



7. Electrical Considerations

Associated Electrical Risks

Fire Risk from Faulty Lighting Circuits

1. Overheated components
2. Faulty ballasts or LED drivers
3. Poor connections
4. Overloaded circuits
5. Indicators: Flickering, Burning smells, Discolouration of fittings

Key Point: Faulty lighting systems can become ignition sources

7. Electrical Considerations

Associated Electrical Risks

Emergency Lighting Failure

Why It Matters?

1. Emergency lighting is a life-safety system
2. Failure compromises evacuation during power loss
3. Common Causes: Battery failure, Poor testing regimes, Electrical faults in backup circuits

Electrical reliability is critical for emergency lighting performance

7. Electrical Considerations

Associated Electrical Risks

Risks During Maintenance and Replacement

High-Risk Activities: Lamp replacement, Fault investigation, Cleaning of luminaires

Typical Issues: Work on live circuits, Inadequate isolation, Lack of competence or training

Maintenance activities often present higher risk than normal operation

7. Electrical Considerations

Key Message

Electrical hazards are secondary but relevant

- Electrical risks must be managed where they affect:
 - Lighting safety
 - VisibilitySystem reliability
 - Poor electrical integrity undermines:
 - Lighting design
 - Emergency preparedness
 - Workplace safety



Lightning as a Physical Workplace Hazard

1. What Is the Hazard?

Atmospheric electrical discharge during thunderstorms

2. Potential Consequences

Fatal injury or serious burns

Blast effects and falls

Fires and equipment damage

3. Work Activities at Risk

Construction and excavation, Work at height (scaffolds, roofs, cranes). Outdoor maintenance and logistics. Ports, agriculture, and maritime activities



Lightning injuries?

1. Include heart attacks
2. Blunt trauma
3. Temporary neurological syndromes
4. Muscle injuries
5. Eye injuries
6. Skin lesions
7. burns



How can lightning can cause injuries?

Direct strike	Victims may sustain a direct strike, which is often fatal
Contact injury	Occurs when lightning strikes an object the victim is touching
Side flash	Occurs when lightning splashes or bounces off an object onto the victim
Ground current	Occurs when lightning strikes the ground near a victim and the ground current passes from the strike point through the ground into the victim
Streamer	Bursts of energy can come up from objects near the ground; sometimes these streamers travel through people
Blast injury	An injury from lightning's blast effect, or thunder

30-30 Rule

Lightning's distance:

Count the time from the flash to the bang—for each 5 seconds between, the lightning is 1.6 km away (activate lightning safety plan at count of 30s or 9.6 km away) and don't resume activities for 30 minutes—it's called the 30-30 rule

Lightning struck the fence, and the electrical current traveled along the fence killing the cows.



30–30 Lightning Safety Rule

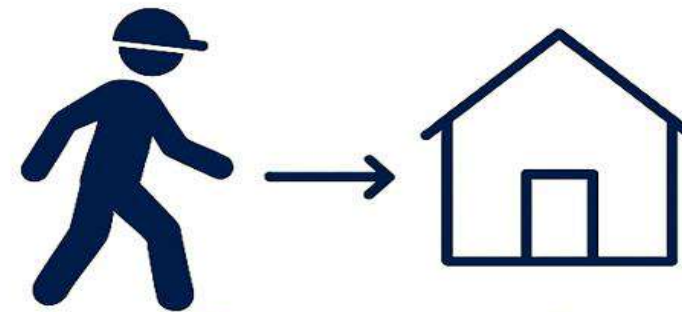
for weather conditions in Malta



30 seconds

Count fewer than
30 seconds after seeing
lightning and hear thunder

30 minutes



**Pause work
and seek shelter**
Don't resume until 30
minutes after the last nearby
thunder

Electrical Considerations Related to Lighting

Summary – Key Takeaways

1. Electricity is only considered in relation to lighting systems
2. Damaged lighting can present shock and fire hazards
3. Emergency lighting depends on reliable electrical systems
4. Maintenance activities increase electrical risk exposure
5. Electrical hazards are secondary, but must not be ignored



8. Malta Legal and Regulatory Framework

Occupational Health and Safety Authority Act (CH.646)

1. Purpose of the Act: Establishes the legal framework for occupational health and safety in Malta
2. Provides the basis for workplace health, safety, and welfare requirements
3. Relevance to Lighting: Requires employers to safeguard employees' health and safety
4. Lighting is considered part of: Safe working conditions, Prevention of occupational risks

Adequate and safe lighting is a legal obligation, not good practice only



8. Malta Legal and Regulatory Framework

Undergraduate Diploma in
Occupational Health & Safety

S.L. 646.08 - Work Place (Minimum Health and Safety Requirements) Regulations

1. Scope: Set minimum standards for workplace conditions
2. Apply to all workplaces under Maltese jurisdiction
3. Lighting Provisions
 - Workplaces must be provided with sufficient natural or artificial lighting
 - Lighting must be:
 - Appropriate for the nature of the work
 - Free from hazards such as glare or shadows
 - Emergency lighting required where failure of normal lighting presents a risk
4. Compliance is assessed based on actual working conditions, not design intent



8. Malta Legal and Regulatory Framework

Employer Duties Related to Lighting

1. Adequate Lighting for Work Activities

- Lighting levels must suit the task being performed
- Higher visual demands require higher quality and quantity of light

2. Control of Glare and Visual Discomfort

- Employers must prevent:
 - Direct glare, Reflected glare
 - Discomfort affecting workers' vision

Especially important for screen-based and precision work

8. Malta Legal and Regulatory Framework

Employer Duties Related to Lighting

3. Maintenance of Lighting Systems

- Lighting installations must be:
 - Clean
 - Fully functioning
 - Properly maintained
- Failed, damaged, or flickering luminaires must be addressed promptly

8. Malta Legal and Regulatory Framework

Employer Duties Related to Lighting

1. Inclusion of Lighting in Risk Assessments
2. Lighting must be considered during:
 - Workplace risk assessments
 - Ergonomic assessments
 - Task-specific evaluations

Poor lighting is a foreseeable and preventable risk



Malta Legal and Regulatory Framework

Summary – Key Takeaways

1. Maltese legislation requires safe and adequate workplace lighting
2. Regulations specify minimum standards for lighting.
3. Employers must manage lighting through design, maintenance, and risk assessment: Glare, visual discomfort, and poor visibility are compliance issues



Case Study 1 – Office Environment

1. **Scenario:** Office with screen-based work & Overhead lighting + daylight & Long periods of computer use.
2. **Observed Problems:** Screen glare, Poor or absent task lighting, Visual fatigue and discomfort.
3. **Effects on Workers:**
 - **Visual Issues:** Reflections on screens, Difficulty seeing clearly
 - **Postural Effects:** Leaning forward, Head and neck strain
 - **Reported Complaints:** Eye strain, Headaches, Neck and shoulder pain

Case Study 1 – Office Environment

A. Discussion Points

1. Where is glare coming from?
2. Is general lighting enough for screen work?
3. How is lighting affecting posture?
4. What risks could develop over time?



Case Study 1 – Office Environment

Case Study 1 – Suggested Controls

1. Engineering: Anti-glare luminaires, Adjustable desk/task lighting
2. Administrative: Correct screen positioning, Workstation assessments

Poor lighting → poor posture → health problems

1. Can a well lit workplace still be unsafe?
2. Is more light always better for safety?
3. What do our eyes see — lux or luminance?
4. Why do people lean forward when lighting is poor?
5. Can lighting contribute to musculoskeletal disorders?
6. Why might workers complain even when lux levels meet standards?
7. What is an example of a lighting hazard in an office?
8. Why is lighting considered an ergonomic risk factor?
9. Why measure lighting at task level?
10. Can lighting conditions change throughout the day?

11. Why is flicker dangerous around machinery?
12. Is emergency lighting a comfort feature?
13. Can PPE solve poor lighting?
14. What happens if lighting systems are poorly maintained?
15. Why is lighting included in risk assessments?
16. Can a lux meter detect glare?
17. Why is uniformity as important as brightness?
18. What is the single most important message of this lecture?



Next: Lecture 7: Machinery, Mechanical Hazards & Machine Safeguarding

Students examine mechanical hazards including entanglement, crushing, cutting, impact, shearing, and drawing-in. Safeguarding methods—guards, interlocks, presence-sensing devices—are introduced. Lockout/tagout (LOTO) principles and safe isolation procedures are reviewed. Real case studies highlight common incident mechanisms.

