

People – Technology - Innovations

Fire protec-
systems
to protect

■ — Powder coating systems



Fire protection powder coating systems

Application in:

- Automatic powder coating systems
- Manual powder coating systems
- Plants with open and closed recovery plants (cyclone and filter)

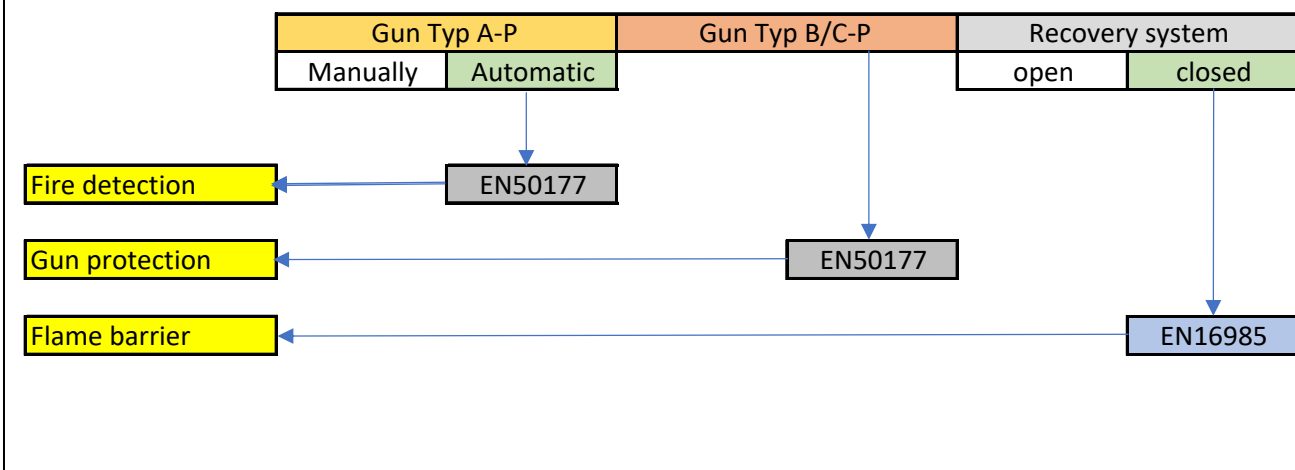
Protection concept

The process of electrostatic powder coating means working with flammable and explosive powder air mixtures. The risks must be recognised and should be included in the planning stage.

The essential risks are the danger of fire within the booth, the danger of fire in the open filters, as well as the danger of explosion in the enclosed cyclone and filter by burning powder particles that are sucked through the ducts from the booth.

Example: During the cleaning of the filter pads the disturbed powder can be ignited by the burning powder particles. This could lead to the bursting of the filter unit and represent a considerable danger for persons and plant.

Selection matrix safety device fire protection



Normative references

The following requirements exist, amongst others, from the standards **EN50177:2009** and **EN16985:2018 04/2019**

❶ Fire detection system in booths with powder guns

(EN16985:2018 04/2019 4.8.4)

Fire detection and locking must be built up into safety category PL d.

(DIN EN16985:2018 04/2019 4.8.4)

The detection in the booth is executed by extremely sensitive flame detectors suitable for Ex Zone 22. These react within milliseconds and are not tripped by daylight. The requirement of a maximum reaction time for fire detection is fulfilled.

❷ Fast reacting fire suppressing system (flame block) at enclosed recovery system such as a filter

(EN16985:2018 04/2019 4.9.3.3)

Rapid fire suppression if ignition sources inside the closed recovery system are excluded.

At fire detection an extinguishing agent flame block is set up in front of the powder recovering system, by the nozzles, to prevent a possible fire breakout into the powder recovering system..

❸ Switching off the technical ventilation including filter cleaning, the high-voltage device and the spray systems

(DIN EN16985:2018 04/2019 4.10 & DIN EN 50177:2009-5.2.5)

The fire detection and control device process the incoming signals and immediately starts the alarm and switches off the coating plant. Safety-related controls must be designed in accordance with EN ISO 13849-1:2015.

(DIN EN16985:2018 04/2019 4.10 Table 5)

Interlocking of the fire detection system with the application and technical ventilation are to be carried out in PL d.

The alarms and system ready for operation and without malfunction are provided via two channels with safety contacts.

This allows the application and the booth itself to be locked in a differentiated manner.

❹ Earthing control device for workpieces if it cannot be ensured that they are earthed (leakage resistance <1MΩ)

For the supervision of the earthing an earthing control unit can be installed in front of the booth.

(EN 50177:2009-5.7.3)

The resistance to earth from the suspending point of each workpiece shall not exceed 1 MΩ. The voltage during measurement shall be 500V or 1000 V. The construction of hangers shall ensure that the workpieces remain earthed during the coating process..

❺ stationary equipment for coating with flammable powder

(EN 50177:2009-3.1)

Equipment in which the electrostatic spraying system is stationary or by means of automatic machines.... to be led

The equipment generally exists

.....

Fire protection devices

❻ Locally acting automatic fire extinguishing system for spraying systems

(EN 50177:2009-5.2 Table 2 & 5.2.5)

A locally acting automatic fire extinguishing system is required for spraying systems of the category 3D of the types B-P and C-P.

The conclusion: Implementing explosion protection with a fast-reacting fire suppression system is a technically and economically optimal solution which is implemented in almost 100% of the applications.

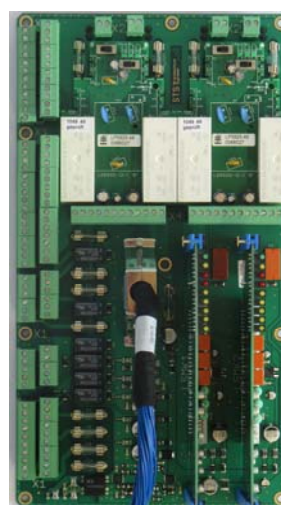
Technical data

The control type EPS + LSMK

The advantages of the control system EPS + LSMK from 2017 are not only the new space-saving design and the touch-panel control unit with event memory for STS fire protection systems.

Furthermore their additional protective functions and modular design have been developed in cooperation with TÜV, resulting in the main features:

- Touchdisplay with event memory
- UPS with lightning protection class 2 + 3 VDE 0100-443;-534
- Network-side voltage spikes are filtered out
- EMC improvements according the actual demanding
- TÜV certificate
- Special development for this plant type
- Safety contacts 2-channel for fire detection and operational readiness
- Individual customer extensions possible
- Data backup via USB stick
- Accessibility via WWW via VPN
- Comply the current safety standards according to the applicable standards: EN16985:2018; EN50177/A1:2013-01; EN ISO 13849-2:2012; EN ISO13849-1:2015



Logik	Kat.3
PFH [1/h]	1,01E-7
MTTFd [a]	100 (high)
DCavg [%]	60 (low)
CCF	75 (Fulfills)
CCF	75 (Fulfills)
PL r	PL d (Fulfills)

Technical data

Supply voltage depending on configuration	100 ... 500V AC, 50 / 60Hz
Current	0,8A
Fusing of the fire protection system	6A, permanent voltage supply, with separate fuse protection in front of the main switch
Operating voltage	24 VDC (22 til 27,5 VDC)
Overvoltage category	III
Protection type control cabinet	IP54
Max. Installation height	2000m above NN
Response time typical	330ms, if setting flame detector FL8 or FL9: UV + IR channel, UV on 50ms
Potential-free safty contacts	Max. 24V DC 5A / 230V AC 3A
temperature range Fire protection system	+10°C bis +45°C / with max. 95% rel. humidity

Standard requirements

Extract from EN 50177:2009
“Stationary electrostatic application equipment for ignitable coating powders”

5.2 Requirements for spraying systems of the category 3D
 Table 2

5.2.5 Locally acting automatic fire extinguishing system ^{a)} for type B-P and C-P

^{a)} A locally acting automatic fire extinguishing system is not required if exclusively spraying systems of the category 2D of the types B-P and C-P are used in explosive areas of the zone 22.

5.2.5 Locally acting automatic fire extinguishing system
 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. Regarding powder recovering systems, the requirements of EN 12981 shall be satisfied.
 EN 13478 shall be observed

...
 NOTE: In addition to the room-protection system, locally acting fire extinguishing systems (fire extinguishing systems which are installed and allocated to the object) shall protect the area between the powder outlet and the workpiece effectively.

5.7.3 The resistance to earth from the suspending point of each workpiece shall not exceed 1 MΩ. The voltage during measurement shall be 500 V or 1000 V. The construction of hangers shall ensure that the workpieces remain earthed during the coating process.

NOTE Since workpieces are often earthed by metallic hooks, it is important to clean these hooks regularly or to design them in such way, that the built-up of insulating layers of coating materials is prevented.

6.2 Tests of the stationary equipment

6.2.10 Effectivity of locally acting fire extinguishing system

7.2.3 Test intervals

For a safe operation of the stationary equipment for electrostatic spraying of ignitable coating powders the intervals for repeated tests shall be determined by the manufacturer. The intervals depend on the operational and local conditions. The following maximum test intervals are recommended:

Table 4 - Test intervals

STS recommendation Fire detection: 12 months



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