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**Oprema za ročno elektrostatično brizganje - Varnostne zahteve - 3. del: Ročna oprema za brizganje vnetljivih kosmičev**

Electrostatic hand-held spraying equipment - Safety requirements - Part 3: Hand-held spraying equipment for ignitable flock

Elektrostatische Handsprüheinrichtungen - Sicherheitsanforderungen - Teil 3: Handsprüheinrichtungen für entzündbaren Flock

Equipement manuel de projection électrostatique - Exigences de sécurité - Partie 3: Equipement manuel de projection de floque inflammable

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**EN 50050-3**

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English version

**Electrostatic hand-held spraying equipment -  
Safety requirements -  
Part 3: Hand-held spraying equipment for ignitable flock**

Équipement manuel de projection  
électrostatique -  
Exigences de sécurité -  
Partie 3: Équipement manuel de  
projection de floque inflammable

Elektrostatische Handsprüheinrichtungen -  
Sicherheitsanforderungen -  
Teil 3: Handsprüheinrichtungen für  
entzündbaren Flock

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

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## Foreword

This document (EN 50050-3:2013) has been prepared by SC 31-8, "Electrostatic painting and finishing equipment", of CLC/TC 31, "Electrical apparatus for potentially explosive atmospheres".

The following dates are fixed:

- latest date by which this document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2014-10-14
- latest date by which the national standards conflicting with this document have to be withdrawn (dow) 2016-10-14

In combination with EN 50050-1:2013 and EN 50050-2:2013, this document supersedes EN 50050:2006.

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For the relationship with EU Directive(s) see informative Annex ZZ, which is an integral part of this document.

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## 0 Introduction

### 0.1 Process

In the process of electrostatic flock application, flock particles are transported from a reservoir to an applicator either by gravitational forces or within an air stream. As the flock particles are passing the applicator, they are electrostatically charged and developed by means of a high voltage of some tens of kilovolts and ejected in the form of a cloud which is directed towards the workpiece. The flock particles of the cloud are attracted by the earthed workpiece and enclosed from a before served adhesive layer. They stick in this adhesive layer until the adhesive is set at room temperature or by heating.

Flock particles not deposited on the workpiece (overspray) are removed by the exhaust ventilation system, by brushes or other devices into the flock recovery system.

### 0.2 Explosion hazards

**0.2.1** An explosion can occur, if

- the concentration of flock particles in air is within the explosion limits,
  - contamination by adhesives (in a cured condition most of the adhesives are insulating), and
  - an ignition source of appropriate energy for this explosive atmosphere
- is present.

Ignition sources could be, for instance, a hot surface, a naked flame, an electric arc or a spark.

An explosion could be prevented, if at least one condition is avoided. Because it is very difficult to exclude the possibility of ignitable discharges completely, the main focus should be the prevention of ignitable concentrations of flock in air.

**0.2.2** Deflagration of explosive atmospheres is only possible within a given range of concentration, but not, if the concentration is above or below this range.

**NOTE** If an explosive cloud of flock and air is trapped into a closed room, an explosion can lead to a fatal increase of pressure.

**0.2.3** It is important that deposits of flock are not allowed to accumulate within the spraying areas for they may be whirled up and give rise to an explosive atmosphere. This does not apply to deposits on filter devices and accumulations of flock in reservoirs where filters and reservoirs are integrated in the spraying area and are designed to collect the flock.

**0.2.4** Particular attention should be paid to the prevention of electrostatic charges on different surfaces located in the vicinity of the flock cloud. This could apply to e.g. workpieces during the coating process.

### 0.3 Electric hazards

**0.3.1** Electric shock (by direct or indirect contact) can be generated, for instance, by contact with

- live parts, which are not insulated for operational reasons,
- conductive parts, which are not connected to dangerous voltage during normal operation, but only in case of failure,
- insulated live parts with insufficient or damaged insulation due to external impact.

**0.3.2** Inadequate earthing may occur, for instance, due to

- faulty connections to the protective earthing system,
- a too high resistance to earth (e. g. contamination by flock).

**0.3.3** Hazards could occur, for instance, if hazardous malfunctions (e.g. shortcut of electronic safety circuits) occur due to interferences of the high voltage equipment and the components of the control and safety systems.

**0.3.4** Hazardous electrostatic discharges could be generated, for instance, by non-earthed conductive components or by large insulating surfaces, especially if they are backed with conductive material.

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## 1 Scope

**1.1** This European Standard specifies the requirements for hand-held or hand-operated electrostatic spraying equipment for ignitable flock within a temperature range from 5 °C to 40 °C to be used in explosive atmospheres generated by their own spray cloud.

This European Standard deals with all electrical hazards significant for the electrostatic spraying of flock, which could also contain small quantities of added metal particles, if the work is carried out under conditions recommended by the manufacturer. In particular, this includes ignition hazards resulting from the generated explosive atmosphere. This European Standard specifies the design-related and test requirements for electrostatic spraying equipment of type A-F and type B-F according to Table 1 of EN 50223:2010.

**1.2** Electrostatic applicators are considered to be equipment of group II, category 3D for use in potentially explosive areas of zone 22. All other parts of hand-held electrostatic spraying equipment are considered to be equipment of category 3D if they are installed or used in potentially explosive areas of zone 22.

NOTE 1 Solvent vapours which could be evaporated by workpieces coated with adhesives do not lead to a zone 2 in the flocking area.

**1.3** In addition to the requirements above, the requirements of EN 1953 applies with regard to all other significant hazards relevant for applicators (e.g. health hazards, inadequate ergonomics).

**1.4** This European Standard does not apply to

- zone classification of the areas in and around spray booths [see EN 50223],
- zone classification of other areas with potentially explosive atmosphere [see EN 60079-10-2],
- selection, erection and application of other electrical and non-electrical equipment in areas with explosion hazard [see EN 60079-14 and EN 50223],
- cleaning of spraying areas, see instruction manual of the spray booth,
- fire prevention and protection, for instance fire hazards due to other sources [see EN 50223],
- explosion protection systems [see EN 50223],
- dust hazards [see EN 12981].

NOTE 2 Noise is not considered to be a significant hazard for hand-held spraying equipment for ignitable flock.



## 2 Normative references

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

EN 1953	<i>Atomising and spraying equipment for coating materials – Safety requirements</i>
EN 1149-5	<i>Protective clothing – Electrostatic properties – Part 5: Performance requirements</i>
EN 12981	<i>Coating plants – Spray booths for application of organic powder coating material – Safety requirements</i>
EN 50223:2010	<i>Stationary electrostatic application equipment for ignitable flock material – Safety requirements</i>
EN 60079-7:2007	<i>Explosive atmospheres – Part 7: Equipment protection by increased safety "e" (IEC 60079-7:2006)</i>
EN 60204-1	<i>Safety of machinery – Electrical equipment of machines – Part 1: General requirements (IEC 60204-1)</i>
EN 60529	<i>Degrees of protection provided by enclosures (IP code) (IEC 60529)</i>
EN 61340-4-1	<i>Electrostatics – Part 4-1: Standard test methods for specific applications – Electrical resistance of floor coverings and installed floors (IEC 61340-4-1)</i>
EN 62061	<i>Safety of machinery – Functional safety of safety-related electrical, electronic and programmable electronic control systems (IEC 62061)</i>
EN ISO 12100	<i>Safety of machinery - General principles for design - Risk assessment and risk reduction (ISO 12100)</i>
EN ISO 13849-1	<i>Safety of machinery - Safety-related parts of control systems - Part 1: General principles for design (ISO 13849-1)</i>
EN ISO 20344	<i>Personal protective equipment – Test methods for footwear (ISO 20344)</i>

### 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

#### 3.1

##### **hand-held spraying equipment**

hand-held or hand-operated equipment for electrostatic coating using ignitable flock, generally comprising the following parts:

- applicator;
- flock supply system;
- control device;
- high voltage supply system;
- connecting cable

#### 3.2

##### **connecting cable**

electric cable to the applicator

#### 3.3

##### **earthing device**

device for earthing the hand-held spraying equipment permanently

#### 3.4

##### **spraying device**

outlet opening for the flock

#### 3.5

##### **high voltage electrode**

conductive part of the applicator which is at high voltage and serves to charge the coating material directly or indirectly

#### 3.6

##### **control device**

device generally having the following functions:

- control of, for instance, the flock supply system, the control air, the purge air

Note 1 to entry A combination of the control device and the high voltage supply according to 3.8 is possible.

#### 3.7

##### **applicator**

equipment for application of flock

Note 1 to entry In general, the applicator comprises the following parts:

- high voltage electrode;
- high voltage supply (as far as integrated into the applicator);
- housing;
- spraying device;
- exchangeable attachment parts (e.g. nozzles, extensions, angular pieces, etc.);
- if applicable, battery unit (integrated fixedly, or attached).

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**3.8****high voltage supply for applicators**

in general, high voltage supply comprising the following parts:

- low voltage section with devices for switching on and off the hand-held spraying equipment and for adjustment, control, regulation, limitation and monitoring of current and voltage, as well as the required connecting cables;
- high voltage generator

**3.9****spraying area**

area, closed or not, in which the flock is applied to the workpiece by the hand-held spraying equipment

**3.10****dangerous discharge**

discharge which generates the hazard of ignition of explosive mixtures or of electric shock

**3.11****flock supply system**

in general, flock supply system comprising the following:

- flock reservoir;
- dosing devices for flock;
- supply lines for flock;
- devices for drive, control and monitoring flock supply system

**3.12****workpiece**

article to which the flock is applied

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**3.13****ignitable flock**

flock which, in a whirled-up state, could be ignited by an effective ignition source and which continues to burn after the ignition source has been removed or may react in the form of an explosion

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**3.14****explosive atmosphere**

mixture of air, under atmospheric conditions, and of ignitable substances in the form of gas, vapour, mist, powder or flock, in such proportions that it can be ignited by effective ignition sources, such as excessive temperature, arcs or sparks [EN 1127-1]

**3.15****Lower Explosion Limit****LEL**

concentration of ignitable gas, vapour, mist, powder or flock in air below which an explosive atmosphere will not be formed

**3.16****discharge energy**

energy discharged from a conductive part of the installation in form of a spark which could cause both electric shock to a person and an ignition of an explosive atmosphere

**3.17****antistatic footwear**

footwear that has a resistance to earth via its sole, which is low enough to prevent the build-up of electrostatic charges capable to produce a dangerous discharge

Note 1 to entry See EN ISO 20344.

Note 2 to entry A required electric insulating resistance to prevent electric shocks is not contradictory to this definition.