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HEALTH AND SAFETY DIRECTIONS

ACTIVITIES INTO CONFINED SPACES

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PURPOSE

This Operating Procedure applies to those who perform inspections in areas suspected of pollution or confined. This procedure applies to the work environments of suspected pollution of Articles 66 and 121 of Legislative Decree 9 April 2008, n. 81, and in confined environments in Annex IV, paragraph 3, of the same decree.

In agreement as defined in the Presidential Decree 177/2011 any work in the area of suspected pollution or confined environments can only be done by companies or self-employed qualified and that meet certain requirements relating to risk assessment, and qualifications and training of personnel, operational procedures and management measures emergencies.

The provisions of this procedure shall also apply in respect of companies or self-employed persons to whom the work will be subcontracted.

POSSIBLE RISK'S FACTORS IN CONFINED SPACES

| Risk's factor | Possible Causes |
|---|--|
| ASPHYXIATION | Lack of oxygen due to fermentation processes (formation of carbon dioxide, hydrogen sulfide, etc.) and / or creation, presence, introduction of gases that are substituted with oxygen (nitrogen, carbon monoxide, etc.), entrapment materials decevoli bulk (cereals, plastic granules of catalysts, media, inert dry bulk, food, etc.) |
| ADVERSE MICROCLIMATIC CONDITIONS | High humidity, high or low temperature, use of PPE in limited transpiration, type of work in progress, etc. |
| EXPLOSION / FIRE | Evaporation of flammable liquids, presence or creation of flammable gases, lifting of flammable dust and presence of ignition sources of various kinds (electrostatic charge, use of tools and work equipment that produce sparks, equipment and apparatus, cutting and welding , etc.) |
| POISONING | Presence of residues, reactions of decomposition or biological, not effective insulation, etc. |
| FALL | Lack or incorrect provision of temporary structures, non-use of PPE, use of equipment is not suitable or misused (eg. Scale trope short or unconstrained), etc. |



| Risk's factor | Possible Causes |
|---|--|
| ELECTRIC SHOCK | Use of systems and tools not adequate to the classification of the instruments do not comply with applicable laws or in poor condition, operating errors (electrical insulation failure), lack of coordination, lack of isolation / electrical disconnection, etc. |
| CONTACT WITH ELEMENTS MOVING | Parts of the plant / machinery is not adequately protected, use of equipment not suitable restricted environment, etc. |
| COLLISION/CRUSH | Access from road areas, falls of serious, wrong use of the means, lack of coordination in phase of the input / output |
| BURNS / FREEZING | presence of high temperature parts or at low temperature not sufficiently protected; wrong use in thermal machines (insufficient cooling or heating), etc. |
| DROWNING | Sudden rainfall events, infiltration, missing insulation, etc. |
| ATMOSPHERE WITH EXCESS OF OXYGEN | If the amount of oxygen is greater than 21% (concentration in air under normal conditions), there is an increased risk of fire and explosion |
| PLOWS | Due to the instability of the product contained, landslides, or other |
| NOISE | Due to work activities carried out within the confined |
| BIOHAZARD | Due to possible existence or decomposition of organic substances (for example, slurry) |

GENERAL INFORMATION ON THE CONDUCT OF INSPECTIONS

It's necessary to prevent the entry into confined spaces, as far as possible, and it is advisable to check if the work within them can be carried out in other ways (eg. working from the outside using remote-controlled devices, cameras, and while taking into account the state art and technological development). If this is not possible, it is necessary that the work is carried out according to specific safety procedures to be determined by the Principal of the activities.

You need to work in confined spaces is authorized and has been shared and signed an authorization form (Work Permit), which are identified those involved in the management of safety.

All safety specifications imposed by the applicable regulations in the place where it carries out the inspection must be strictly observed.

If you have not taken adequate safety measures by the customer, the CO3's technician has the responsibility to take all precautionary measures.

The CO3's technician can't perform activities and inspections in confined spaces if there are no appropriate procedures and staff of the client can handle a possible emergency situation.

Activities are prohibited in solitary without the presence of personnel outside the site can handle possible emergencies.

HOW TO ACCESS CONFINED SPACE

It is always necessary to have a person outside the confined space to observe and communicate with workers inside, so readily give the alarm in case of emergency and activate the rescue procedures. The staff outside is appropriate and identified by the Employer Principal and his representative. In particular cases, the emergency team can be outside of an external specialized company

Wearing the type of respiratory PPE, workers have access to the workplace using seat belts and ropes of the proper length to ensure the carrying out of work and a quick recovery in emergency conditions; in particular, a worker must always be present at the access opening from the outside and be able to recover an injured worker and / or taken ill in the shortest time possible and in accordance with established emergency procedures.

If in the working area the creation of an explosive atmosphere can't be excluded, the work equipment, facilities, and the type of processing performed must exclude the formation of flames and sparks and however for any type of



trigger.

Cartellonistica che si consiglia di apporre in ambienti confinati o sospetti di inquinamento



(*) Non esistono cartelli di tipo unificato per questa tipologia e il cartellone ha un carattere indicativo. Si suggerisce che esso contenga almeno le indicazioni di "pericolo generico" o altri pittogrammi previsti dalla vigente normativa (ad esempio ATEX, presenza infiammabili, tossici). Le restanti illustrazioni, non esaustive, hanno lo scopo di richiamare le principali prescrizioni previste dalla procedura.

USE OF PERSONAL PROTECTIVE EQUIPMENT (PPE)

It is necessary that workers are provided with the appropriate PPE and use them as prescribed.

The staff must have at least the following equipment:

- filter masks or respirators insulation;
- helmet to protect the head from falling material from above or impact with objects;
- safety harness (if any);
- protective gloves;
- eye protection if you are exposed to hazardous substances, splinters, etc.,
- safety footwear;
- protective clothing;
- ear protection and hearing protection (if any).

The equipment that are normally included are: gas detectors, flashlights, communication tools, attrezzatura work. Depending on the evidence of the risk analysis carried out for the specific job, may also be considered necessary additional PPE, eg devices for protection against falls from a height.



GAS DETECTORS

The gas detector is a safety device that notifies the user when the amount of hazardous gas exceeds the set-point factory set alarm. It is your responsibility to respond properly to the alarm.

Before each use:

- Perform a self-test:
 - Perform the test in an atmosphere free of background gas
 - After executing the test wait 30 seconds before using the detector to make sure that the device detects gas accurately
- Ensure that the air sensor is clean and free of residues



APPENDIX 01 - RISK FROM HAZARDOUS SUBSTANCES OR LACK OF OXYGEN

Before performing the work and during them, you must ensure that the environment confined there is a concentration of oxygen suitable for breathing (21 /%) and there are no dangerous concentrations of chemicals asphyxiating, poisonous or flammable. The air monitoring must be carried out at different height levels to take account of different possible stratification of hazardous substances; where it can be no doubt about the dangers of the atmosphere should be taken specific precautions.

Some risk's conditions may exist prior to the beginning of the activities, others may occur during the execution of some jobs.

The Confined Space's checking is made by the Compliance Officer the activities in collaboration with possibly the Employer Client must identify a suitable site manager with the task of informing and supervising outside firms.

The access to a confined space can be done only after receiving adequate information and after that have been made all the verification and sampling / remediation that allow access to the site.

The risk of asphyxia (lack of oxygen) can be due to poor air exchange and / or by inhalation / absorption of asphyxiating toxic chemical agents.

You must remember that:

- the normal concentration of oxygen in ambient air is about 21%;
- between 19.5 and 18% will have possible difficulty breathing;
- below 18%, the atmosphere becomes notbreathable and can cause serious breathing problems;
- between 12 and 8% breathing becomes faster, there is inability to understand, unconsciousness, nausea and vomiting;
- between 8 and 4%, death occurs within minutes or seconds.

These values should not be considered an absolute; the effects of different concentrations vary depending on the state of health of the operators and the physical activities performed.

Among the agents asphyxiating, should be considered for example: carbon dioxide, nitrogen, helium, argon, hydrogen, methane, ethane, propane, butane, freon / halon.

Examples of situations of risk can be:

- not adequate removal of nitrogen (N2) or another agent as a result of reclamation activities or inerting;
- fermentation and decomposition of organic substances with production of carbon dioxide (CO2), methane (CH4), hydrogen sulfide (H2S) if present sulfur compounds;
- reactions between soil water, gypsum and limestone, with production of carbon dioxide; combustion processes;
- oxidation reactions within steel tanks and containers (rust);
- reactions between waste and atmospheric oxygen;
- reactions of substances contained within the holds of ships, trucks, tanks, and the like, with oxygen;
- dispersion of extinguishing agents or refrigerants such as carbon dioxide, nitrogen or halogenated agents (halons, freon, argon) in non-ventilated areas;
- environments or containers in wineries;
- oxidation reactions from some types of materials (residues, scale, waste, soils).

You must remember that many poison gas are odorless, colorless and tasteless, are not detected by the sensory human and cause loss of consciousness without warning, to which man can feel the danger in time.

The symptoms most easily distinguishable can be the following:

- dizziness and progressive loss of balance;
- a feeling of heaviness in the front part of the head;
- tingling tongue and at the ends of the fingers and toes;
- slurred speech, inability to make sounds;
- reduction of the ability to perform physical efforts and to coordinate movements;



- reduction of consciousness and a number of sensitive, particularly touch.

The risk of poisoning can occur when:

- improper cleaning of confined space with the presence of residual materials that can emit gases, fumes or vapors (for example, H₂S);
- presence of gases, fumes, toxic vapors that can:
 - invade tanks or tanks through connecting pipelines;
 - be produced during maintenance activities;
- presence of liquid and solid substances that, under some conditions, can suddenly release dangerous gases or vapors into the environment;
- presence of dust;
- the presence of liquids and solids which emit toxic gases in the presence of air or water vapors (sulfur, phosphor emitting phosphine to acids and water or steam, etc.);
- chemical reactions of decomposition or fermentation;
- suspected pollution or confined environments where you make welding processes;
- working with toxic organic solvents or toxic vapors;
- activities near sewers, mouths access wells and connection to the network;
- combustion in oxygen defect;
- excavations and ditches containing contaminated soil as waste discharges;
- reactions between substances incompatible with accumulation of toxic gases (eg. Acid substances with hypochlorites, sulfides, cyanides, etc.).

Typical toxic substances are: hydrogen sulfide (H₂S), hydrogen cyanide (HCN), and other solvents.

Concentrations of contaminants must be at least below the threshold limit values defined by the law in force if any; alternatively, you can refer to international standards.

Note that the characteristic odor of rotten eggs their hydrogen sulfide or hydrogen sulfide (H₂S), at concentrations equal to or greater than 100 ppm, is no longer perceived as the olfactory nerve is paralyzed.

APPENDIX 02 - FIRE AND EXPLOSION HAZARD

The risk of fire and explosion is related to the formation, collection or accumulation of flammable substances in sufficient concentration to be triggered by a source at the scene or transported therein (electric shock and electrostatic sparks produced by shock and friction, open flames, hot surfaces, electromagnetic waves, other).

Work in confined spaces where there are atmospheres with potential risk of fire and explosion must be performed by adopting specific measures of prevention and protection; these measures consist, for example:

- elimination of substances and mixtures, where possible;
- in the use of protected equipment;
- application of technical and organizational procedures (for example, closure of all the lines of communication with the confined environment, valves or other).

The main parameters that you need to know are:

- Range of explosion: concentration range of a flammable substance in air within which an explosion can occur;
- LEL: lower limit of the explosion;
- Temperature Flash: temperature above which the surface of a flammable liquid vapors are released in concentrations that ignite.

The concentration of the mixture can be evaluated by the use of portable instruments, said explosimeters, equipped with an alarm threshold fixed or adjustable. It is necessary that these devices are running continuously and that they are used properly by trained personnel. The security level of a Explosimeter (ie the category, according to the ATEX Directive), as is the case for all products intended for use in potentially explosive atmospheres must be compatible with the predicted probability of an explosive atmosphere.

The explosimeters can for example be usefully employed to work in installations of transport and distribution of combustible gas or in places with reclaimed ventilation, to report the incipient formation of an explosive atmosphere.

The explosimeters are available for both a single gas that more gas (multi-gas). There are instruments that sample gas from the outside of the confined environment, for example by means of a probe tube and analyze it in a safe place. The withdrawal from the outside localized or not can operate with some certainty.



Work equipment (lamps, vacuum cleaners, fans, etc.) must be responsive to the DPR 126/98 (transposing Directive ATEX), the category chosen by the project manager in relation to the probability and duration of the explosive atmosphere and with specific marking as by the following examples:

| Work equipment | Equipment's marking |
|----------------|-----------------------|
| Lamp CE xxxx | II 2GD Ex ib e IIC T4 |
| Fan CE xxxx | II 2G Ex c d e T6 |

where:

- II: represents the group of devices other than those that go in the mine;
- 2: represents the category (level of protection);
- G / D: are for gas and dust, respectively;
- Ex: symbol for products used in areas with risk of explosion;
- ib, and, d: are ways of protection (eg. Ib represents the intrinsic safety);
- T6, T4: is temperature classes (permissible surface);
- xxxx: number of the institution enabled.

As for clothing, workers who need access to areas at risk of fire and explosion are to be provided with clothing (shoes, gloves, overalls) antistatic, so the technical literature suggests values of resistance to ground of clothing less than 108 Ω . Any cables or ropes used must not be able to become sources of ignition.

Grounding is an effective protection for parts of equipment and work equipment that can be characterized by the accumulation of electrostatic charges.

Steel tools that can generate single sparks, such as screwdrivers and wrenches, may be used only if the presence of an explosive atmosphere is not expected during normal operation. We recommend the use of gears of non-sparking, normally alloy of beryllium, brass, to be used in every case with extreme caution. The tools that generate a shower of sparks (eg. Sanders) should not be used in an explosive atmosphere.

It must be clear that in environments with risk of fire and explosion can not be used machinery, instruments, tools, clothing, communication systems and detection instrumentation that have not been authorized and verified through the model of authorization for entry into environment suspicion of pollution or confined: may not have the appropriate features and cause serious accidents.

Furthermore, the work equipment, such as the tripod, winches, cables, vacuum cleaners, fans, and others, that can be introduced or placed in close proximity to an environment suspected of pollution should, however, be equipped with CE marking according to the relevant (for example Directive machines, ATEX, low voltage, electromagnetic compatibility) and be accompanied by the instruction manual if provided, available at all times.

All measuring instruments must be tested and calibrated with the periodicity in the manual of use and maintenance. You can still use work equipment built in the absence of laws and regulations to transpose the EU directives of the product or made available to workers prior to the date of their issuance if they meet the general safety requirements set out in Annex V of the Italian Law D. Lgs.81 / 2008.