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Fire protection
systems
for the protection of

■ — wet painting systems



Application Protection

Dangers

Electrostatic painting means working with combustible and explosive materials. Some of the most important dangers are

- The danger of fire of the electrostatically charged paint in the application area between the bell/ gun and the workpiece.
- The danger of fire through remains of paint in the spray booth and filters, especially if different paints are being handled can lead to reactions.
- The danger of fire through remains of paint in separating and drying filter elements.
- The danger of fire in cavities such as cladded tripods of portal systems, cladded supply lines and colour change housing of side and roof machines.
- Ignition of paint remains through operating error, through mechanical or electrical malfunction during operation of the spray booth.

These existing risks must be recognised and already included in the plant planning stage.



Requirements

Requirements consisting of the following standards, amongst others

- EN 50176:2010 Stationary equipment for electrostatic coatings with flammable fluid coating materials
- EN 12215:2010 Coating systems –spray booths for fluid or organic coating materials

Electrostatic coating systems must be equipped with a property protection extinguishing system and a room protection system for the booths. This requirement can be realised with an autonomous property protection system or a 2-stage extinguishing system.



Application protection (Property protection extinguishing system)

Fire detection application protection

The coating booths are monitored by IR/UV flame detectors¹. The flame detectors are attached inside or outside of the coating booths and are approved for the defined Ex-Zone. The flame detectors recognise a flame in less than one second. To protect the detection unit from deposits, the flame detectors are sometimes equipped with the possibility of visual monitoring and can be equipped with an air purging fixture.

In special cases, other types of detectors can also be used. All extinguishing systems are equipped with manual triggers (pushbutton detectors)².

Control

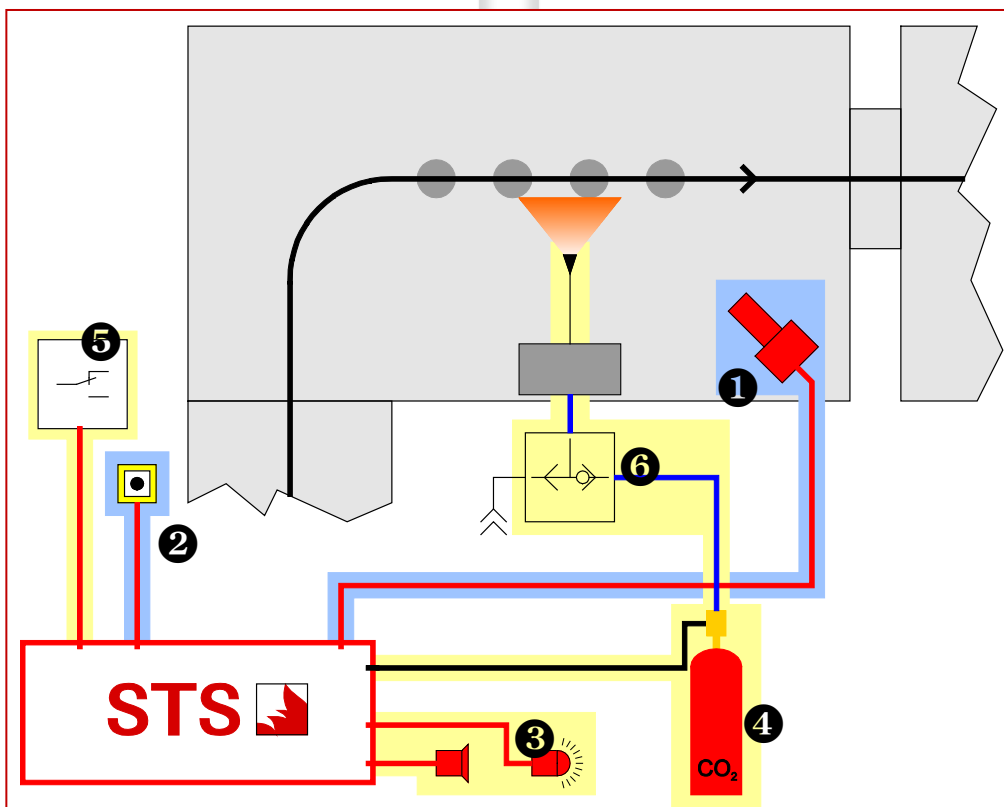
On recognition of a fire or when actuating the manual trigger², the personnel are alarmed³, the application protection⁴ activated and the paint feed as well as the supply air and exhaust system switched off⁵.

If the fire is not successfully extinguished, flooding of the spray booth (protected areas) must take place.

Extinguishing application protection

In the case of application protection⁴, the supply of extinguishing agent is fed without delay via a pressure reducing unit into the piping network. It is then fed into the working ducts of the application via an OR valve⁶ without causing any danger to people as a rule. The quantity of solvent is calculated in a way that there is sufficient extinguishing agent for several intermittent extinguishing procedures.

Carbon dioxide (CO₂) is used as an extinguishing agent. The extinguishing agent is stored in high pressure steel bottles. The size and number of bottles depends on the particular need. The maximum filling weight per extinguishing agent cylinder amounts to 50 kg. The filling is monitored automatically by an integrated electronic measuring system. When an adjustable minimum filling level is reached, an optical display is shown on the unit and a message is sent to the controller. Refilling during application protection is only necessary if this is indicated by the automatic filling level monitor.



Extinguishing Systems Spray Booth

Extinguishing system spray booth (Flood extinguishing system)

Fire detection Booth

In addition to fire detection for the application protection, heat detectors⁷ are also installed in the protected areas if the extinguishing system spray booth is used.

Control

The control procedure takes place like that for application protection⁴, only instead of the delay-free application protection complete flooding of the protected areas⁹ is activated after the expiry of the pre-warming time⁸.

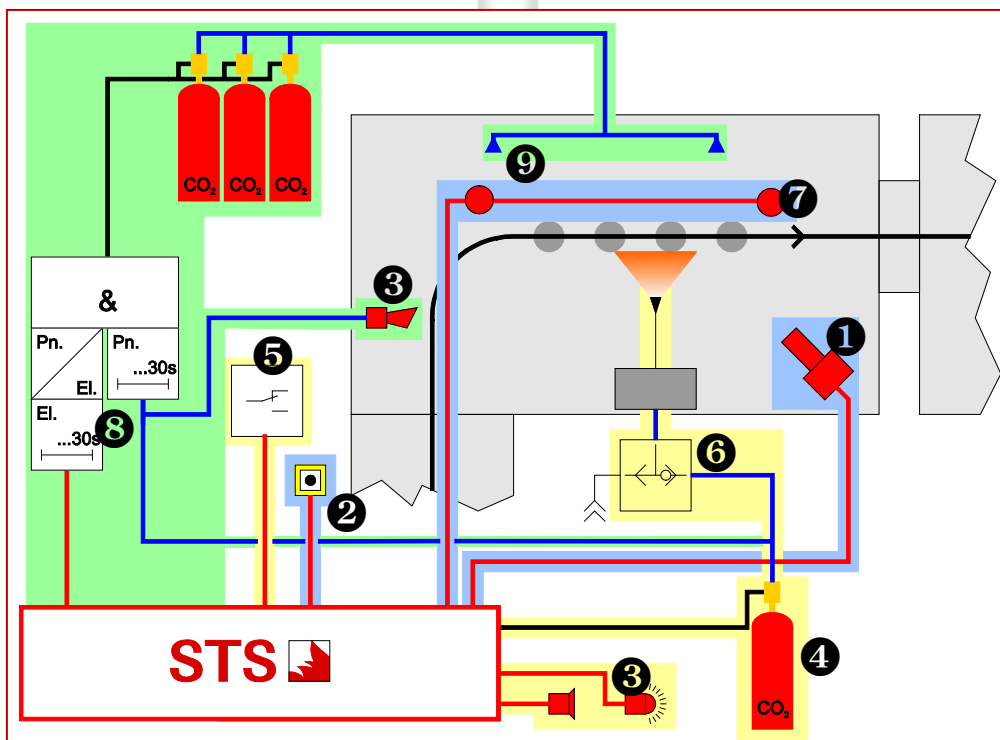
Flooding

In the case of systems in which persons could be present in the extinguishing area and the solvent CO₂ is used, an electro-pneumatic delay installation⁸ is required to trigger the system (BGR 134). This installation should prevent triggers by external influences (e.g. lightning), that can put a purely electronic delay installation out of action. In this case, there could be the risk of fatal personal injury. Likewise, a second pneumatic alarm installation⁵ is used.

The extinguishing agent in Stage 2 (flooding) is fed via high pressure steel lines to the extinguishing area. The extinguishing agent is distributed through nozzles⁹ with protective caps, which are preferably installed in the roof area of the protected property.

If different extinguishing areas are possible due to spatial separation, the extinguishing system can also be implemented as a multi-area system. In the case of a multi-area system, the supply of solvent can be reduced with respect to the entire systems.

The extinguishing agent line can, for example, during maintenance work in the booth, be connected to a monitored shutoff valve.



Standard requirements

Extract from DIN EN 50176:2010-04 "Stationary electrostatic application equipment for ignitable liquid coating material"

5.2 Requirements on spray systems in Category 3G

Table 2

5.2.5 Locally-acting automatic extinguishing system ^{c)} for Types B-L, C-L and D-L

^{c)} A locally-acting automatic extinguishing system is not necessary if spray systems of Category 2G of Types B-L, C-L and D-L in explosion-endangered areas of Zone 2 are used exclusively.

5.2.5 Locally-acting automatic extinguishing systems

Electrostatic spray systems must be equipped with locally-acting automatic fire extinguishing systems that can be triggered without delay in case of a fire. As soon as the extinguishing system is triggered, the high voltage supply, the coating material feed and the compressed air must be switched off automatically.

EN 13478 is to be observed.

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REMARK Locally-acting extinguishing systems (permanently installed, extinguishing systems assigned to the property) should effectively protect the endangered area between the coating material outlet and the workpiece in addition to a room protection system.

6.3 Checking the stationary equipment

6.3.10 Effectiveness of the locally-acting fire extinguishing systems

Extract from DIN EN 12215:2010-06 "Coating plants - Spray booths for application of organic liquid coating materials"

5.7.1 Fires

All spray booths into which combustible organic material is sprayed are to be equipped with a manual or automatic actuating fire extinguishing system.

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The installation of an automatic fire extinguishing installation depends on the size of the spray booth, the presence of operating personnel and the danger through fires (type of coating materials, spray procedure). EN 13478 is to be taken into account.

Automatic fire detection installations are required in the spray booths for automatic spray installations. In the case of a fire, the technical ventilation must stop through self-actuation, the feed of fluid organic coatings materials interrupted and, if applicable, the fire dampers closed.

Spray booths for locally-installed (automatic) electrostatic spray systems must be equipped with automatic fire extinguishing systems (see EN 50176).

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