SLOVENSKI STANDARD
SIST EN 50053-1:1996

01-februar-1996

Requirements for the selection, installation and use of electrostatic spraying equipment for flammable spraying materials - Part 1: Hand held electrostatic paint spray guns with an energy limit of O.24 mJ and their associated apparatus

Requirements for the selection, installation and use of electrostatic spraying equipment for flammable materials -- Part 1: Hand-held electrostatic paint spray guns with an energy limit of 0,24 mJ and their associated apparatus

Bestimmungen für die Auswahl, Errichtung und Anwendung elektrostatischer Sprühanlagen für brennbare Sprühstoffe -- Teil 1: Elektrostatische Handsprüheinrichtungen für flüssige Sprühstoffe mit einer Energiegrenze von 0,24 mJ sowie Zubehör

Règles de sélection, d'installation et d'utilisation d'un équipement de projection électrostatique pour produits inflammables -- Partie 1: Pistolets manuels de projection électrostatique de peinture avec une énergie limite de 0,24 mJ et leur matériel associé

Ta slovenski standard je istoveten z: **EN 50053-1:1987**

ICS:

29.260.20	Električni aparati za eksplozivna ozračja	Electrical apparatus for explosive atmospheres
87.100	Oprema za nanašanje premazov	Paint coating equipment

SIST EN 50053-1:1996 **en**

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 50 053:
Part 1
February 1987

UDC: 667.661.23-83/621.319.7:620.263:001.4:620.1:614.83

Key words: potentially explosive atmosphere; explosive atmosphere; explosion proofing; electrostatic hand-held spraying equipment; spray gun; energy limit of 0,24 mJ; requirement for selection; requirement for installation; requirement for use

English version

Requirements for the selection, installation and use of electrostatic spraying equipment for flammable materials. Part 1. Hand-held electrostatic paint spray guns with an energy limit of 0,24 mJ and their associated apparatus

Règles de sélection, d'installation et d'utilisation des équipements de projection électrostatique pour produits inflammables. Partie 1. Pistolets manuels de projection électrostatique de peinture avec une énergie limite de 0,24 mJ et leur matériel associé

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Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CENELEC General 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 CENELEC General 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

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National foreword

This British Standard has been prepared under the direction of the General Electrotechnical Engineering Standards Committee.

BS 6742 will implement CENELEC European Standards for hand-held electrostatic painting and finishing equipment using flammable materials. This Part of BS 6742 is identical with the English text of EN 50 053 : Part 1 : 1987. The other published Part is:

Part 1. *Specification for hand-held spray guns and associated apparatus* (≡ EN 50 050 : 1986)

The remaining Parts at present envisaged are:

Part 3. *Requirements for selection, installation and use of hand-held powder spray guns (energy limit of 5* mJ*) and associated apparatus* (in course of final editing in CENELEC committee)

Part 4. *Requirements for selection, installation and use of hand-held flock spray guns (energy limit of 0,24 or 5* mJ*) and associated apparatus* (under discussion in CENELEC committee)

The preparation of further CENELEC European Standards for 'automatic' electrostatic spraying equipment using flammable materials is still to be considered.

Contents

CENELEC Harmonization Document referred to in European Standard EN 50 053: Part 1:

CENELEC HD 365 S 3 Classification of degrees of protection provided by enclosures (IEC 529 (1976) and amendments 1 and 2)

ISO Standard referred to in European Standard EN 50 053: Part 1:

ISO 2251 (1975) Lined antistatic rubber footwear

European Standards referred to in European Standard EN 50 053: Part 1:

EN 50 014 (1977) (1st edition) Electrical apparatus for potentially explosive atmospheres — General requirements (including amendment 1 (July 1979), amendment 2 (June 1982), amendment 3 (December 1982), amendment 4 (December 1982) and amendment 5 (February 1986))

EN 50 050 (1986) (1st edition) Electrical apparatus for potentially explosive atmospheres — Electrostatic hand-held spraying equipment.

This European Standard has been prepared by CENELEC Sub-Committee 31-8.

1 Introduction

In the process of paint spraying, liquid is converted into a mist of paint droplets which are directed onto a surface to produce an evenly distributed film of the required thickness and texture. In the electrostatic spraying system the atomized droplets are charged by means of a high voltage of the order of tens of kilovolts so that they are attracted to the earthed workpiece.

2 Scope

This European Standard gives requirements for the selection, installation and safe use of hand-held electrostatic spray guns with an energy limit of 0,24 mJ and their associated apparatus complying with EN 50 050, which may cause an explosive atmosphere when spraying flammable liquid.

This European Standard considers only the hazards that are specific to the electrostatic characteristics of the electrostatic spraying process.

For other aspects, such as

- classification of hazardous areas (e.g. classification into zones),
- selection, installation and use of electrical equipment in hazardous areas,
- health hazards (e.g. toxic and skin effects, electric shock),
- cleaning of paint spraying areas,
- fire hazard from external sources,
- storage and handling of flammable liquids,

national regulations apply.

3 Definitions

For this European Standard the following definitions apply:

3.1 antistatic footwear: Footwear that has a resistance to earth, via the sole, which is low enough to prevent the build-up of electrostatic charges.

3.2 antistatic gloves: Gloves that have a resistance low enough to prevent the build-up of electrostatic charges.

3.3 antistatic floor: A floor that has a resistance to earth which is low enough to prevent the build-up of electrostatic charges.

3.4 explosive atmosphere: A mixture with air, under atmospheric conditions, of flammable substances in the form of gas, vapour, mist, powder or flock, in such proportions that it can be exploded by excessive temperature, arcs or sparks (the danger is a real one).

3.5 lower explosive limit (LEL): The concentration of flammable gas, vapour or mist in air below which an explosive atmosphere will not be formed.

3.6 hazardous area: An area in which an explosive atmosphere is or may be expected to be present in quantities such as to require special precautions for the construction, installation and use of electrical apparatus.

3.7 workpiece: The article on which the spraying material is to be deposited.

3.8 spray cabin: An area closed on all sides while spraying except for means of ingress and egress for the workpieces and ducts for ventilation (see figure 1). The access door for the operator shall be closed while spraying.

3.9 spray booth: An area closed on all sides except on the side of the operator and for means of ingress and egress for the workpieces and ducts for ventilation (see figure 2).

4 General requirements

4.1 Instructions

Instructions on the installation and safe use of hand-held electrostatic paint-spraying equipment and associated apparatus covered by the scope of this European Standard shall be provided by the manufacturer of the equipment. These instructions shall be in a language that the user can understand.

4.2 Operator training and warning placard

The electrostatic spraying equipment is intended to be used only by trained personnel who shall be fully conversant with the requirements for use laid down in this European Standard. In addition, a warning placard in a language which the operator can understand shall be displayed in a prominent position in the vicinity of the spraying area. This placard shall summarize the important procedures and precautions which shall be observed by the operators. The dangers inherent in unauthorized cleaning procedures shall be clearly stated. See clause 6.

4.3 Footwear and gloves

Footwear intended for use by operators shall be antistatic and shall comply with ISO 2251.

If gloves are required, only antistatic gloves or gloves with the palms removed shall be used. Antistatic gloves shall be tested in accordance with 7.1.

5. Installation requirements

5.1 Floors

The floor within the operator's working area shall be antistatic, see figures 1 to 3 for guidance. Any permanent or temporary covering or coating (e.g. sealing) on the floor shall not increase the resistance to earth above the limit specified in 7.2. Deposits of residues may adversely affect the resistance to earth and shall not be allowed to accumulate.

NOTE 1. Ordinary bare concrete is generally found to be antistatic.

NOTE 2. In some circumstances the use of earthed metal grids for the floors may be advisable.

5.2 Spray cabins, spray booths and other spraying areas

5.2.1 Where spraying is carried out within a cabin or booth, all parts of the structure surface shall have a resistance to earth less than 1 MΩ.

NOTE. Glass windows are normally acceptable.

Any openings in the walls of the spray cabin or spray booth specifically made only for the ingress and egress of the workpiece shall be as small as possible and shall not be intended for use as access by personnel.

5.2.2 If spraying is not carried out within a booth or cabin, the user shall take into account the rate of application of material, any ventilation present, and take the necessary measures to avoid the risk of fires and explosions. The area

shall be fenced in to restrict access. For earthing requirements see **5.4.5**.

Spraying inside storage tanks and similar locations will need special precautions, due to the presence of the electrostatic spray gun. See also **5.4.1**.

5.3 Exhaust ventilation system

5.3.1 An exhaust ventilation system shall be provided to ensure that the concentration of flammable vapour or mist is below 25 % of the LEL, except for the immediate vicinity of the nozzle of the spray gun and the article being sprayed.

The exhaust ventilation system flow rate shall be marked on the spray cabin or spray booth.

5.3.2 The exhaust ventilation system shall be interlocked with the electrostatic spraying equipment, so that electrostatic spraying cannot be carried out unless the exhaust ventilation is in operation.

5.4 Electrical equipment

5.4.1 *Electrostatic spray guns*

All electrostatic spray guns shall comply with the requirements of EN 50 050 with an energy limit of 0,24 mJ.

NOTE 1. Safety may be impaired if electrostatic spray guns are improperly used.

NOTE 2. The possibility of ignition by an electrical discharge is a particular hazard with electrostatic spraying.

NOTE 3. Ignition may be caused by the discharge of an unearthed object, including personnel charged by induction, contact or other charging mechanisms.

5.4.2 *Associated apparatus*

The associated apparatus (as defined in EN 50 050) shall whenever possible be located outside hazardous areas. Associated apparatus in hazardous areas shall comply with the requirements of one or more of the types of protection listed in EN 50 014 and of the degree of protection of at least IP 54 as defined in HD 365 S3.

5.4.3 *Enclosures of electrical equipment in hazardous areas*

Enclosures of electrical equipment manufactured from plastics or other non-metallic materials shall have an insulation resistance not exceeding 1 GΩ (see test method in **22.4.7.8** of EN 50 014).

5.4.4 *Electrical equipment in areas other than in spray cabins or spray booths*

Where there is a hazardous area created by the spraying process (see **5.2.2**) appropriate electrical equipment shall be used and other electrical equipment shall be isolated from all sources of supply.

5.4.5 *Earthing and bonding*

All conductive enclosures of the electrical equipment and all conductive structures such as floors, walls, ceilings, fences, conveyors, workpieces, paint containers, etc. within the working area shall be bonded together with the earth terminal of the high voltage generator to the protective earth system of the electrical supply.

Each workpiece shall have a resistance to earth not greater than 1 MΩ. This resistance shall be checked regularly. Jigs and hooks shall be designed to ensure that workpieces remain earthed.

NOTE. Since earthing of workpieces is frequently made through metal suspension hooks, it is essential that such hooks are frequently cleaned to avoid the build-up of insulating coats of paint.

6 Cleaning, maintenance and use of spraying equipment

6.1 The manufacturer's instructions on the cleaning of guns shall be followed. These shall include the following warnings:

6.1.1 Before starting to clean the gun or carrying out any other work in the spraying area the high voltage supply shall be switched off in such a manner that it cannot be re-energized by operating the trigger of the spray gun.

6.1.2 Only metallic containers shall be used for the cleaning liquid, and they shall be reliably earthed.

6.1.3 Solvents with a flashpoint as high as possible should be used, preferably higher than ambient temperature.

6.2 The electrostatic paint spraying equipment shall be maintained regularly according to the manufacturer's instructions. Repairs shall be undertaken only in accordance with the manufacturer's instructions.

6.3 A warning placard shall display at least the following information:

6.3.1 The equipment shall be operated only by trained personnel.

6.3.2 The requirements of **6.1** and **6.2** above.

7 Type tests

7.1 Antistatic gloves

From each of three gloves of the same type which have been stored for seven days at a temperature of 23 ± 2 °C and 50 ± 5 % relative humidity, take a specimen of 80 mm diameter out of the palm.

For multi-layered gloves all layers are tested in one testing process, even if, by taking the specimens, the connections between the layers no longer exist.

Apply a circular electrode of 50 mm diameter with a force of 10 N to the top of a specimen lying on a circular metal plate with a diameter greater than 80 mm. Measure the resistance between the electrode and the metal plate under the ambient conditions given above using an applied d.c. voltage of not less than 100 V and not more than 1000 V from a source which will not constitute an electric shock risk to personnel.

Each of the three readings shall be not greater than 100 MΩ.

7.2 Antistatic floor

Wipe the spot to be tested with a dry cloth. Apply a circular electrode of 50 mm diameter with a force of 10 N to a piece of blotting paper moistened with tap water placed on the spot to be tested. The edge of the electrode shall not extend beyond the blotting paper. Measure the resistance between the electrode and a reliable connection to earth using an applied d.c. voltage of not less than 100 V and not more than 1000 V from a source which will not constitute an electric shock risk to personnel. The measurement shall be made at about every square metre of the floor and the measuring spots shall be distributed evenly on the floor. The resistance to earth shall nowhere exceed the limit value 1 MΩ.

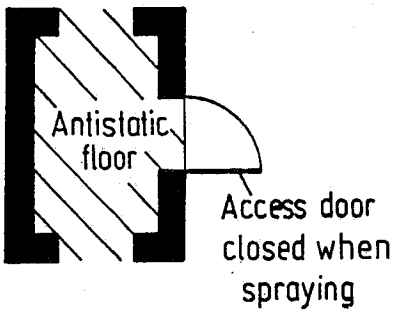

Figure 1. Spray cabin

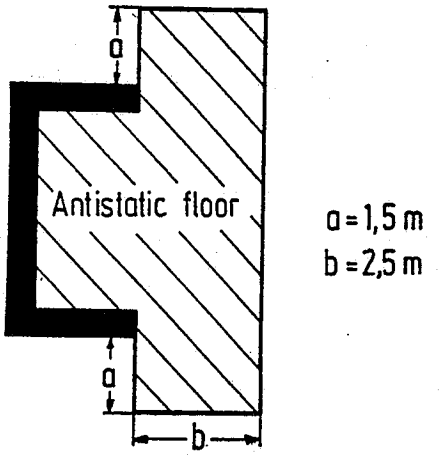

Figure 2. Spray booth

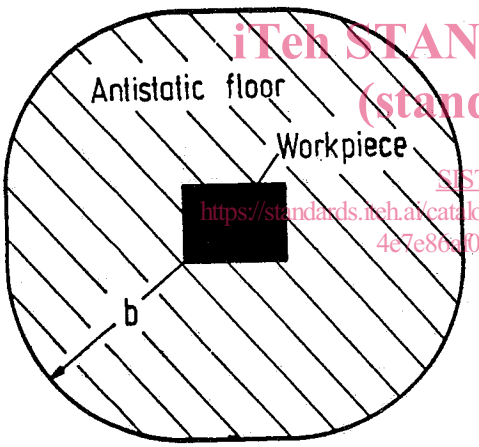

Figure 3. Extent of area of antistatic floor in accordance with 5.1 around workpiece which is being sprayed