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EU-ILO Project
ENHANCING THE LABOUR ADMINISTRATION CAPACITY
TO IMPROVE WORKING CONDITIONS AND TACKLE UNDECLARED WORK

Training for trainers
OSH - risk management (assessment and control)
methodologies and labour inspectors' gesture

PART II

OCCUPATIONAL SAFETY AND HEALTH IN CONSTRUCTION

December 2018

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Supporting tools

ILO Safety and Health in Construction Convention, 1988

available at

https://www.ilo.org/dyn/normlex/en/f?p=NORMLEXPUB:12100:0::NO::P12100_ILO_CODE:C167

ILO Safety and Health in Construction Recommendation, 1988

available at

https://www.ilo.org/dyn/normlex/en/f?p=NORMLEXPUB:55:0::55:P55_TYPE,P55_LANG,P55_DOCUMENT,P55_NODE:REC,en,R175,/Document

EU Framework Directive 89/391

available at

<https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:01989L0391-20081211&from=EN>

EU Council Directive 92/57/EEC

available at

<https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:01992L0057-20070627&from=EN>

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Non-binding guide to good practice for understanding and implementing Directive 92/57/EEC (Section 3, section 1.4)

available at <https://publications.europa.eu/en/publication-detail/-/publication/96b5fe83-ef7d-4628-9af0-e02b25810c1d>

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EU-ILO Project

«Enhancing the labour administration capacity
to improve working conditions and tackle undeclared work»

Training for trainers

OSH risk management methodologies and labour inspectors' gesture

CONSTRUCTION

Module 4

EU and ILO sectoral OSH standards

www.ilo.org/UkraineEUProject

Mr. Karel Van Damme, General Counsellor,
the Federal Public Service Employment,
Work and Social Dialogue, inspection service well-being at work,
Belgium

Inspector's knowledge?

WHAT YOU KNOW, YOU SEE

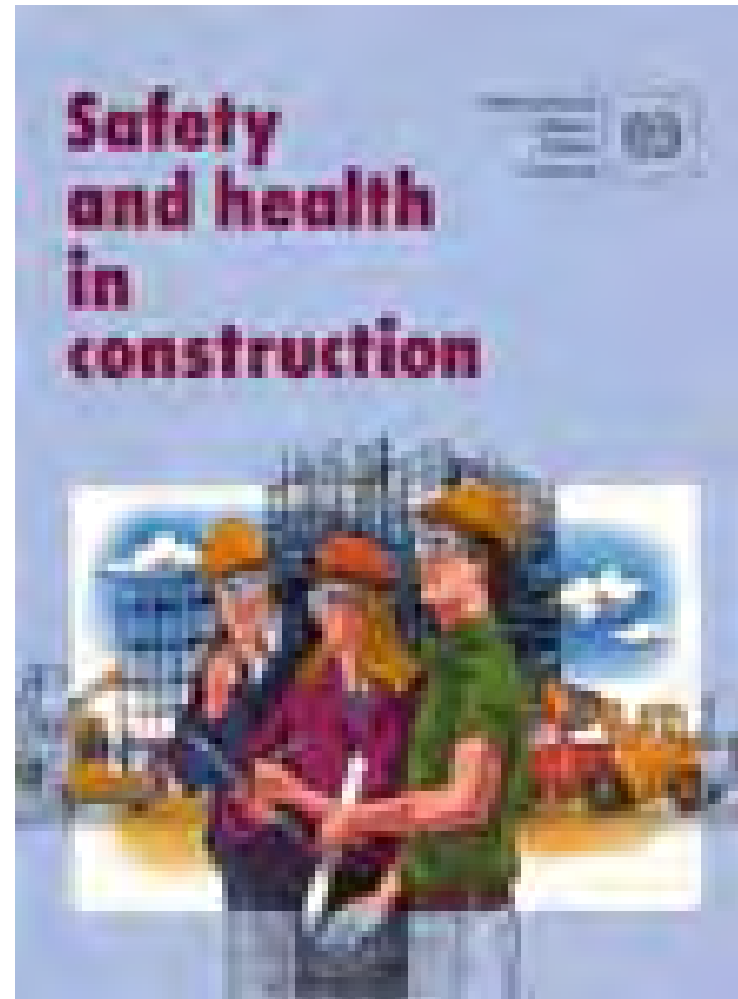
WHAT YOU DO NOT KNOW, YOU DO NOT SEE

ILO

C 167 – Safety and Health
in Construction
Convention , 1988

R175- Safety and Health
in Construction
Recommendation, 1988

And a detailed
brochure in 1991



ILO: The term **construction** covers (1):

(i) building, including excavation and the construction, structural alteration, renovation, repair, maintenance (including cleaning and painting) and demolition of all types of buildings or structures;

ILO: The term **construction** covers (2):

(ii) civil engineering, including excavation and the construction, structural alteration, repair, maintenance and demolition of, for example, airports, docks, harbours, inland waterways, dams, river and avalanche and sea defence works, roads and highways, railways, bridges, tunnels, viaducts and works related to the provision of services such as communications, drainage, sewerage, water and energy supplies;

ILO: The term **construction covers (3):**

(iii) the erection and dismantling of prefabricated buildings and structures, as well as the manufacturing of prefabricated elements on the construction site;

EU Directive 92/57/EEC

temporary or mobile construction sites

of 24 June 1992 on the implementation of minimum safety and health requirements at temporary or mobile construction sites (eighth individual Directive within the meaning of Article 16 (1) of Directive 89/391/EEC)

And a brochure:

**Non-binding guide to good
practice for understanding and
implementing Directive 92/57/EEC
'Construction Sites'**

Application of the Framework Directive EU

- Avoiding risks
- Evaluating the risks which cannot be avoided
- Combating the risks at source
- Adapting the work to the individual
- Adapting to technical progress
- Replacing the dangerous by the non-dangerous or the less dangerous
- Developing a coherent overall prevention policy
- Giving collective protective measures priority over individual protective measures
- Giving appropriate instructions to workers

Construction Directive Annex I

List building & civil engineering (non-exhaustive)

1. Excavation
 2. Earthworks
 3. Construction
 4. Assembly and disassembly of prefabricated elements
 5. Conversion or fitting-out
 6. Alterations
 7. Renovation
 8. Repairs
 9. Dismantling
 10. Demolition
 11. Upkeep
 12. Maintenance — Painting and cleaning work
 13. Drainage
- Etcetera

Construction Directive Annex II : Particular risks (simplified version)

1. risk from chemical or biological substances
3. ionizing radiation
4. near high voltage power lines.
5. risk of drowning.
6. work on wells, underground earthworks, tunnels.
7. divers
8. workers in caissons
9. use of explosives.
10. assembly or dismantling of heavy prefabricated components.

Construction Directive Annex IV

General minimum requirements (1)

- Stability and solidity
- Energy distribution installations
- Emergency routes and exits
- Fire detection and fire fighting
- Ventilation
- Exposure to particular risks
- Temperature

Construction Directive Annex IV

General minimum requirements (2)

- Natural and artificial lighting of workstations, rooms and traffic routes on the site
- Doors and gates
- Traffic routes- danger areas
- Loading bays and ramps
- Freedom of movement at the workstation
- First aid

Construction Directive Annex IV

General minimum requirements (3)

- Sanitary equipment
- Rest room sand/or accomodation areas
- Pregnant women and nursing mothers
- Signposting of the site
- Drinking facilities
- Eating facilities

Construction Directive Annex IV

On-site indoor workstations

1. Stability and solidity
2. Emergency doors
3. Ventilation
4. Temperature
5. Natural and artificial lighting
6. Floors, walls, ceilings and roofs of rooms
7. Windows and skylights
8. Doors and gates
9. Traffic routes
10. Escalators and travelators
11. Room dimensions and air space in rooms

Construction Directive Annex IV

On-site outdoor workstations (1)

- Stability and solidity
- Energy distribution installations
- Atmospheric influences
- Falling objects
- Falls from height
- Scaffolding and leaders
- Lifting equipment

Construction Directive Annex IV

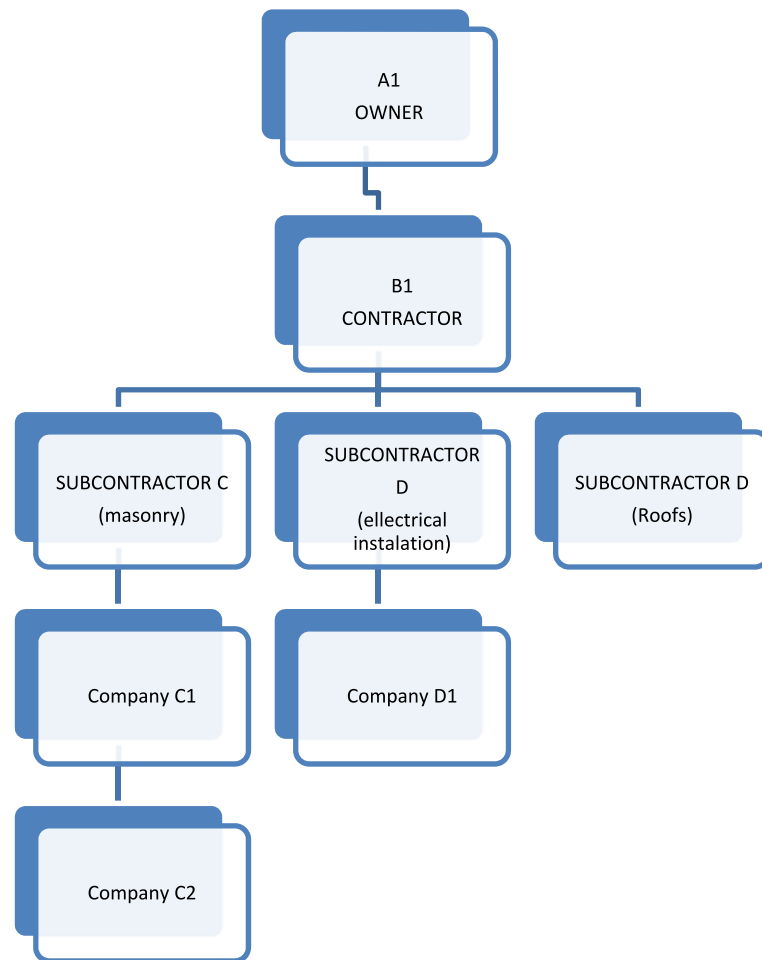
On-site outdoor workstations (2)

- Excavating and materials-handling and machinery
- Installations, machinery, equipment
- Excavations, wells, underground works, tunnels and earthworks
- Demolition work
- Metal or concrete frameworks, shutterings and heavy prefabricated components

Construction Directive Annex IV

On-site outdoor workstations (3)

- Cofferdams and caissons
- Work on roofs



- 47 workers on site
- owner: safety coordinator
- contractor: supervision team
- **10 bogus independent workers** contracted by C1/ 8 bogus contracted by C2/ 2 by D
- **13 undeclared workers**: 1 for C1, 2 for D2, 9 for D and 1 hired from an alleged independent worker rendering services to D1
- **4 immigrant workers** with illegal residence (3 working for D and 1 for C1)
- **5 temporary workers** placed by company ABC, which was contracted by B1
- No workers representatives for OSH
- Company D1 not authorized to render services in construction

ILO Convention 167

Article 8

1. Whenever two or more employers undertake activities simultaneously at one construction site-

(a) the principal contractor, or other person or body with actual control over or primary responsibility for overall construction site activities, shall be responsible for coordinating the prescribed safety and health measures and, in so far as is compatible with national laws and regulations, for ensuring compliance with such measures;

ILO Convention 167

Article 8

1. Whenever two or more employers undertake activities simultaneously at one construction site-
 - (b) in so far as is compatible with national laws and regulations, where the principal contractor, or other person or body with actual control over or primary responsibility for overall construction site activities, is not present at the site, he shall nominate a competent person or body at the site with the authority and means necessary to ensure on his behalf co-ordination and compliance with the measures, as foreseen in subparagraph (a) above;
 - (c) each employer shall remain responsible for the application of the prescribed measures in respect of the workers placed under his authority.

ILO Convention 167

2. Whenever employers or self-employed persons undertake activities simultaneously at one construction site they shall have the duty to co-operate in the application of the prescribed safety and health measures, as may be specified by national laws or regulations.

ILO Recommendation 175

4. National laws or regulations should require that employers and self-employed persons have a general duty to provide a safe and healthy workplace and to comply with the prescribed safety and health measures.

ILO Recommendation 175

5.

(1) Whenever two or more employers undertake activities at one construction site, they should have the duty to co-operate with one another as well as with any other persons participating in the construction work being undertaken, including the owner or his representative, in order to comply with the prescribed safety and health measures.

(2) Ultimate responsibility for the co-ordination of safety and health measures on the construction site should rest with the principal contractor or such other person as is primarily responsible for the execution of the work.

ILO Recommendation 175

6. The measures to be taken to ensure that there is organised co-operation between employers and workers to promote safety and health at construction sites should be prescribed by national laws or regulations or by the competent authority. Such measures should include-

- (a) the establishment of safety and health committees representative of employers and workers with such powers and duties as may be prescribed;
- (b) the election or appointment of workers' safety delegates with such powers and duties as may be prescribed;
- (c) the appointment by the employer of suitably qualified and experienced persons to promote safety and health;
- (d) the training of safety delegates and safety committee members.

ILO Recommendation 175

7. Those concerned with the design and planning of a construction project should take into account the safety and health of the construction workers in accordance with national laws, regulations and practice.

8. The design of construction equipment, tools, protective equipment and other similar equipment should take account of ergonomic principles.

EU framework Directive on OSH

4. Without prejudice to the other provisions of this Directive, where several undertakings share a work place, the employers shall cooperate in implementing the safety, health and occupational hygiene provisions and, taking into account the nature of the activities, shall coordinate their actions in matters of the protection and prevention of occupational risks, and shall inform one another and their respective workers and/or workers' representatives of these risks.

EU Construction Directive

Whereas, moreover, self-employed persons and employers, where they are personally engaged in work activity, may, through their activities on a temporary or mobile construction site, jeopardize the safety and health of workers;

Whereas it is therefore necessary to extend to self-employed persons and to employers where they are personally engaged in work activity on the site certain relevant provisions of Council Directive 89/655/EEC of 30 November 1989 concerning the minimum safety and health requirements for the use of work equipment by workers at work (second individual Directive) (1), and of Council Directive 89/656/EEC of 30 November 1989 on the minimum health and safety requirements for the use by workers of personal protective equipment at the workplace (third individual Directive) (2);

EU construction directive art 2

(...)

(e) ‘**coordinator for safety and health matters at the project preparations stage**’ means any natural or legal person entrusted by the client and/or project supervisor, during the project preparation stage, with performing the duties referred to in Article 5;

(f) ‘**coordinator for safety and health matters at the project execution stage**’ means any natural or legal person entrusted by the client and/or project supervisor, during execution of the project, with performing the duties referred to in Article 6.

EU construction directive

Article 3

Appointment of coordinators — Safety and health plan — Prior Notice

1. The client or the project supervisor shall **appoint one or more coordinators** for safety and health matters, as defined in Article 2 (e) and (f), for any construction site on which more than one contractor is present.
2. The client or the project supervisor shall ensure that prior to the setting up of a construction site a **safety and health plan** is drawn up in accordance with Article 5 (b).

EU construction directive

The Member States may, after consulting both management and the workforce, allow derogations from the provisions of the first subparagraph, except where it is a question of:

- work involving particular risks as listed in Annex II, or
- work for which prior notice is required pursuant to paragraph 3 of this Article.

EU construction directive

3. In the case of constructions sites:

- on which work is scheduled to last longer than 30 working days and on which more than 20 workers are occupied simultaneously, or
- on which the volume of work is scheduled to exceed 500 person-days, the client or the project supervisor shall communicate a **prior notice** drawn up in accordance with Annex III to the competent authorities before work starts.

EU Construction Directive

Project execution stage: duties of coordinators

The coordinator(s) for safety and health matters during the project execution stage shall:

(a) coordinate implementation of the general principles of prevention and safety:

- when technical and/or organizational aspects are being decided, in order to plan the various items or stages of work which are to take place simultaneously or in succession,
- when estimating the period required for completing such work or work stages;

EU Construction Directive

(.....)

(d) **organize cooperation** between employers, including successive employers on the same site, coordination of their activities with a view to protecting workers and preventing accidents and occupational health hazards and reciprocal information as provided for in Article 6 (4) of Directive 89/391/EEC, ensuring that self-employed persons are brought into this process where necessary;

(e) coordinate arrangements **to check** that the working procedures are being implemented correctly;

EU Construction Directive

Article 7

Responsibilities of clients, project supervisors and employers

1. Where a client or project supervisor has appointed a coordinator or coordinators to perform the duties referred to in Articles 5 and 6, this does not relieve the client or project supervisor of his responsibilities in that respect.
2. The implementation of Articles 5 and 6, and of paragraph 1 of this Article shall not affect the principle of employers' responsibility as provided for in Directive 89/391/EEC.

EU Construction Directive

Article 8

Implementation of Article 6 of Directive 89/391/EEC

When the work is being carried out, the principles set out in Article 6 of Directive 89/391/EEC shall be applied, in particular as regards:

- (a) keeping the construction site in good order and in a satisfactory state of cleanliness;
- (b) choosing the location of workstations bearing in mind how access to these workplaces is obtained, and determining routes or areas for the passage and movement and equipment;
- (c) the conditions under which various materials are handled;

EU Construction Directive

- (d) technical maintenance, pre-commissioning checks and regular checks on installations and equipment with a view to correcting any faults which might affect the safety and health of workers;
- (e) the demarcation and laying-out of areas for the storage of various materials, in particular where dangerous materials or substances are concerned;
- (f) the conditions under which the dangerous materials used are removed;
- (g) the storage and disposal or removal of waste and debris;

EU construction Directive

- (h) the adaptation, based on progress made with the site, of the actual period to be allocated for the various types of work or work stages;
- (i) cooperation between employers and self-employed persons;
- (j) interaction with industrial activities at the place within which or in the vicinity of which the construction site is located.

Amalgam of causes of accidents

- **Fall from height**

- Ladders & steps
- Scaffolds
- Roof/ /floor/platform
- Hole in the ground
- Moveable platform
- Non-moving vehicle
- Other (not protected)



- **Fall on same level**

- **Fall down stairs/ ramp**

- **Moving vehicle**

- Struck by
- In or on with loss of control

- **Trapped between/against**



- **Loss of Containment**

- normally closed containment
- Normally open

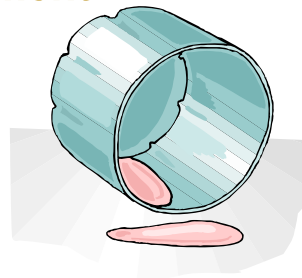
- **Fire**

- **Explosion**

- **Buried by bulk mass**

- **Immersion in liquid**

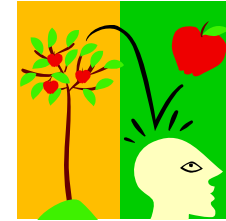
- **Too rapid (de)compression**



- **Extreme muscular exertion**

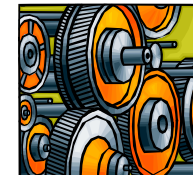
- **Human aggression**

- **Animal behaviour**



- **Contact with**

- Falling objects
- Flying/ ejected objects
- Hanging/swinging objects
- Object used/ carried
- Rolling/sliding object
- Object moved into



- **Moving parts of machine**

- **Handheld tools operated by self**

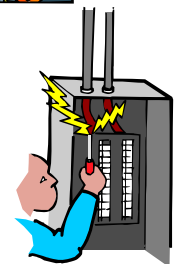
- **Electricity**

- **Extreme hot or cold**

- **Hazardous substance without loss of containment**

- **Hazardous atmosphere in confined space**

- **Hazardous atmosphere through breathing apparatus**



PREVENTION: some considerations

Experts/Expertise in house or external (Accredited, advisory, available, autonomous, advocating) EVERY COMPANY EXTERNAL and/or INTERNAL PREVENTIVE SERVICE

Labour inspection= expertise + enforcement

Responsible versus irresponsible companies

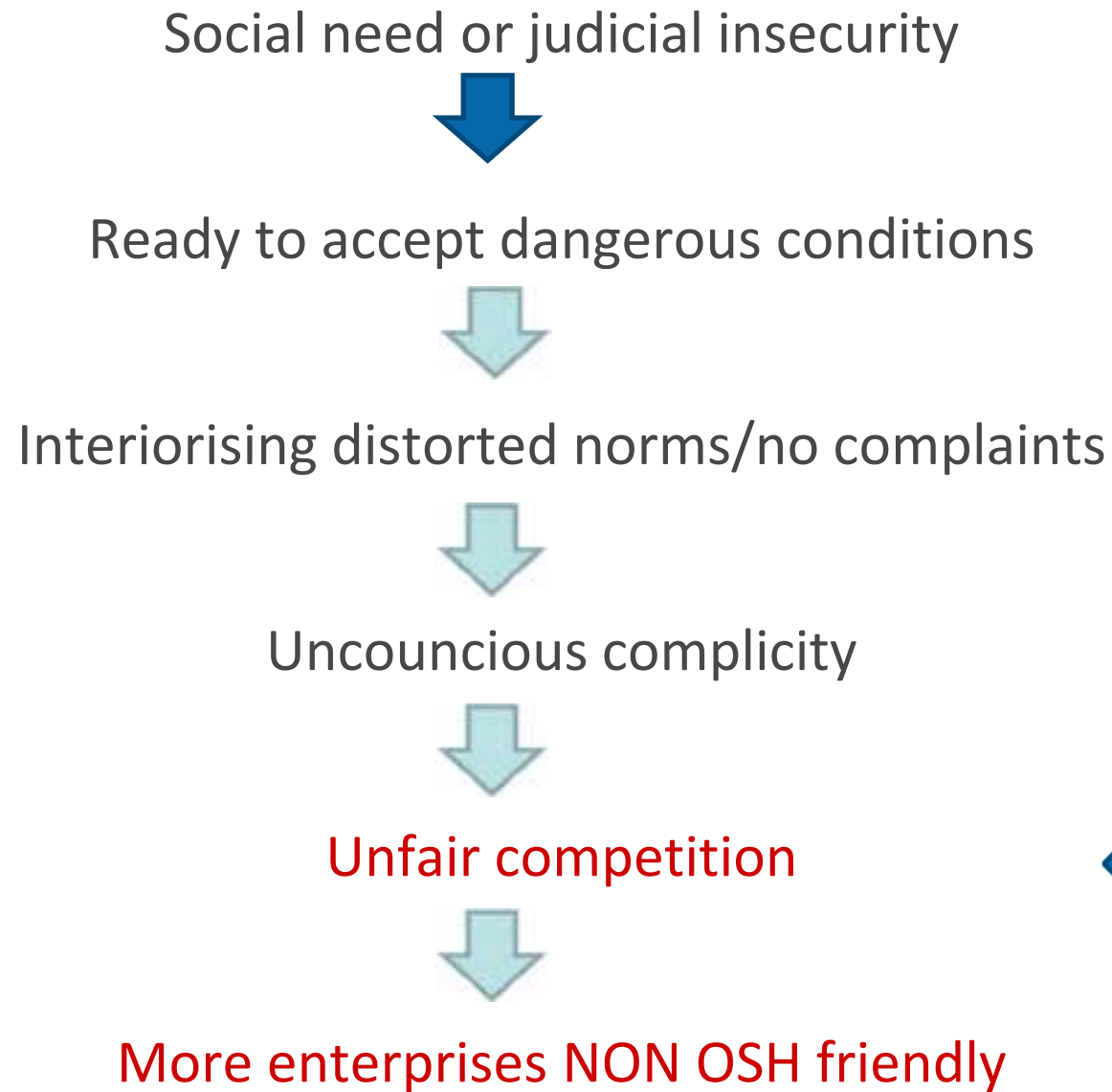
- Sufficient to impose RA and set goals in regulations?
- Or impose tools for prevention?
 - = Regulations as a source of knowledge + tool for enforcement

Experience good and bad (accident/OD analysis, information, sensibilisation)

Black lists? Pillory? No, but...

Financial incentives?

Quid subcontracting? Joint and several liability? Yes, but..





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CONSTRUCTION

Module 5

Risk management

www.ilo.org/UkraineEUProject

Mr. Karel Van Damme, General Counsellor,
the Federal Public Service Employment,
Work and Social Dialogue, inspection service well-being at work,
Belgium

FRAMEWORK DIRECTIVE EU

- Avoiding risks
- Evaluating the risks which cannot be avoided
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- Giving appropriate instructions to workers

RISK ASSESSMENT

- **Step 1** — Identifying the hazards and those at risk
- **Step 2** — Evaluating and prioritising the risks
- **Step 3** — Deciding on preventative action
- **Step 4** — Taking action
- **Step 5** — Monitoring and reviewing Integrated risk registers

FALLS

- Works at height
- Erecting and dismantling of scaffolding
- Falls from the same level



ELECTRICITY

- use of poorly maintained electrical equipment;
- work near overhead power lines;
- contact with underground power cables during excavation work or horizontal boring or drilling;
- mains electricity supplies;
- use of unsuitable electrical equipment in explosive areas;
- fires started by poor electrical installations and faulty electrical appliances;
- untested worksite distribution boards and defective residual-current-operated protective devices.

ELECTRICITY

- electric shock
- electrical burns
- loss of muscle control
- thermal burns.



RISK RELATED TO GAS

- Natural gas is usually distributed through network of buried
- transmission and distribution pipes.
- Gas releases can occur as a result of mains failures but also as a result of accidental damage.
- Leaks can also occur from bulk storage tanks and from smaller cylinders stored and used on construction sites.
- Under certain circumstances, these leaks can result in
- a fire or explosion.



WORK ON TRAFFIC ROADS

- collisions between vehicles working inside the site,
- and between vehicles passing close to the site;
- collisions by passing vehicles with site machinery,
- equipment (e.g. scaffolds) and workers (perhaps
- where the site is not adequately signed and physically protected);
- asphalt fumes produced during paving works — this may affect different parts of the body (skin, eyes,
- throat, etc.) and may cause cancer;
- exhaust fumes and diesel particles.



TRAFFIC ON SITE

Risks to pedestrians from on-site traffic can be reduced by providing segregated pedestrian and vehicular routes that are properly demarcated and by providing added protection for pedestrians at places of particular risk.

Crossing points require particular attention.



CONSTRUCTION MACHINERY

Risks related to earthmoving equipment (backhoes, loader shovel excavators, etc., including their accessories) may include:

- roll-over of the equipment,
- objects falling onto the equipment,
- malfunctioning safety and other warning devices, etc.



CONSTRUCTION MACHINERY

The risks related to lifting equipment (e.g. tower cranes, mobile cranes, etc., including accessories such as slings) may include:

- workers falling from height during the installation, operation and dismantling of the equipment,
- collapse of the equipment during use due to overloading or during erection and dismantling, and
- failures due to poor slinging techniques, etc.

MANUAL HANDLING

Manual handling generally involves lifting and moving loads by hand or other bodily force. Many people hurt their backs, arms, hands or feet when routinely lifting everyday loads and not just when lifting a single load proves to be too heavy



GESTURES AND POSTURES

These are risks of occupational injury or disease due to constraining postures and intense or repetitive physical efforts. Cumulative damage can occur



EXPLOSIVES

Explosives create risk of injury from the explosion, from projected or flying material, from toxic fumes and from over pressures.

INSTABILITY

Risk of injury may be created by falling objects from an upper level or from the collapse of structures, earthworks and equipment. Loss of structural integrity can be due to a number of causes.

These include failures in design especially of temporary works, failures in correctly executing the works as designed and failures in properly monitoring the work being undertaken to take account of the unforeseen.



DRAWNING

This risk can arise when crossing water to reach a place of work, and when working over or nearby water.



NOISE

Workers who use power tools, such as:

- concrete breakers, pokers and compactors;
- sanders, grinders and disc cutters;
- hammer drills;
- chipping hammers;
- chainsaws;
- cartridge-operated tools; and
- scabblers or needle guns.

Workers who operate heavy plant or control machines on site, and anyone in close proximity to them.

VIBRATIONS

Vibration from work with powered hand-held tools, equipment or processes can damage the hands and arms of users causing 'hand-arm vibration syndrome'. This is a painful, irreversible condition which includes 'vibration white finger'.

The effects can be impaired blood circulation, damage to the nerves and muscles, and loss of the ability to grip properly.

The main sources of vibration from powered hand-held tools are demolition hammers, drills, hammer drills, angle grinders, chain saws and hand-held circular saws.



VIBRATIONS

Back pain can be caused by or aggravated by vehicle or machine vibrations that pass through the vehicle's seat and into the driver's body through the buttocks. This is known as whole-body vibration.

Wholebody vibration can also be caused by standing on a vibrating platform of a vehicle or machine. In this case, vibration passes into the operator through their feet.

The main sources for vibration are excavators, wheel loaders, caterpillars, graders, scrapers, site dumpers, articulated dump trucks, wheeled (motor) scrapers and rough terrain forklift trucks.

BURNS

Touching high temperature objects when working in close proximity to them creates a risk of burning.

The escape of hot liquids, vapours and gases are other ways of suffering high temperature burns.

Exposure to chemicals can cause burns as can electricity.

HEAT AND COLD

Workers can face high temperatures and be at risk of heat stroke during work such as:

- the demolition of metal melting tanks;
- welding, especially in confined spaces;
- work in live plant rooms especially where additional stressors are present, such as the use of respiratory equipment when, say, stripping asbestos; and
- blast furnace reconstruction.

Workers can face extremely cold temperatures in places such cold stores.

WEATHER

Weather conditions that may increase risks to safety

and health include:

- high winds;
- precipitation — rain and snow;
- icy conditions;
- high humidity;
- exposure to the adverse effects of the sun;
- extremes of temperature.

WEATHER

- Strong winds can adversely affect the operation of cranes and other lifting gear, especially when handling large sheet items such as cladding and roofing sheets and formwork panels.
- Strong winds can also adversely affect workers handling large lightweight panels, for instance when fixing sheet roofing and metal decking.
- Bad weather is a general body stressor.
- High temperatures in the summer might lead to heatstroke or burns by ultraviolet radiation.
- Low temperatures may increase the adverse effects of vibratory tools and may increase colds and infections.

DUST

Dusts are harmful to the respiratory tract and respiratory system.

Some dusts are carcinogenic (e.g. asbestos).

Dust may arise, for example, from:

- removing asbestos structure during refurbishment;
- cutting wood;
- chasing and cutting brickwork, blockwork, concrete and stone;
- manipulation of cement and other powders.



CHEMICAL

- the chemicals that are already there, before the construction process starts — such sources might be natural or man-made;
- the chemicals that are a part of the construction process; and
- chemical risks as a by-product of a construction process.



CHEMICAL

- Risks of the first kind arise mainly during demolition work and the clean up of former waste deposits and abandoned sites.
- Asbestos may be found in existing facilities where it was used for structural fire protection or insulation purposes.
- A wide range of chemicals can result from former industrial processes, e.g. at the sites of old coke oven plants, contaminated facilities as well as contaminated ground can be expected



CHEMICAL

- Chemical risks of the second kind arise from chemicals used during the construction process. These might typically be from the evaporation of solvents used in paints, varnishes, lacquers and adhesives.
- Solvents are harmful to the nervous system and might cause brain damage.
- Isocyanates and epoxy resins found in paints, adhesives and bonding agents may irritate skin and lungs and may lead to severe allergic reactions and asthma.
- ETC..... !!!!!

BIOLOGICAL

- Biological agents can typically be present in the soil, in sewers and drains, in roofing voids, attics and basements, in water-cooling towers, rotten materials and in certain workplaces such as hospitals and biohazard laboratories.
- Agents can be airborne. They can be released by disturbance such as during the demolition of contaminated facilities and the removal of contaminated plaster.
- Pigeon droppings are a further example of biological risk as is Weill's disease from water contaminated by rats.

FIRE

Many sources such as:

- the use of flammable liquids;
- welding or abrasive cutting techniques used in places not specially prepared for such works;
- liquid gases used with an open flame;

and

- flammable and combustible materials, e.g. petroleum, timber and packaging.

Work in compressed air creates an increased risk of fire.

Fire risks when working in confined spaces where escape may be difficult similarly requires careful consideration.

EXPLOSION WITHOUT EXPLOSIVES

Explosion risks can typically occur from:

- the use of solvents and ignition by sparks;
- static electricity (e.g. it might ignite blasting agents);
- explosive atmospheres in sewers;
- damage to pipes containing explosive gases;
- and
- unexploded ordinance in the ground.

ASPHYXIA

- Asphyxia risks exist in those places where either toxic gases are present or where gases have displaced oxygen leading to a non-respirable atmosphere.
- Sewer systems, including those designed to carry surface water, need to be checked before entering as do other confined spaces.
- Acute intoxication by hydrogen sulphide (H_2S) can lead to death as can oxygen deficiency.

TRANSPORT RISKS

Transport risks can arise during travel to and from work when workers perform distant assignments on behalf of their employers.

HYGIENE

A lack of general hygiene on a construction site can lead to unnecessary risks to health. There is a need to:

- provide decent washing facilities (including showers where needed) to enable workers to clean themselves effectively from contaminants;
- provide in particular cases special clothing so that ordinary clothing and exposed skin does not become contaminated with anything harmful;
- instruct workers about the precautions that are required to combat particular risks;
- keep work areas and welfare facilities in a good state of cleanliness;
- ensure adequate food hygiene and the safe disposal of unwanted food stuffs that might otherwise attract vermin.

OTHER RISKS !!!

- pressurised fluids (hydraulic circuit),
- work in confined spaces (crawl space, tank),
- work-related stress (imbalance between workers' capability and work constraints),
- workplace violence (e.g. mugging),
- nanoparticles (welding!)
- electromagnetic fields,
- artificial optical radiation,
- increased risk of injury and ill health due to the combined effects of a number of different hazards (i.e. synergistic / multi-factor effects).

IONISING RADIATION

Workers may also be at risk of radiation exposure due to the working environment, for instance at nuclear facilities (e.g. defence establishments, power stations, research facilities, universities, hospital nuclear medicine facilities, etc.) and from equipment containing ionizing sources such as density gauges and smoke detectors.

CAISSON WORK

- Working in compressed air creates the risk of decompression sickness, pains around joints such as the knees and, more rarely, life-threatening through adverse effects on the central nervous system.
- Other risks include damage to air-containing body cavities such as the ears and sinuses if not lungs, and long-term chronic conditions that damage hip and shoulder joints.



Supporting tools to Module 5

Risk management

1.Substitution or elimination

2.Isolation

3.Reduced number of exposed

4.Reduced exposure potentiality

5.Local suction and general ventilation

6.To humanise work procedures

7.Hygienic work procedures

8.Personal protective devices

9.Sanitary arrangements

10.Instruction always

Respirable Crystalline Silica (RCS)

**Presentation to support the implementation of SLIC Guidance for
National Labour Inspectors on addressing risks from worker exposure
to respirable crystalline silica (RCS) on construction sites**

Senior Labour Inspectors Committee

What is RCS?

- ▶ **Crystalline silica** (CS) is a form of Silica (SiO_2) found widely in stone, rocks, sands and clays.
- ▶ Many **construction products** contain CS – see table
- ▶ Cutting, breaking, drilling etc of silica based products releases crystalline silica which **can be inhaled deep into the lungs** (gas exchange region)
- ▶ Visible dust and **invisible** respirable fractions

Crystalline Silica concentrations in common materials	
Silica containing composites, e.g. manufactured stone	Up to > 90%
Sandstone, gritstone, quartzite, flint	More than 70%
Concrete, mortar	25% to 70%
Shale	40% to 60%
China stone	Up to 50%
Tile	30% to 45%
Slate	Up to 40%
Granite	Up to 30%
Brick	Up to 30%
Ironstone	Up to 15%
Basalt, dolerite	Up to 5%

RCS Health effects

- ▶ Inhaling RCS can lead to serious health effects – **Silicosis** & **Chronic Obstructive Pulmonary Disease (COPD)**
- ▶ **Silicosis** can develop at or below some member state Occupational Exposure Limit Values (OELVs)
- ▶ Exposed workers are at increased risk of developing **lung cancer** – It is a group 1 Carcinogen (IARC)
- ▶ Other health effects include **tuberculosis, kidney disease and cardiovascular disease**



Legal Framework

- ▶ **Framework Directive**
89/391/EEC - Risk
elimination – Hierarchy of
Control
- ▶ Directive 98/24/EC (**CAD**)
applies – Risk Assessment
- ▶ **CMD** will also apply –
BOELV for RCS in Annex
III

Hierarchy of Controls	
■	Elimination e.g. design and use of appropriate work processes, systems so that the operation giving rise to the exposure is no longer necessary, such as using total enclosure or use of pre-cut materials.
■	Substitution e.g. replacement of high quartz content material A with low (or no) quartz content material B which is less hazardous.
■	Engineering Controls e.g. installation of local exhaust ventilation unit, water suppression.
■	Administrative Controls e.g. restricting access to a controlled work area; provision of training, instruction and information.
■	PPE e.g. use of half-mask respirator, as a last resort.

Legal Framework

Risk Assessment

- ▶ Employers must be **in possession of a risk assessment** for hazardous substances including RCS.
- ▶ **NLIs should determine** the degree to which the employer has met their responsibilities to conduct or complete a risk assessment.
- ▶ **NLIs should check** the level of competence employed to do the risk assessment, if consultation with workers has been undertaken, if training and instruction given, if prevention and preventative measures are appropriate to risk assessment and monitoring of those control measures are being undertaken, results of risk assessment made available to workers and/or representatives

Inspector Should Consider the following	
Elimination or substitution	Has the employer considered elimination or substitution e.g. process, use of pre-cut materials, or substituting with materials with no crystalline silica content, changing to low quartz materials?
Task	What work is creating the dust and how much energy is involved? The higher the energy the greater the risk. Can the task be done in another way that reduces the risk?
Location	Where is the work taking place? The more enclosed a space the higher the exposures will be unless a suitable means of extraction is used; this has an impact on the controls required e.g. RPE
Duration	How long is the task taking? Generally, the longer the task the higher the exposure.
Frequency	How frequently is the task done? Are people likely to be regularly exposed doing other similar tasks?
People	Who is being exposed? Is it just the worker doing the task or are others being exposed?
Controls	Are effective controls in place and in line with the hierarchy of control?
Monitoring of Controls	Is there a system in place to monitor controls e.g. supervision, personal air sampling?
Other OSH issues	Does application of appropriate controls introduce other OSH issues e.g. ladder work with on-tool extraction may increase the risk of falls?

Hierarchy of Control

Elimination and Substitution

- ▶ **Difficult or impossible** to achieve in the construction industry
- ▶ Risks can be eliminated for 'other' workers by '**segregating RCS work area**' from other areas on site.
- ▶ Using '**right size**' building products
- ▶ Using '**block splitters**'
- ▶ Using 'no' or 'low' quartz content materials
- ▶ Substitution important for **abrasive blasters**



Hierarchy of Control

Engineering Controls

▶ Water Suppression

- **Water directed** to tool cutting point during cutting etc
- Minimum flow rate of **0.5L/min**
- **Look for** lack of correct pressure, blocked spray jets, inadequate supply of water or damping areas only before working



▶ On Tool Extraction

- **Type of LEV system**
- **Captor hood** most important
- Extraction unit (industrial vacuum) should be fitted with **Medium (M) or High Filtration (H)**



Hierarchy of Control

▶ Administrative controls

- Adopting **safe work practices**
- Providing appropriate **training, information** and **instruction**
- **Supervision** to ensure correct controls in place
- **Limiting** co-worker exposure and **rotating** workers



Personal Protective Equipment

▶ Respiratory protection

- **CE marked** disposable **FFP3, Half mask with P3 filter** or **powered helmets** for those with beards etc.
- **Fit test** required in some Member States
- Workers must be **clean shaven**
- **Workers** must be **trained** and **supervised** on correct use and maintenance.
- **Abrasive blasting** – airline blasting helmet for large stone cleaning projects



Health Surveillance (HS)

- ▶ **Approach varies** in Member States
- ▶ **HS** should be introduced **when risk to health from RCS exposure**
- ▶ HS Aim: **to detect ill health** at early stage, **provides data to Employer to improve controls & support workers**
- ▶ May include **questionnaires, lung function test, chest x-rays**
- ▶ **Results** must be explained to worker and fitness to work discussed with employer by competent person
- ▶ Results and **trends to inform** risk assessment reviews and on-going controls

Good Hygiene and Housekeeping

- ▶ **Changing & storage facilities**
 - In line with National Requirements
- ▶ **Uncontaminated areas** for eating and drinking
 - Workers should not eat, drink or smoke in contaminated areas
- ▶ **Washing facilities**
 - Warm water, mild skin cleansers, soft paper towels for drying
 - Pre-work creams to aid cleaning
 - Provision of showers where heavy contamination expected
- ▶ **Cleaning**
 - Vacuum cleaners with M filter or wet cleaning methods
 - Do not use dry brushing or compressed air.



Information and Training

▶ Should include

- **Hazards** of RCS and health effects
- Good practice **case studies**
- Types of **products** containing silica
- Types of **activities** leading to high exposures
- Elimination or control **measures**
- **Care and use of PPE and RPE**
- Education on **health surveillance**

▶ Toolbox talks

- Refreshers on regular basis

Using the task sheets

- ▶ Task Sheets provide **basic guidance to NLIs**
- ▶ Possible **actions** are recommended to NLIs where high, medium or low RCS risks present on site
- ▶ NLI will have discretion on level of action depending on Member State enforcement regime
- ▶ NLIs can share guidance from the task sheets with employers/employees
- ▶ NLIs **should be aware of other processes** or novel construction techniques/ processes which may generate quartz based dust

Employment, Social Affairs & Inclusion
Illustrative for national labour inspectors on addressing risks from worker exposure to respirable crystalline silica (RCS) on construction sites

European Commission

2.1 Cutting concrete kerbs, blocks and paving with a cut-off masonry saw

Poor practice – no dust suppression or RPE (HSE, GB)

Good practice – water suppression and RPE (HSE, GB)

Good practice – using a low energy splitter such as a block splitter (MSA, DE)

General comment	Using a hand-held masonry saw to cut bricks, concrete blocks and similar materials without dust controls can result in exposures to significant airborne concentrations of RCS. The task requires the control measures in this sheet to be properly applied, to reduce exposure below the benchmark OELV 5.1 mg/m ³ .
Recommended controls for RCS dust	- Adequate supply of water for water suppression in line with manufacturer's instructions (in the absence of a prescribed rate in the manual, studies show a minimum of about 0.5 litres per minute is required to optimise dust suppression e.g. an 8 litre container would be used in about 16 minutes). (See also page 12 of part 1) - Where possible a low energy cutter should be used - Respiratory Protective Equipment (RPE) e.g. PPF3 disposable masks or half mask respirators with a P3 filter should be used
Reversible Action by National Labour Inspector	High Health Risk – Control: immediate action when all controls proving ineffective (e.g. stop work, use of fumes, use of administrative fees etc.) Medium Health Risk – Control: action is required when one control is proving ineffective (e.g. use of fumes requiring action) Low Health Risk – No action required when all controls are present and effective
Designing Out Risks	- Limit the number of cuts during design/layout - Get material cut off-site and delivered - Use low dust-containing material

Case study No.1

- ▶ **What is the problem here?**
- ▶ **What action would you take and why?**
- ▶ **What advice would you give employee and employer?**



Case study No.2

- ▶ **What is the problem here?**
- ▶ **What action would you take and why?**
- ▶ **What advice would you give employee and employer?**

