

Electrostatics - Part 4-4: Standard test methods for specific applications - Electrostatic classification of flexible intermediate bulk containers (FIBC)

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

| | |
|---------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|
| See Eesti standard EVS-EN IEC 61340-4-4:2018 sisaldab Euroopa standardi EN IEC 61340-4-4:2018 ingliskeelset teksti. | This Estonian standard EVS-EN IEC 61340-4-4:2018 consists of the English text of the European standard EN IEC 61340-4-4:2018. |
| Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas. | This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation. |
| Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 06.04.2018. | Date of Availability of the European standard is 06.04.2018. |
| Standard on kättesaadav Eesti Standardikeskusest. | The standard is available from the Estonian Centre for Standardisation. |

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ICS 17.220.99, 29.020, 55.080

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English Version

**Electrostatics - Part 4-4: Standard test methods for specific applications - Electrostatic classification of flexible intermediate bulk containers (FIBC)
(IEC 61340-4-4:2018)**

Electrostatique - Partie 4-4: Méthodes d'essai normalisées pour des applications spécifiques - Classification électrostatique des grands récipients pour vrac souples (GRVS)
(IEC 61340-4-4:2018)

Elektrostatik - Teil 4-4: Normprüfverfahren für spezielle Anwendungen - Einordnung flexibler Schüttgutbehälter (FIBC) in elektrostatischer Hinsicht
(IEC 61340-4-4:2018)

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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

The text of document 101/546/FDIS, future edition 3 of IEC 61340-4-4, prepared by IEC/TC 101 "Electrostatics" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 61340-4-4:2018.

The following dates are fixed:

- latest date by which the document has to be (dop) 2018-12-06
implemented at national level by
publication of an identical national
standard or by endorsement
- latest date by which the national (dow) 2021-03-06
standards conflicting with the
document have to be withdrawn

This document supersedes EN 61340-4-4:2012.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC shall not be held responsible for identifying any or all such patent rights.

Endorsement notice

The text of the International Standard IEC 61340-4-4:2018 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standards indicated:

| | | |
|----------------|------|------------------------------|
| IEC 60079-32-2 | NOTE | Harmonized as EN 60079-32-2. |
| IEC 61340-2-1 | NOTE | Harmonized as EN 61340-2-1. |

Annex ZA (normative)

Normative references to international publications with their corresponding European publications

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

NOTE 1 Where an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: www.cenelec.eu.

| <u>Publication</u> | <u>Year</u> | <u>Title</u> | <u>EN/HD</u> | <u>Year</u> |
|---------------------|-------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|-------------|
| IEC 60079-10-1 | - | Explosive atmospheres - Part 10-1: Classification of areas - Explosive gas atmospheres | EN 60079-10-1 | - |
| IEC 60079-10-2 | - | Explosive atmospheres - Part 10-2: Classification of areas - Explosive dust atmospheres | EN 60079-10-2 | - |
| IEC 60243-1 | 2013 | Electric strength of insulating materials - Test methods -- Part 1: Tests at power frequencies | EN 60243-1 | 2013 |
| IEC 60243-2 | - | Electric strength of insulating materials - Test methods - Part 2: Additional requirements for tests using direct voltage | EN 60243-2 | - |
| IEC 60417-DB | - | Graphical symbols for use on equipment | - | - |
| IEC 61340-2-3 | - | Electrostatics - Part 2-3: Methods of test for determining the resistance and resistivity of solid materials used to avoid electrostatic charge accumulation | EN 61340-2-3 | - |
| ISO 7000 | - | Graphical symbols for use on equipment - Registered symbols | - | - |
| ISO 21898 | - | Packaging - Flexible intermediate bulk containers (FIBCs) for non-dangerous goods | EN ISO 21898 | - |
| ISO/IEC 80079-20-2- | - | Explosive atmospheres - Part 20-2: Material characteristics - Combustible dusts test methods | EN ISO/IEC 80079-20-2 | - |
| ASTM E582 | - | Standard test method for minimum ignition energy and quenching distance in gaseous mixtures | - | - |

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INTRODUCTION

Flexible intermediate bulk containers (FIBC) are widely used for the storage, transportation and handling of powdered, flaked or granular material. Typically, they are constructed from woven polypropylene fabric in the form of cubic bags of about 1 m³ volume, although they can vary in shape and in size from 0,25 m³ to 3 m³. The fabric used may be a single layer, a multi-layer laminate, or a coated fabric. Untreated polypropylene is an electrical insulator, as is often the case with the products placed in FIBC. There is ample opportunity for the generation of electrostatic charge during filling and emptying operations and in unprotected FIBC high levels of charge can quickly build up. In such cases, electrostatic discharges are inevitable and can be a severe problem when FIBC are used in hazardous explosive atmospheres.

A hazardous explosive atmosphere can be generated when handling fine powders that create dust clouds or thin layers of powder, both of which can be ignited by electrostatic discharges. A hazardous explosive atmosphere can also be generated when using gases or volatile solvents. In these industrial situations, there is clearly a need to eliminate incendive electrostatic discharges.

As with any industrial equipment, a thorough risk assessment should always be conducted before using FIBC in potentially hazardous situations. This part of IEC 61340 describes a system of classification, test methods, performance and design requirements and safe use procedures that can be used by manufacturers, specifiers and end-users as part of a risk assessment of any FIBC intended for use within a hazardous explosive atmosphere. However, it does not include procedures for evaluating the specific risks of electrostatic discharges arising from products within FIBC, for example cone discharges, from personnel or from equipment used near FIBC. Information on risks associated with cone discharges is given in Annex E.

CAUTION: The test methods specified in this document involve the use of high voltage power supplies and flammable gases that may present hazards if handled incorrectly, particularly by unqualified or inexperienced personnel. Users of this document are encouraged to carry out proper risk assessments and pay due regard to local regulations before undertaking any of the test procedures.

ELECTROSTATICS –

Part 4-4: Standard test methods for specific applications – Electrostatic classification of flexible intermediate bulk containers (FIBC)

1 Scope

This part of IEC 61340 specifies requirements for flexible intermediate bulk containers (FIBC) between 0,25 m³ and 3 m³ in volume, intended for use in hazardous explosive atmospheres. The explosive atmosphere can be created by the contents in the FIBC or can exist outside the FIBC.

The requirements include:

- classification and labelling of FIBC;
- classification of inner liners;
- specification of test methods for each type of FIBC, inner liner, labels and document pockets;
- design and performance requirements for FIBC, inner liners, labels and document pockets;
- safe use of FIBC (including those with inner liners) within different zones defined for explosion endangered environments, described for areas where combustible dusts are, or can be, present (IEC 60079-10-2), and for explosive gas atmospheres (IEC 60079-10-1);
- procedures for type qualification and certification of FIBC, including the safe use of inner liners.

NOTE 1 Guidance on test methods that can be used for manufacturing quality control is given in Annex C.

The requirements of this document are applicable to all types of FIBC and inner liners, tested as manufactured, prior to use and intended for use in hazardous explosive atmospheres: Zones 1 and 2 (Groups IIA and IIB only) and Zones 21 and 22 (see Annex D for classification of hazardous areas and explosion groups). For some types of FIBC, the requirements of this document apply only to use in hazardous explosive atmospheres with minimum ignition energy of 0,14 mJ or greater and where charging currents do not exceed 3,0 µA.

NOTE 2

0,14 mJ represents a realistic minimum ignition energy for a Group IIB gas or vapour atmosphere. Although more sensitive materials exist, 0,14 mJ is the lowest minimum ignition energy of any material that is likely to be present when FIBC are emptied. 3,0 µA is the highest charging current likely to be found in common industrial processes. This combination of minimum ignition energy and charging current represents the most severe conditions that might be expected in practice.

FIBC are not normally used in Zone 0 or Zone 20. If FIBC are used in Zone 0 or Zone 20, the requirements of this document are applicable, together with additional requirements that are beyond the scope of this document to define.

The volume contained within FIBC can be designated as Zone 20, in which case the requirements of this document are applicable.

Solids containing residual solvent can result in a hazardous explosive atmosphere within FIBC, possibly resulting in the volume being designated as Zone 1 or Zone 2; in which case the requirements of this document are applicable.

Compliance with the requirements specified in this document does not necessarily ensure that hazardous electrostatic discharges, for example cone discharges, will not be generated by the

contents in FIBC. Information on the risks associated with cone discharges is given in Annex E.

Compliance with the requirements of this document does not mitigate the need for full risk assessment. For example, metal and other conductive powders and toner powders can require additional precautions to prevent hazardous discharges from the powders.

NOTE 3 In the examples mentioned in the paragraph above, additional precautions can be necessary in the case of metal or other conductive powder because if the powder is isolated and becomes charged, incendiary sparks can occur, and in the case of toner powders, incendiary discharges can occur during rapid filling and emptying operations. IEC TS 60079-32-1 [1]¹ gives guidance on additional precautions that can be necessary.

Test methods included in this document can be used in association with other performance requirements, for example when a risk assessment has shown the minimum ignition energy of concern is less than 0,14 mJ, charging currents are greater than 3,0 µA, or the ambient conditions are outside of the range specified in this document.

Compliance with the requirements specified in this document does not necessarily ensure that electric shocks to personnel will not occur from FIBC during normal use.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

IEC 60079-10-1, *Explosive atmospheres – Part 10-1: Classification of areas – Explosive gas atmospheres*

IEC 60079-10-2, *Explosive atmospheres – Part 10-2: Classification of areas – Explosive dust atmospheres*

IEC 60243-1:2013, *Electric strength of insulating materials – Test methods – Part 1: Tests at power frequencies*

IEC 60243-2, *Electric strength of insulating materials – Test methods – Part 2: Additional requirements for tests using direct voltage*

IEC 60417, *Graphical symbols for use on equipment* (available at: <http://www.graphical-symbols.info/equipment>)

IEC 61340-2-3, *Electrostatics – Part 2-3: Methods of test for determining the resistance and resistivity of solid materials used to avoid electrostatic charge accumulation*

ISO/IEC 80079-20-2, *Explosive atmospheres – Part 20-2: Material characteristics – Combustible dusts test methods*

ISO 7000, *Graphical symbols for use on equipment – Registered symbols* (available at: <http://www.graphical-symbols.info/equipment>)

ISO 21898, *Packaging – Flexible intermediate bulk containers (FIBCs) for non-dangerous goods*

¹ Numbers in square brackets refer to the Bibliography.