
Inštalacije za avtomatsko opremo za elektrostatično brizganje z gorljivim prahom za prevleke

Automatic electrostatic spraying installations for flammable coating powder

Ortsfeste elektrostatische Sprühanlagen für brennbare Beschichtungspulver

Installations automatiques de projection électrostatique de poudre de revêtement inflammable

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87.100	Oprema za nanašanje premazov	Paint coating equipment

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English version

Automatic electrostatic spraying installations for flammable coating powder

Installations automatiques de projection
électrostatique de poudre de revêtement
inflammable

Ortsfeste elektrostatische Sprühanlagen
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Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

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CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

Foreword

This European Standard was prepared by SC 31-8, Electrostatic painting and finishing equipment, of Technical Committee CENELEC TC 31, Electrical apparatus for explosive atmospheres. It was revised taking into account the comments received during the Unique Acceptance Procedure launched in December 1993 and was submitted to a second vote (3MV). The text of this draft was approved by CENELEC as EN 50177 on 1996-10-01.

The following dates were fixed:

- latest date by which the EN has to be implemented
at national level by publication of an identical
national standard (dop) 1997-06-01
- latest date by which the national standards conflicting
with the EN have to be withdrawn (dow) 1997-06-01

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Introduction

i Process

In the process of electrostatic powder coating the powder is transported in an air stream from a powder hopper up to an electrostatic spraying device. As the powder particles flow through the spraying device they are electrostatically charged by means of a high voltage of the order of some tens of kilovolts and ejected in the form of a cloud which is directed towards the workpiece. The powder particles of the cloud are attracted to and deposited on the earthed workpiece. The powder will continue to be deposited on the earthed workpiece until, at a certain thickness, it acts as an insulator further deposition of powder is prevented.

Powder that is not deposited on the workpiece (overspray) is extracted by the exhaust ventilation system or other means into the powder collection unit.

The workpieces coated with powder are then passed into an oven where the powder is melted and cured into a coherent coating.

ii Special hazard iTeh STANDARD PREVIEW

A flammable coating powder¹⁾ explosion may occur where both:

- the concentration of coating powder in air is in the explosion range and <https://standards.itih.ai/catalog/standards/sist/d967abc3-af01-450c-a52f-1cc9e9cd-110>
- a source of ignition of sufficient energy for that coating powder cloud is present. This ignition source can be for example a hot surface, a naked flame or an electrical arc or spark.

It follows that an explosion can be prevented if one or preferably both of these conditions are avoided. Due to the difficulty in totally eliminating sources of ignition most reliance should be placed on avoiding explosive concentrations of coating powder in air.

ii.2.1 Although an intimate mixture of flammable coating powder and air may burn with explosive violence, not all mixtures will do so. There is a range of concentrations of coating powder in air in which the mixture can explode, but mixtures above or below this range cannot.

NOTE: If a burning powder cloud is confined within a space which restricts free escape of expanding gases and combustion products the explosion may lead to a pressure increase.

ii.2.2 The particle size distribution of coating powders is usually in the range of 5 μm to 80 μm . Where there is a doubt about or no knowledge of the lower explosion limit, an average concentration of the coating powder suspended in the air of 10 g/m^3 shall not be exceeded.

1) Flammable coating powders will behave as combustible/flammable dusts.

ii.2.3 It is important that deposits of powder are not allowed to accumulate within the spraying areas for they may become disturbed and give rise to an explosive atmosphere. This does not apply to deposits on filter devices and accumulations of coating powder in hoppers where filters and hoppers are integrated in the spraying area and are designed to collect the coating powder.

ii.2.4 Careful attention should be given to prevent the build-up of an electrostatic charge on various surfaces close to the powder application zone. These can be the workpieces being coated or moving automatic devices and fixtures of the powder spraying system etc. Care should be taken that these are adequately earthed. Of special importance is the attention needed to maintain proper earthing through the fixtures supporting the workpieces. These should be carefully designed to minimize deposition of powder on them.

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1 Scope

1.1 This European Standard specifies requirements for automatic electrostatic spraying installations which are used for spraying flammable coating powders which may form explosive atmospheres in the spraying area. In this connection distinction is made between spraying devices which due to their type of construction comply with requirements as laid down in EN 50050:1986 as applicable, and those for which other discharge energies and/or current limits are stipulated.

It also specifies the constructional requirements for the safe operational conditions of the electrical installations including ventilation requirements. Additional requirements as to the construction of the spraying areas such as cabins, booths, etc. are dealt with in other standards, currently in preparation in CEN/TC 271.

1.2 This European Standard considers the following three broad classes of electrostatic spraying systems.

Type A Systems complying with EN 50050:1986 with a discharge energy limit of 5 mJ (see 5.1.1)

In these systems there is no danger of either electric shock or incendive energy.

Type B Systems with a discharge energy limit in excess of 5 mJ but less than 350 mJ and a current limit of less than 0,7 mA (see 5.1.2)

In these systems there is no danger of electric shock but there are dangers from incendive energy.

Type C Systems with a discharge energy in excess of 350 mJ and/or a current in excess of 0,7 mA (see item 5.1.3)

In these systems there are dangers of electric shock and from incendive energy.

1.3 This European Standard considers only the hazards being specific to the electrostatic characteristics of the electrostatic powder coating process using coating powders which do not contain dynamically separable metallic particles.

1.4 For other aspects, such as:

- classification of hazardous areas for example into zones;
- selection, installation and use of electrical equipment in hazardous areas;
- health hazards, for example toxic and skin effects;
- cleaning of spraying areas;
- fire hazard from external sources;
- storage and handling of flammable powder outside of the electrostatic spraying installation;
- fire protection;
- explosion protection systems;

where there are no harmonized European Standards then national regulations apply.

2 Normative references

This European Standard incorporates, by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

EN 344	1991	Requirements and test methods for safety - Protective and occupational footwear for professional use
prEN 1127-1	1993	Safety of machinery - Fire and explosions - Part 1: Explosion prevention and protection
EN 50014	1992	Electrical apparatus for potentially explosive atmospheres General requirements
EN 50050	1986	Electrical apparatus for potentially explosive atmospheres Electrostatic hand-held spraying equipment
EN 50053	1989	Requirements for the selection, installation and use of electrostatic spraying equipment for flammable materials
EN 60529	1991	Degrees of protection provided by enclosures (IP Code) (IEC 529:1989)

3 Definitions

For the purpose of this European Standard, the following definitions apply:

3.1 electrostatic spraying device for coating powder

A device for charging and depositing suspended powder particles with the assistance of electric fields. This may include electrodes for forming the cloud of the powder.

3.2 electrostatic spraying system

A system in general comprising the electrostatic spraying devices for applying coating powder, the high voltage supply system and connecting cables.

3.3 automatic electrostatic spraying installation

An installation in which the spraying device is either permanently fixed or led by means of moving automatic devices (e.g. robots).

The installation comprises in general the following items:

- spraying area;
- high voltage supply system;
- electrostatic spraying device;
- coating powder supply;
- device for the collection and conditioning of coating powder;
- fixtures of the spraying devices;
- jigs/resp. fixtures of the workpieces;
- conveyors;
- earthing system;
- exhaust ventilation system;
- fire protection equipment;
- explosion protection device.

3.4 high voltage supply system

Voltage conversion unit comprising in general:

- low voltage section with devices for switching on and off the unit and for adjustment, control, regulation, limitation and monitoring of voltage and current;
- high voltage section for voltage conversion;
- high voltage switching device;
- high voltage cables.

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3.5 spraying area

An area, closed or not, in which the spraying material is deposited onto the workpieces by the electrostatic spraying system.

3.5.1 enclosed spray cabin

An area closed on all sides while spraying excluding openings for ingress and egress of the workpieces, ducts for ventilation and the powder collection unit.

3.5.2 partly enclosed spray cabin

An area closed on all sides while spraying excluding openings for ingress and egress of the workpieces, the automatic electrostatic spraying devices, ducts for ventilation and the powder collection unit.

3.5.3 spray booth

An area closed on all sides while spraying except on the side of the automatic electrostatic spraying devices and excluding openings for ingress and egress of the workpiece, ducts for ventilation and the powder collection unit.

