

Managing Physical Hazards

Lecture Title: Workplace Environment Hazards Slips, Trips, Falls & Confined Spaces

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**Undergraduate Diploma in
Occupational Health and Safety**

Welcome and Objectives

This session covers physical hazards linked to workplace conditions—flooring, surfaces, obstacles, contamination, footwear, and poor housekeeping. Students explore friction requirements, environmental influences, and design factors. Confined space physical hazards (oxygen deficiency, mechanical energy, engulfment) and permit-to-work requirements are also 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 — Physical Hazard Control Strategies: Engineering, Administrative & PPE

Lecture 10 — Integrated Physical Hazard Management & Continuous Improvement

18th May

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



Why Workplace Environment Hazards Matter

Managing Physical Hazards

A. Previous topics have focused on:

1. Measurement & exposure
2. Physical agents (noise, vibration, heat, radiation)
3. Design-related hazards (lighting, ergonomics)
4. Mechanical risks and safeguarding

B. Today's focus:

1. How the workplace environment itself creates physical hazards



From Individual Hazards to the Work Environment

Managing Physical Hazards: A Progression

Hazards acting on the worker (machines, noise, heat)

→ Hazards created around the worker (layout, design, maintenance)

→ Hazards arising through movement and space (slips, falls, confined spaces)



What Do We Mean by Workplace Environment Hazards?

Workplace environment hazards arise from interaction between:

1. People

Movement, behaviour, task execution

2. Surfaces

Flooring condition, contamination, friction

3. Space

Layout, access, clearance, level changes

4. Atmosphere

Oxygen levels, air quality, confined conditions



Why These Hazards Matter at This Stage of the Module

Workplace environment hazards are:

1. Predictable

Known locations and conditions where hazards occur

2. Repetitive

Same hazards arising in the same areas over time

3. Manageable

Can be controlled through design, planning, and systems



Two Faces of Environment Hazards

1. Slips, Trips & Falls

- High frequency incidents
- Often normalised or underestimated
- Cumulative injury burden

2. Confined Spaces

- Less frequent exposure
- High severity and fatal potential
- Low margin for error

Some hazards injure many people a little, others injure few people catastrophically — but both come from poor control of workplace environmental conditions.

Types of Workplace Environment Hazards

1. Permanent conditions

- Fixed features of the workplace
- Exist regardless of the task

2. Temporary / transient conditions

- Change during work or over time
- Often short-term but high risk



Examples of Permanent vs Temporary Conditions

1. Permanent

- Flooring type
- Layout and access routes
- Level changes

2. Temporary / Transient

- Spills and contamination
- Cleaning activities
- Maintenance work



What Influences Workplace Environment Hazards

Workplace environment hazards are influenced by

- Design
- Housekeeping
- Maintenance
- Work organisation



Slips, Trips & Falls — Hazard Identification

Slips

1. What Is a Slip?

- A slip occurs when there is insufficient friction between the foot and the walking surface
- The foot slides unexpectedly, leading to loss of balance

Slips are about the start of movement, before any trip or fall happens.



Slips, Trips & Falls — Hazard Identification

Slips – Loss of Friction

- Slips result from loss of friction at the shoe: floor interface
- Friction must be greater than the force needed for walking
- When friction is reduced → slip risk increases

Slips are physics-based, not random events

Slips, Trips & Falls — Hazard Identification

Slips – Loss of Friction - Common Causes of Loss of Friction

- **Water** (rain, leaks, cleaning activities, condensation)
- **Oils & greases** (machinery leaks, food preparation areas)
- **Dust & powders** (production residues, raw materials, spillages)

Highlight that many of these are normal by-products of work, not unusual failures.

Slips, Trips & Falls — Hazard Identification

Common Causes of Loss of Friction: Water as a Slip Hazard

Water as a Slip Hazard

- Creates a thin film between footwear and floor
- Reduces surface grip
- Often present during:
Cleaning, Wet weather, Process-related activities

Slips, Trips & Falls — Hazard Identification

Common Causes of Loss of Friction: Oils, Greases, and Powders

Oils, Greases, and Powders

- Oils and greases coat the surface, drastically reducing friction
- Powders and dust act like tiny ball bearings
- Often linked to:

Poor housekeeping, Delayed spill response Inadequate maintenance

Interaction of Floor + Footwear + Environment

1. **Floor surface:** Material, Texture, Condition
2. **Footwear:** Sole material, Slip resistance, Wear
3. **Environment:** Contaminants, Moisture, Lighting and visibility

Slip risk is never caused by one factor alone

Why Slip Risks Are Often Underestimated

Slips are:

- Common
- Repetitive
- Seen as “minor”

Serious injuries can still occur:

- Fractures, Head injuries → Long-term absence or Fatality

High-frequency hazards still require systematic risk management

Managing Slip Hazards — What Matters

1. Slip hazards arise when floor friction is reduced.
2. This usually happens when:
 - Floors become wet or contaminated
 - Oils, greases, dust, or powders are present
 - Floor surfaces are unsuitable for the task
3. Effective slip prevention focuses on
 - Preventing and controlling contamination
 - Selecting and maintaining appropriate floor surfaces
 - Matching footwear to the working environment



Slips, Trips & Falls — Hazard Identification

Trips

1. What Is a Trip?

- A trip occurs when the foot strikes an object or uneven surface
- Causes a loss of balance due to interruption of normal walking movement
- Often happens even on dry surfaces

Trips are about obstacles and changes in level, not friction



Slips, Trips & Falls — Hazard Identification

Trip – Obstruction

Obstruction

- Items left in walkways or access routes
- Reduce clear walking space
- Often temporary but frequently repeated
- **Common examples:**
Tools, Materials, Waste, Equipment left after work activities

Slips, Trips & Falls — Hazard Identification

Trip – Obstruction - Uneven Surfaces

Uneven Surfaces

- Sudden changes in walking level
- Surfaces that are damaged, worn, or poorly maintained
- Create unexpected foot contact
- **Common Examples**

Damaged flooring, Loose tiles, Changes between rooms or process areas, Steps without clear definition

Slips, Trips & Falls — Hazard Identification

Trip – Obstruction - Uneven Surfaces

Uneven Surfaces

- Sudden changes in walking level
- Surfaces that are damaged, worn, or poorly maintained
- Create unexpected foot contact
- **Common Examples**

Damaged flooring, Loose tiles, Changes between rooms or process areas, Steps without clear definition



Slips, Trips & Falls — Hazard Identification

Trip – Obstruction - Uneven Surfaces - Poor Housekeeping

Poor Housekeeping

- Failure to keep work areas clean, tidy, and organized
- Leads to:
Obstructions, Materials in walkways, Cables and hoses left unmanaged

Many trip hazards are created by routine work activities

Slips, Trips & Falls — Hazard Identification

*Trip – Obstruction - Uneven Surfaces - Poor Housekeeping -
Cables, Hoses, and Pallets*

Cables, Hoses, and Pallets

- Cables and hoses trailing across walkways
- Pallets stored in access routes
- Temporary setups becoming “normal”

High-risk areas

- Production floors, Maintenance activities, Temporary or changeover operations



Why Trip Hazards Persist

1. Hazards become normalized
2. “Temporary” conditions last too long
3. Reliance on workers to “watch where they walk”
4. Safety management
 - Indicates weaknesses in:
 - Planning
 - Supervision
 - Layout design



Managing Trip Hazards — What Matters

1. Trip hazards are created by how the workplace is organized
2. They appear where:
 - Walkways are obstructed
 - Surfaces are uneven or poorly maintained
 - Housekeeping is not controlled
3. Effective trip prevention focuses on
 - Keeping walkways clear at all times
 - Designing and maintaining safe access routes
 - Controlling temporary items (cables, hoses, pallets)



Slips, Trips & Falls — Hazard Identification

Falls

1. What Do We Mean by Falls?

- A fall occurs when a person loses balance and movement cannot be recovered
- Falls may occur:
 - On the same level
 - From level changes
- Falls are often the outcome of slip or trip events

Falls are the consequence, not the starting hazard



Slips, Trips & Falls — Hazard Identification

Falls – Same level falls

Same level falls

- Occur without height difference
- Often follow: Slips, Trips
- Can still result in: Fractures, Head injuries, Long-term absence

“Same level” does not mean “low risk”

Slips, Trips & Falls — Hazard Identification

Falls – Falls from Level Changes

Falls from Level Changes

- Changes in walking level increase fall severity
- Includes:
 - Steps, Ramps, Platform edges

Risk increases where level changes are:

- Unexpected
- Poorly marked

Slips, Trips & Falls — Hazard Identification

Falls – Poor Edge Protection

1. Unprotected or poorly protected edges
2. Missing or inadequate:
 - Guardrails, Handrails, Toe boards
3. High risk during:
 - Maintenance, Temporary works, Access to plant and equipment

Edge protection is an engineering control, not optional



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

Slips, Trips & Falls — Hazard Identification

Falls – Poor Visibility

Inadequate lighting hides:

- Level changes
- Edges, Hazards,
- Visual perception is critical for balance

Risk increases in:

Older buildings, Temporary lighting setups, Outdoor areas at night or in bad weather



Managing Falls — What Matters

1. Falls are rarely sudden or unavoidable
2. They occur when:
 - Slip and trip hazards are not controlled
 - Level changes are poorly managed
 - Temporary risks become “normal”

Effective fall prevention focuses on

- Design and edge protection
- Visibility and lighting
- Control of transient hazards



Flooring, Friction & Environmental Influences

1. Walking relies on friction between footwear and the floor
2. When friction drops below what is needed for normal movement → slip risk increases
3. Flooring performance is not fixed — it changes with conditions

A floor can be compliant and still become dangerous

Friction — The Concept (No Calculations)

1. Friction is the resistance to sliding
2. It is what allows us to:
 - Walk, Stop, Turn safely
3. Low friction = higher slip risk

We manage friction through design and control, not maths

Static vs Dynamic Conditions

1. Static conditions
 - Standing
 - Slow movement
2. Dynamic conditions
 - Walking
 - Turning
 - Carrying loads

Most slips happen during movement, not standing still



Environmental Influences on Friction

1. Friction is strongly affected by environmental conditions
2. Common contaminants include:
 - Water, Oil and grease
 - Dust and powders
 - Cleaning residues

Floors don't become unsafe on their own — conditions change



Water and Moisture

1. Water creates a barrier between shoe and floor
2. Sources include:
 - Cleaning activities
 - Leaks or condensation
 - Rainwater brought indoors

Risk increases on smooth or polished surfaces

Oil, Dust, and Cleaning Residues

1. Oils and greases significantly lower friction
2. Dust and powders act like fine particles that reduce grip
3. Cleaning products may:
 - Leave residues
 - Create slippery films if not rinsed properly

Good cleaning can increase or decrease safety



Wear and Surface Degradation Over Time

1. Floor surfaces change with use
2. Wear can:
 - Polish surfaces
 - Reduce texture
 - Remove slip-resistant properties
3. High-traffic areas deteriorate faster
4. Management issue: Floors must be maintained, not just installed



Design Considerations — Gradients and Slopes

1. Gradients increase reliance on friction
2. Risk increases when combined with:
 - Wet conditions
 - Smooth surfaces
3. Ramps and sloped walkways need:
 - Suitable surface finishes
 - Drainage
 - Good visibility

Design Considerations — Lighting and Visibility

1. People rely on vision to adjust walking behaviour
2. Poor lighting hides:
 - Wet patches
 - Changes in surface
 - Slopes or edges
3. Good lighting supports safe decision-making



What This Means for Safety Management

1. Flooring safety is:
 - Dynamic, Condition-dependent, System-driven
2. Effective control requires:
 - Anticipation of environmental changes
 - Ongoing inspection
 - Integration of design, cleaning, and maintenance

Controlling Slips, Trips & Falls

1. Elimination / Substitution
2. Engineering controls
3. Administrative controls
4. Personal Protective Equipment (PPE)

The higher the control level, the more reliable the risk reduction



Elimination / Substitution (Most Effective)

1. Remove level changes where possible
2. Eliminate unnecessary steps, ramps, or thresholds
3. Replace unsuitable or unsafe flooring materials

If the hazard is removed, the risk is removed



Elimination Examples (Practical)

1. Redesign layouts to avoid changes in level
2. Replace polished or smooth surfaces in wet areas
3. Modify processes to prevent contamination at source

Requires planning and investment, not signage

Engineering Controls

1. Slip-resistant floor surfaces
2. Handrails on stairs and ramps
3. Guarding or protecting exposed edges

Engineering controls reduce risk without relying on people



Engineering Controls — Why They Work

1. Built into the workplace
2. Always present
3. Less influenced by human behaviour or fatigue

Well-designed environments are inherently safer



Administrative Controls

1. Housekeeping standards
2. Planned cleaning regimes
3. Routine inspections
4. Defect identification and reporting

These manage risk, but do not remove hazards

Administrative Controls — Limitations

1. Depend on:
 - People following procedures
 - Supervision and discipline
2. Less reliable than elimination or engineering

Necessary, but not sufficient on their own

Personal Protective Equipment (PPE)

1. Slip-resistant footwear
2. Used where other controls cannot fully eliminate risk
3. Strengths
 - Reduces slip likelihood in specific conditions



1. Old standard (EN ISO 20345:2011: still seen on many shoes in workplaces)

- SRA → wet floors
- SRB → oily metal floors
- SRC → mixed environments

2. New standard (EN ISO 20345:2022)

- Slip resistance = mandatory
- SR marking = enhanced slip resistance for demanding conditions. Many workplaces still legitimately use SRA/SRB/SRC footwear due to long transition periods (valid until late 2029).



PPE — Strengths and Limitations

1. Strengths

- Immediate protection
- Useful for specific tasks or areas

2. Limitations

- Does not remove the hazard
- Effectiveness depends on:
 - Correct selection
 - Wear and condition
 - User compliance



Legal Context — Malta Focused

Slips, Trip and Fall

- S.L. 646.08 - Work Place (Minimum Health and Safety Requirements) Regulations
- S.L. 646.27 - Health and Safety at Work (Minimum Health and Safety Requirements for Work at Construction Sites) Regulations
- S.L. 646.11 - General Provisions for Health and Safety at Workplaces Regulations

Slips, trips and falls are not governed by one single 'STF law' in Malta: they are controlled through workplace and construction regulations under the wider duty of care framework.



EN ISO 14122-3:2016

Safety of machinery – Permanent means of access to machinery – Guard-rails

1. EN ISO 14122-3 states that a guard-rail is required when:
 - There is a fall risk greater than 500 mm, OR
 - There is a gap > 180 mm between a walking surface and an adjacent structure
2. What type of protection?
 - Guard-rail with:
 - Top rail (minimum height 1100 mm)
 - Intermediate protection (knee rail or uprights)
 - Toe board where there is a risk of stepping or objects falling



Commonly used in : Factories / Mezzanines / Platforms

EN 13374:2025

Temporary Edge Protection Systems

1. When is protection required?

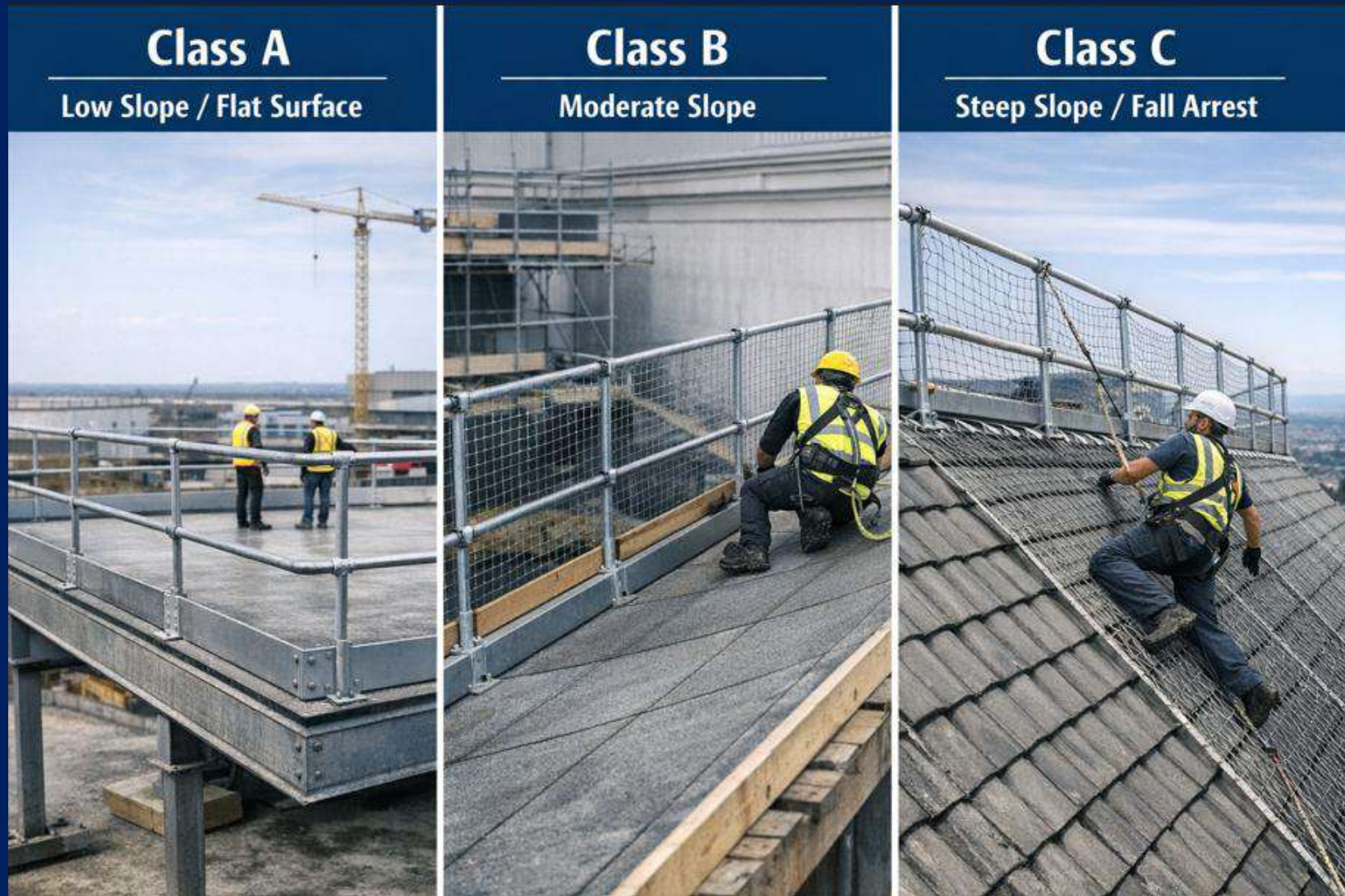
EN 13374 requires edge protection whenever there is an exposed edge with a fall hazard, and then classifies the system required based on: Slope of the surface, Potential falling height, Dynamic risk (sliding / falling forward)

2. Protection is classified:

- Class A – flat / low-slope surfaces
- Class B – moderate slope or increased risk
- Class C – steep slopes / high dynamic fall risk

3. This standard directly supports S.L. 646.27.





From Routine Hazards to High-Risk Situations

1. Slips, trips, and falls occur during normal, everyday work
2. They reveal:
 - Design weaknesses
 - Poor maintenance
 - Gaps in supervision

Everyday hazards are early warning signs



Why Confined Spaces Are Different

1. Confined spaces:
 - Intensify hazards
 - Reduce escape options
 - Allow little margin for error
2. The same weaknesses become immediately dangerous.

What is inconvenient in open space can be fatal in confined space



Same Principles — Higher Stakes

1. Hazard identification
2. Risk assessment
3. Control hierarchy
4. Permit and supervision systems
5. The principles do not change
6. The consequences do



Why This Matters

- Confined space incidents rarely result from:
- A single mistake
- They usually result from:
 - Accumulated system failures
 - Lessons not learned from everyday hazards



Confined Spaces — Understanding the Risk

What Makes a Space Confined?

A space is considered confined when it has:

1. Limited or restricted access or egress
2. Not designed for continuous occupancy
3. Potential to Contain a Serious Hazard

Confined spaces are defined by risk, not size



Limited Access / Egress

1. Restricted openings for entry or exit
2. Difficult or slow escape
3. Rescue access is often limited
4. Examples
 - Vertical entry points
 - Narrow openings
 - Single entry routes



Not Designed for Occupancy

1. Space intended for:
 - Storage
 - Process operation
 - Transport of materials
2. Not designed for people to work inside for long periods
3. Normal workplace protections may not exist



Potential for Serious Harm

1. Atmospheres may be:
 - Oxygen-deficient
 - Toxic
 - Flammable
2. Other hazards include:
 - Engulfment
 - Mechanical or process hazards
 - Heat or poor visibility

Hazards can
become
life-threatening
very quickly



Tank Entry



Underground Sewer



Confined Crawl Space



Silo Interior

Why Confined Spaces Are Dangerous

1. Conditions can change rapidly
2. Hazards may not be visible or obvious
3. Small errors have severe consequences

Little time to react if something goes wrong



Rescue Is Difficult

1. Entry and exit are restricted
2. Unplanned rescue increases risk
3. Many fatalities involve would-be rescuers

Rescue must be planned, not improvised

Confined Space Examples — Malta Context

1. Common confined spaces locally include:

- Pump pits
- Tanks and silos
- Manholes and sewer systems
- Ship-related spaces (holds, ballast tanks, engine rooms)

These spaces exist across industry, infrastructure, and maritime operations in Malta

Physical Hazards in Confined Spaces

Why Hazards in Confined Spaces Are Different

1. Hazards in confined spaces:
 - Act faster
 - Give little warning
 - Allow limited recovery
2. Multiple hazards often exist at the same time
3. Confined spaces amplify physical hazards



Core Physical Hazards in Confined Spaces

1. Oxygen deficiency / enrichment
2. Mechanical hazards
3. Engulfment
4. Heat stress
5. Restricted movement



Oxygen Deficiency / Enrichment

1. Oxygen levels can fall or rise rapidly
2. Causes include:
 - Displacement by other gases
 - Consumption by processes
 - Poor ventilation
3. Effects range from:
 - Impaired judgment
 - Loss of consciousness
 - Death

Oxygen cannot be detected by human senses



Mechanical Hazards

1. Moving or energised equipment within the space
2. Stored energy may include:
 - Mechanical
 - Electrical
 - Hydraulic or pneumatic
3. Risk increases during:
 - Maintenance, Cleaning, Clearance of blockages

Isolation failures are a common cause of incidents



Engulfment

1. Being surrounded, covered, or trapped by material
2. Materials may include:
 - Liquids, Powders, Granules
3. Engulfment can:
 - Restrict movement,
 - Prevent breathing,
 - Lead to rapid fatality

Engulfment allows little or no time to escape



Heat Stress

1. Heat sources include:
 - Ambient temperature
 - Hot surfaces
 - Physical exertion
2. Risk factors:
 - Poor airflow
 - Protective clothing
 - Extended work duration

Heat stress can impair decision-making before symptoms are recognised

Restricted Movement

1. Limited space restricts:
 - Body positioning
 - Escape
 - Use of tools
2. Awkward postures increase:
 - Fatigue, Error likelihood
 - Slower response to emergencies

Normal tasks become high risk in restricted spaces



Multiple Fatalities — The Rescue Effect

1. Many confined space fatalities involve:
2. Unplanned rescue attempts
3. Co-workers entering without controls
4. Additional casualties occur when:
 - Hazards are not understood
 - Emotional response overrides procedures

Rescue without control multiplies harm



“Short Duration” ≠ Low Risk

1. Time spent in a confined space is a poor risk indicator
2. High-risk conditions can cause harm:
 - Within seconds
 - Without warning
3. Brief tasks still require full controls

Exposure severity matters more than exposure time



Risk Assessment & Permit to Work

Why Risk Assessment Is Critical in Confined Spaces

1. Confined spaces contain multiple, interacting hazards
2. Conditions can change before and during entry
3. Effective risk assessment is the foundation of safe entry

Entry without assessment is uncontrolled exposure



Risk Assessment — What Must Be Assessed

1. Confined space risk assessment must consider:

- The space
- The work activity
- The atmosphere
- Energy isolation
- Access and rescue



Assessing the Space

1. Size and shape of the space
2. Entry and exit points
3. Internal layout and obstructions
4. Potential for engulfment or restricted movement

The space itself can be the hazard



Assessing the Work Activity

1. Type of task being carried out
2. Tools, equipment, and materials used
3. Duration and number of persons entering
4. Potential for introducing new hazards

The work can change the risk profile of the space



Assessing the Atmosphere

1. Oxygen levels
2. Presence of:
 - Toxic gases or vapours
 - Flammable atmospheres
 - Need for atmospheric testing and ventilation
3. Critical reminder:
 - Atmospheric conditions can change rapidly



Energy Isolation

1. Identify all sources of energy:
 - Mechanical
 - Electrical
 - Hydraulic
 - Pneumatic
2. Ensure isolation before entry
3. Prevent unexpected start-up or release

Many fatalities involve isolation failures



Access and Rescue Considerations

1. Safe entry and exit arrangements
2. Communication methods
3. Rescue capability:
 - Equipment
 - Trained personnel
4. Suitability of rescue for the specific space

Rescue must be planned before entry



Permit to Work — What Is It?

1. A formal, documented control system
2. Authorises specific work in a confined space
3. Confirms that:
 - Risks have been assessed
 - Controls are in place
 - Responsibilities are clear



When Is a Permit to Work Required?

1. When work is carried out in a confined space
2. When hazards cannot be eliminated
3. When strict controls and authorisation are required

Routine work can still need a permit



What the Permit Ensures — Authorization

1. Only approved work is carried out
2. Only authorised persons may enter
3. Clear roles and responsibilities are defined



What the Permit Ensures — Controls in Place

1. Isolation completed
2. Atmospheric testing conducted
3. Ventilation provided
4. Required PPE identified and available



What the Permit Ensures — Communication

1. All involved understand:
 - The hazards
 - The controls
 - The emergency arrangements

2. Communication between entrants and standby persons



What the Permit Ensures — Time Limits

1. Permit issued for:
 - Specific task
 - Defined duration
 - Conditions must be re-checked if time expires
2. Permits are not open-ended



What the Permit Ensures — Closure

1. Work completed safely
2. Space left in safe condition
3. Permit formally closed
4. Isolations reinstated only after confirmation



Legal Context — Malta Focused

S.L. 646.19 - Work Place (Minimum Requirements for Work) (Confined Spaces and Spaces having Explosive Atmospheres) Regulations

1. What Is S.L. 646.19?

- It establishes legally binding minimum requirements for:
- Work carried out in confined spaces

2. **“confined space”** means an enclosed space which has limited openings for entry or egress, and, or which may contain insufficient levels of oxygen or contain or produce dangerous air contaminants liable to cause a risk to the health and safety of workers who enter such a space, and includes any room, chamber, booth, tunnel, tank, silo, vat, pit, pipe, drain, sewer or flue and any other enclosed space



Legal Context — Malta Focused

S.L. 646.19 - Work Place (Minimum Requirements for Work) (Confined Spaces and Spaces having Explosive Atmospheres) Regulations

Employers must ensure:

1. Risk Assessment Before Entry
2. Safe System of Work
3. Energy Isolation
4. Atmospheric Controls
5. Competent Supervision

1. Rescue must be planned
2. Employers must not rely solely on:
 - Emergency services
 - Unplanned co worker rescue

Case Study 1 — *Slip Hazard from Poor Housekeeping* (OSHA-Enforced Incident)

1. Incident Summary

- On 6 December 2021, a worker slipped on a recently mopped tile floor in a workplace restroom and suffered a fractured ankle, requiring hospitalization.
- The area had been cleaned shortly before the incident, but no warning signage was in place, and the employee was not wearing slip-resistant footwear as required by site rules.

<https://bhhcsafetycenter.com/slip-trip-fall-the-3-non-fatal-injury-cause-and-how-we-stop-it-fatality-file/?print=pdf>



Case Study 1 — *Slip Hazard from Poor Housekeeping*

2. Immediate Causes

- Wet, smooth tile flooring
- No “Wet Floor” warning signage
- Inadequate enforcement of slip-resistant footwear policy

3. Underlying System Failures

- Poor housekeeping control during cleaning activities
- Failure in hazard communication (temporary hazards not controlled)
- Reliance on worker behaviour rather than environmental controls



Case Study 1 — *Slip Hazard from Poor Housekeeping*

4. OSHA Findings

OSHA determined that the employer failed to control a predictable slip hazard. Wet floors are a well-known environmental hazard, and the absence of signage and footwear enforcement amounted to inadequate preventive measures

5. Key Learning Points

Slips are high-frequency, high-probability incidents

Temporary hazards (cleaning, spills) must be actively managed

Environmental control failures often precede personal protective failures

“Routine” tasks create risk when systems are weak



Case Study 2 — *Fatal Confined Space Entry Due to Permit Failures*

1. Incident Summary

In Twinsburg, Ohio, a worker died after entering a confined space containing organic chemical residue without proper controls. The space was not ventilated or atmospherically tested, and no non-entry rescue equipment was used. The incident resulted in a fatality, with OSHA launching a full investigation.

<https://www.dol.gov/newsroom/releases/osha/osha20250721-0>



Case Study 2 — *Fatal Confined Space Entry Due to Permit Failures*

2. Immediate Causes

- Oxygen-deficient atmosphere
- Inadequate ventilation
- No atmospheric testing before entry

3. Underlying System Failures

- Absence of a Permit-Required Confined Space system
- No formal risk assessment before entry
- Lack of rescue planning and equipment



Case Study 2 — *Fatal Confined Space Entry Due to Permit Failures*

4. OSHA Findings

OSHA found the company failed to meet mandatory permit-required confined space entry requirements, including:

- Atmospheric testing
- Continuous ventilation
- Non-entry rescue arrangements



Case Study 2 — *Fatal Confined Space Entry Due to Permit Failures*

5. Key Learning Points

Confined space incidents rarely result from a single error.

Fatalities often involve systemic and procedural failures

Lack of planning escalates routine work into catastrophic events

Many confined space deaths occur before workers realise danger



1. If a floor is dry and clean, can it still cause a slip?
2. Why do slips, trips, and falls happen in the same locations repeatedly?
3. Is a “temporary” hazard always low risk?
4. What usually causes more injuries overall: slips or confined spaces?
5. True or false: “If no one has fallen yet, the workplace is compliant.”
6. What fails first in a slip incident: the worker or the system?
7. Why are slips often underestimated compared to other hazards?
8. What three things interact to create slip risk?
9. Which causes a trip: poor friction or obstruction?
10. Why do trip hazards often remain uncorrected?



11. Are same level falls low risk?
12. Why is lighting important for preventing falls?
13. Can a floor be “compliant” and still unsafe?
14. Why do confined spaces turn small mistakes into fatalities?
15. Is a confined space defined by size?
16. Why is unplanned rescue so dangerous in confined spaces?
17. Does short-duration work mean low confined space risk?
18. What is the main purpose of a permit to work in confined spaces?
19. What do slips, trips, and falls tell us about safety management?



Next: Lecture 9: Physical Hazard Control Strategies: Engineering, Administrative & PPE

Focuses on practical ways to control physical hazards using the hierarchy of controls. Engineering controls include isolation, enclosure, damping, shielding, ventilation, noise barriers, vibration mounts, and machine safeguarding elements. Administrative controls (work rotation, exposure scheduling, maintenance regimes) are discussed along with PPE selection and limitations.



1. The Ċirkewwa confined space tragedy
2. January 2000, Ċirkewwa, Malta
3. Three drainage/sewage workers died after entering an underground sewage chamber to repair a valve
4. The space contained toxic gases
5. No adequate gas monitoring or respiratory protection was in place
6. One worker re-entered in an attempted rescue and also died

<https://tvmnews.mt/en/news/20-years-since-cirkewwa-tragedy-worker-died-trying-to-rescue-colleagues/>

