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## Explosionsskyddad elektrisk materiel – Installation av utrustning för automatisk sprutmålning med brännbart pulver

*Automatic electrostatic spraying equipment for flammable coating powder*

Som svensk standard gäller europastandarden EN 50177:2006. Den svenska standarden innehåller den officiella engelska språkversionen av EN 50177:2006.

### Nationellt förord

Tidigare fastställd svensk standard SS-EN EN 50177, utgåva 1, 1997 gäller ej fr o m 2009-05-01.

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ICS 87.100

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Denna standard är fastställd av SEK Svensk Elstandard, som också kan lämna upplysningar om **sakinnehållet** i standarden.  
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### *Standarder underlättar utvecklingen och höjer elsäkerheten*

Det finns många fördelar med att ha gemensamma tekniska regler för bl a säkerhet, prestanda, dokumentation, utförande och skötsel av elprodukter, elanläggningar och metoder. Genom att utforma sådana standarder blir säkerhetskraven tydliga och utvecklingskostnaderna rimliga samtidigt som marknadens acceptans för produkten eller tjänsten ökar.

Många standarder inom elområdet beskriver tekniska lösningar och metoder som åstadkommer den elsäkerhet som föreskrivs av svenska myndigheter och av EU.

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SEK samordnar svenska intressenters medverkan i SEKs tekniska kommittéer och stödjer svenska experters medverkan i internationella och europeiska projekt.

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Utformningen av standarder sker i allt väsentligt i internationellt och europeiskt samarbete. SEK är svensk nationalkommitté av International Electrotechnical Commission (IEC) och Comité Européen de Normalisation Electrotechnique (CENELEC).

Standardiseringsarbetet inom SEK är organiserat i referensgrupper bestående av ett antal tekniska kommittéer som speglar hur arbetet inom IEC och CENELEC är organiserat.

Arbetet i de tekniska kommittéerna är öppet för alla svenska organisationer, företag, institutioner, myndigheter och statliga verk. Den årliga avgiften för deltagandet och intäkter från försäljning finansierar SEKs standardiseringsverksamhet och medlemsavgift till IEC och CENELEC.

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Du som vill dra nytta av dessa möjligheter är välkommen att kontakta SEKs kansli för mer information.

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English version

**Automatic electrostatic spraying equipment  
for flammable coating powder**

Equipements automatiques  
de projection électrostatique  
de poudre de revêtement inflammable

Ortsfeste elektrostatische Sprühanlagen  
für brennbare Beschichtungspulver

This European Standard was approved by CENELEC on 2006-05-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

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.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

**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. The text of the draft was submitted to the formal vote and was approved by CENELEC as EN 50177 on 2006-05-01.

This European Standard supersedes EN 50177:1996.

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 or by endorsement (dop) 2007-05-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2009-05-01

This European Standard has been prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association and covers essential requirements of EC Directive 94/9/EC. See Annex ZZ.

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## Contents

0	Introduction .....	4
1	Scope .....	5
2	Normative references .....	5
3	Definitions .....	6
4	General requirements .....	9
5	Construction requirements .....	10
6	High voltage tests .....	12
7	Marking .....	12
8	Instruction manual, cleaning and maintenance .....	13
	Annex A (normative) Spraying areas and powder collection unit .....	15
	Annex ZZ (informative) Coverage of Essential Requirements of EC Directives .....	16

## 0 Introduction

### 0.1 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 and so 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.

### 0.2 Special hazard

A flammable coating powder <sup>1)</sup> explosion may occur where both

- the concentration of coating powder in air is in the explosion range and
- 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.

**0.2.1** 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.

**0.2.2** 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<sup>3</sup> shall not be exceeded.

**0.2.3** 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.

**0.2.4** 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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<sup>1)</sup> In the sense of this European Standard flammable coating powders are treated as combustible dusts.

## 1 Scope

**1.1** This European Standard specifies requirements for automatic electrostatic spraying equipment which are used for spraying flammable powders which create 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 50050:2006 as applicable, and those for which other discharge energies and/or current limits are stipulated.

It also gives information on the safe operational conditions of the electrical equipment including ventilation requirements. Additional requirements as to the construction of the spraying areas such as cabins, booths, etc. are dealt with in EN 12981.

**1.2** This European Standard considers the following three types of electrostatic spraying systems.

Type A Systems complying with EN 50050:2006 with a discharge energy limit of 2 mJ (see 5.1.1)

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

Type B Systems with a discharge energy in excess of 2 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 discharges of 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 5.1.3)

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

**1.3** This European Standard considers the hazards specific to explosive atmospheres created by the electrostatic spraying process.

**1.4** The automatic electrostatic spraying equipment for flammable coating powders shall be constructed suitable for group II category 3 as defined in EN 60079-0.

**1.5** This European Standard does not deal with matters of noise created by the equipment. For this item, the requirements are laid down in EN ISO 11688-1.

## 2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

CLC/TR 50404	2003	Electrostatics – Code of practice for the avoidance of hazards due to static electricity
EN 1127-1	1997	Explosive atmospheres – Explosion prevention and protection – Part 1: Basic concepts and methodology
EN 1149	series	Protective clothing – Electrostatic properties
EN 12981	2005	Coating plants – Spray booths for application of organic powder coating material – Safety requirements