ICS 27.070 SLOVENSKÁ TECHNICKÁ NORMA Február 2019

STN	**Technológia palivových článkov Časť 5-100: Prenosné výkonové sústavy palivových článkov Bezpečnosť**	**STN EN IEC 62282-5-100** 36 4512

Fuel cell technologies - Part 5-100: Portable fuel cell power systems - Safety

Táto norma obsahuje anglickú verziu európskej normy.
This standard includes the English version of the European Standard.

Táto norma bola oznámená vo Vestníku ÚNMS SR č. 01/19

Obsahuje: EN IEC 62282-5-100:2018, IEC 62282-5-100:2018

Oznámením tejto normy sa od 17.05.2021 ruší
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EUROPEAN STANDARD

NORME EUROPÉENNE

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EN IEC 62282-5-100

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Supersedes EN 62282-5-1:2012

English Version

Fuel cell technologies - Part 5-100: Portable fuel cell power systems - Safety (IEC 62282-5-100:2018)

Technologies des piles à combustible - Partie 5-100: Systèmes à piles à combustible portables - Sécurité (IEC 62282-5-100:2018)

Brennstoffzellentechnologien - Teil 5-100: Portable Brennstoffzellen-Energiesysteme - Sicherheit (IEC 62282-5-100:2018)

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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

Ref. No. EN 62282-5-100:2018 E

European foreword

The text of document 105/649/CDV, future edition 1 of IEC 62282-5-100, prepared by IEC/TC 105 "Fuel cell technologies" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 62282-5-100:2018.

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) 2019-02-17
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2021-05-17

This document supersedes EN 62282-5-1:2012

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

Endorsement notice

The text of the International Standard IEC 62282-5-100:2018 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 series	NOTE Harmonized as EN IEC 60079 series
IEC 60079-0	NOTE Harmonized as EN IEC 60079-0
ISO/IEC 80079-20-1	NOTE Harmonized as FprEN ISO 80079-20-1[1]
IEC 60079-32 series	NOTE Harmonized as EN 60079-32 series
IEC 60664-1	NOTE Harmonized as EN 60664-1
IEC 60730 series	NOTE Harmonized as EN 60730 series
IEC 61140	NOTE Harmonized as EN 61140
IEC 61439-1	NOTE Harmonized as EN 61439-1
ISO 4080	NOTE Harmonized as EN ISO 4080
ISO 15156-1	NOTE Harmonized as EN ISO 15156-1
IEC 62282-6-100	NOTE Harmonized as EN 62282-6-100

[1] To be published.

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 When 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 60034	series	Rotating electrical machines	-	-
IEC 60068-2-75	-	Environmental testing - Part 2-75: Tests - Test Eh: Hammer tests	EN 60068-2-75	-
IEC 60079-2	-	Explosive atmospheres - Part 2: Equipment protection by pressurized enclosure "p"	EN 60079-2	-
IEC 60079-10	series	Explosive atmospheres - Part 10-1: Classification of areas - Explosive gas atmospheres	EN 60079-10	series
IEC 60079-15	-	Explosive atmospheres - Part 15: Equipment protection by type of protection "n"	EN IEC 60079-15	-
IEC 60079-29	series	Explosive atmospheres - Part 29-1: Gas detectors - Performance requirements of detectors for flammable gases	EN 60079-29	series
IEC 60086-4	-	Primary batteries - Part 4: Safety of lithium batteries	EN 60086-4	-
IEC 60204-1 (mod)	2016	Safety of machinery - Electrical equipment of machines - Part 1: General requirements	EN 60204-1	2018
IEC 60216-4-1	-	Electrical insulating materials - Thermal endurance properties -- Part 4-1: Ageing ovens - Single-chamber ovens	EN 60216-4-1	-
IEC 60335-1 (mod)	2010	Household and similar electrical appliances - Safety - Part 1: General requirements	EN 60335-1	2012
+ A1	2013			
+ A2	2016			
-	-		+ A11	2014
-	-		+ AC	2014
-	-		+ A13	2017
IEC 60364-4-41	-	Low-voltage electrical installations - Part 4-41: Protection for safety - Protection against electric shock	HD 60364-4-41	-
IEC 60529	-	Degrees of protection provided by enclosures (IP Code)	-	-
IEC 60695-2-11	-	Fire hazard testing - Part 2-11: Glowing/hot-wire based test methods - Glow-wire flammability test method for end-products (GWEPT)	EN 60695-2-11	-

IEC 60695-2-13	-	Fire hazard testing -- Part 2-13: Glowing/hot-wire based test methods - Glow-wire ignition temperature (GWIT) test method for materials	EN 60695-2-13	-
IEC 60695-11-5	-	Fire hazard testing - Part 11-5: Test flames - Needle-flame test method - Apparatus, confirmatory test arrangement and guidance	EN 60695-11-5	-
IEC 60695-11-10	-	Fire hazard testing -- Part 11-10: Test flames - 50 W horizontal and vertical flame test methods	EN 60695-11-10	-
IEC 60695-11-20	-	Fire hazard testing - Part 11-20: Test flames - 500 W flame test method	EN 60695-11-20	-
IEC 60730-1 (mod)	2013	Automatic electrical controls - Part 1: General requirements	EN 60730-1	2016
+ A1	2015		+ A1	2016
IEC 60730-2-5	-	Automatic electrical controls -- Part 2-5: Particular requirements for automatic electrical burner control systems	EN 60730-2-5	-
IEC 60730-2-17	-	Automatic electrical controls for household- and similar use -- Part 2-17: Particular requirements for electrically operated gas valves, including mechanical requirements		-
IEC 60812	-	Analysis techniques for system reliability - Procedure for failure mode and effects analysis (FMEA)	EN 60812	-
IEC 60884-1	-	Plugs and socket-outlets for household and- similar purposes -- Part 1: General requirements		-
IEC 60934	-	Circuit-breakers for equipment (CBE)	EN 60934	-
IEC 60950-1 (mod)	2005	Information technology equipment - Safety - Part 1: General requirements	EN 60950-1	2006
-	-		+ A11	2009
+ A1 (mod)	2009		+ A1	2010
-	-		+ A12	2011
-	-		+ AC	2011
+ A2 (mod)	2013		+ A2	2013
IEC 60990	2016	Methods of measurement of touch current and protective conductor current	EN 60990	2016
IEC 61000-3-2	-	Electromagnetic compatibility (EMC) - Part 3-2: Limits - Limits for harmonic current emissions (equipment input current ≤ 16 A per phase)	EN IEC 61000-3-2	-
IEC 61000-3-3	-	Electromagnetic compatibility (EMC) - Part 3-3: Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ¿ 16 A per phase and not subject to conditional connection	EN 61000-3-3	-
IEC 61000-6-1	-	Electromagnetic compatibility (EMC) - Part 6-1: Generic standards - Immunity standard for residential, commercial and light-industrial environments	EN 61000-6-1	-
IEC 61000-6-2	-	Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity standard for industrial environments	EN 61000-6-2	-
IEC 61000-6-3	-	Electromagnetic compatibility (EMC) -- Part 6-3: Generic standards - Emission standard for residential, commercial and light-industrial environments	EN 61000-6-3	-

IEC 61000-6-4	-	Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments	EN IEC 61000-6-4	-
IEC 61025	-	Fault Tree Analysis (FTA)	EN 61025	-
IEC 61032	-	Protection of persons and equipment by enclosures - Probes for verification	EN 61032	-
IEC 61508-1	-	Functional safety of electrical/electronic/programmable electronic safety-related systems - Part 1: General requirements	EN 61508-1	-
IEC 61511-1	-	Functional safety - Safety instrumented systems for the process industry sector - Part 1: Framework, definitions, system, hardware and application programming requirements	EN 61511-1	-
IEC 61511-3	-	Functional safety - Safety instrumented systems for the process industry sector - Part 3: Guidance for the determination of the required safety integrity levels	EN 61511-3	-
IEC 61882	-	Hazard and operability studies (HAZOP studies) - Application guide	EN 61882	-
IEC 62040-1	-	Uninterruptible power systems (UPS) - Part 1: Safety requirements		-
IEC 62040-2	-	Uninterruptible power systems (UPS) - Part 2: Electromagnetic compatibility (EMC) requirements		-
IEC 62133	series	Secondary cells and batteries containing alkaline or other non-acid electrolytes - Safety requirements for portable sealed secondary cells, and for batteries made from them, for use in portable applications	EN 62133	series
IEC 62282-2	-	Fuel cell technologies -- Part 2: Fuel cell modules	EN 62282-2	-
ISO 3864	series	Graphical symbols - Safety colours and safety signs		-
ISO 7000	-	Graphical symbols for use on equipment -- Registered symbols		-
ISO 7010	-	Graphical symbols - Safety colours and safety signs - Registered safety signs	EN ISO 7010	-
ISO 15649	-	Petroleum and natural gas industries -- Piping		-
ISO 16000-3	-	Indoor air – Part 3: Determination of formaldehyde and other carbonyl compounds in indoor air and test chamber air - Active sampling method		-
ISO 16000-6	-	Indoor air – Part 6: Determination of volatile organic compounds in indoor and test chamber air by active sampling on Tenax TA® sorbent, thermal desorption and gas chromatography using MS or MS-FID		-
ISO 16017-1	2000	Indoor, ambiant and workplace air - Sampling and analysis of volatile organic compounds by sorbent tube/thermal desorption/capillary gas chromatography – Part 1: Pumped sampling	EN ISO 16017-1	2000
ISO 16111	-	Transportable gas storage devices --- Hydrogen absorbed in reversible metal hydride		-
ISO 16528	series	Boilers and pressure vessels	-	-

IEC 62282-5-100

Edition 1.0 2018-04

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Fuel cell technologies –
Part 5-100: Portable fuel cell power systems – Safety

Technologies des piles à combustible –
Partie 5-100: Systèmes à piles à combustible portables – Sécurité

IEC 62282-5-100:2018-04(en-fr)

IEC 62282-5-100

Edition 1.0 2018-04

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Fuel cell technologies –
Part 5-100: Portable fuel cell power systems – Safety

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CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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FUEL CELL TECHNOLOGIES –

Part 5-100: Portable fuel cell power systems – Safety

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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8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 62282-5-100 has been prepared by IEC technical committee 105: Fuel cell technologies.

This edition cancels and replaces the second edition of IEC 62282-5-1, published in 2012. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to IEC 62282-5-1:

- the requirements and verification method regarding 4.13 and 7.21 for oxygen depletion have been modified;
- the requirements and verification method regarding 4.14 and 7.22 for emission of effluents have been modified;
- Subclauses 4.21 and 7.20.3, for fuel cell power systems with flammable gas generators relying on water reactive technology, new safety requirements and test procedures have been added;
- Subclause 7.11.1 e) has been updated; for an overcurrent test in abnormal operations, a new test procedure in consideration of safety has been added.

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

CDV	Report on voting
105/649/CDV	105/670/RVC

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 62282 series, published under the general title *Fuel cell technologies*, 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.

FUEL CELL TECHNOLOGIES –

Part 5-100: Portable fuel cell power systems – Safety

1 Scope

This part of IEC 62282 covers construction, marking and test requirements for portable fuel cell power systems. These fuel cell systems are movable and not fastened or otherwise secured to a specific location. The purpose of the portable fuel cell power system is to produce electrical power.

This document applies to AC and DC type portable fuel cell power systems, with a rated output voltage not exceeding 600 V AC, or 850 V DC for indoor and outdoor use. These portable fuel cell power systems cannot be used in hazardous locations as defined in IEC 60050-426:2008, 426-03-01 unless there are additional protective measures in accordance with IEC 60079-0[5][1)].

This document does not apply to portable fuel cell power systems that are

1) permanently connected (hard wired) to the electrical distribution system,
2) permanently connected to a utility fuel distribution system,
3) exporting power to the grid,
4) for propulsion of road vehicles,
5) intended to be used on board passenger aircraft.

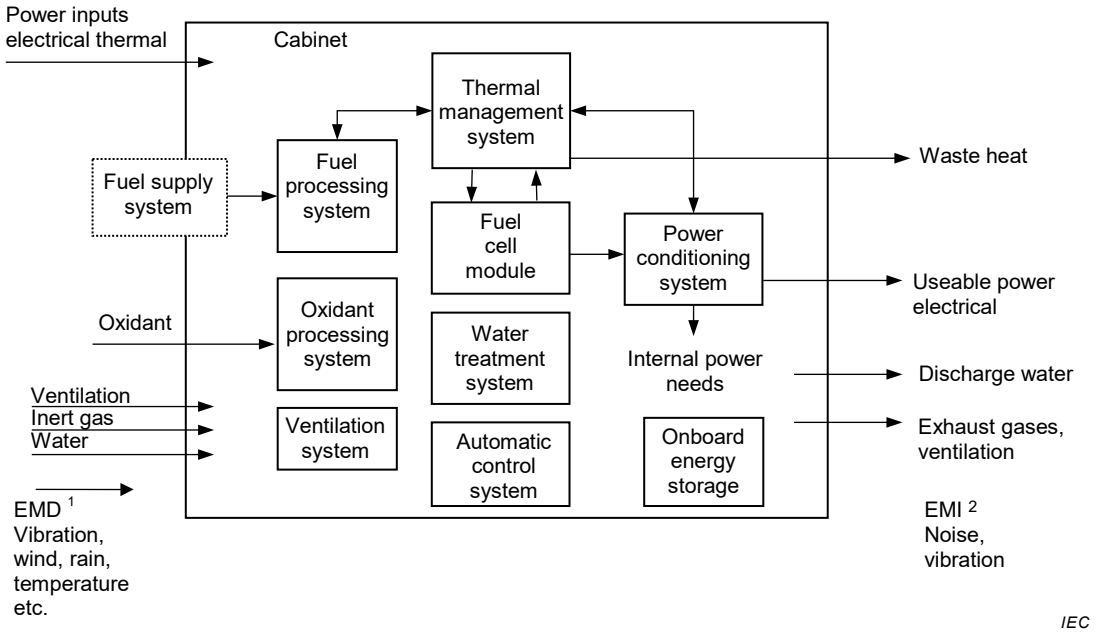
Fuel cells that provide battery charging for hybrid vehicles where the battery provides power and energy for propulsion of the vehicle are not included in the scope of this document

The following fuels and fuel feedstocks are considered within the scope of this document:

- natural gas,
- liquefied petroleum gas, such as propane and butane,
- liquid alcohols, for example methanol, ethanol,
- gasoline,
- diesel,
- kerosene,
- hydrogen,
- chemical hydrides.

This document does not preclude the use of similar fuels or oxidants from sources other than air provided the unique hazards are addressed through additional requirements.

1) Numbers in square brackets refer to the Bibliography.



Key

1 EMD electromagnetic disturbance

2 EMI electromagnetic interference

Figure 1 – Portable fuel cell power systems

The overall design of a portable fuel cell power system anticipated by this document forms an assembly of some or all of the following systems (see Figure 1), integrated as necessary, to perform designated functions, as follows:

Fuel processing system – chemical processing equipment including any associated heat exchangers and controls required to convert input fuel to a composition suitable for the fuel cell stack.

Oxidant processing system – subsystem that meters, conditions, processes and may pressurize the incoming oxidant supply for use within the fuel cell power system.

Thermal management system – subsystem intended to provide cooling and heat rejection in order to maintain thermal equilibrium within the fuel cell power system, and, if necessary, to provide for the recovery and utilization of excess heat and to assist in heating the fuel cell power systems during start-up.

Power conditioning system – equipment which is used to change the magnitude or waveform of the voltage, or otherwise alter or regulate the output of a power source.

Automatic control system – assembly of sensors, actuators, valves, switches and logic components (including process controllers) that maintains the fuel cell power system parameters within the manufacturer's specified limits without manual intervention.

Fuel cell module – assembly, including a fuel cell stack(s), which electrochemically converts chemical energy to electric energy and thermal energy intended to be integrated into a power generation system.

Fuel supply system – either integral to the portable fuel cell power system or supplied through a removable and refillable container assembly.

On-board energy storage system – an internal energy source intended to aid or complement the fuel cell module in providing power to internal or external loads.

Ventilation systems – subsystem of the fuel cell power system that provides, by mechanical means, air to its cabinet.

Water treatment systems – provides for treatment and purification of recovered or added water for use within the portable fuel cell power system.

These requirements are not intended to prevent the design and construction of a portable fuel cell power system not specifically described in this document, provided that such alternatives have been considered and equivalent testing yields equivalent safety performance to that specified in this document. In considering alternative designs or construction, this document can be used to evaluate the alternative materials or methods to be used as to their ability to yield equivalent performance to that specified in this document.

This document does not cover requirements of pressurized or non-pressurized fuel supply containers upstream of the appliance gaseous or liquid fuel supply connector that are not integral to the portable fuel cell power system.

All pressures in this document are considered to be gauge pressures, unless otherwise specified.

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 60034 (all parts), *Rotating electrical machines*

IEC 60068-2-75, *Environmental testing – Part 2-75: Tests – Test Eh: Hammer tests*

IEC 60079-2, *Explosive atmospheres – Part 2: Equipment protection by pressurized enclosure "p"*

IEC 60079-10 (all parts), *Explosive atmospheres – Part 10: Classification of areas*

IEC 60079-15, E*xplosive atmospheres – Part 15: Equipment protection by type of protection "n"*

IEC 60079-29 (all parts), *Explosive atmospheres – Part 29: Gas detectors*

IEC 60086-4, *Primary batteries – Part 4: Safety of lithium batteries*

IEC 60204-1:2016, *Safety of machinery – Electrical equipment of machines – Part 1: General requirements*

IEC 60216-4-1, *Electrical insulating materials – Thermal endurance properties – Part 4-1: Ageing ovens – Single-chamber ovens*

IEC 60335-1:2010, *Household and similar electrical appliances – Safety – Part 1: General requirements*
IEC 60335-1:2010/AMD1:2013
IEC 60335-1:2010/AMD2:2016

IEC 60364-4-41, *Low-voltage electrical installations – Part 4-41: Protection for safety – Protection against electric shock*

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

IEC 60695-2-11, *Fire hazard testing – Part 2-11: Glowing/hot-wire based test methods – Glow-wire flammability test method for end-products (GWEPT)*

IEC 60695-2-13, *Fire hazard testing – Part 2-13: Glowing/hot-wire based test methods – Glow-wire ignition temperature (GWIT) test method for materials*

IEC 60695-11-5, *Fire hazard testing – Part 11-5: Test flames – Needle-flame test method – Apparatus, confirmatory test arrangement and guidance*

IEC 60695-11-10, *Fire hazard testing – Part 11-10: Test flames – 50 W horizontal and vertical flame test methods*

IEC 60695-11-20, *Fire hazard testing – Part 11-20: Test flames – 500 W flame test method*

IEC 60730-1:2013, *Automatic electrical controls – Part 1: General requirements*
IEC 60730-1:2013/AMD1:2015

IEC 60730-2-5, *Automatic electrical controls – Part 2-5: Particular requirements for automatic electrical burner control systems*

IEC 60730-2-17, *Automatic electrical controls for household and similar use – Part 2-17: Particular requirements for electrically operated gas valves, including mechanical requirements*[2)]

IEC 60812, *Analysis techniques for system reliability – Procedure for failure mode and effects analysis (FMEA)*

IEC 60884-1, *Plugs and socket-outlets for household and similar purposes – Part 1: General requirements*

IEC 60934, *Circuit-breakers for equipment (CBE)*

IEC 60950-1:2005, *Information technology equipment – Safety – Part 1: General requirements*
IEC 60950-1:2005/AMD1:2009
IEC 60950-1:2005/AMD2:2013

IEC 60990:2016, *Methods of measurement of touch current and protective conductor current*

IEC 61000-3-2, *Electromagnetic compatibility (EMC) – Part 3-2: Limits – Limits for harmonic currents emissions (equipment input current ≤ 16 A per phase)*

IEC 61000-3-3, *Electromagnetic compatibility (EMC) – Part 3-3: Limits – Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤16 A per phase and not subject to conditional connection*

IEC 61000-6-1, *Electromagnetic compatibility (EMC) – Part 6-1: Generic standards – Immunity standard for residential, commercial and light-industrial environments*

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2) Withdrawn.

IEC 61000-6-2, *Electromagnetic compatibility (EMC) – Part 6-2: Generic standards – Immunity standard for industrial environments*

IEC 61000-6-3, *Electromagnetic compatibility (EMC) – Part 6-3: Generic standards – Emission standard for residential, commercial and light-industrial environments*

IEC 61000-6-4, *Electromagnetic compatibility (EMC) – Part 6-4: Generic standards – Emission standard for industrial environments*

IEC 61025, *Fault tree analysis (FTA)*

IEC 61032, *Protection of persons and equipment by enclosures – Probes for verification*

IEC 61508-1, *Functional safety of electrical/electronic/programmable electronic safety-related systems – Part 1: General requirements*

IEC 61511-1, *Functional safety – Safety instrumented systems for the process industry sector – Part 1: Framework, definitions, system, hardware and application programming requirements*

IEC 61511-3, *Functional safety – Safety instrumented systems for the process industry sector – Part 3: Guidance for the determination of the required safety integrity levels*

IEC 61882, *Hazard and operability studies (HAZOP studies) – Application guide*

IEC 62040-1, *Uninterruptible power systems (UPS) – Part 1: Safety requirements*

IEC 62040-2, *Uninterruptible power systems (UPS) – Part 2: Electromagnetic compatibility (EMC) requirements*

IEC 62133 (all parts), *Secondary cells and batteries containing alkaline or other non-acid electrolytes – Safety requirements for portable sealed secondary cells, and for batteries made from them, for use in portable applications*

IEC 62282-2, *Fuel cell technologies – Part 2: Fuel cell modules*

ISO 3864 (all parts), *Graphical symbols – Safety colours and safety signs*

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

ISO 7010, *Graphical symbols – Safety colours and safety signs – Registered safety signs*

ISO 15649, *Petroleum and natural gas industries – Piping*

ISO 16000-3, *Indoor air – Part 3: Determination of formaldehyde and other carbonyl compounds in indoor air and test chamber air – Active sampling method*

ISO 16000-6, *Indoor air – Part 6: Determination of volatile organic compounds in indoor and test chamber air by active sampling on Tenax TA® sorbent, thermal desorption and gas chromatography using MS or MS-FID*

ISO 16017-1:2000, *Indoor, ambient and workplace air – Sampling and analysis of volatile organic compounds by sorbent tube/thermal desorption/capillary gas chromatography – Part 1: Pumped sampling*

ISO 16111, *Transportable gas storage devices – Hydrogen absorbed in reversible metal hydride*

ISO 16528 (all parts), *Boilers and pressure vessels*