SLOVENSKI STANDARD
SIST EN 50223:2002

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Avtomatska oprema za elektrostatiļ ni nanos gorljivih kosmiļ astih materialov

Automatic electrostatic application equipment for flammable flock material

Ortsfeste elektrostatische Flockanlagen für entzündbaren Flock

Matériel automatique de projection électrostatique de flock inflammable

Ta slovenski standard je istoveten z: **EN 50223:2001**

ICS:

29.260.20	Elektriļ ni aparati za eksplozivna ozraļ ja	Electrical apparatus for explosive atmospheres
87.100	Oprema za nanašanje premazov	Paint coating equipment

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English version

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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

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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 50223 on 2000-08-01.

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 or by endorsement	(dop)	2001-08-01
- latest date by which the national standards conflicting with the EN have to be withdrawn	(dow)	2003-08-01

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Introduction

Process

In the process of electrostatic flock application the flock is transported e.g. either by gravitational forces from a hopper, or in an air stream, or by electrostatic forces through an electric field. As the flock particles flow through the flock application device and/or the electric field they are electrostatically charged by means of a high voltage of the order of some tens of kilovolts provided by a high voltage generator. In the form of a cloud they are attracted to and deposited on the earthed workpiece. They stick to those parts of it which are covered with an adhesive layer. The adhesive is set at room temperature or by heating.

Flock particles not deposited on the workpiece (overspray) are extracted by the exhaust ventilation system or other means into the flock collection unit.

Special hazard

An explosion may occur where both:

- the adhesives used form explosive gas atmospheres or the concentration of flock or the hybrid mixture of both in air is in the explosion range, and

- a source of ignition of sufficient energy for that explosive gas atmosphere or flock cloud[1)] 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 gas and flock in air.

NOTE 1 If an aqueous based or a flammable solvent free adhesive is used, an explosive gas atmosphere cannot be formed.

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

NOTE 2 If a flammable gas and/or flock cloud is confined within a space which restricts free escape of expanding gases and combustion products the explosion may lead to a pressure increase.

Where there is a doubt about or no knowledge of the lower explosion limit, an average concentration of the flock suspended in the air of 100 g/m^3 shall not be exceeded in the flock application cabin or booth. This does not apply to the flock field.

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

Careful attention should be given to prevent the build-up of an electrostatic charge on various surfaces close to the flock application area. These can also be the workpieces being flocked or moving automatic devices and fixtures of the flock application system etc. Care shall 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 flock and/or adhesives on them.

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1) Flammable flock material can behave as combustible/flammable dusts.

1 Scope

1.1 This European Standard specifies requirements for automatic electrostatic flock application equipment which is used for applying flammable flock which may form explosive atmospheres in the flock application area. In this connection a distinction is made between flock application 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 flock application cabins and 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 flock application systems and two types of adhesives flammable and not flammable used in the flocking industry:

Type A Systems complying with EN 50050:1986 with a discharge energy limit of 0,24 mJ or 5 mJ (see 5.1.1)

In cases of flock application in association with adhesives which can form an explosive atmosphere, the energy limit of the flock application device shall be 0,24 mJ.

In cases of flock application in association with adhesives which do not form an explosive atmosphere, the discharge energy limit of the application device shall be 5 mJ.

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 0,24 mJ or 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 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 specific to the electrostatic characteristics of the electrostatic flock process.

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;
- cleaning of application areas;
- fire hazard from external sources and flammable adhesives;
- storage and handling of flammable flock outside of the electrostatic flock application installation;
- fire protection;
- explosion protection systems;

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

NOTE The use of electrostatic hand-held flock application equipment for flock material of minimum ignition energies in excess of 500 mJ only used with adhesives which do not form explosive gas atmospheres is covered by EN 50059.

1.5 This standard applies to automatic electrostatic flock applications, which have been produced after the date of publication of the present standard and in which flammable substances are released.

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 applies (including amendments).

EN 292-2	1991	Safety of machinery - Basic concepts, general principles for design Part 2: Technical principles and specifications
EN 344	1992	Requirements and test methods for safety, protective and occupational footwear for professional use
EN 954-1	1996	Safety of machinery - Safety related parts of control systems Part 1: General principles for design
EN 1127-1	1997	Explosive atmospheres - Explosion prevention and protection Part 1: Basic concepts and methodology
EN 1149	Series	Protective clothing – Electrostatic properties
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 50053-3	1990	Requirements for the selection, installation and use of electrostatic spraying equipment for flammable materials Part 3: Electrostatic hand-held flock application guns with an energy limit of 0,24 mJ or 5 mJ and their associated apparatus.
EN 50059	1990	Specification for electrostatic hand-held spraying equipment for non-flammable material for painting and finishing
EN 60204-1	1997	Electrical equipment of machines -- Part 1: General requirements
EN 60529	1991	Degrees of protection provided by enclosures (IP Code) (IEC 60529:1989)

3 Definitions

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

3.1
electrostatic application device for flock
a device for metering, charging and depositing suspended flock particles with the assistance of electric fields. This may include electrodes for forming the cloud of the flock

3.2
electrostatic flock application system
a system in general comprising the electrostatic flock application devices for applying flock, the high voltage supply system and connecting cables

3.3
automatic electrostatic flock application equipment (flock machine)
an equipment in which the flock application device is either permanently fixed or led by means of moving automatic devices (e.g. robots)

In some of these machines the effect of the electrical field is assisted by pneumatic and/or mechanical or gravitational forces.

The application equipment comprises in general the following items:

- flock application cabins and booths;
- high voltage supply system;
- electrostatic flock application device;
- flock supply and/or metering system;
- devices for the collection and conditioning of flock;
- fixtures of the flock application 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.

3.5
application area
an area, closed or not, in which the flock is deposited onto the workpieces by the electrostatic application system

3.5.1
enclosed application cabin
an area closed on all sides while flocking excluding openings for ingress and egress of the workpieces, ducts for ventilation and the flock collection unit

3.5.2
partly enclosed application cabin
an area closed on all sides while flocking excluding openings for ingress and egress of the workpieces, the automatic electrostatic application devices, ducts for ventilation and the flock collection unit

3.5.3
application booth
an area closed on all sides while flocking except on the side of the automatic electrostatic application devices and excluding openings for ingress and egress of the workpieces, ducts for ventilation and the flock collection unit

3.6
flock collection unit
unit which collects excessive flock of the application process which has not been deposited on the workpiece

In general, the flock collection unit is connected with the application area either directly or through the ducts of the exhaust ventilation