BS EN IEC 61340-4-4:2018

BSI Standards Publication

# Electrostatics

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

bsi.

# National foreword

This British Standard is the UK implementation of EN IEC 61340-4-4:2018. It is identical to IEC 61340-4-4:2018. It supersedes BS EN 61340-4-4:2012+A1:2015, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee GEL/101, Electrostatics.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.


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**Compliance with a British Standard cannot confer immunity from legal obligations.**

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

# EN IEC 61340-4-4

April 2018

ICS 17.220.99; 29.020; 55.080

Supersedes EN 61340-4-4:2012

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)

This European Standard was approved by CENELEC on 2018-03-06. 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.

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

**CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels**

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| • latest date by which the national standards conflicting with the document have to be withdrawn | (dow) | 2021-03-06 |

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.

| Publication | Year | Title | EN/HD | Year |
|---|---|---|---|---|
| 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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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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# ELECTROSTATICS –

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

## FOREWORD

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International Standard IEC 61340-4-4 has been prepared by IEC technical committee 101: Electrostatics.

This third edition cancels and replaces the second edition, published in 2012, and Amendment 1:2014. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

a) in light of experimental evidence, the maximum resistance to ground limit for Type C FIBC, and corresponding resistance limits for inner liners used in Type C FIBC has been increased from $1{,}0 \times 10^7\ \Omega$ to $1{,}0 \times 10^8\ \Omega$;
b) the classification of Type L1 inner liners has been revised and extended to include Type L1C inner liners made from multi-layer materials with a conductive internal layer;

c) a labelling requirement to include a reference to IEC TS 60079-32-1 for guidance on earthing has been added.

The text of this International Standard is based on the following documents:

| FDIS | Report on voting |
|---|---|
| 101/546/FDIS | 101/555/RVD |

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts in the IEC 61340 series, published under the general title *Electrostatics*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

**IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.**

# 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 $m^3$ volume, although they can vary in shape and in size from 0,25 $m^3$ to 3 $m^3$. 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 $m^3$ and 3 $m^3$ 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