SLOVENSKI STANDARD
oSIST prEN 50059:2016

01-julij-2016

Oprema za ročno elektrostatično brizganje - Varnostne zahteve - Ročna oprema za brizganje nevnetljivih premazov

Electrostatic hand-held spraying equipment - Safety requirements - Hand-held spraying equipment for non-ignitable coating materials

Elektrostatische Handsprüheinrichtungen - Sicherheitsanforderungen - Handsprüheinrichtungen für nichtentzündbare Beschichtungsstoffe

Equipement manuel de projection électrostatique - Exigences de sécurité - Equipement manuel de projection de revêtement ininflammable

Ta slovenski standard je istoveten z: **prEN 50059**

ICS:

87.100	Oprema za nanašanje premazov	Paint coating equipment

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EUROPEAN STANDARD

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English Version

Electrostatic hand-held spraying equipment - Safety requirements - Hand-held spraying equipment for non-ignitable coating materials

Equipement manuel de projection électrostatique - Exigences de sécurité - Equipement manuel de projection de revêtement ininflammable

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This draft European Standard is submitted to CENELEC members for enquiry.
Deadline for CENELEC: 2016-08-05.

It has been drawn up by CLC/TC 204.

If this draft becomes a European Standard, 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.

This draft European Standard was established by CENELEC 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 CEN-CENELEC Management Centre has the same status as the official versions.

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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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

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European foreword

This document (prEN 50059:2016) has been prepared by CLC/TC 204 “Safety of electrostatic painting and finishing equipment”.

This document is currently submitted to the Enquiry.

The following dates are proposed:

• latest date by which the existence of this document has to be announced at national level	(doa)	dor + 6 months
• latest date by which this document has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	dor + 12 months
• latest date by which the national standards conflicting with this document have to be withdrawn	(dow)	dor + 36 months (to be confirmed or modified when voting)

This document will supersede EN 50059:1990.

The significant changes with respect to EN 50059:1990 are as listed below:

— modification of the title of the standard;

— extension of introduction;

— extension of normative references;

— extension of terms and definitions;

— new arrangement, amendment and complement of the requirements for hand-held spraying equipment for non-ignitable liquid coating materials;

— definition of requirements for safety functions;

— new arrangement amendment and complement of tests for hand-held spraying equipment for non-ignitable liquid coating materials;

— new arrangement and extension of the information for use;

— definition of requirements for repeated tests;

— introduction of the normative Annex A ” Test of a discharge with the peak current value $I_{C(p)}$ and the pulse duration t_i (type test) “;

— introduction of the informative Annex B “Example for discharge test”;

— introduction of the informative Annex C “Ignitability of water-based paints”;

— introduction of the informative Annex D “Quality assurance systems for electrostatic spraying equipment”;

— introduction of the informative Annex ZZ “Coverage of Essential Requirements of EC directives.

0 Introduction

0.1 Process

During the electrostatic coating process the non-ignitable coating material is transported from a reservoir to an applicator where it is atomised by mechanical forces and by the influence of an electric field. The coating material is charged by high voltage of some 10 kV and a spray cloud is generated. The charged parts/droplets of the coating materials are attracted by and applied to the earthed workpiece.

Parts/droplets of the coating material, which are not applied to the workpiece (overspray) are removed by a suction device or by other means.

After the coating process the coated workpieces are introduced into a dryer or oven where a dry film of coating material is generated.

0.2 Fire hazards

0.2.1 Fire hazards can be caused by deposits of coating materials inside the spray booth, exhaust air ducts, the recovery system for coating materials, and filters. During operation, malfunctions or electrical faults may cause ignition of these residues. This is especially true for spray booths where electrostatic coating takes place. The fast propagation of the fire leads to hazards also in adjacent areas.

0.2.2 Particular attention should be paid to the prevention of electrostatic charges on different surfaces, which are in the vicinity of the spray cloud. This could apply to workpieces during the coating process or the reciprocating devices and the mounting parts of the spraying system, etc.

0.2.3 When spraying non-ignitable coating material, the formation of an explosive atmosphere is not likely to occur. Electrostatic application equipment for ignitable coating materials are covered by EN 50050-1, EN 50050-2 and EN 50050-3.

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 coating materials).

0.3.3 Hazards could occur, for instance, if hazardous malfunctions (e.g. shortcut of electronic safety circuits) occur due to interferences of the electrostatic 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.

0.3.5 Ventricular fibrillation is the primary risk of electric shock. The undercut of the current limit and the fibrillation limits are proven by current and time measurement. In this standard, $I_{(t)}$ is used as a measure for falling below the current limit and the fibrillation limits. It is comparable to the amount of current $Ix\ t$ or the specific fibrillation energy $I^2\ x\ t$ in accordance with IEC/TS 60479-1 and IEC/TS 60479-2. A power limit as given in the standards EN 50176, EN 50177, EN 50223 and EN 50348 is not applicable in this standard due to the characteristics of the equipment and the resulting hazard of electric current.

127 **0.3.6** Permanent flow through the body with direct current may lead to warming of body parts (reversible
128 burns?). Beginning and interruption of current flow can be harmful and cause crampy muscle contractions.

1 Scope

1.1 This European Standard specifies the requirements for hand-held or hand-operated electrostatic spraying equipment for non-ignitable liquid coating materials which

— do not generate an explosive atmosphere inside the spraying area;

— are used to process materials with a conductivity of less than 2000 µS/cm;

— operate with direct current having a sinusoidal ripple of not more than 10 % of the rms value.

This European Standard deals with all electrical hazards significant for the electrostatic spraying of non-ignitable liquid coating materials, which could also contain small quantities of added metal particles, if the work is carried out under conditions recommended by the manufacturer.

This European Standard specifies the design-related and test requirements for electrostatic spraying equipment of type A-NL according to Table 1 of EN 50348:2010.

1.2 With regard to all other significant hazards relevant for applicators (e.g. ejection of fluids, mechanical strength, electrical (apart from electrostatic) hazards, noise, contract with or inhalation of dangerous substances, ergonomics) the requirements of EN 1953 applies.

1.3 This European Standard also gives details regarding quality assurance systems for electrostatic spraying equipment, see Annex D.

1.4 For electrostatic spraying equipment used in food and pharmaceutical industry, additional requirements may apply.

1.5 This European Standard does not apply to

— electrostatic hand-held spraying equipment for non-ignitable coating materials which are placed on the market before the date of publication of this European Standard

— cleaning of spraying areas, see instruction manual of the spraying booth,

— fire prevention and protection [for instance fire hazards due to other sources; see EN 12215, EN 12981],

— requirements for machinery for the supply and recirculation of coating material under pressure [see EN 12621].

The requirements of EN 12621 apply for specific requirements for machinery for the supply and recirculation of coating materials under pressure.

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 1149-5, *Protective clothing – Electrostatic properties – Part 5: Material performance and design requirements*

EN 1953, *Atomising and spraying equipment for coating materials – Safety requirements*

EN 12215, *Coating plants – Spray booths for application of organic liquid coating materials – Safety requirements*

EN 50348:2010, *Stationary electrostatic application equipment for non-ignitable liquid coating material – Safety requirements*

EN 60079-7:2007, *Explosive atmospheres – Part 7: Equipment protection by increased safety "e" (IEC 60079-7:2006)*

EN 60204-1*, Safety of machinery – Electrical equipment of machines – Part 1: General requirements (IEC 60204-1)*

EN 60529, *Degrees of protection provided by enclosures (IP code) (IEC 60529)*

EN 62061, *Safety of machinery – Functional safety of safety-related electrical, electronic and programmable electronic control systems (IEC 62061)*

EN ISO 12100, *Safety of machinery - General principles for design - Risk assessment and risk reduction (ISO 12100)*

EN ISO 13849-1, *Safety of machinery – Safety-related parts of control systems - Part 1: General principles for design (ISO 13849-1)*

EN ISO 20344, *Personal protective equipment – Test methods for footwear (ISO 20344)*

3 Terms, definitions and symbols

3.1 Terms and definitions

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

3.1.1
hand-held spraying equipment
hand-held or hand-operated equipment for electrostatic coating using non-ignitable liquid coating materials, generally comprising the following parts:

— applicator;

— coating material supply system;

— control device;

— high voltage supply system;

— connecting cable

3.1.2
connecting cable
electric cable to the applicator or charging device for liquid coating material

3.1.3
earthing device
device for earthing the electrostatic hand-held spraying equipment permanently

3.1.4
spraying device
outlet opening for the coating materials

3.1.5
high voltage electrode
conductive part, which is at high voltage and serves to directly or indirectly charging of the coating material

3.1.6
control device
device generally having the following functions:

— control of, for instance, the coating material supply system and the control air

Note 1 to entry: A combination of the control device and the high voltage supply according to 3.1.8 is possible.

3.1.7
applicator
equipment for application of coating materials that comprises the following parts in general:

— if applicable, 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)

3.1.8
high voltage supply for applicators
high voltage supply comprising the following parts in general:

— 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

3.1.9
spraying area
area, closed or not, in which the coating material is applied to the workpiece by the hand-held spraying equipment

3.1.10
dangerous discharge
discharge which generates a hazard of electric shock

3.1.11
coating material supply system
coating material supply system that comprises the following in general:

— reservoir for coating materials;

— dosing and mixing devices for coating materials;

— supply lines for coating materials;

— devices for drive, control and monitoring supply of coating materials;

— charging device for liquid coating material

3.1.12
workpiece
article to which the coating material is applied

3.1.13
non-ignitable liquid coating materials (coating material)
liquids and varnishes which cannot be ignited by an effective ignition source during spraying

Note 1 to entry: A formula for the estimation of ignitability on the basis of the composition of the liquid coating material is given in Annex C.

3.1.14
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 an 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.

3.1.15
antistatic clothes
clothes that have a resistance to earth, which is low enough to prevent the build-up of electrostatic charges capable of an dangerous discharge

Note 1 to entry: See EN 1149–5.

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

3.1.16
antistatic floor
floor that has a resistance to earth, which is low enough to prevent the build-up of electrostatic charges capable to produce an dangerous discharge

3.1.17
accessories
accessories are all devices, components and other equipment, except for 3.1.7 of this standard

3.1.18
repeated test
test of the hand-held spraying equipment, including all accessories, to be carried out at regular intervals

3.2 Symbols

U_{max} maximum outlet voltage of the high-voltage generator

I_{max} maximum outlet current of the high-voltage generator

$I_{B\ rms}$ body current (RMS) flowing from the hand to both feet's

$I_{C\ (p)}$ peak current value of a discharge caused by the hand-held spraying equipment

t_i time period, in which the peak current value $I_{C(p)}$ is dropped to 5% of its value, but not less than 500 mA

T time constant of a discharge