Fire Detection and Suppression System

For Powder Coating Systems

A fast reacting fire detection and suppression system - the optimum technical solution for explosion prevention, compliant to standard EN954-1 Category 3 for maximum safety.

Fire detection sensor.

Fire detection sensor shown in situ on a ColorMax^3 fast colour change booth.

Supplied with all new powder coating installations or suitable for retrofit to existing installations of any kind. Protect your installation and comply with safety regulations.

The process of electrostatic powder coating means working with flammable and explosive powder-air mixtures. The essential risks are the danger of fire within the booth or open faced powder collector modules or if present, the danger of explosion in the cyclones and afterfilter by burning powder particles being ingressed through the interconnecting exhaust ductwork from the booth.

What causes a fire?

Poorly maintained or designed conveyor hooks and flight bars that do not provide an adequate earth for the product that is being sprayed. For example, hooks that are continually re-used for spraying and curing without being cleaned. Without the proper earthing you may see sparks generated inside the booth, which could lead to a fire.

What causes an explosion?

If a fire was present during the reverse jet pulse cleaning cycle of the cartridge filters, the disturbed airborne powder could be ignited by the burning powder particles. This could lead to a catastrophic build of up pressure and explosion inside the afterfilter unit, representing considerable danger for employees and factory.

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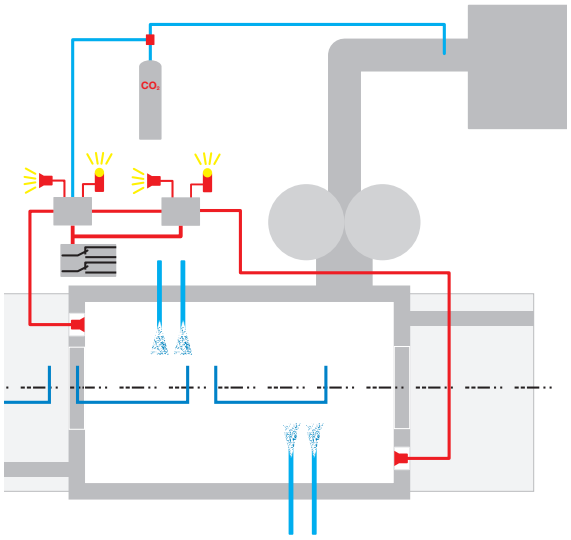
The interior of the powder booth is continually monitored by the fire detection system using combined IR and UV detectors. Each detector is mounted in the booth wall, in the line of sight of the spray guns.

In the example of an ignition being detected in an open faced cartridge booth, the spray guns, electrostatic voltage, cartridge cleaning cycle and ventilation unit are immediately shut down and an audible and visual alarm is triggered. This rapid reaction prevents propagation of the flame by removing the powder 'fuel'. Systems of this type are typically used on cartridge collector systems "open" to the booth where there is no risk of explosion.

If the powder coating installation consists of a 'closed' cyclone and afterfilter system, upon an ignition being detected, the alarms are initiated, booth and guns are shut down and in addition CO_2 is simultaneously injected into the interconnecting ductwork to act as a flame barrier to prevent possible ignition and explosion in the powder collector. Systems of this type are typically used on installations where an enclosed afterfilter provides ventilation to the spray booth via ductwork.



Each flame detection unit monitors both IR and UV light sources in the powder spraying environment to reduce the risk of false alarms and lost production. Each detector features an air wash system that keeps sensor lenses clean when the booth is running and continual self tests for dirty lenses, promoting system reliability. Being rated as Class A (max 2mJ energy rating, BS EN 50177), Nordson powder guns themselves do not need individual protection by a fire suppression system.

References to European safety regulations

The following European safety regulations (amongst others) are applicable to our design:

(EN 12981:2005 - 5.6.1.3) Powder spray booths shall be equipped with a fire detection system, independent of the type of powder recovery system. The fire detection system shall have a response time less than 0.5 seconds. The ignition detection in the booth is executed by robust yet sensitive flame detectors suitable for Ex Zone 22. These react within milliseconds and are not falsely triggered by daylight.

(EN 12981:2005-5.2.4.1 & 5.2.4.2) - Fire detection, fire alarm and interlocking circuits must comply with EN594-1 category 3. Category 3 means that potential faults in the safety related part of a control system are detected and that measures are taken to bring the controlled equipment into a safe state.

(EN 50177:2009 - 5.2.5) Electrostatic spraying systems shall be equipped with locally acting automatic fire extinguishing systems which are actuated immediately in case of fire. When the fire extinguishing system has been activated, the high voltage supply, the supply of coating materials and the pressurised air shall be cut off automatically.

For more information, speak with your Nordson representative or contact your Nordson regional office.

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