Irish Standard
I.S. EN 61340-4-4:2012&A1:2015

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

I.S. EN 61340-4-4:2012&A1:2015

Incorporating amendments/corrigenda/National Annexes issued since publication:

EN 61340-4-4:2012/A1:2015

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This document is based on:	*Published:*
EN 61340-4-4:2012	2012-03-23

This document was published under the authority of the NSAI and comes into effect on:	ICS number:
2015-01-28	17.220.99 29.020 55.080 NOTE: If blank see CEN/CENELEC cover page

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EUROPEAN STANDARD

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EN 61340-4-4:2012/A1

January 2015

ICS 29.020; 17.220.99; 55.080

English Version

Electrostatics - Part 4-4: Standard test methods for specific applications - Electrostatic classification of flexible intermediate bulk containers (FIBC) (IEC 61340-4-4:2012/A1:2014)

Electrostatique - Partie 4-4: Méthodes d'essai normalisées pour des applications spécifiques - Classification électrostatique des grands récipients pour vrac souples (GRVS) (IEC 61340-4-4:2012/A1:2014)

Elektrostatik - Teil 4-4: Normprüfverfahren für spezielle Anwendungen - Einordnung flexibler Schüttgutbehälter (FIBC) in elektrostatischer Hinsicht (IEC 61340-4-4:2012/A1:2014)

This amendment A1 modifies the European Standard EN 61340-4-4:2012; it was approved by CENELEC on 2014-12-17. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this amendment the status of a national standard without any alteration.

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Europäisches Komitee für Elektrotechnische Normung

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Foreword

The text of document 101/421/CDV, future IEC 61340-4-4:2012/A1, prepared by IEC/TC 101 "Electrostatics" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 61340-4-4:2012/A1:2015.

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) 2015-09-17
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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 61340-4-4

March 2012

ICS 17.220.99; 29.020; 55.080

Supersedes EN 61340-4-4:2005

English version

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

(IEC 61340-4-4:2012)

Electrostatique -
Partie 4-4: Méthodes d'essai normalisées pour des applications spécifiques -
Classification électrostatique des grands récipients pour vrac souples (GRVS)
(CEI 61340-4-4:2012)

Elektrostatik -
Teil 4-4: Normprüfverfahren für spezielle Anwendungen -
Einordnung flexibler Schüttgutbehälter (FIBC) in elektrostatischer Hinsicht
(IEC 61340-4-4:2012)

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

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Ref. No. EN 61340-4-4:2012 E

Foreword

The text of document 101/346/FDIS, future edition 2 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 61340-4-4:2012.

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)	2012-11-22
• latest date by which the national standards conflicting with the document have to be withdrawn	(dow)	2015-02-22

This document supersedes EN 61340-4-4:2005.

EN 61340-4-4:2012 includes the following significant technical changes with respect to EN 61340-4-4:2005:

a) Adoption of a type classification system for FIBC based on four types: A, B, C and D.

b) Guidance for safe use of FIBC in relation to hazardous areas and hazardous zones defined in EN 60079-10-1 and EN 60079-10-2 is added.

c) Resistance to groundable points and electrical breakdown voltage measurements on FIBC shall be measured at low humidity only.

d) Requirements for labelling FIBC are changed to improve clarity and ease of recognition by end users.

e) Classification, performance requirements and guidance for safe use of inner liners in combination with FIBC are added.

f) An informative annex giving guidance on test methods for quality control and inspection testing is added.

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The text of the International Standard IEC 61340-4-4:2012 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following note has to be added for the standard indicated:

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, 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.

NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

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 - Combustible dust atmospheres	EN 60079-10-2	-
IEC 60243-1	1998	Electrical strength of insulating materials - Test methods - Part 1: Tests at power frequencies	EN 60243-1	1998
IEC 60243-2	-	Electric strength of insulating materials - Test methods - Part 2: Additional requirements for tests using direct voltage	EN 60243-2	-
IEC 60417	Data-base	Graphical symbols for use on equipment	-	-
IEC 61241-2-3	-	Electrical apparatus for use in the presence of combustible dust - Part 2: Test methods - Section 3: Method for determining minimum ignition energy of dust/air mixtures	-	-
IEC 61340-2-3	-	Electrostatics - Part 2-3: Methods of test for determining the resistance and resistivity of solid planar materials used to avoid electrostatic charge accumulation	EN 61340-2-3	-
ISO 7000	2004	Graphical symbols for use on equipment - Index and synopsis	-	-
ISO 21898	-	Packaging - Flexible intermediate bulk containers (FIBCs) for non-dangerous goods	EN ISO 21898	-
ASTM E582	-	Standard test method for minimum ignition energy and quenching distance in gaseous mixtures	-	-

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IEC 61340-4-4

Edition 2.0 2012-01

INTERNATIONAL STANDARD

NORME INTERNATIONALE

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

Électrostatique –
Partie 4-4: Méthodes d'essai normalisées pour des applications spécifiques – Classification électrostatique des grands récipients pour vrac souples (GRVS)

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IEC 61340-4-4

Edition 2.0 2012-01

INTERNATIONAL STANDARD

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

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INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

PRICE CODE
CODE PRIX

X

ICS 17.220.99; 29.020; 55.080

ISBN 978-2-88912-851-8

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

ELECTROSTATICS –

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

FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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International Standard IEC 61340-4-4 has been prepared by IEC technical committee 101: Electrostatics, in cooperation with ISO subcommittee 3: Performance requirements and tests for means of packaging, packages and unit loads, of ISO technical committee 122: Packaging.

This second edition cancels and replaces the first edition, published in 2005, and constitutes a technical revision.

The main changes with respect to the first edition are listed below:

a) Adoption of a type classification system for FIBC based on four types: A, B, C and D.
b) Guidance for safe use of FIBC in relation to hazardous areas and hazardous zones defined in IEC 60079-10-1 and IEC 60079-10-2 is added.
c) Resistance to groundable points and electrical breakdown voltage measurements on FIBC shall be measured at low humidity only.

d) Requirements for labelling FIBC are changed to improve clarity and ease of recognition by end users.

e) Classification, performance requirements and guidance for safe use of inner liners in combination with FIBC are added.

f) An informative annex giving guidance on test methods for quality control and inspection testing is added.

The text of this standard is based on the following documents:

FDIS	Report on voting
101/346/FDIS	101/353/RVD

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

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

A list of all the 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 publication will remain unchanged until the stability date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication 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, e.g. 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 standard 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 standard 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 may be created by the contents in the FIBC or may 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 and inner liner;
- design and performance requirements for FIBC and inner liners;
- 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 may 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 may be used for manufacturing quality control is given in Annex C.

The requirements of this standard 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 standard 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 is the minimum ignition energy of a typical Group IIB gas or vapour. 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.

Compliance with the requirements specified in this standard does not necessarily ensure that hazardous electrostatic discharges, e.g. 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 standard does not mitigate the need for full risk assessment. For example, metal and other conductive powders and toner powders may require additional precautions to prevent hazardous discharges from the powders.

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

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1 Figures in square brackets refer to the bibliography.

Test methods included in this standard may 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 standard.

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

2 Normative references

The following referenced documents are indispensable for the application 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 – Combustible dust atmospheres*

IEC 60243-1:1998, *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 60417-5019:2006, *Graphical symbols for use on equipment*. Available at: <http://www.graphical-symbols.info/equipment>"

IEC 61241-2-3, *Electrical apparatus for use in the presence of combustible dust – Part 2: Test methods – Section 3: Method for determining minimum ignition energy of dust/air mixtures*

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

ISO 7000:2004, *Graphical symbols for use on equipment – Index and synopsis*

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

ASTM E582, *Standard test method for minimum ignition energy and quenching distance in gaseous mixtures*

3 Terms and definitions

For the purposes of this document, the following terms and definitions, as well as those given in IEC 60079-10-1, IEC 60079-10-2 and ISO 21898, apply.

3.1
quenching
effect of solid objects acting as heat sinks in close proximity to gas

3.2
critical quenching distance
maximum separation distance between opposing electrodes below which quenching prevents ignition at a specified energy