Education and Culture

Leonardo da Vinci

TRIA

DEVELOPMENT OF A COMPREHENSIVE TRAINING COURSE FOR ASSESSING THE RISK AT WORKPLACE

TRAINING MANUAL

FOR RISK ASSESSMENT IN THE

CEMENT INDUSTRY

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M01-EN.1 INTRODUCTION TO THE MODULE

M01-EN.1.1 SCOPE OF THE MODULE

This training Module aims to present the main hazards that are embedded in the Cement production processes as well as the risk assessment including the management of the corresponding risk.

The basic principles and the risk assessment methodology are described in training module M0-EN, within which the risk assessment form used in this module is provided.

For every production process a representative Risk Assessment Table has been prepared, while for all the supporting processes there is a description of the hazards as well as an indicative Check List for managing the identified hazards.

M01-EN.1.2 PURPOSE OF THE TRAINING MODULE

The goal of the module is for the participants to have by the end of the course to have:

– basic realisation of all the main hazards in the cement industry.

– basic knowledge and experience of the ways in which accidents can be prevented

– basic knowledge for managing risk

M01-EN.1.3 CLASSIFICATION OF THE HAZARDS IN THE CEMENT INDUSTRY

In all the cement production processes there are hazards that can be classed in:

- Routine and general hazards such as:
    - Safe behaviour
    - Environment, work and passage areas
    - Work equipment
    - Safety labelling
    - Personal Protective Equipment (PPE)
    - Manual load handling
- Special hazards during the cement production phases such as:
    - Quarrying
    - Crushing
    - Clinker production
    - Milling processes at raw mill, cement milling and coal milling
    - Material transport
    - Filtering
    - Storage
    - Loading and delivery of final products
    - Fuel storage activities
    - Use of hazardous material

    - Generating units
- Special hazards as a result of the work environment:
    - Dust
    - Noise
    - Fire
    - Emergency response

M01-EN.1.4 CEMENT MANUFACTURE PROCESS FLOW

The following diagram shows the process flow of a typical cement factory

M01_01_01.jpg

M01-EN 2 HAZARDS AND THEIR SOURCES IN THE CEMENT INDUSTRY

M01-EN 2.1 QUARRYING

The quarrying activity includes the drilling of bore holes, the filling up of explosives and the triggering of the explosives. Once this happens then the material is loaded and transported either to open storage piles or to the crushing area.

During the process of charging and ignition, the explosives are transported to the explosion area from the explosive storage facilities.

M01-EN 2.1.1 Hazards as a result of the Storage Transport and Use of explosives

The explosives are stored only in approved sites that have to comply with the requirements of relevant legislation. During explosives storage the main hazards are the following:

- Storing explosives and capsules in the same area
- Entry of unauthorised persons in the area
- Smoking or use of naked flame in the storage area
- Storage of other goods and equipment
- Bad housekeeping in and out of the warehouse.
- Inadequate distance (<10cm) between the containers and the warehouse wall
- Absence of boundaries and labelling
- Insufficient building maintenance (lighting, ventilation) with the possibility of concentration of humidity in the warehouse
- Execution of non approved maintenance work on the warehouse electrical wiring.
- Insufficient warehouse security
- Not following the FIFO (First In First Out) in the management of explosive stocks
- Using work or personal equipment that can create sparks (eg wireless mobile phones)

Hazards during the transport of the explosives are:

- The use of unauthorised vehicles
- The transport of explosives together with capsules as well as not keeping the necessary labelling during transport
- The carrying of passengers
- The unplanned stoppage
- The transport of explosives during unstable weather

Hazards during the use of explosives are:

- The Failure to implement the company rules and regulations
- The use of unauthorised explosives
- The Failure to use the approved explosion plan
- The existence of unexploded boreholes

- The Failure to prevent unauthorised person to approach the explosives area
- The transport of more than required explosives quantity
- The temporary storage of explosives at excessive temperatures (greater than 65 degrees C) or near naked flame
- The use of mobile telephony or wireless near explosives
- The use of unauthorised equipment when opening a hole in the explosives

During the filling up and triggering the explosives the main hazards are:

- The triggering the explosives by unauthorised personnel or outside the agreed timetable
- The insufficient warning prior to triggering
- The approach of other persons other than the person in charge near the explosion area following the triggering
- The failure to comply with the company procedures in case of untriggered explosives
- The failure to comply with the connecting procedures in case of electrical triggering

M01-EN 2.1.2 Hazards during the Bore holing process

During the bore holing process the basic hazards are:

- The moving parts of the bore holing machinery
- Falls from height
- Material falling from height
- Crushing of quarry table
- Hurling of material
- Presence of dust and noise
- Movement of earth moving equipment

M01-EN 2.1.3 Quarrying Operations - Risk Assessment – Protection Measures

M01- EN. 2.1.3.1 Storage and transport of explosives

(1)		Hazard (2)		(3)	(4)	5)
No.		Specific Hazard Area	Hazard Description	Person	Harm	Current safety measures
1	0	Storage and transport of explosives		-	-	-
1	1	Storage of explosives	Includes: - Storing of explosives with triggers - Storage of other goods -Bad housekeeping -Bordering and labelling - Failing to comply with the FIFO -Use of work or personal equipment that create sparks	Storekeeper People working in the area	Multiple deaths from explosion	Existence of operational procedures. Periodic checks Trained personnel
1	2	Insufficient security in the warehouse area	-Entry of unauthorised persons - Failing to comply with the safe keeping and securing procedures	Storekeeper People working in the area	Multiple deaths from explosion due to unauthorised use of explosives	Existence of operational procedures. Periodic checks Trained personnel
1	3	Insufficient maintenance of building	Badly maintained building with the possibility of entry of humidity -Unauthorised maintenance of electrical wiring	Storekeeper People working in the area Maintenance personnel	Multiple deaths from explosion due to wiring failure or from humidity	Preventive maintenance of the building (check for humidity on walls and floors, electrical wiring) Periodic checks Trained maintenance personnel
1	4	Unauthorised transport of explosives	- The use of unauthorised vehicles -The transport of explosives together with capsules as well as not keeping the necessary labelling during transport -The carrying of passengers -The unplanned stoppage -The transport of explosives during unstable weather	Driver, passengers, Inhabitants	Multiple deaths due to explosion	Use of approved vehicles. Protection of explosives from high temperatures. Periodic vehicle checks. Use of appropriate signage during transport. Existence of operational procedures for the transportation of explosives during unstable weather.

(1)		Hazard (2)		(3)	(4)	(5)
No.		Specific Hazard Area	Hazard Description	Person	Harm	Current safety measures
3	1	Use of explosives		-	-	-
3	1	Use of unauthorised explosives	Use of unauthorised explosives – ignorance of special instructions	Person in charge	Multiple deaths	Implementation of the FIFO principle. Periodic checks and stock control
3	2	Failure to comply with the explosion plan	In case of untriggered explosives there will be confusion	People working in the area	Death from unexpected explosion of untriggered explosive	Existence of written instructions of the charging and triggering process. Training of personnel involved. Periodic implementation audits
3	3	Untriggered bore holes	Work near untriggered bore holes	People working in the area	Death from unexpected explosion of untriggered explosive	Training and retraining of personnel Periodic audits of operational instructions
3	4	Failure to comply with triggering procedures	- Failing to implement the company rules and regulations The use of unauthorised explosives Failing to use the approved explosion plan The existence of unexploded boreholes Failing to prevent unauthorised person to approach the explosives area Allowing the transport of more than required explosives quantity Leaving the explosives unprotected from excessive temperature or near flame Using mobile telephony or wireless near explosives Using unauthorised equipment during bore holing	People working in the area	Death from unexpected explosion of untriggered explosive	Transportation of the explosives to be used only. Protection of the explosives from high temperatures. Forbid the use of mobiles or wireless near the explosives. Isolation of area from unauthorised personnel. Existence of written regulations for the connection and electrical triggering.
3	5	Unplanned triggering	- Triggering the explosives by unauthorised personnel or outside the agreed timetable - Not giving the necessary and timely warning prior to triggering	People working in the area	Death from unexpected explosion of untriggered explosive	Existence and communication of the triggering plan. Use of trained personnel. Work audits.

M01-EL.2.1.3.2 The bore holing process

(1) No.		Hazard (2) Specific Hazard Area	Hazard Description	(3) Person	(4) Harm	(5) Current safety measures
2	0	**Bore holing**				
2	1	Moving parts of the bore holing machine	-Mechanical hazards due to the moving parts of the bore holing machinery	Person in charge Operator	Severe harm	Training of personnel Periodic check of protective measures of the bore holing machine
2	2	Material falling from height	Material falling from height from the above quarry table	Person in charge Operator	Severe harm	Checks of the quarry table. Existence of a drilling plan. Never drill on an older bore hole.
2	3	Fall from height	Working near the edge	Person in charge Operator	Severe harm	Implementation of operational procedures including checks prior to working on a quarry table. Make sure that there is adequate space between the bore holing machinery and the quarry table edge.
2	4	Failure of a quarry table	Failure of a quarry table due to instability following the previous explosion	Person in charge Operator	Severe harm	Check prior to working on a quarry table for possible cracks and drops.
2	5	Blasting of material	Blasting of material during bore holing	Person in charge Operator	Severe harm	Training of personnel. Use of PPEs.
2	6	Presence of dust and noise	Presence of dust and noise during the operation of the drilling machinery	Person in charge Operator	Gradual hearing impairment , Breathing problems	Training of personnel Use of PPE
2	7	Movement of earth moving equipment	Crushing of employees working on the quarry tables	Person in charge Operator	Severe harm or death	Implementation of operational directives relating to the movement of transportation equipment and personnel in the quarry.
2	8	Maintenance of the bore holing machinery	Failure to secure the machinery. Maintenance by unauthorised personnel	Maintenance technician	Severe harm or death	Implementation of operational directives relating to the securing of machinery for the execution of maintenance work. Preparation of the temporary measures. Use of PPE

M01-EN.2.1.4 Accident Prevention Check List

M01-EN.2.1.4.1 Accident Prevention Check List – Storing and Transportation of Explosives

No.	Control Points	S/US	Observations
	Warehouse -External		
1	Check the existence of the necessary signage outside the explosives warehouse		
2	Check the adequacy of the boundary. Is there lock?		
3	Check the signage and that all the necessary PPE are prescribed		
4	Check the adequacy of the housekeeping outside the warehouse. Are there other materials that are a source of hazard.		
5	Check the maintenance condition of the building. The condition of the roof, the door, the walls (integrity and humidity)		
6	Check the position of overhead electricity supply cables so that in case of electric discharge there is no explosion hazard		
	Warehouse -Internal		
7	Check the adequacy of internal housekeeping (waste material, specified corridors)		
8	Check the existence of materials other than explosives. Check the place where the capsules are stored		
9	Check the adequacy of the space between the explosives boxes and the wall. There should be a space of at least 10-20 cm		
10	Check for the existence of humidity on the floor and the walls. Are there adequate ventilation measures		
11	Check the general condition of the lighting electrical wiring		
12	Check that the necessary documentation is kept by the storekeeper		
13	Check that FIFO rule is followed by physically checking the explosives batches		
14	Check the adequacy of the maintenance of the warehouse		
	Transport of explosives		
15	Check the approval of the vehicles used for the transport of explosives		
16	Check the adequacy of maintenance of the vehicles		
17	Check the use of the necessary signage		

	during the transportation of explosives		
18	Check the procedure for transporting explosives and capsules		
19	Check the procedure for avoiding of an unplanned stop		
20	Check the procedure for the transport of explosives during unstable weather		
21	Check the arrangements for the transport of passengers		

M01-EN.2.1.4.2 Accident Prevention Check List – Use of Explosives

No.	Control Points	S/US	Observations
	Use of explosives		
22	Check that all personnel involved with the use of explosives are approved and authorised. Check the availability of certificates.		
23	Check the use of the Regulations for the use of explosives.Check that the documented procedures are available		
24	Check that the procedure for issuing the explosive out of the warehouse is followed. Check the documentation and records used.		
25	Check the existence and use of the explosion plan.		
26	Check that the transportation method is carried out according to the operational procedures and the method of protection from heat and humidity.		
27	Check how it is ensured that no unauthorised people approach the area.		
28	Check the use of the appropriate tool for opening the hole on the dynamite stick.		
29	Check the method of communication during the transportation and use of explosives		
	Charging and triggering		
30	Check how it is ensured that all personnel are cleared from the explosion area		
31	Check the warning procedures		
32	Check the existence and method of communication of the explosion plan		
33	Check the method of communication of the changes to the explosion plan.		
34	Check the measures taken following the explosion.		
35	Check the measures taken in case of an unexploded bore hole.		

36	Check the existence of operational instructions for the case of electric triggering.		

M01-EN.2.1.4.3 Accident Prevention Check List – The drilling process

No.	Control Points	S/US	Observations
	During the preparation for drilling		
37	Check the existence of a drilling plan prior to the operation.		
38	Check for unexploded bore holes.		
39	Check that on the work surface is stable with no surface cracks		
40	Make sure that no quarrying or material transportation work is carried at a quarry table situated above.		
41	Check that no drilling is carried out in an old bore hole.		
42	Check that no drilling is carried out next to an unexploded bore hole		
43	Check that there is space between the drilling rig and the table edge.		
44	Check that drilling rig has been transported to the quarry table according to the operational procedures.		
	Drilling process		
45	Check the use of PPE during the drilling process.		
46	Check that all drilling machine guards are in position.		
47	Check that everybody stays clear of the moving parts of the drilling rig during operation.		
48	Check the existence of operational procedures in case the drilling element is stack.		
	Maintenance and checking of the drilling rig		
49	Check that the routine maintenance on the drilling rig has been carried out. Check the condition of the hydraulic system for possible leakages.		
50	Check the protective measures during the maintenance activity. Check the use of appropriate PE and the use of the manufacturers operating manual		

M01-EN.2.2 CRUSHING

M01-EN.2.2.1 Hazards

The hazards in the Crushing department focus on:

- The rotational movement and the movement of the parts of the crusher
- The exposure to noise and dust of the personnel responsible for the continuous control of the crusher
- The maintenance activities inside the crushing chamber
- The electrical problems
- The activities inside the hopper due to:
    - The operation of the feeder
    - The possible crushing of material
    - The approach of heavy goods vehicles for unloading material
- The movement of heavy goods vehicles:
    - Reversing of the vehicle into the hopper
    - Accident on personnel
- The inappropriate loading of material onto the heavy goods vehicles with the result that material is hurled from the vehicle as the material is transported.

M01-EN.2.2.2 Risk Assessment table – Protection measures

(1) No.		Hazard (2) Specific Hazard Area	Hazard Description	(3) Person	(4) Harm	(5) Current safety measures
1	0	Crusher				
1	1	Crusher moving parts	The moving parts of the crusher to come into contact with people	Operators Maintenance technicians	Serious injury, Death	Use of Guards. Use of securing procedures so that all personnel is removed from the area
1	2	Electricity	During the maintenance of the electrical parts there is a hazard from the electric cables	Maintenance technicians	Serious injury, Death	Authorised personnel
1	3	Exposure to Noise	During the operation of the crushers	Operators	Gradual hearing impairment	Use of PPE
1	3	Maintenance while machinery is in operation	Necessary interaction with the machinery	Maintenance technicians	Serious injury, Death	Authorised personnel
1	4	Inappropriate loading of material on heavy vehicle	Inappropriate loading can cause the shifting of the load with the result that rocks and material is flung in the area of the hopper	Operators	Serious injury, Death	Training of personnel. Construction of a control room made from concrete to withstand possible crushing
1	5	Movement of heavy goods vehicles	The vehicle can hit an operative while reversing or making him fall in the hopper	Operators	Serious injury, Death	Guards at the back of the vehicle. Training of personnel
1	6	Excessive dust	During unloading dust is flung in the air	Operators	Breathing problems	Use of PPE
1	7	Work inside the hopper	Necessary work in the hopper for the purpose of unblocking the mouth of the hopper	Operators	Serious injury	Training of personnel. Presence of an observer. Check the stability of rocks inside the hopper. Adequate light

M01-EN.2.2.3 Accident Prevention Check List

No.	Control Points	S/US	Observations
	Area of Hopper		
1	Check that the material is correctly loaded on the vehicle.		
2	Check the existence of a hopper guard and that is in good condition		
3	Check that in the hopper area there is the correct signage specifying the necessary PPE.		
4	Check that the correct PPEs are used.		
5	Check that during reversing the are the necessary sound warnings so that no operative is at the back of the vehicle.		
6	Check that no work is carried out in the hopper unless there is continual supervision, that there is no risk from crushing rocks and that the feeder is secured.		
7	Check that there is the necessary lighting in the crusher area.		
	Crusher		
8	Check that all the necessary crusher guards are in place.		
9	Check that the machine securing procedure is carried out by the supervisor.		
10	Check that there are no unguarded moving parts		
11	Check that the work clothing is not loose with the possibility of coming into contact with the rotating part.		
12	Check that no maintenance work is carried out on working machinery without the supervision and written consent from the supervisor.		
13	Check that all maintenance work is carried out by authorised personnel.		
	Crusher chamber		
14	Check the existence of written procedures for the stopping of the crusher and that these procedures are adhered to.		
15	Check that all work in the crusher chamber is carried out under supervision		

M01-EN.2.3 STORAGE AND MATERIAL TRANSPORTATION SYSTEMS

M01-EN.2.3.1 Hazards and protection measures

The main hazards during the transportation and storing of material are:

- The airborne dust created during the storage of material
- The conveyor belts during their normal operation as well as during their maintenance

In order to reduce the risk from airborne dust:

- Material should not be stored at unacceptable heights
- To use dust suction systems
- To implement the necessary procedures for the routine cleaning of the settled dust

In material transport systems there are moving parts that are a constant source of hazard for any person working near these conveyors during normal operation or during the maintenance activities. For the safe operation of material transportation systems all the necessary guards are applied to isolate the moving parts. Additionally where personnel is working at a short distance from the guards, emergency stops are provided within short distance of these operators.

During the **normal operation** of the transportation systems:

- The removal of guards by unauthorised personnel must be prevented.
- Any maintenance work during the operation of the transportation systems must be avoided
- Removing material during the operation of the conveyors must be avoided
- The cleaning of overflows during operation must be avoided unless the cleaning is done by the conveyor operative.
- The use of unauthorised passageways either over or under the transportation systems must be avoided because there is the risk of personnel getting trapped by the conveyor or overflowing material can fall from height
- The overhead bridges must be clean in order to minimise the possibility of the tripping and falling of the personnel performing the checks on the conveyor belts
- Any intervention on the conveyor belt overload systems must be done by authorised personnel

During the maintenance activities of the material conveyor belts it is necessary:

- For the transportation systems to be secured so that accidental start ups are eliminated.
- To check that all guards have been put in place prior to commissioning and
- To Check that the maintenance work is completed and that all maintenance personnel have left the vicinity of the equipment

M01-EN.2.3.2 Risk assessment in the material storage and material transportation systems

(1) No.		Hazard (2) Specific Hazard Area	Hazard Description	(3) Person	(4) Harm	(5) Current safety measures
2	0	-	Material storage and material transportation systems	-	-	-
2	1	Airborne dust	Airborne dust in the storage area	Operatives	Breathing problems	PPEs, Dust suction systems
2	2	Conveyor moving parts	Contact with moving parts, the risk of entrapment	Operatives	Serious injury	Guarding,
2	3	Cleaning of overflows	Contact with moving parts, the risk of entrapment	Operatives	Serious injury	Side guarding,
2	4	Use of unauthorised passages	Use of unauthorised passages. Travelling over and under of the transportation system	Operatives, technicians	Serious injury , death	Restricted entry. Use of appropriate safety signage
2	5	Maintenance during operation	Risk when carried out by unauthorised personnel	Operatives, technicians	Serious injury , death	Use of authorised personnel. Supervision
2	6	Motor overloading systems	Unauthorised tampering	Operatives, technicians	Serious injury , death	Use of authorised personnel. Supervision
2	7	Supervision platforms	Unclean platforms can cause staggering and falls	Operatives, technicians	Fall from height, Serious injury , death	Implementation of the dust cleaning schedule,

M01-EN.4.3.3 Accident Prevention Check List – Material Storage and Transportation

No.	Control Points	S/US	Observations
	Storage area		
1	Check the existence of a general cleaning programme for the systematic cleaning the settled dust.		
2	Check the current measures for minimising the dust sources		
3	Check the proper operation and maintenance condition of the dust suction systems		
	Material transportation systems		
4	Check the existence of the necessary guards on the transportation systems.		

5	Check the protection measures in case maintenance activity is carried out during the operation of the transportation system.		
6	Check the protection measures taken during the removal of material from the conveyor belts		
7	Check the protection measures taken during the overflowing of the transportation system		
8	Check the existence of the appropriate health and safety signage		
9	Check that the appropriate PPEs are used by the operatives in the area.		
10	Check how the access over and under the transportation system is carried out.		
11	Check that there the appropriate labelling of approved passageways		
	Maintenance of transportation systems		
12	Check the securing procedures before and after the maintenance of transportation systems including the guards		
13	Check the electrical panels so that all electrical circuits are properly labelled		

M01-EN.2.4 THE MILLING PROCESSES (MILLING, HOMOGENISATION, STORING) – RAW MATERIAL AND CEMENT MILLS

The milling plant consists of:

- The mill (cylindrical with ball bearings) and the separator
- The filters (The hazards and protection measures are described in chapter M01-EN.2.6)
- The furnace for the production of hot gases for drying (for the hazards and protection measures please see the Chapter on fuels)
- The blowers for mixing the material after milling and before storage
- The exhaust blowers at the storage silos

M01-EN.2.4.1 Hazards and Protection measures during normal operation

The main hazards during normal operation of the mills mainly concern:

- The movement parts of machinery
- The falling of personnel from height of material
- The falling of material from height in case the protection ducting is blocked
- The hurling of mill parts
- The exposure to noise
- The exposure to dust

For the safe operation of the mills all the necessary guards must be in place in order to isolate the mechanical movement from contact with the operators. Additionally where operatives need to be near moving parts of machinery the necessary emergency batons must exist in case there is a need for to stop the machinery.

For the purpose of supervising the mills the operators are having to walk on specific platforms equipped with protective railing so that falls from height are prevented.

Due to the excess kinetic energy of material as it rotates and the continuous pounding of the material inside the mill there is a serious hazard from the frequent hurling of mill nuts. In order to minimise the risk of accidents it is necessary to wear the appropriate helmet as well as the periodic tightening of the of the nuts.

Within the milling area and the blowers homogenising area – storage, the employees are exposed to noise and dust. The sound level must be assessed and if in doubt it must be measured. The resulting corrective action first of all must involve the reduction of noise at source, then the isolation of noise and if then this is not possible to use the necessary and appropriate PPEs.

Due to the nature of work there is risk of dust being released to the atmosphere and if the dust stays airborne for a long time it creates short and long term breathing problems to the employees. A dust collection system must be used and employees must use the appropriate PPEs.

M01-EN.2.4.2 Hazards and protective measures during maintenance

The maintenance activities in the inside of the mills include:

- The maintenance of mill linings
- The replacement of the milling balls

As a result of the above activities a number of serious hazards are created for the workers at least as follows:

- Falls from height (from the mill platforms)
- Hurling of metallic fragments from the mills' shell
- Work in confined spaces with insufficient ventilation
- Exposure to dust
- Exposure to High temperatures

Due to the nature of the hazards involved such high risk operations must necessarily be planned so that all the following preventive measures are adhered to:

- Securing of the plant in a place where there is easy access of the maintenance technician into the mill
- The maintenance activity must be conducted by authorised personnel
- The work must be carried out under continuous supervision
- Adherence to documented operating preventive procedures
- Assure the necessary ventilation of the work space
- Assure the reduction of temperature prior to access to the space

- The use of the appropriate PPEs that must include:
    - Special helmet equipped with eye protector
    - Safety belt connected to a tying rope
    - Special work ware and foot ware able to withstand thermal load
    - Heat retarding gloves
    - Special mask equipped with ventilating fun or connected to a central ventilation system
    - Portable torchlight RCD 15A

M01-EN.2.4.3 Risk Assessment in milling operations (Milling, Homogenisation, Storage) – Raw material and cement mills

(1) No.		Πηγή / Hazard (2) Specific Hazard Area	Hazard Description	(3) Person	(4) Harm	(5) Current safety measures
1	0		**Risk Assessment in milling operations – Raw material and cement mills**			
1	1	Airborne dust	Airborne dust in the milling area	Operators	Breathing problems	PPEs, Dust suction systems
1	2	Mechanical moving parts of mills	Contact with moving parts	Operators	Serious injury	Proper guarding, PPEs.
1	3	Falling material	During transportation there a risk from falling material	Operators	Serious injury	Proper guarding, PPEs.
1	4	Operators falling from height	Operatives falling from height by not using approved passageways	Operators , Maintenance Technicians	Serious injury , Death	Proper guarding, Safety signage PPEs.
1	5	Maintenance/ cleaning activity on operating machinery	Increased risk if carried out by unauthorised personnel	Operators , Maintenance Technicians	Serious injury , Death	Proper guarding, PPEs, Supervised work
1	6	Exposed to excessive noise levels	Exposed to excessive noise levels in the milling areas due to the crushing of material inside the mill and due to the operation of the homogenisation blowers	Operators , Maintenance Technicians	Gradual hearing impairment	Minimise noise at source or isolate noise. PPEs. Secure the doors of the homogenisation rooms
1	7	Work in confined spaces	Work in confined spaces during the repair of the mill inner walls or the replacement of the milling balls	Operators , Maintenance Technicians	Serious injury , Death	, PPEs, Supervised work
1	8	Back firing	Hot gases returning back due to insufficient respiration of the furnace	Operators , Maintenance Technicians	Serious injury from burns, Death	Use of an automatic fuel interruption system (fusible link)

M01-EN.2.4.4 Accident Prevention Check List

No.	Control Points	S/US	Observations
	Normal Operation		
1	Check the existence of collective protection measures such as barriers, guards or access doors and the machinery guards.		
2	Check the existence and adherence to operating procedures dictating the method of cleaning and unblocking.		
3	Make sure that no maintenance activity is carried out during operation		
4	Check the protection measures undertaken during the removal of material		
5	Check the existence and adequacy of safety signage and labelling,(eg restricted passageways, use of PPEs)		
6	Check if the use and maintenance of the approved PPEs		
7	Check the passageways used by all personnel. Check the proper labelling of each passageway		
8	Check the noise isolation of the homogenisation rooms by securing the doors		
	Mill maintenance		
9	Check the securing procedures before and after the maintenance of equipment including the guarding		
10	Check that all maintenance activity in the mills is carried out by Authorised technicians and that there is continuous supervision by a third person		
11	Check the internal condition of the mill prior to entry for absence of material and absence of thermal load		
12	Check the condition of the PPEs that must be used: Safety belt harness, Ventilation mask, Work ware, Safety shoes, Special helmet equipped with eye protector		
13	Check the access of the manholes – Positioning of the mill at stop		
14	Check the securing of the access door		
15	Check the proper use of the PPEs		

M01-EN.2.5 SILO CLEANING OPERATIONS – RAW MATERIAL AND CEMENT

M01-EN.2.5.1 Hazards

The internal cleaning of silos is high risk and relatively frequent operation in the cement industry and for this reason all necessary preventive measures must be taken. The cleaning of the silo takes place whenever there is a problem in the extraction of material due to the blocking of the outlets from solidified material. In addition this happens when there is a problem with the ventilators and a result there is insufficient ventilation or homogenisation of the material in the Blending Sib.

The main hazards are focused in the following:

- Work in confined spaces
- Falling of personnel from the working platform
- Falling of material
- Exposure to dust
- Use of lifting equipment

Preventive safety measures

For such a high risk operation there must be a responsible supervisor for the silo cleaning. He is responsible to ensure that the following steps are followed:

- Firstly he must notify the silo operatives about the impending cleaning and to make sure that the feeding of material to the silo is stopped. This is done by decommissioning the relevant electrical motors, closing the silo inlet valves and by placing blind flanges for additional safety.
- Before the start of any cleaning activity the silo must be inspected from above using light (RCD 15A) which is lowered gradually downwards in order to observe:
    - If there are conglomerated masses of material on the silo walls and at what height
    - The quantity and distribution of material
    - To identify whether the level of material is over or under the silo side door

- Afterwards the cleaning of the walls from above is carried out, using the Givonet system which is done with the use of connecting the necessary piping without having to enter the silo
- The next step is to open carefully the side door. The door and the area around the door is cleaned using a dust suction system (DISAB) and with the use of aluminium piping with the operatives staying out side the silo.
- Once the supervisor has inspected and made sure that he has seen the bottom of the silo near the door and that no material masses are hang from the silo walls, then he gives the necessary instructions to start the Filter funs.
- All personnel entering the silo must be equipped with the following:
    - Dust mask type P2 or P3 due to the small size of dust particles inside the silo

    - Safety shoes
    - Safety glasses
    - Helmet
    - Safety belt and harness connected to an appropriate rope leading outside of the silo. There must be at least two operatives outside the silo who in case of emergency will pool out the operative inside the silo. The supervisor is always nearby throughout the cleaning activity
- The cleaning of the silo is done either manually or using the suction system (DISAB). In both cases the cleaning is done peripherally in a downward spiral direction using the work platform
- The operator inside the silo must pay constant attention to the fact that he must step only on the clean bottom surface
- If the cleaning operation takes more than one day then it is the responsibility of the supervisor to inform daily the silo operators about the start and finish times.

M01-EN.2.5.2 Risk assessment – Cleaning of storage silos

(1) No.		Hazard (2) Specific Hazard Area	Hazard Description	(3) Person	(4) Harm	(5) Current safety measures
1	0		**Cleaning of storage silos**			
1	1	Falling of personnel	Falling of operatives during accessing the work area or when using the lifting platform	Operators/ cleaners	Serious injury, death	PPEs, Approved and tested lifting device (platform)
1	2	Work in confined spaces	Work in confined spaces inside the silo	Operators/ cleaners	Serious injury, death	PPEs,, Supervision
1	3	Airborne dust	Airborne dust inside the silo	Operators/ cleaners	Breathing problems	PPEs, Dust suction system
1	4	Falling of material	Falling of material during the cleaning of the silo walls	Operators/ cleaners	Serious injury	PPEs. Cleaning from top to bottom
1	5	Falling of material	Falling of material during the cleaning of the silo walls due to insufficient securing of the safety devices	Operators/ cleaners	Serious injury	PPEs, Approved and tested lifting device (platform)
1	6	Use of hand held work equipment	Use of hand held work equipment during the cleaning operation.	Operators/ cleaners	Serious injury	PPEs
1	7	Exposure to noise	Inside the silo due to the use of the work equipment	Operators/ cleaners	Gradual hearing impairment	PPEs

M01-EN.2.5.3 Accident Prevention Check List – Cleaning of storage silos

No.	Control Points	S/US	Observations
	Silo operation		
1	Check the existence of collective protection measures such as barriers, guards or access doors at the top of the silo.		
2	Check the existence and use of the operating instructions for accessing the silo		
3	Check condition of the staircase inside the silo		
4	Check the existence of the necessary safety signage for the use of PPEs and restriction for authorised personnel only		
	During cleaning inside the silo		
5	Check the condition and use of the manual work		

	equipment		
6	Check for the continuous supervision of work		
7	Check that the cleaning is done in downward spiral manner		
8	Check the accessing of the silo through the manholes		
9	Check the securing of the side manhole following the completion of cleaning		
10	Check the use of the PPEs. Check the condition of the PPEs (Safety belt, Ventilation mask, Safety work ware Safety shoes, Special helmet with eye protection		

M01-EN.2.6 THE CLINKER PRODUCTION PROCESS

The clinker production facility includes the rotating furnace the preheating cyclones the clinker cooler, the clinker filters and the work vehicles.

M01-EN.2.6.1 Hazards

The main hazards are focussed on the following

- Use of fuels Χρήση καυσίμων
- Contact with superheated material
- Exposure to heat
- Exposure to noise
- Fall from height
- Mechanical hazards

The hazards due to the maintenance activities inside the clinker furnace may involve:

- Taking down and repairing of the composite inner lining
- Taking down material that adhered to the inner walls

In such activities other additional hazards must be included such as:

- Falling of material
- Insufficient ventilation
- Working in a confined space
- Thermal load
- Saturation of space with dust
- Moving part of transport machinery
- Use of high pressure pumps

With regards to the hazards of the operation and maintenance of the filters please refer to chapter 2.7.

M01-EN.2.6.2 Risk assessment in clinker production

(1) No.		Hazard (2) Specific Hazard Area	Hazard Description	(3) Person	(4) Harm	(5) Current safety measures
1	0		**Clinker production**			
1	1	Falling of operatives	Falling of operatives during gaining access inside the furnace	Technicians	Serious injury, death	PPEs, Checked lifting devices
1	2	Work in confined spaces	Work in confined spaces inside the furnace and the preheater	Technicians	Serious injury, death	PPEs, Supervision
1	3	Airborne dust	Airborne dust inside the clinker furnace, the preheater and the cooler	Technicians	Breathing problems	PPEs, Dust suction system Ventilation system
1	4	Falling of material	Falling of material	Technicians	Serious injury	PPEs, Supervision
1	5	Falling of the inner lining	Falling of the inner lining	Technicians	Serious injury	PPEs, Supervision
1	5	Use of manual work equipment	Use of manual work equipment	Technicians	Serious injury	PPEs, Supervision
1	6	Exposure to noise	Exposure to noise in the furnace area	Operators Technicians	Gradual hearing impairment	PPEs
1	7	Use of high pressure equipment	Use of the high pressure water pump to clean the linings (WOMA)	Operators Technicians	Serious injury	Maintenance and check of the high pressure line. Use of PPEs
1	8	Exposure to thermal load	Exposure to thermal load in the clinker furnace area	Operators Technicians	Thermal stress	PPEs, Supervision

M01-EN.2.6.3 Accident Prevention Check List – Clinker production

No.	Control Points	S/US	Observations
	Operation		
1	Check the existence of collective protection measures such as barriers, guards or access doors for the inspection of the preheater, the kiln and the cooler		
2	Check the existence and use of operating procedures for gaining access to the preheater, the kiln and the cooler		
3	Check that all operators in the clinker production area use the appropriate PPEs		
	Maintenance		
4	Check that all maintenance activity in the preheater, the kiln and the cooler is properly planned in advance - Check the use of pre-maintenance inspection - Authorised technicians		
5	Check the access equipment prior to entry into the preheater, the kiln and the cooler		
6	Check the protective measures undertaken prior to entry		
7	Check the condition of the inside of the the preheater, the kiln and the cooler prior to entry: The existence of material, temperature inside		
8	Check the existence of the necessary safety signage		
9	Check the condition of the PPEs - Safety belt harness - Ventilation mask - Work ware - Safety shoes - Special helmet equipped with eye protector		
10	Check the adequacy and condition of the manual work equipment		
11	Check that the work inside the furnace is carried out under constant supervision		

M01-EN.2.7 THE FILTERING PLANT

In the cement industry there are 2 types of filters used for the collection of the dust produced: the electrostatic filters and the bag filters. The hazards associated with the normal operation as well as the maintenance of both types of filters, are very similar. In the following analysis the hazards for both are described and the peculiarities of each type are identified.

M01-EN.2.7.1 Hazards and protection measures during normal operation

During the normal operation the main hazards associated with filters are:

- Falling of material on operatives due to blockage of the transportation system
- Operatives falling from height
- Exposure to dust
- Asphyxiation of operatives when inside the filters
- Electrical hazards (for electrostatic filters)
- Explosion due to the existence of increased concentration of CO in the case of coal dust

The main protective measures are:

- Never remove all the necessary safety devises such as barriers, guards, security of access doors etc
- The use of authorised personnel
- Always to follow the operating procedure for securing the electrostatic filter
- To follow the special operating instructions given for a particular type of work
- To with the safety instruction available at the work place
- To use the appropriate PPEs assigned to each operative

M01-EN.2.7.1 Hazards and protection measures during Filter maintenance

During the maintenance activities inside of the filter the following additional risks must be added such as:

- Dusty environment
- Accumulated material
- Insufficient ventilation
- High temperature
- Staggering and falling of operators
- Static electricity (electrostatic filters)

The main preventive measures necessary include:

- The removal all the accumulated material from the filter prior to entry
- The cleaning of the filter in a well ventilated environment
- The adequate earthing of the electrostatic filter
- The interruption of the compressed air supply (bag filters)
- The isolation of the mechanical movement of the filter as well as the material transportation system
- The review the dust levels prior to entry into the filter
- Opening the side doors so that the filter is cooled prior to entry

- The presence of supervisors outside the filter side doors so that they can act in case of an emergency
- The use the appropriate PPEs.

M01-EN.2.7.3 Risk assessment in filtering operations

(1) No.		Hazard (2) Specific Hazard Area	Hazard Description	(3) Person	(4) Harm	(5) Current safety measures
1	1	-	-	-	-	-
1	1	Falling of material	Falling of material on operatives (may be hot)	Operatives	Serious injury	Guarding, Barriers, and other collective safety measures.
1	2	Falling of operatives from height	Falling of operatives from height during maintenance and operation	Operatives, Technicians	Serious injury	Guarding, Barriers, and other collective safety measures. Operating procedures
1	3	Exposure to dust	Exposure to dust during normal operation and maintenance	Operatives, Technicians	Serious injury	Adequate securing of the filters prior to any maintenance work. Use of PPEs.
1	4	Work in confined space	Work in confined space inside the electrostatic filters	Operatives, Technicians	Breathing problems asphyxiation	Adequate securing of the filters. Use of PPEs , authorised and trained personnel
1	5	Static electricity	Static electricity can be created if the filter is not earthed properly, can be a source of ignition	Operatives, Technicians	Serious injury	Adequate securing of the filters. Authorised and trained personnel

M01-EN.2.7.3 Accident Prevention Check List – Filter operation

No.	Control Points	S/US	Observations
1	Check the existence of collective protection measures such as barriers, guards or access doors and access passageways.		
3	Check the existence of operating instructions for accessing the filters		
3	Check that all maintenance activity in the filters area is properly planned in advance - Check the use of pre-maintenance inspection -Authorised technicians		
4	Check the appropriateness of the access equipment.		
	Maintenance activities		

5	Check the activities prior to entering the filters. Check of the filter condition Check the securing of the filters		
6	Check for the existence and adequacy of the safety signage		
7	Check the use of the PPEs Check the condition of the PPEs - Safety belt harness - Ventilation mask - Work ware - Safety shoes - Special helmet equipped with eye protector		
8	Check the condition of the work equipment		
9	Check that the maintenance activity is supervised		
10	Check that the filters are cleaned using the operating procedures and that the area is well ventilated and there is proper use of PPEs.		
11	Check that the access to the filter is done through the appropriate access doors		
12	Check the securing of the access doors following the maintenance activity		

M01-EN.2.8 LOADING AND DELIVERY OF PRODUCTS

The loading and delivery equipment used includes the bag filling machine, the palletiser, the packing material warehouse, the finished goods warehouse and the truck silo filling facility

The main hazards associated with this area are:

- Mechanical hazards associated with the moving parts of machinery
- The movement of heavy lorries and goods transporting equipment (fork lifts delivery lorries, silo trucks etc)
- Fire in the packing material area or the wooden pallets
- Falls from height either material or people
- The hurling of dust or coming into contact with hot material
- Manual handling of loads
- Exposure to noise

The basic preventive measures for the reduction of the reduction of the consequences from the above hazards are:

- That guards or other collective safety barriers should never be removed (barriers, access doors)
- The adherence to the special operating instructions

- The adherence to the limited access rules as well as the road safety signage
- The use of the appropriate PPEs provided

During maintenance activities the following hazards are added to the above list:

- Getting hit by compressed air or other hydraulic fluids
- Getting hit, crushed or trapped by machinery
- Dusty environment

The basic preventive measures for the reduction of these additional associated risks are:

- The adherence to the standard operating procedures for the securing of the machinery prior to any maintenance activity
- The adherence any additional special instructions provided
- The use all the necessary PPEs provided

M01-EN.2.8.2 Risk assessment Bagging and loading for delivery of goods

(1)		Hazard (2)		(3)	(4)	(5)
No.		Specific Hazard Area	Hazard Description	Person	Harm	Current safety measures
1	1	Bagging area				
1	1	Mechanical movement of machinery	The Mechanical movement of machinery can be a source of hazard particularly when the operatives work near the machine	Operators	Serious injury due to entrapment	Existence of the necessary guards, Safety labelling, Restricted access areas. Use of PPEs.
	2	Dusty environment	Dusty environment in the bagging area	Operators	Breathing problems	, Safety labelling, Restricted access areas. Use of PPEs.
1	3	Movement of heavy goods transportation vehicles	Movement of heavy goods transportation vehicles	Operators	Serious injury , death	Existence of the necessary guards, Safety labelling, Restricted access areas. Use of PPEs.
1	4	Maintenance of machinery	Getting hit by compressed area or hydraulic fluids	Technicians	Serious injury ,	Existence of the necessary guards, Safety labelling, Restricted access areas. Use of PPEs.
2	1	Loading area				
2	1	Fall form height	Fall form height of operatives or truck drivers working on trucks	Operators Truck drivers	Serious injury ,	Existence of the necessary guards, Safety labelling, Restricted access areas. Use of PPEs.
2	2	Falling of material form height	Hurling of material	Operators	Serious injury ,	Existence of the necessary guards, Safety labelling, Restricted access areas. Use of PPEs.
2	3	Movement of trucks and operatives	Movement of trucks and heavy material movement vehicles	Operators	Serious injury ,	Existence of the necessary guards, Safety labelling, Restricted access areas. Use of PPEs.
2	4	Exposure to dust	Dusty environment	Operators	Breathing problems	Existence of the necessary guards, Safety labelling, Restricted access areas. Use of PPEs.

M01-EN.2.8.3 Accident Prevention Check List – Loading for delivery of goods

No.	Control Points	S/US	Observations
	Operation		
1	Check the existence of collective protection measures such as barriers, guards or access doors.		
2	Check the current protection measures		
3	Check the existence and use of operating procedures for gaining access to the bagging area		
4	Check that all maintenance activity in the bagging area is properly planned in advance - Check the use of pre-maintenance inspection - Authorised technicians		
5	Check that the bagging equipment operates properly and that all moving parts are isolated or are far away from the operative		
6	Check that all work at height is done safely and that all safety measures are in place. (existence of the necessary safety measures)		
7	Check all the safety measures that are in place for the safe movement of operatives and goods transportation vehicles		
9	Check the existence of the appropriate safety signage		
10	Check that the appropriate PPEs are used by all personnel		
	Bagging equipment maintenance activities		
11	Check the condition of manual work equipment		
12	Check that there is continuous supervision during the maintenance activity		
13	Check that the machine securing procedures are followed		
14	Check that the appropriate PPEs are used		

M01-EN.2.9 FUEL STORAGE FACILITIES

During the production of cement, the drying of raw materials and the production of clinker there is a need to consume large quantities of fuel that can be solid (coal and pet coke), liquid (heavy fuel oil) or gas.

For combustion (fire) to take place there is a need for three conditions to coexist:

- Presence of fuel

- Presence of oxygen
- Presence of thermal energy (heat)

If any one of the above three conditions is absent then the combustion does not take place (stops or does not start)

The start up of an unwanted fire may be due to employees not adhering to the company's operating procedures, or due to the inappropriate maintenance of the fuel storage facilities.

The main hazards associated with the storage and use of fuel are:

- Explosion
- Fire
- Asphyxiation
- Creation of toxic waste (eg VOCs)

The basic sources of ignition are:

- The use of open flames near the storage areas
- The creation of hot spots during operation or maintenance of the tanks
- The self ignition of hot material
- The electrical discharge (thunderbolt, electrostatic charges, short circuits)

The basic preventive and protective measures for the reduction risks associated with the above are aimed towards the isolation or quick reduction of one of the three sources that create or cause the combustion namely the fuel quantity or oxygen or the presence of heat.

For this reason it is necessary:

- To adhere to the special safety operational instructions that specify that no smoking is allowed, nor the use of open flames near that fuel tanks and the distribution facilities
- To comply with the safety signage
- To make sure that the supply of electricity is switched off prior to any maintenance work.
- To make sure that the conditions for creating an explosive is removed prior to entering an empty tank or storage silo that previously contained fuel
- To routinely maintain all the storage facility's health and safety equipment such as high pressure relief valves, the control valves, the equipment for protection against atmospheric discharge, the earthing equipment, the fire fighting and/ or neutralisation as well as the pipe isolation valves.
- To always use the appropriate PPEs

All hot working activities near the tanks should not be carried out unless authorised using the documented operational procedures..

Use of Coal

During the use of coal the main hazards are due to:

- The fact that coal can easily self ignite when exposed to the air

- The explosive characteristics of coal dust
- The production of highly toxic CO as a result of slow and incomplete combustion

In order to manage the risks with the above hazards it is necessary to:

- Avoid the storage of coal in enclosed areas or silos for a long time
- Control the temperature as well as the CO concentrations
- Inspect the outdoor storage facilities
- Make sure that the coal transportation pipes are always earthed so that any excess charges do not create an explosive condition
- Maintain the fire fighting/ neutralisation equipment in good order

Use of Fuel oil

During the use of Fuel Oil the main hazard is its flash point combustion temperature (>65C) which is relatively low.

In order to manage the risks associated with the use of fuel oil it is essential to:

- Ensure that the storage tanks are properly earthed and are equipped with the necessary facilities for use against atmospheric discharge
- Avoid fuel leaks during maintenance or unloading and to remove any possible discharges
- Make sure that the fire fighting and neutralisation facilities are properly maintained and in good operating condition
- Avoid the direct contact of fuel oil with human skin

Use of fuel gas

During the use of Gas the main hazard is its very low combustion temperature as well as the fact that the gas is transported under pressure

In order to manage the risks associated with the use of gas it is necessary to:

- Routinely check the integrity of the gas distribution network and always follow the special safety instructions in case of maintenance on the electrical safety devices
- Make sure that all authorised personnel involved, know and operate the emergency gas cut-off/ shat-down procedures
- The storage tanks and distribution network are properly earthed and are equipped with the necessary facilities for use against atmospheric discharge

M01-EN.2.9.2 Risk Assessment at the Fuel Storage Facilities

(1) No.		Hazard (2) Specific Hazard Area	Hazard Description	(3) Person	(4) Harm	(5) Current safety measures
2	0	Fuel Storage		-	-	-
2	1	Use of open flame	Use of open flame can create accidental ignition	All personnel	Multiple deaths	Hot working operating instructions
2	2	Hot spots	Hot spots are created during the maintenance activities which can be a source of ignition	All personnel	Multiple deaths	Hot working operating instructions
2	3	Hurling of hot particles	Hurling of hot particles from an other fire source in the area	All personnel	Multiple deaths	Hot working operating instructions Emergency response plan in case of another fire source in the area
2	4	Electrical spark	Electrical spark during maintenance work on the coal dust piping system	All personnel	Multiple deaths	Authorisation procedures for working on the coal transportation system
2	5	High temperatures	High temperatures created within the coal storage stock piles	All personnel	Multiple deaths	Coal storage inspection procedures
2	6	Atmospheric discharge	Atmospheric discharge during unstable weather	All personnel	Multiple deaths	Maintenance and control procedures of the antidischarge facilities.

M01-EN.2.9.3 Accident Prevention Check List Fuel storage

No.	Control Points	S/US	Observations
	Fuel and Gas storage facilities		
1	Check the safety signage		
2	Check the current protection measures as well as the Emergency preparedness and response plans and evacuation procedures		
3	Check the existence of work instructions for work on and around the storage facilities		
4	Check the existence and use of maintenance planning procedures for work on the storage tanks.		

	- Inspection of work prior to execution - Authorised technicians		
5	Check the equipment for executing maintenance work in the fuel storage area		
6	Check the existence and use of written authorisation for carrying out maintenance in the storage facilities area		
7	Check the prevention measures prior to carrying out the work		
8	Check the cut-off of the electricity supply		
9	Check the condition and use of the appropriate PPEs		
10	Check the appropriateness and use of the manual work equipment		
11	Check the level of supervision of work		
12	Check the maintenance of the high pressure relief valves		
13	Check the condition of earthing facilities		
14	Check the condition of the facilities against atmospheric discharge		
15	Check the maintenance and condition of the fire fighting equipment		
16	Check the condition of automatic shat-of valves		
	Coal Storage		
17	Check the existence and use of documented instructions and criteria for the storage of coal in open spaces		
18	Check the adherence to instructions		
19	Check the condition of the coal transportation facilities		
20	Check the existence of records proving that the storage temperature is routinely checked		

M01-EN.2.10 ENVIRONMENT, WORK AREAS AND PASSAGEWAYS

The work areas must be constructed and adjusted according to the following parameters:

- The provision of adequate space for the activities carried out and the existence of entrances and exits
- The operational, ergonomic and safe positioning of work places and equipment
- The environmental conditions (Ventilation, air conditioning and light)
- The protection against physicochemical agents such as Noise, Dust, VOCs, toxic substances etc.

The safe keeping of the work place contributes greatly towards the prevention of accidents and work diseases

For this to be achieved there is a need to:

- Keep the passageways, floors and emergency exits free of any obstacles. To remove presently any material spilt on floors and escalators. If this is not possible the spillage area must be correctly labelled and protected.
- To remove and sharp corners or edges present either as a result of the building or the equipment and furniture.
- To close any permanent or temporary floor openings.
- To replace any barriers or guards when removed.
- To place the manual equipment and hand tools in safe place and out of the way.

In work areas where there is a risk of explosion or fire it is forbidden:

- To smoke or use of open flame
- To use tools and equipment that may create sparks or overheating

M01-EN.2.10.2 Accident Prevention Check List Environment, Work areas and Passageways

No.	Control Points	S/US	Observations
	Passageways		
1	Check safety signage. Existence and labelling of emergency exits		
2	Check that the passageways and corridors have no obstacles: - Work place floors - Passageway floors - Emergency exits		
3	Check the existence of cleaning instructions in case of spillage of slippery substances on the floors		
4	Check the existence of sharp or protruding edges in the work place		
5	Check the existence of floor openings and the existence of protection		
6	Check the adequacy of the stable barriers to protect openings: - Barriers - Guard plates		
7	Check the good housekeeping of the work place		
8	Check the work place layout. Safe positioning: - Work places - Equipment		
9	Check the following environmental		

	conditions for adequacy: - Ventilation (number of air changes per hour) - Air conditioning (Maximum and minimum work place temperature) - Lighting (Adequate lighting for the work being carried out)		
10	Check the protection measures against physiochemical factors: - Check the noise level (assessment of level) - Check the dust level (take dust measurements) - Check the VOCs levels - Check the existence of toxic substances in the work place		

M01-EN.2.11 LADDERS AND SCAFFOLDING

M01-EN.2.11.1.1 Hazards from the use of ladders

The common movable ladders must be made from strong material (equivalent to its use) with strong beams and non slippery steps. A ladder that is not functioning properly must be removed from use.

Another main hazard is the inherent instability of the ladder and for this reason the ladder must be stabilised appropriately or held down by personnel.

The ladders must be fit for use. The ladder must be at least 1 m higher than the work level.

The ladders must have the right inclination so that they are not too inclined or unstable. The inclination angle should be between 68^{o} to 75^{o}, or inclination 1 (base) to 4 (height).

The double movable ladders should be less than 5 meters high and should have a solid method of restrain so that they do not open beyond the accepted limit.

For ladders equipped with extensions the full length of which reaches a maximum length of 12 meters must be stabilised at the top and the operative on the ladder must be supervised by a colleague at the ladder base. The operatives using such types of ladder must be trained and authorised in their use.

For the safe use of ladders it is necessary to:

- Check the condition of the ladders as well as the presence and adequacy of the anti slip material on the steps. In case that the floor surface is unstable or uneven there is a need to take the necessary measures that the ladder legs are stabled.
- Climb up and down the ladder with the face facing the ladder moving slowly and steadily holding the ladder with both hands.
- Avoid moving the body on the sides in order to reach away from the ladder or step further than the third step from the top.
- Handle only light tools always properly on a special belt so that the hands are always free to move up and down.

- Always use the helmet either on the ladder or working near.
- Avoid moving the ladder with a person on it.
- Have a colleague at hand to help the movement of people and vehicles whenever he ladder has to be placed in a passageway.
- Avoid letting two operators on the same ladder.
- Never leave tools on the top step of a double ladder.
- Never use the ladder as a scaffolding piece.
- Never work on metal ladders when the distance between the top of the ladder and the electricity supply lines is less than 5 meters.

M01-EN.2.11.1.2 Scaffolding hazards

For the execution of work at a height of more than 2m the scaffolding is the best method for managing the risk of falling from height. The use scaffolding itself on the other hand has the following hazards:

- The assembly and taking down of the scaffolding must be carried out by competent people equipped with the necessary harness and under the direction of a supervisor and according to the assembly instructions of the scaffolding manufacturer. Prior to the assembly of the scaffolding all parts and equipment are thoroughly checked.
- For scaffolding of more than 10m high they must be made of metallic piping.
- The scaffolding must comply with the legal requirements relating to the structure, assembly, use, the stability characteristics, the strength, the adequacy of the levels and floors, the access to the levels etc.
- The floor levels should be at least 0.6m. There is also a need for a barrier of at least 1m height.
- Metallic scaffolding must be protected against atmospheric discharges by having earthing every 20m along the perimeter.
- The maximum scaffolding load must be known and documented.
- The stable tying up on the building effectively secures the scaffolding from horizontal or seismic movements. Additionally it must be made sure that the scaffolding base is situated on a stable ground.

When working on scaffolding it is necessary to:

- Carry the hand tools only in special toolboxes and belts
- Lift material using appropriate lifting devices
- Avoid throwing tools and materials from height but by using the appropriate containers.
- Avoid leaving unsecured planks
- Secure safely the floor planks
- Avoid blocking the passageways with material
- Move from one level to the other using the appropriate ladders

- Avoid running or jumping on the level floors
- Avoid overloading the floors beyond the approved loading limit

Safety measures for movable scaffolding

- Avoid going beyond the accepted height
- Make sure that the wheels are blocked when stationary and secure the structure from possible tripping or movement
- Do not overload the scaffolding with material since there is the possibility of moving the centre of gravity upwards with increased possibility of tripping
- Do not move the scaffolding while it is used by operatives or contains materials
- Climb up or down the scaffolding from the inside of the scaffolding only
- Avoid approaching naked or isolated electrical supply lines either during assembly or the movement of the scaffolding

M01-EN.2.11.2 Accident Prevention Check List – Use of Ladders and Scaffolding

No.	Control Points	S/US	Observations
	Movable ladders		
1	Check for the appropriate safety labelling		
2	Check the maintenance and condition of ladders. Use of anti slip steps.		
3	Check that if the ground is unstable all the necessary protection measures are applied at the foot of the ladder		
4	Check the proper use of the ladder: - Climb up and down the ladder with the face facing the ladder moving slowly and steadily holding the ladder with both hands. - Avoid moving the body on the sides in order to reach away from the ladder or step further than the third step from the top.		
5	Check the implementation of the appropriate work instructions: - Always use the helmet either on the ladder or working near. - Avoid moving the ladder with a person on it. - Use of an assistant to help the movement of people and vehicles whenever he ladder has to be placed in a passageway. - Avoid letting two operatives on the same ladder. - Never leave tools on the top step		

	of a double ladder. - Never use the ladder as a scaffolding piece. - Never work on metal ladders when the distance between the top of the ladder and the electricity supply lines is less than 5 meters		
	Scaffolding		
6	Check that the assembly of the scaffolding is carried out by competent people		
7	Check that prior to the assembly of the scaffolding all parts and equipment are thoroughly checked.		
8	Check that the scaffolding complies with the legal requirements relating to the structure, assembly, use, the stability characteristics, the strength, the adequacy of the levels and floors, the access to the levels etc		
9	Check that the floor levels are at least 0.6m and that the barrier is at least 1m high.		
10	Check that the metallic scaffolding is protected against atmospheric discharges by having earthing every 20m along the perimeter.		
11	Check that the maximum scaffolding load is known and documented.		
12	Check the stable tying up on the building to effectively secure the scaffolding from horizontal or seismic movements.		
13	Check that the scaffolding base is situated on a stable ground		
	Movable scaffolding		
14	Check that the scaffolding does not exceed the accepted height		
15	Check that the wheels are blocked when stationary and that the structure is secured from possible tripping or movement		
16	Check that the scaffolding is not loaded with material since there is the possibility of moving the centre of gravity upwards with increased possibility of tripping		
17	Check that the scaffolding is not moved while it is used by operatives or contains materials		
18	Check that that the climbing up or down the scaffolding is carried out from the inside of the scaffolding only		
19	Check that approaching naked or isolated		

	electrical supply lines either during assembly or the movement of the scaffolding is avoided.		

M01-EN.2.12 USE OF FORK LIFTS

Fork lifts are used in all cases when there is a need to move and lift up materials, finished goods and equipment.

Since the use of such vehicles is necessary there is a need for all personnel involved to be careful for proper use paying attention to both the driver as well as the employees working in the vicinity.

The use of fork lifts is associated with a number of accidents mainly due to the fact that there are hazards linked to their use.

M01-EN.2.12.1 Hazards from the use of Fork Lifts

The more frequently reported accidents linked to the use of fork lifts are:

- Tilting of the fork lift
- Tilting of the load
- Hitting of goods or people

The main reasons for the increased risk when using fork lifts are:

- Lack of basic training
- Insufficient maintenance
- Insufficient visibility
- Inappropriate load
- In appropriate positioning of the load on the forks
- Excessive speed and negligent road safety culture

The fork lift drivers have the direct responsibility for the safe use of the vehicle. It is also the responsibility of the maintenance personnel to assure the reliable and proper functioning of the vehicle

M01-EN.2.12.2 Accident Prevention Check List- Use of Fork lifts (FL)

No.	Control Points	S/US	Observations
1	Check the authorisation given to the FL driver by management.		
2	Check compliance of the preventive maintenance instructions both from the driver and the maintenance technician. Brakes Steering wheel Lifting devices Tire condition Alarm systems		
3	Check for existence and compliance to		

	documented work instructions		
4	Check the existence of the necessary safety devices		
5	Check the use of instructions for the safe parking of the FL - Inclined level - Forks down - Keys - Use of hand break		
6	Check the existence and use of the instructions for the safe use of the FL - Carrying of personnel - Appropriate forks - Securing of the load - Visibility - Forks down - Unknown load - Inappropriate pallets		
7	Check the existence of safety signage - Area used by FL - Area used by personnel		
8	Check the area used by FL - Sharp upwards or downwards inclination - Uneven floor		
9	Check the adherence to the safety instructions during the refilling of fuel		
10	Check the adherence to the safety instructions during the charging of the batteries		
11	Check the use of the appropriate PPEs by the FL driver		

M01-EN.2.13 USE OF WORK VEHICLES (WV)

M01-EN.2.13.1 Hazards from the use of work vehicles

Other work vehicles are vehicles that are used to carry out other support activities within the cement factory. Such vehicles are earth moving equipment, loading trucks, mechanised broom etc.

Hazards can be generated from the use of such vehicles due to bad visibility, lack of training, not adhering to policies and instructions.

As a result of the above a number of accidents may arise that may involve the hitting or stepping of personnel, hitting other vehicles, hitting the buildings or facilities or the tilting of the vehicle itself due to inclined surfaces.

M01-EN.2.13.2 Accident Prevention Check List- Use of Work Vehicles (WV)

No.	Control Points	S/US	Observations
1	Check the authorisation given to the WV driver by management		
2	Check compliance of the preventive maintenance instructions both from the driver and the maintenance technician. Brakes Steering wheel Lifting devices Tire condition Alarm systems		
3	Check for existence and compliance to documented work instructions		
4	Check the existence of the necessary safety devices on the WV		
5	Check the use of instructions for the safe parking of the WV - Inclined level - Forks down - Keys - Use of hand break		
6	Check the existence and use of the instructions for the safe use of the WV - Carrying of personnel - Securing of the load - Visibility - Unknown load		
7	Check the existence of safety signage - Area used by WV - Area used by personnel		
8	Check the area used by WV - Sharp upwards or downwards inclination - Uneven floor		
9	Check the adherence to the safety instructions during the refilling of fuel		
10	Check the adherence to the safety instructions during the charging of the batteries (If applicable)		
11	Check that there is a documented method of reporting and following up on breakdowns		
12	Check the use of the appropriate PPEs by the WV driver		

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M01-EN.2.14 METAL WELDING AND CUTTING OPERATIONS

M01-EN.2.14.1.1 Hazards in the Welding and Cutting Operations

The welding and cutting operations entail hazards such as:

- Hurling of hot particles
- Burns and fires
- Explosion
- Electrocution
- Exposure to hot and radiating sources
- Smoke and dangerous gases

In such activities the main protection and prevention measures are:

- The personnel undertaking these activities must have the necessary competence and authorisation
- The welding work areas must be isolated with the use of appropriate barriers so that glaring and hurling of hot particles to other areas is eliminated
- When welding is carried out at higher levels all the necessary measures must be undertaken so that other operatives working below are protected from hot particles. It is the responsibility of the welder to implement such protection.
- Remove all flammable material and waste material. If this is not possible then protective barriers must be used.
- During the welding or cutting operation there must be a fire extinguisher at hand and the operative must be competent in their use.
- Make sure that in case where welding is carried out indoors then a smoke suction system must be used appropriately placed.
- Prior to leaving the welding area the operative must check if as a result of the operation a hot spot has been created.
- Superheated welded areas must be protected so that they do not accidentally come in contact with skin.
- Welding cannot take place in areas where there is storage of flammable liquids such as petrol and paint.
- Always use the appropriate PPEs provided

M01-EN.2.14.1.2 Hazards from the use of Oxygen – Acetylene in welding and cutting operations

A. General care of the cylinders

The operatives must make sure that:

- Oxygen or acetylene cylinders are handled with care whether full or empty and should not be thrown down, rolled or hit. Prior to their transportation valve caps must be used.

- The cylinders are placed in a special cylinder trolley in the upright position and tight up using chains or other strong means. The cylinders should not be transported with any other means other than the trolley provided. The use of magnetic lifting devices must be avoided
- The flexible piping is not pulled or bent violently and should be placed away from passageways and protected from damage from overstepping, hurled particles, hot surfaces or sharp edges.
- The stability means provided are used so that accidental displacement is avoided
- Following the use of the welding cylinders these are not be left unattended but placed in a predefined and safe area and not in the area of the rotary kiln.
- The cylinders are labelled according to an international labelling system. If the cylinders provided do not conform to the labelling these should be removed and returned to the supplier. It is forbidden to write on the cylinders.
- The oxygen cylinders are stored separately from the other cylinders. Also empty and full cylinders are stored separately. During storage the cylinders are safely secured in order to avoid their displacement and fall. They are not exposed to the sun or other sources of heat.
- Smoking and the use of open flames in the cylinders storage area is strictly prohibited. The area must be well ventilated.
- Prior to using the welding equipment this is checked thoroughly namely the valve, the piping and the burner. All piping must be equipped with a non return valve. The piping connections must be checked on a daily basis.
- On a routine basis the piping is checked for possible leaks using soap solution.
- No valve part is greased.
- Valves are operated using the appropriate tools provided.

B Use of cylinders

The operatives must make sure that:

- The cylinders are always held upright and at a safe distance from the work area in a position that in case of emergency the operative can have unobstructed and quick access to the cut off valves.
- The burner is lit using a steady flame or a lighter without delaying especially indoors.
- The burner is cut off during momentary breaks in operation either to clean the burner or any other reason. The flame can be on only for short durations.
- The burner is placed in a predetermined position so that it does not come accidentally into contact with the piping the cylinders or other operatives.
- In case the burner catches fire the valves must be cut off readily. For this reason the appropriate key must be on the valve at all times.
- The flame is cut off by cutting the acetylene valve first and then the oxygen valve.
- At the end of the cylinders use the valves are cut off and the remaining gas in the piping should be let out.

- In case of cylinders overheating or ignition the emergency procedures are followed.
- The approved pressure settings are always used
- During the assembly of the piping to the cylinders and the burner the pipe colours are not confused

M01.EN.2.14.1.3 Arc welding operations

The welding and cutting operations can be a source of hazards such as:

- Hurling of hot particles
- Burns and fires
- Explosion
- Electrocution
- Exposure to hot and radiating sources
- Smoke and dangerous gases

The additional protection measures during arc welding operations are:

- The use of the protective arc welding mask provided to protect the eyes from the flash as well from ultra-violet rays. The cover should be able to protect the operative's neck and face.
- The electrical connections as well as their condition on the welding machine should be checked on a daily basis. Additionally the condition of the electrodes and the welding pliers must be checked routinely
- The pliers that provide the contact should be connected on the body to be welded near the welding area.
- When welding on trucks with rubber wheels the truck should be earthed and extra care should be taken due to the existence of fuel and lubricants.
- The welding machine electricity supply lead should be protected from chemicals, mechanical trapping or water on the ground.
- During the arc welding operation the appropriate PPEs should be used that must include welding gloves, apron, shin protectors and safety shoes.

M01-EN.2.14.2 Accident Prevention Check List – Welding and metal cutting operations

No.	Control Points	S/US	Observations
1	Check that the personnel undertaking these activities have the necessary competence and authorisation		
2	Check that the welding work areas are isolated with the use of appropriate barriers so that glaring and hurling of hot particles to other areas is eliminated		
3	Check that when welding is carried out at		

	higher levels (overhead) all the necessary measures are undertaken so that other operatives working below are protected from hot particles. It is the responsibility of the welder to implement such protection.		
3	Check the existence and compliance with the welding operating instructions		
4	Check the good housekeeping of the work area. Check that all flammable material and waste material is removed. If this is not possible then protective barriers must be used.		
5	Check that during the welding or cutting operation there is a fire extinguisher at hand and the operative is competent in their use		
6	Check that the appropriate PPEs are used. Welder must know the eye protection measures to be used for each type of welding technique used.		
7	Check that in case where welding is carried out indoors a smoke suction system is used appropriately placed		
8	Check that prior to leaving the welding area the operative checks if as a result of the operation a hot spot has been created		
9	Check that the superheated welded areas are protected so that they do not accidentally come in contact with skin		
10	Check that no welding takes place in areas where there is storage of flammable liquids such as petrol and paint		
	Transportation and use of cylinders		
11	Check that oxygen or acetylene cylinders are handled with care whether full or empty so that: - They are not thrown down, rolled or hit. - Prior to their transportation valve caps are used - The cylinders are placed in a special cylinder trolley in the upright position and tight up using chains or other strong means. - The cylinders are not transported with any other means other than the trolley provided. - The use of magnetic lifting devices are avoided		
12	Check flexible piping so that:		

	- The flexible piping is not pulled or bent violently - It is placed away from passageways and protected from damage from overstepping, hurled particles, hot surfaces or sharp edges - The stability means provided are used so that accidental displacement is avoided		
13	Check that cylinder are stored so that: - Following the use of the welding cylinders they are not left unattended but placed in a predefined and safe area and not in the area of the rotary kiln.		
14	Check so that: - The cylinders are labelled according to an international labelling system. - If the cylinders provided do not conform to the labelling these are removed and returned to the supplier.		
15	Check so that: - The oxygen cylinders are stored separately from the other cylinders. - Empty and full cylinders are stored separately. - During storage, the cylinders are safely secured in order to avoid their displacement and fall. - They are not exposed to the sun or other sources of heat. - Smoking and the use of open flames in the cylinders storage area is strictly prohibited. - The area is well ventilated		
	Pre – welding check		
16	Check that prior to using the welding equipment: - This is thoroughly checked, namely the valve, the piping and the burner. - All piping is equipped with a non return valve. - The piping connections are checked on a daily basis		
17	Check on a routine basis the piping for		

	possible leaks using soap solution		
18	Check that it is forbidden to grease any valve part and that the valves are operated using the appropriate tools provided		
	Use of cylinders		
19	Check that the cylinders are always - held upright and - At a safe distance from the work area in a position that in case of emergency the operative can have unobstructed and quick access to the cut off valves.		
20	Check that the operating instructions regarding the following items are followed: - Burner ignition - Gas cut-off - Positioning of a lit burner - At the end of the cylinders use the valves are cut off and the remaining gas in the piping is let out.		
21	Check so that during the assembly of the piping to the cylinders and the burner the pipe colours are not confused		
	Arc welding operation		
22	Check that: - During the arc welding operation the appropriate PPEs are used that must include welding gloves, apron, shin protectors and safety shoes.		
23	Check: - The electrical connections as well as their condition on the welding machine is checked on a daily basis. - Additionally the condition of the electrodes and the welding pliers is checked routinely		
24	Check: - The pliers that provide the contact should be connected on the body to be welded near the welding area.		
25	Check: - When welding on trucks with rubber wheels the truck should be earthed and extra care should be taken due to the existence of fuel		

	and lubricants.		
26	Check: - The welding machine electricity supply lead are protected from chemicals, mechanical trapping or water on the ground.		

M01-EN.2.15 USE OF MANUAL HAND TOOLS

M01-EN.2.15.1.1 Hazards from the use of manual hand tools

The moving parts of manual hand tools must be guarded or equipped with safety devices in case they are hazardous.

The safety devices should never be removed unless required for their maintenance.

In such cases all necessary measures must be taken so that the risk of accident is reduced.

All guards or other safety devices must be replaced as soon as maintenance intervention has been carried out.

The general protection measures are:

- To never operate a manual hand tool if the worker is not competent in its use or authorised to do so.
- To always make sure that the hand tools are appropriate for the intended use and are correctly applied
- To never interfere with the hand tools' electrical wiring unless you are competent to do so.
- To always plan your activities before using a hand tool
- To never touch its moving parts or try to stop it using your hands
- Never were loose or unbuttoned work wear or hanging sleeves, rings or ties because there is a serious risk of trapping. For the same reason any long hair must be contained within a hat
- To never approach any machine parts or the cutting area without the use of appropriate PPEs.
- To never leave the manual hand tool unattended and in operation
- To secure the hand tool before its cleaning or maintenance
- To never clean the work benches by using o compressed air, or by blowing, or by using bare hands. Use the appropriate brooms and spades provided. The grinding pieces may cause an accident
- To never talk to the operator during the use of hand tools
- To always use the appropriate PPEs for each type of operation

M01-EN.2.15.1.2 Hazards from the use of hand tools with electrical supply

The basic hazards are:

- Coming into contact with electricity
- Coming into contact with its moving parts
- The use of inappropriate parts and consumables
- The hurled particles, parts or machined parts

During the use of electrical hand tools such as drills and grinding wheels it is necessary to always check the environmental conditions such as:

- The working voltage and well as the supply sockets. The supply must correspond to the one labelled on the tool itself
- If the work area is wet or there is possibility of the tool coming into contact with metallic masses the voltage should not be more than 50V. Portable light must carry an appropriate RCD 15A
- Hand tools with double insulation must be preferred since they are safer
- Hand tools with power greater or equal to 1000W must be connected on the supply using a socket equipped with an RCD safety device
- The area must be appropriately lit and the passageways must be protected

For the safe use of portable electrical tools by the workers it is necessary to:

- Always place and remove the socket while the supply switch is off
- Always make sure that the socket is appropriate for use and that the earth leads are properly connected
- Never use equipment for which the electrical characteristics are not known or they do not carry a label form the manufacturer
- Make sure that all moving or hazardous parts are equipped with the necessary guards
- Be aware about where the supply lead is placed. It should not be placed on hot surfaces or sharp edges.
- Always check the integrity of the electrical connections when supply leads are extended. Always use sockets equipped with RCDs
- Always grab the tools from the handle in order to avoid accidental start-up of the tool
- Never lay down the supply leads since there is an increased risk of trips and falls
- Always use the appropriate PPEs
- In case the hand tool is not operating properly then it must be submitted for repair to the competent technicians rather than attempt to repair it yourself

M01-EN.2.15.1.3 Hazards from the use of hand tools driven using compressed air

The main hazards are created from:

- The use of compressed air
- The use of flexible piping
- The hurling of particles and cut parts during operation

For the safe use of hand tools driven using compressed air it is necessary to:

- Make sure that all moving parts are equipped with the necessary guards and other safety devices
- Check the integrity of the flexible hoses, the pressure level as well as the connections to be safe and dry
- Make sure that the piping does not impose an increased risk to the others
- Never bend the pipes in order to stop the flow of air or use the pipes as a puling rope to pull the tools
- Always use the supply valve whenever there is a need for die change or at the end of the
- Always remove the air from the supply line at the end of operation
- Always use the appropriate PPEs

M01-EN.2.15.2 Accident Prevention Check List – Use of Manual Tools

No.	Control Points	S/US	Observations
	Manual hand tools		
1	Check the existence of safety labelling on the tool		
2	Check that the moving parts are adequately guarded Check the existence of CE marking		
3	Check that all other safety measures are in place		
4	Check that the technician is trained and authorised to use the particular tool		
5	Check the existence and use of appropriate work instructions		
6	Check that the work space is tidy. Check the level of housekeeping		
7	Check that the necessary fire fighting measures are at hand and that the operative is trained in their use.		
8	Check that the operative uses the PPEs provided and that his work ware is not loose with the possibility of entanglement in the tool. Check that the operative is aware of the use of appropriate PPEs for each type of work.		
	Manual hand tools with electrical supply		
9	Check that the appropriate work instructions are followed with respect to		

	working in the open: - Appropriate voltage - Wet work area - Portable lights - Method of connection to supply source - Protection measures for passers by		
10	Check that the manufacturers instructions are followed. Check for CE Marking labelling		
11	Check the adequacy of the electrical connections		
12	Check the condition of the electrical connections		
13	Check the work area housekeeping paying particular attention to the supply lead.		
14	Check the use of appropriate PPEs		
	Hand tools driven using compressed air		
15	Check the existence of appropriate safety labelling on the tools		
16	Check that the moving parts are adequately guarded Check the existence of CE marking		
17	Check that all other safety measures ate in place		
18	Check the work area housekeeping paying particular attention to the flexible air supply hoses		
19	Check the use of appropriate PPEs		

M01-EN.2.16 LIFTING MACHINES AND EQUIPMENT

The usual lifting machines, devices and equipment used in the cement industry are cranes, elevators/ lifts, hoists, the crane bridge and hydraulic jacks.

Due to the nature of operation of these machines any misuse, failure to comply with instructions, any lack of planning or coordination, careless action, inappropriate stand or positioning of body, insufficient maintenance etc, can be serious sources of hazards in the work place.

M01-EN.2.16.1.1 General hazards in the use of Lifting equipment

The main sources of hazards from the use of lifting equipment are:

- Crashing of the load or the lifting mechanism onto employees or operators within the working range of the lifting equipment
- Fall of the load to be lifted due to the failure of the lifting gear
- Fall of the load to be lifted due to insufficient or inappropriate securing of the load
- Tilting of the load during its transportation

- Crashing of the load on the building and as a result the tilting, release and crushing down of the load
- Electrocution as a result of lifting mechanism contacting overhead electricity supply lines

In general for the safe use of lifting equipment it is necessary:

- To allow their operation only by authorised and trained personnel having all necessary licenses
- To make sure that the operators comply with the necessary work instructions
- To make sure their safe operation and in particular the stopping mechanism, the breaks and the lifting lines
- To check on a routine basis the hook mechanism
- To always secure the load using the approved straps
- To always lift the load slowly upwards for several cm in order to make sure that the load is balanced and stable prior to its lifting
- To always avoid the lifting of loads overhead from working personnel. For this reason the lifting equipment must be equipped with a warning sound signal so that all persons are withdrawn from the area under the load.

M01-EN.2.16.2 Accident Prevention Check List – Use of Lifting equipment

No.	Control Points	S/US	Observations
	General protective measures		
1	Check the existence of the necessary safety labelling on the lifting equipment		
2	Check that the moving parts of the lifting device is appropriately guarded Check the existence of a valid CE Marking certificate, including the lifting gear		
3	Check that all protective measures are in place		
4	Check that the lifting equipment operator is trained and authorised to use the equipment		
5	Check the existence and use of the work instructions for the particular lifting equipment		
6	Check the level of maintenance and the existence of operational integrity certificates or certificates of test for: - Transmission system - Breaking and isolation - Lifting lines - Load limiting device - Hook		
7	Check that the loads are properly secured prior to lifting		
8	Check that the loads are properly lifted (slow upward movement, slow side ways movement with no operatives underneath)		

9	Check that above the lifting area there are no electricity supply lines		
	Use of hoists		
10	Check the use of safety operating instructions: - Gradual tensioning of load - Gradual unwinding of rope from pulley - Appropriate connection (tying up) to the load		
11	Check the integrity of the hook		
12	Check the use of suppliers instructions Check the existence of a valid CE Marking certificate and labelling		
13	Always be aware of the load you are lifting and assess the lifting capabilities of the hoist and the lifting gear		
14	**Use of lifts and elevators**		
15	Check the existence of the necessary safety labelling on the lifting equipment		
16	Check that the moving parts of the lifting device is appropriately guarded Check the existence of a valid CE Marking certificate , including the lifting gear		
17	Always be aware of the load you are lifting and assess the lifting capabilities of the hoist and the lifting gear		
18	Check that the loads are properly secured prior to lifting		
19	Check the use of safety operating instructions		
	Use of crane bridge		
20	Check the existence of the necessary safety labelling in the crane bridge area		
21	Check the rout of the load to be moved		
22	Check the existence of other organisational arrangements prior to moving the load		
23	Always be aware of the load you are lifting and assess the lifting capabilities of the hoist and the lifting gear. The operator responsible should know at all times		
24	Check the existence and use of the suppliers operation and maintenance instructions Check the existence of a valid CE Marking certificate		
25	Check that the all operators make use of the appropriate PPEs		

*Lifting equipment at the cement silo***M01_02_02.jpg**

01.03. RISK ASSESSMENT IN THE CEMENT INDUSTRY – GENERAL INFORMATION

01.03.1 SUMMARY OF MAJOR HAZARDS PER AREA OF OPERATION

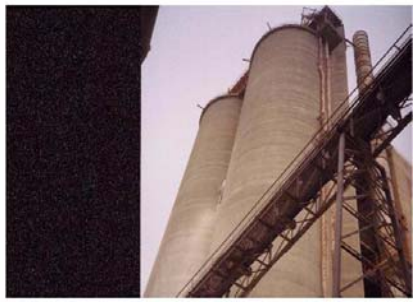
AREA OF ACTIVITY	NOISE	ENV. COND.	DUST	ELECTRICITY	MECHANICAL HAZARDS	FALLING MATERIAL	MOVEMENT OF TRUCKS
QUARRYING	X	X	X			X	X
CRUSHING	X		X	X	X	X	X
STORAGE AND MATERIAL MOVEMENT			X		X	X	
GRINDING AND MILLING	X	X	X	X	X		X
SILO CLEAN.		X	X	X	X	X	
CLINKER PRODUCTION	X	X	X	X	X	X	
FILTERING PROCESS	X	X	X	X	X	X	
LOADING AND DELIVERY	X		X		X	X	X
FUEL STORAGE		X	X				X

01.03.2 DESCRIPTION OF THE MAIN HAZARDS AND THE CORRESPONDING PREVENTION MEASURES

AREA	**HAZARDS**	**PREVENTION MEASURES**	**VISUAL APPRECIATION**
QUARRYING	Drilling • Fall from height • Hurling of material Movement of heavy goods vehicles • The collapse of a floor level • Mechanical movement of the drill • Exposure to noise and dust Charging and ignition • Inappropriate use of explosives • Fall from height • The collapse of a floor level • Hurling of material • Exposure to noise and dust and vibration • Movement of heavy goods vehicles	• The moving parts of the bore holing machinery • Falls from height • Material falling from height • Crushing of quarry table • Hurling of material • Presence of dust and noise • Movement of earth moving equipment • Job safety analysis and work permit • Isolation of the charging and ignition area • Use of minimum explosives • Authorised person in charge • Pre-approved explosion plan • Safety signage • Safety warnings • No smoking	 

CRUSHER AREA	Loading/ Unloading • Track movement (reversing) • Load displacement • Reversing into hopper • Falling rocks during unloading • Absence of reversing barrier Crusher Operation • Stacking of hopper • Accidental start up of crusher • Hazards during unplanned maintenance • Electrical hazards • Work inside the crusher control room	• Uniformly distributed load • Worker movement segregation areas • Existence of safety signage • Implementation of approved codes of practice • Install proper guards and barriers • Guards to isolate mechanical hazards • Maintenance by approved technicians under supervision • Work inside the hopper only under supervision • Concrete walls for the control room	
RAW MATERIAL STORAGE	• Airborne dust	• Use of the stacker and reclaimer system to collect dust • Routine cleaning of the area • Good housekeeping	

RAW MATERIAL MILLS, HOMOGENISATION AND RAW MATERIAL STORAGE	• Back firing of the furnace • Noise • Dust • Absence of protective barrier • Absence of guards • Electrocution • Hot material	• Use of fuel safety device (fusible link) • Use of a tag in / tag out system during maintenance • Use of a closed circuit surveillance system • Use of a dust suction system (Disab)	
THE CLINKER PRODUCTION PROCESS PREHEATING OF MATERIAL	• High temperatures • Superheated material particles	• Use of a safe system of work – no accidental operation (tag in/ tag out procedures)	
KILN OPERATION	• Back firing of burner • Working near hot surfaces • Working in a hot environment	• Use of a closed circuit surveillance system • Use of a safe system of work – no accidental operation (tag in/ tag out procedures)	

COOLING SYSTEM	• Dusty environment • Accidental hurling of hot material • Use of a high pressure pump to clean the area	• Use of authorised personnel • Use of a dust suction system (Disab) • Use of a safe system of work – no accidental operation (tag in/ tag out procedures)	
CEMENT AND RAW MATERIAL STORAGE SILO CLEANING	• Noise during the cleaning operation • Falling material from the silo walls • Dusty environment • Operator getting overcome by material at the base of the silo	• Use of dust suction system • Floor preparation • Use of safety signage • Use of tag in/ tag out procedures • Use of blind flanges • Continual supervision • Provision of adequate lighting • Provision of sufficient ventilation using bag filters	

			
PACKAGING	• Dusty environment • Falling material • Moving parts of packaging machinery • Movement of heavy trucks • Existence of third parties (truck drivers) in the area	• Use of a dust suction system • Use of appropriate PPEs • Training of personnel • Adequate machine guarding • Use of safety signage	
LOADING AND UNLOADING	• Overhead loads • Use of lifting equipment • Falling of loads • Dusty environment	• Use of authorised personnel • Provision of appropriate maintenance to the lifting equipment • Use of load limiting devices • Routine cleaning of the area	

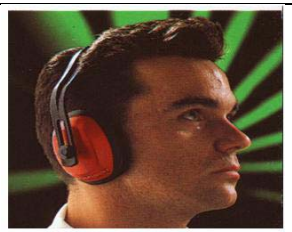
MAINTENANCE DEPARTMENT	• Toxic fumes from welding operations • Insufficient tag in/ tag out procedures during maintenance • Manual handling causing Musculoskeletal problems • High temperatures • Electricity • Use of hand tools • Bad housekeeping	• Use of a fumes suction system • Trained personnel • Use of hoists • Use of approved and maintained metering devices • RCD 's 30 mA • Routine cleaning – goog housekeeping practices • Use of approved and well maintained hand tools USE	
FUEL STORAGE	• Use of naked flames near fuel storage • The creation of hot spots during maintenance activities • The hurling of hot material in the fuel area • Electrical discharges (Thunderbolt, electrostatic charges during refuelling , short circuits)	• Existence of a work permit system for working near the fuel storage • Maintenance and control of the anti-discharge system	

USE OF ALTERNATIVE FUELS	• Biological hazards from the use of bone meal, used rubber tyres, olive seats, RDF and other solid waste	• Routine cleaning of the area • Use of appropriate PPEs	
WORK ENVIRONMENT, WORK AREAS AND PASSAGEWAYS	• Absence of safety signage • Obstructions in the passageways • Inadequate environmental conditions • Insufficient protection from physiochemical factors	• Use of appropriate safety signage indicating the passageways and emergency exits • Good house keeping of the area • Assessment of the environmental conditions and provision of adequate protection	
USE OF WORK VEHICLES (FORK LIFTS, LOADERS UNLOADERS, Disab,)	• Insufficient training • Insufficient maintenance • Inappropriate securing of the load • Speeding • Insufficient visibility	• Authorisation and training of personnel • Routine maintenance of the work vehicles • Provision of work instructions • Labelling of the vehicle movement area	

LIFTING EQUIPMENT	• Crush of the load or the lifting mechanism onto operatives • Fall of the load to be lifted due to the failure of the lifting gear • Insufficient or inappropriate securing of the load • Tilting of the load during its transportation • Crashing of the load on the building • Electrocution as a result of lifting mechanism contacting o/h lines	• Use of authorised and trained personnel • Existence and compliance with work instructions • Safe operation of the stopping mechanism, the breaks and the lifting lines • Check on a routine basis the hook mechanism • Always secure the load using the approved straps • Always avoid the lifting of loads overhead from working operatives.	

01.03.3 SUMMARY OF USE OF PERSONAL PROTECTIVE EQUIPMENT (PPE) PER AREA

AREA	**SOURCE**	**PPE**
QUARRING	**DUST**	P1 MASK, GOGGLES, UNIFORMS   
	NOISE	EAR PROTECTORS > 80db

		
	FALLING MATERIAL	HELMET, SAFETY BOOTS  
CRUSHING, STORAGE OF MATERIAL	DUST	P1 MASK, GOGGLES, UNIFORMS
	FALLING MATERIAL	HELMET, SAFETY BOOTS
	NOISE	EAR PROTECTORS > 80db
	LIGHT	PORTABLE LIGHT 24v

AREA	**SOURCE**	**PPE**
MILLING AREA	DUST	P1 MASK, GOGGLES, UNIFORMS
	FALLING MATERIAL	HELMET, SAFETY BOOTS
	NOISE	EAR PROTECTORS > 80db
	LIGHT	PORTABLE LIGHT 24v
	HOT MATERIAL	HEAT RESISTING GLOVES
CLINKER PRODUCTION	HOT ENVIRONMENT	• HEAT RESISTING OVERALLS 600°C • MASKS FOR PROTECTION AGAINST ULTRAVIOLET RADIATION • HEAT RESISTING GLOVES
	FALLING MATERIAL	HELMET, SAFETY BOOTS
CEMENT MILLS	DUST	P1 MASK, GOGGLES, UNIFORMS
	FALLING MATERIAL	HELMET, SAFETY BOOTS
	NOISE	EAR PROTECTORS > 80db
	LIGHT	PORTABLE LIGHT 24v
	HOT MATERIAL	HEAT RESISTING GLOVES
AREA	**SOURCE**	**PPE**

PACKING AND PREPARATION FOR DELIVERY	DUST	P1 MASK, GOGGLES, UNIFORMS
	FALLING MATERIAL	HELMET, SAFETY BOOTS
	NOISE	EAR PROTECTORS > 80db
	LIGHT	PORTABLE LIGHT 24v
MAINTENANCE	ELECTROCUTION	ΓANTIA 11.000 V
	FALLING MATERIAL	HELMET, SAFETY BOOTS
	DUST	P1 MASK, GOGGLES, UNIFORMS
	HIGH TEMPERATURE	HEAT PROTECTION GLOVES 300 **°C**
	WELDING	WELDING MASK, WELDING APRON

01.04. ASSESSMENT TEST

USE OF THE GRAPHICAL METHOD

1. THROUGH THE USE OF REAL EXAMPLES IN THE FORM OF ACTUAL PHOTOGRAPHS THE PARTICIPANTS IDENTIFY THE HAZARDS

2. RISK ASSESSMENT OF THE IDENTIFIED HAZARDS USING THE RISK ASSESSMENT TABLES PROVIDED

01.04.1 TEST 1- RISK ASSESSMENT USING THE GRAPHICAL METHOD (PICTURE OF A WORK AREA)

IDENTIFYING THE HAZARDS

IDENTIFICATION OF HAZARDS

WORK AREA WITHOUT BARRIER

ABSENCE OF GUARD

ELECTRICAL HAZARD

INAPPROPRIATE PPE

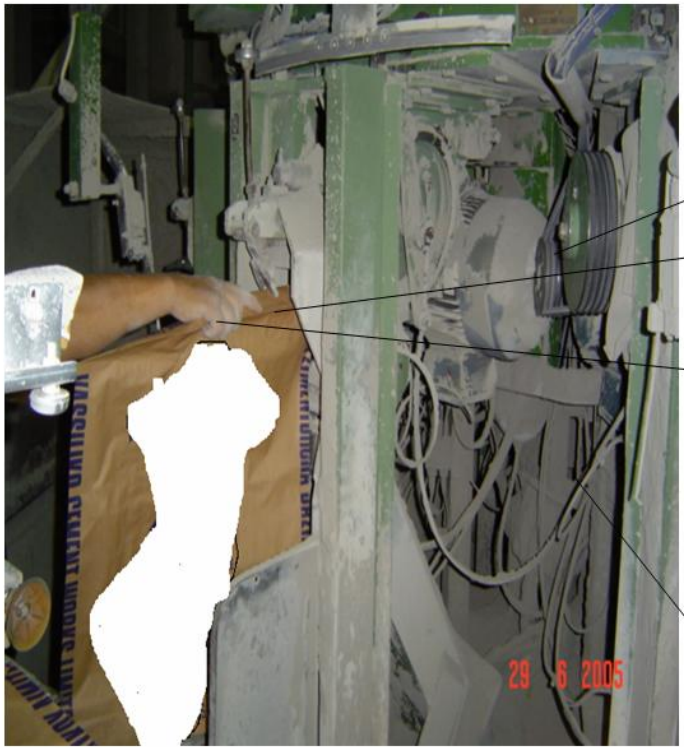
WORKING NEAR MACHINERY

INSUFFICIENT MAINTENANCE

BAD HOUSEKEEPING

01.04.2 TEST 2- RISK ASSESSMENT USING THE GRAPHICAL METHOD (PICTURE OF A WORK AREA)

IDENTIFYING THE HAZARDS



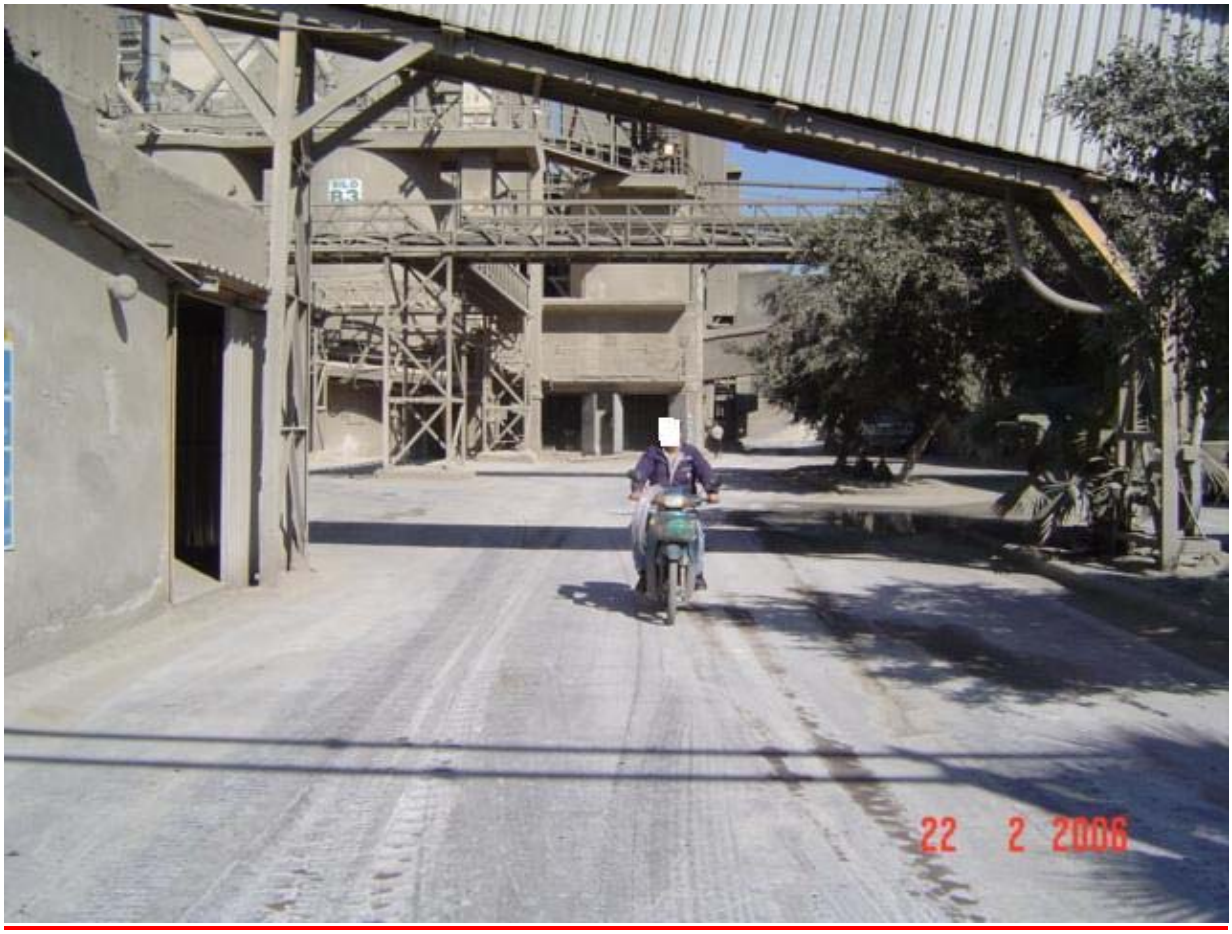
UNGUARDED ROTATING MECHANISM

HAND TOO CLOSE TO MOVING PART

NO USE OF PROTECTIVE GLOVE

BAD HOUSEKEEPING OF WIRING AND CABLING

01.04.3 TEST 3- RISK ASSESSMENT USING THE GRAPHICAL METHOD (PICTURE OF A WORK AREA)



IDENTIFYING THE HAZARDS

- NOT WEARING THE APPROPRIATE PPE: HELMET AND MASK
- TRANSPORTING A HOSE PIPE ON THE MOTORCYCLE
- TRAVELLING IN THE MIDDLE OF A ROAD ALSO USED BY HEAVY GOODS VEHICLES