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March 2018



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CONTROLLING DUST

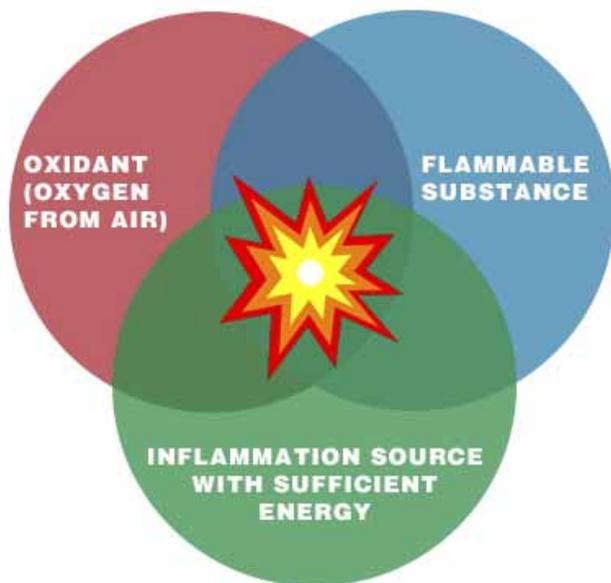
Guillarme Coupez, Standard Industrie, discusses a system to control dust during conveying, improving production and safety.

Introduction

Optimising production tools means reducing operating and maintenance costs. The LIFTUBE system, developed and patented by Standard Industrie International, responds to this problem by improving the sealing of conveyor belts, thus raising the productivity and safety standards compared to traditional conveyor belts.

The LIFTUBE is a solution that optimises the sealing of any conveyor belt (smooth or cleats, rubber or PVC, and vulcanised hot or cold). It comes as a replacement to stations equipped with three rollers on the conventional conveyors. These are standard 1 m modules that are scalable and easy to install on all or part of a new or existing conveyor while keeping the belt, chassis, and motorisation of origin. It is installed between the point of loading and unloading. Available in widths from 500 – 1400 mm, in high temperature, explosive, or self-extinguishing versions, the LIFTUBE avoids any contamination of the product transported with the outside environment. This seal proof system enables easy tilting of the glide boards and the central roller for easy and minimal maintenance. Thanks to its pinch point protections, the LIFTUBE improves the working conditions of the operators.

Reduction of atmospheric emissions, improved visibility, staff safety, and reduced maintenance are only a few advantages of this solution.



Three factors that combine to cause an explosion.

Some accessories, such as the dust collectors, have been developed to increase the containment effect of the material and to minimise dust emissions.

Adaptable on 2 m of LIFTUBE, the dust collector is equipped with a filter of 18 – 45 m², a motor-fan unit of 2.2 – 4 kW, and a reverse jet declogging system. Ideal after a chute, it will largely limit dust emissions. It is dustproof (IP55) and can be positioned at any time on the LIFTUBE.

The integration of LIFTUBE

Located in Haute-Savoie, near Geneva, a limestone quarry wanted to integrate the LIFTUBE solution and the dust collector into a new installation project that included conveyors, hammers, and grinders.

The size of the conveyor equipped with LIFTUBE is 27 m at the centre distance for a belt width of 800 mm, a hopper hood, and a dust collector.

The conveyor is located just under the crusher, which creates a dusty airflow between the feed hopper and the chute. The speed of the belt pushes this charged air into the conveyor and can create dust emissions at the outlet. To solve the problem, there are several solutions: installation of decompression chambers, misting system, vacuuming, and dedusting. This last solution which was chosen by the customer, is the most compact and the most economical. Fixed on only 2 m of LIFTUBE, the dust collector is installed after the last chute, and captures the depression created by the fan particles in suspension. The multi-pocket filter retains these particles, which fall back on the belt during automatic declogging cycles.

Meeting European and international standards

The LIFTUBE is also suitable for conveying explosive products and meets various European and international standards. To understand what an explosive atmosphere is, here are some explanations.

An explosion is usually caused by the accidental inflation of an atmosphere containing large

Table 1. Classification of dust in Europe.

Dust group	Definition		
	Dust type	Size	Resistivity
IIIA	Fuels	>500 µm	-
IIIB	Non-conductive	≤ 500µm	> 10 ³ Ω.m
IIIC	Conductive	<500µm	≤ 10 ³ Ω.m

Table 2. Classification of dust in North America.

Dust group	Definition	
	Dust type	Detail
E	Electrically conductive dust	Metallic powders, such as aluminum or magnesium,
F	Carbon dust	Some are conductive and all are explosive. Black coal, coal dust, etc.
G	Agricultural and plastic dust	Seeds, flours, sugars, spices, rice, some polymers, etc.

quantities of gas, vapours, mists, and dusts. In order to avoid any material damage and loss of life, international-level measures have been taken and concern mainly the chemical and petrochemical industries. Indeed, in these industrial processes, dangerous atmospheres can be formed during the production, transformation, transport, or storage of flammable products. The refinery is one of the typical industries for producing fuel or gas. It is during the storage, the fermentation of gas, or the emanation of flammable gases that the explosive atmosphere is created.

International-level measures also concern facilities where powdered products are used or created, which can generate explosive atmospheres. Sawmills are also an environmental concern. When cutting wood, the finest particles are suspended in the air, creating a potentially explosive atmosphere.

For an explosion to occur, three factors must be met (Figure 1):

- Oxidant: oxygen in the air under optimal conditions (pressure and concentration).
- The flammable substances: gases, including methane, acetylene, and hydrogen; dust, including wood, flour, sugar, aluminium, and carbon with a particle size <0.3 mm; and vapours, including ethyl, alcohol, and acetone.
- An ignition source with the necessary energy: high temperature, arcing, and sparks of

mechanical and/or electrical origin, static electricity, lightning, or misuse.

As far as standards are concerned, there are the two following types.

The ATEX European Directive 2014/34/EU

This applies to systems that contribute to the fight against explosions, but also equipment related to potentially explosive atmospheres. Thus, electrical, non-electrical, and safety and protection components and devices are subject to this directive. This last standard defines the essential requirements for health and safety that must be rigorously followed by the manufacturers. The ATEX logo must therefore appear on product marking plates to identify their membership of the directive. In direct relation, Directive 1999/92/EC focuses on the continuous improvement of the protection in terms of health and safety for the workers, who could be exposed to the so-called zones with explosive atmospheres.

Under the ATEX directive, the site manager has several obligations:

- Prevent the formation of explosive atmospheres or, if this is impossible, avoid the ignition of explosive atmospheres.
- Assess the specific risks associated with explosive atmospheres and write an updated explosion protection document.

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- Classify the areas where explosive atmospheres can occur.
- Mitigate the harmful effects of an explosion to protect the health and safety of workers (installation of necessary equipment, implementation of organisational measures such as staff training, etc.).

The ATEX zoning for dust includes the following three zones:

1. Zone 20 (USA Zone 0): place where an explosive atmosphere is present, frequently or permanently, for an extended period.

2. Zone 21 (USA Zone 1): place where an explosive atmosphere is present occasionally during normal operation.
3. Zone 22 (USA Zone 2): place where an explosive atmosphere is not likely to be present during normal operation or, if it is the case, its presence is short (foreseeable anomaly).

The international IECEX system

It is a voluntary certification system in accordance with international standards for electrical and non-electrical equipment intended for use in explosive atmospheres. Its purpose is to facilitate the international movement of equipment intended for use in potentially explosive atmospheres (in accordance with one or more international standards defining the type of protection against the risk of explosion). This simplifies multiple national certifications and ensures an appropriate level of safety. The IECEX certification system enables Ex equipment manufacturers to obtain a certificate of compliance that is accepted by various organisations. Some countries, such as Australia, recognise this certification as national compliance.

Conclusion

To meet these standards and guidelines, Standard

Industrie International has, thanks to its LIFTUBE equipment, offered a solution adapting to the requirements of various industries. Thanks to the ATEX, self-extinguishing, high temperature, and all stainless steel versions, the conveying of material is done safely by reducing dust emissions considerably, thus ensuring protection and safety for equipment and operators. 🌐

About the author

Guillaume Coupez has been the project manager at Standard Industrie International for 4 years and assists sales representatives at the customer's site in all technical aspects.