WHITE PAPER | CONSTRUCTION

SUSTAIN YOUR CONSTRUCTIONS

RESPIRABLE CRYSTALLINE SILICA - UK

How should you be protecting your workforce?

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INTRODUCTION

> "We have a collective responsibility to protect the health, safety and working environment of our workforce."
>
> **Laurent Mareuge, Founder & CEO of UBY**

"I have been working in the construction and public works sector for over twenty years, having obtained a Master's degree in Public Works from ESTP Paris (a leading university in the construction sector)."

I spent thirteen years as a civil engineering operations manager for Bouygues Travaux Publics, working on various international projects in Hong Kong, South Africa and Australia. After returning to France in 2014, I was appointed director for the first civil engineering project, lot T3B (South-West line 15) of the *"Grand Paris Express"*.

In 2018, I took part in *"innovate like a start-up"*, a competition which is part of the Bouygues Group intrapreneurship program. I was keen to develop solutions to solve specific problems faced by operations managers working in the field.

My first idea was to develop an algorithm to better control construction site nuisances. I was convinced that technology could improve the acceptance of our operations and the quality of life for local residents. The idea was well received, the project was born and we launched the start-up in 2019.

In 2020, we deployed our first sensors to monitor noise pollution on construction sites, co-developing an enhanced algorithm making it possible to recognise and distinguish dozens of different construction site noises, like a human ear would. We're not just talking about providing simple measurements in decibels. We're actually detecting the type of noise and where it originates.

(...)

(...)

Our objective is to provide construction companies and infrastructure managers with an accessible digital monitoring platform to manage their key indicators in real time.

The initial idea of identifying issues and sending alerts in real time evolved into a way of tackling health issues experienced by construction workers, who are potentially exposed to some dangerous substances.

This is the case for crystalline silica, a substance present in many construction materials, particularly in concrete. When working with these materials on construction sites (chiselling, drilling, sanding), crystalline silica degrades into extremely fine dust. If inhaled, it can cause serious lung disease, silicosis and certain cancers.

Due to it being an invisible risk, much like asbestos, the OPTBP (France's professional organisation for accident prevention in building and public works) and the labour inspectorate consider this as a priority health issue, with regulations tightening each year.

In 2023, after successive phases of studies, R&D and 20 prototype launches tested on sites in France, we marketed the brand "uDust", the first patented portable sensors for detecting crystalline silica dust.

We aim to deploy uDust sensors to as many workers as possible who may be exposed to silica during their career. It is a collective responsibility to measure their exposure levels and preserve their long-term health."

Laurent Mareuge
Founder & CEO of UBY

WHAT IS CRYSTALLINE SILICA?

IN SHORT

Silica is a hard, transparent mineral that is found in different forms (for example, in sedimentary and igneous rocks). It's a naturally occurring substance and part of our ecosystem.. Silica makes up about 60% of the Earth's crust and comes in two forms:

- **Free silica:** amorphous silica and crystalline silica
- **Combined**: with other elements, such as aluminium, iron, magnesium, calcium and sodium, known as silicates.

Crystalline silica includes different forms of silica such as quartz, cristobalite and tridymite.

WHERE IS CRYSTALLINE SILICA FOUND?

In public works and construction projects, there are many tasks that involve exposure to silica crystalline dust.

The risk of exposure is often higher on renovation sites than on new construction sites.

Exposure to silica dust is high:

- In demolition work, crushing, material disposal, sweeping, drilling and concrete sawing or planing.
- In underground work, underpinning, concrete spraying (dry method) and rendering.

SILICA IN FIGURES

It is estimated that up to 600,000 UK workers are currently exposed to silica dust. A list of work activities that may represent a high risk of exposure to crystalline silica dust is provided on the UK Health and Safety Executive website.

It is believed that 500 UK construction workers die each year from silicosis and silica is linked to the estimated 4,000 deaths a year from COPD.

WHAT ARE THE HEALTH CONSEQUENCES?

The latest HSE information from their construction dust campaign shows that 4 out of 10 construction workers are being exposed to cancer-causing levels of silica and it is widely believed that silica is the biggest risk to construction workers after asbestos

Crystalline silica dust is one of the oldest forms of occupational exposure due to its presence in many rocks and the construction materials that use them.

It continues to be a problem, especially since crystalline silica has been classified as carcinogenic by national and international bodies.

The **finest** particles (less than 4µm in diameter) can be inhaled when airborne and deposited deep in the lungs.

Crystalline silica dust can cause eye and respiratory tract irritation, chronic bronchitis and irreversible pulmonary fibrosis known as silicosis.

Symptoms of silicosis generally appear several years after exposure and continue to develop even after exposure to it has stopped. These symptoms include coughing, shortness of breath, fatigue and weight loss. In severe cases, silicosis can lead to respiratory failure and death.

Exposure to crystalline silica plays a significant role in the development of lung cancer. The International Agency for Research on Cancer designated crystalline silica in either the quartz or cristobalite form as a Group I human carcinogen in 2012. Any work involving exposure to crystalline silica dust can therefore be considered carcinogenic.

To ensure the long-term health protection of workers, we must act collectively to reduce exposure as much as possible.

HOW CAN YOU PROTECT YOUR WORKFORCE?

CONSTRUCTION INDUSTRY OBLIGATIONS

In the UK, exposure to crystalline silica falls under the Control of Substances Hazardous to Health (COSHH) Regulations 2002. Under these regulations, UK employers have a legal responsibility to carry out risk assessments where there is exposure to harmful substances and to implement control measures.

The regulations define a workplace exposure limit (WEL) for silica dust exposure over a specified period of time. Employers have a duty to monitor the exposure of employees to substances hazardous to health in certain specified situations.

CONTROL MEASURES FOR EXPOSED WORKERS

Where workers are regularly exposed to respirable crystalline silica (RCS) dust and there is a reasonable likelihood that silicosis may develop, health surveillance must be provided by an occupational health professional (doctor or nurse). This includes:

- Assessing baseline respiratory health
- Carrying out ongoing assessments at appropriate frequencies
- Providing a questionnaire
- Performing lung function testing and chest X-rays
- Maintaining health records

RESOURCES

The occupational health professional should have access to:

- Records of respiratory symptoms reported by staff between assessments
- In-force control measures to determine if review or remedial action is required
- HSE and COSHH website, guidance and publications
- Company risk management documentation including concerns raised by staff and sick leave data

HOW CAN YOU PROTECT YOUR WORKFORCE?

DAILY MEASURES TO PUT IN PLACE TO PROTECT YOUR WORKERS' HEALTH

There are several ways of preventing silicosis and protecting employees, such as:

- **Reducing exposure to crystalline silica dust in the workplace** by organising the work site in such a way to limit dust:
  - Using equipment and processes that produce less dust
  - Limiting machining by abrasion as much as possible
- **Implementing collective protection:**
  - Wet methods
  - Dust source sensor device
  - Ventilation devices.
- **Monitoring dust levels more frequently than required by regulations,** to check if exposure remains within safe limits.
- **Providing appropriate personal protective equipment (PPE)** and ensuring that it is used correctly (masks, glasses, overalls) at the right time.
- **Informing and training workers on the risks** associated with silica crystalline exposure, establishing job instructions and developing an exposure prevention sheet.
- **Carrying out regular cleaning of worksites** using a vacuum cleaner equipped with a very high efficiency filter or damp cloths.

EXPOSURE LEVEL REGULATIONS

The UK workplace exposure limit (WEL) for respirable crystalline silica, as defined by the COSHH Regulations 2002, is 0.1 mg/m3 (eight-hour time weighted average).

Regulation 6 lists all substances that have been assigned a WEL and details the appropriate levels. The list is updated frequently through the issuing of EH40/2005 Workplace Exposure Limits. The last update took place in 2020 but did not affect the respirable crystalline silica limit.

HOW CAN YOU PROTECT YOUR WORKFORCE?

UNDERTAKE PERIODIC SAMPLING

Air monitoring specialists use the CIP 10 air sampling device, which collects micro-organisms in a liquid maintained in a rotating cup. The liquid collected is analysed in a laboratory to assess the quantity of silica over a given timeframe.

LIMITATIONS:

- Human intervention is required to assess the time spent carrying out a task.
- Sampling is carried out at a point in time and is not always representative of the worker's actual exposure over the duration of the job nor is it representative of their daily actions.
- The sampling method lacks precision: it is impossible to measure respirable crystalline silica below a minimum quantification level.

uDust
AN INNOVATIVE AND COMPLEMENTARY WAY TO MONITOR ONGOING RISKS

In addition to periodic laboratory tests, UBY's uDust solution is the first individual portable sensor capable of measuring respirable dust in ambient air in real time and calculating the concentration of crystalline silica in the dust.

It can detect overexposure to crystalline silica and send alerts to the relevant people using the latest communication methods and adapting prevention methods to better protect the workforce.

- AUTONOMOUS SENSOR
- REAL-TIME ANALYSIS
- ALL DUST INCLUDING CRYSTALLINE SILICA (SiO_2)
- COMMUNICATION VIA 3G/4G AND WIFI
- 1 YEAR GUARANTEE
  FROM DELIVERY DATE

PROS OF UBY

A UNIQUE AND PATENTED IDENTIFICATION METHOD

A RELIABLE, PRECISE AND INSTANT DETECTION DEVICE

OPTIMISED PREVENTION METHODS

DETECT RESPIRABLE DUST AND CRYSTALLINE SILICA WITH UDUST

Annual cleaning process with an air dust blower (included) paid for by the client.

Udust, our portable, smart sensor, co-developed with Ellona, detects the level of crystalline silica exposure experienced by the workforce in real time.

Our fine particle analysis is based on spectrophotometry.

By means of an individual hand-held sensor, data can be instantly transmitted from the site to our UBY platform.

Analysis and report generation are continuous and automated, complementing traditional sampling campaigns.

You are instantly alerted when overexposure is detected for an employee.

"At the beginning of our operations, we carry out the regulatory tests with CIP10 and laboratory analysis. This is part of our continuous improvement approach to the patented algorithm."

ABOUT UBY

DIGITAL MONITORING FOR CONSTRUCTION COMPANIES AND INFRASTRUCTURE MANAGERS

As Construtech experts, UBY uses the best technology to respond to environmental, productivity, health, security and sustainability issues for construction companies and infrastructure managers.

€10 M
turnover in 2023

150
ongoing projects

UBY uses sensors, patented algorithms and specialist software to provide a simple, comprehensive and unique monitoring solution to address these issues.

UBY is a co-pilot for operations managers, to enable them to manage their projects making the right decisions with right information, at the right time.

UBY believes that technology is an ally for safer and more sustainable buildings.

INFRASTRUCTURE AND COMMUNITY OPERATORS

ANDRA · Société du Grand Paris · SNCF RÉSEAU · PARIS AÉROPORT · Gouvernement Princier PRINCIPAUTÉ DE MONACO · 76 SEINE-MARITIME · Cerema · ESCOTA VINCI

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FURTHER INFORMATION

For further technical and regulatory information, view our **uDust** page

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