



France Ciment



Working in
a confined space

General context



In **2020**, in France

10 fatal accidents and **20** serious accidents for the entire industrial division

In **2023**

1 serious accident in the cement division**.

DESCRIPTION OF ACCIDENTS

CIRCUMSTANCES	Technical
	<ul style="list-style-type: none"> ▲ Material failures: leaks, weakened equipment and pipes ▲ Inadequate protective equipment or absence thereof ▲ Inadequate lock-out or securing of installations ▲ Poor knowledge of the condition of installations
	Organisational
	<ul style="list-style-type: none"> ▲ Lack of communication between company and service provider ▲ Lack of communication between operators working on site ▲ Lack of supervision and monitoring of work ▲ Lack of training for staff working in these areas ▲ Inadequate risk analysis or absence thereof ▲ Lack of emergency procedures in the event of an incident or accident
	Human
CONSEQUENCES	<ul style="list-style-type: none"> ▲ Stakeholder behaviour: lack of awareness / indifference ▲ Lack of safety culture ▲ Panic, anxiety, instinctive and irrational behaviour
	Environmental
	<ul style="list-style-type: none"> ▲ Presence of toxic gases following long-term storage of products ▲ Presence of damaged live electrical cables
	<ul style="list-style-type: none"> <input type="checkbox"/> Asphyxiation <input type="checkbox"/> Intoxication or poisoning <input type="checkbox"/> Electrocution <input type="checkbox"/> Fire and explosion <input type="checkbox"/> Trapping <input type="checkbox"/> Death

Sources

* <https://www.as2team.fr/post/intervention-en-espace-confine>

* <https://protectiondirecte.fr/solutions-et-informations/blog-protection-travail/securite-antichute-trappes-acces>

** France Cement 2023 survey

Example of an actual accident in a cement plant

During a maintenance operation on a cement silo (removal of a non-compliant product and inspection), the worker (a subcontractor's rope access technician) lost consciousness a few minutes after entering via the manhole at the top of the silo.

The supervisor managed to get him out of the silo and the victim regained consciousness before being taken by helicopter to the nearest hospital A&E department.

Although a work permit had been drawn up, the atmosphere inside the silo had not been checked and was found to have high concentrations of carbon monoxide.

In addition, the worker was not wearing the appropriate personal protective equipment (gas detector).

What is a confined space?

Any hollow volume, totally or partially enclosed, with restricted means of access preventing the circulation of air and exchanges with the outside, is a confined space.

As a result, this type of space is not designed or intended to be permanently occupied by personnel.

Operations that may take place during the construction, **maintenance and checking of the condition of the confined space** are therefore classified as occasional or exceptional and require a specific work procedure.

What kind of confined spaces can be found in the cement industry?

Silo



Source:
Shutterstock web

Clinker crusher



Source:
www.metiers-ciment.fr

Kiln



Source:
www.france-ciment.fr

How can I avoid this kind of accident?



1

Risk analysis: a proper **preliminary analysis** of the possible risks in the confined space must be carried out by a qualified individual.

Also take into account any additional risks relating to **special work being carried out nearby**, such as welding, cutting, painting, electrotechnical work, etc.

2

Development of an emergency response plan: defines the measures to be implemented in the event of an emergency, incident or accident.

Plan the following:

- A list of recommended **rescue equipment**, which must be available at the location;
- A **rescue team** made up of **properly-trained people** who can intervene in an accident. These people must be familiar with different types of confined spaces, through **regular exercises**;
- An **evacuation plan**;
- **Warning** and **communication equipment** (e.g.: walkie-talkie).

3

Training of the people involved: all participants must be trained in the **specific safety rules** and must have the appropriate **authorisations** or **accreditations** for this type of work.

4

Work permit: the work permit or work order must be **issued by the principal and signed by all concerned**.

In particular, he/she must **inform** those involved of the **dangers inherent** in the installations and materials, as well as the **particular configuration of the site**. This permit can be different and personalised depending on the company.

Good company practice



- 1 **Lock-out:** lock out energy and fluids that are accessible from the outside.

Work area: must be **marked out** and **access openings** to the space must be **protected**.

Signs must also be **put in place** indicating **that access is prohibited**, except to the persons concerned.

Note that the **manhole** used for entry and exit must have **a diameter of at least 60 cm**.

- 2 To **avoid any electrical risk**, electrical appliances should be supplied by **an isolation or separation transformer** placed **outside the enclosure**.
Lighting must be **extra-low voltage**.

- 3 **Ventilation:** ensure **adequate** ventilation (**natural or mechanical**), **before and during the operation**, to evacuate toxic materials and stabilise oxygen levels.

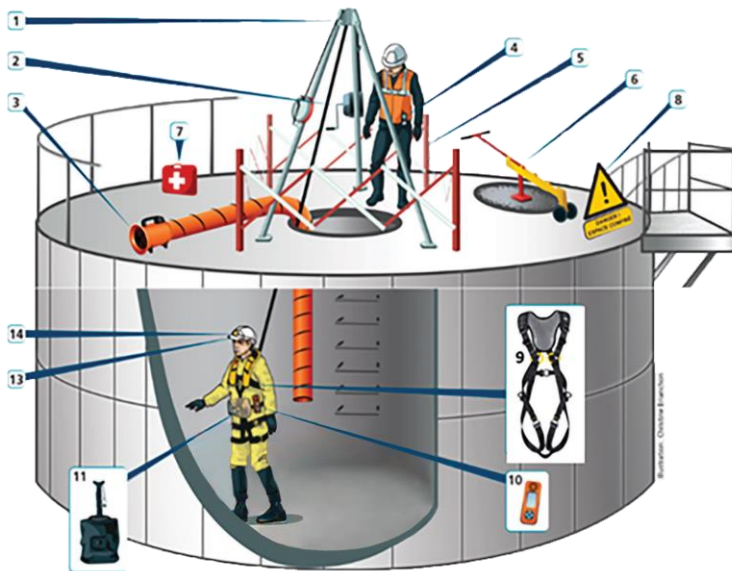
Measurement of oxygen content and toxic substances: measurements must be taken **before entering the confined space**.

- 4 The safe **oxygen content** is between **19.5 and 22.5 %**, while the content of hazardous substances must comply with **exposure limits as defined by the ACGIH** (American Conference of Governmental Industrial Hygienists).

- 5 **Personal protection equipment:** **workers** must have **suitable protective equipment** (helmet, gloves, safety shoes, self-rescue mask, harness, etc.) and **gas detectors** with reliable alarms, **regularly calibrated and checked**.
The operation of all protective equipment must be **checked before the task**.

- 6 **Communication:** an **external supervisor** must be appointed and good **space-time coordination of the task** ensured.

Summary diagram of an intervention in a confined space



Source: Face au Risque - Digital magazine no. 570: "Working in confined spaces" March 2021, with adaptations.

Key

- 1 Means of attachment (jib or equivalent) complying with standard NF EN 795;
- 2 Winch with fall prevention system;
- 3 Ventilation;
- 4 Means of permanent communication with the operator;
- 5 Protective barrier;
- 6 Lifting equipment;
- 7 First aid kit;
- 8 Markings and signs;
- 9 Fall arrest harnesses;
- 10 Portable atmosphere detector with 4 main functions: oxygen, carbon monoxide, methane and hydrogen sulphide;
- 11 Respiratory protection;
- 13 PPE: helmet, gloves, safety boots or shoes, goggles, earplugs, self-rescue mask, etc.;
- 14 Lighting source.