SVENSK STANDARD

SS-EN IEC 62282-4-101, utg 2:2022

Fastställd	Sida	Ansvarig kommitté
2022-10-19	1 (1+57)	SEK TK 105

Bränsleceller – Del 4-101: System för drivning av truckar – Säkerhet

Fuel cell technologies – Part 4-101: Fuel cell power systems for electrically powered industrial trucks – Safety

Som svensk standard gäller europastandarden EN IEC 62282-4-101:2022. Den svenska standarden innehåller den officiella engelska språkversionen av EN IEC 62282-4-101:2022.

Nationellt förord

Europastandarden EN IEC 62282-4-101:2022

består av:

– **europastandardens ikraftsättningsdokument,** utarbetat inom CENELEC
– **IEC 62282-4-101, Second edition, 2022 - Fuel cell technologies - Part 4-101: Fuel cell power systems for electrically powered industrial trucks - Safety**

utarbetad inom International Electrotechnical Commission, IEC.

Tidigare fastställd svensk standard SS-EN 62282-4-101, utg 1:2014, gäller ej fr o m 2025-09-15.

ICS 27.070.00

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN IEC 62282-4-101

September 2022

ICS 27.070

Supersedes EN 62282-4-101:2014

English Version

Fuel cell technologies - Part 4-101: Fuel cell power systems for electrically powered industrial trucks - Safety (IEC 62282-4-101:2022)

Technologies des piles à combustible - Partie 4-101: Systèmes à pile à combustible pour chariots de manutention électriques - Sécurité (IEC 62282-4-101:2022)

Brennstoffzellen-Technologien - Teil 4-101: Brennstoffzellen-Energiesysteme für elektrisch betriebene Flurförderfahrzeuge - Sicherheit (IEC 62282-4-101:2022)

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 IEC 62282-4-101:2022 E

SEK Svensk Elstandard

SS-EN IEC 62282-4-101, utg 2:2022

European foreword

The text of document 105/912/FDIS, future edition 2 of IEC 62282-4-101, prepared by IEC/TC 105 "Fuel cell technologies" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 62282-4-101:2022.

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)	2023-06-15
• latest date by which the national standards conflicting with the document have to be withdrawn	(dow)	2025-09-15

This document supersedes EN 62282-4-101:2014 and all of its amendments and corrigenda (if any).

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Endorsement notice

The text of the International Standard IEC 62282-4-101:2022 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 60034 (series)	NOTE Harmonized as EN 60034 (series)
IEC 60034-11	NOTE Harmonized as EN 60034-11
IEC 60112	NOTE Harmonized as EN IEC 60112
IEC 60243 (series)	NOTE Harmonized as EN 60243 (series)
IEC 60695-11-5	NOTE Harmonized as EN 60695-11-5
IEC 62282-3-100	NOTE Harmonized as EN IEC 62282-3-100
IEC 62282-5-100	NOTE Harmonized as EN IEC 62282-5-100
ISO/IEC 80079-20-1	NOTE Harmonized as EN ISO/IEC 80079-20-1
ISO 16017-1	NOTE Harmonized as EN ISO 16017-1

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 60050-485	-	International Electrotechnical Vocabulary (IEV) - Part 485: Fuel cell technologies	-	-
IEC 60079-0	-	Explosive atmospheres - Part 0: Equipment - General requirements	EN IEC 60079-0	-
IEC 60079-10-1	-	Explosive atmospheres - Part 10-1: Classification of areas - Explosive gas atmospheres	EN IEC 60079-10-1	-
IEC 60079-29-1	-	Explosive atmospheres - Part 29-1: Gas detectors - Performance requirements of detectors for flammable gases	EN 60079-29-1	-
IEC 60079-29-4	-	Explosive atmospheres - Part 29-4: Gas detectors - Performance requirements of open path detectors for flammable gases	EN 60079-29-4	-
IEC 60204-1	-	Safety of machinery - Electrical equipment of machines - Part 1: General requirements	EN 60204-1	-
IEC 60227-3	-	Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V - Part 3: Non-sheathed cables for fixed wiring	-	-
IEC 60227-5	-	Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V - Part 5: Flexible cables (cords)	-	-
IEC 60335-2-41	-	Household and similar electrical appliances - Safety - Part 2-41: Particular requirements for pumps	EN IEC 60335-2-41	-
IEC 60335-2-80	-	Household and similar electrical appliances - Safety - Part 2-80: Particular requirements for fans	EN 60335-2-80	-

IEC 60364-4-41 (mod)	2005	Low-voltage electrical installations - Part 4-41: Protection for safety - Protection against electric shock	HD 60364-4-41	2017
AMD1	2017		/A11	2017
-	-		/A12	2019
IEC 60529	-	Degrees of protection provided by enclosures (IP Code)	-	-
IEC 60584-1	-	Thermocouples - Part 1: EMF specifications and tolerances	EN 60584-1	-
IEC 60664-1	-	Insulation coordination for equipment within low-voltage supply systems - Part 1: Principles, requirements and tests	EN IEC 60664-1	-
IEC 60695	series	Fire hazard testing	EN IEC 60695	series
IEC 60695-1-30	-	Fire hazard testing - Part 1-30: Guidance for assessing the fire hazard of electrotechnical products - Preselection testing process - General guidelines	EN 60695-1-30	-
IEC 60695-10-2	-	Fire hazard testing - Part 10-2: Abnormal heat - Ball pressure test method	EN 60695-10-2	-
IEC 60695-11-4	-	Fire hazard testing - Part 11-4: Test flames - 50 W flame - Apparatus and confirmational test method	EN 60695-11-4	-
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 60730-1 (mod)	2013	Automatic electrical controls - Part 1: General requirements	EN 60730-1	2016
AMD1	2015		/A1	2019
AMD2	2020		/A2	2022
IEC 60812	-	Failure modes and effects analysis (FMEA and FMECA)	EN IEC 60812	-
IEC 60947-3	-	Low-voltage switchgear and controlgear - Part 3: Switches, disconnectors, switch-disconnectors and fuse-combination units	EN IEC 60947-3	-
IEC 60947-5-1	-	Low-voltage switchgear and controlgear - Part 5-1: Control circuit devices and switching elements - Electromechanical control circuit devices	EN 60947-5-1	-
IEC 60950-1	2005	Information technology equipment - Safety - Part 1: General requirements	-	-
AMD1	2009		-	
AMD2	2013		-	-
IEC 61025	-	Fault tree analysis (FTA)	EN 61025	-
IEC 61204-7	-	Low-voltage switch mode power supplies - Part 7: Safety requirements	EN IEC 61204-7	-

IEC/TS 61430	-	Secondary cells and batteries - Test methods for checking the performance of devices designed for reducing explosion hazards - Lead-acid starter batteries	-	-
IEC 61508	series	Functional safety of electrical/electronic/programmable electronic safety-related systems	EN 61508	series
IEC 61558-1	-	Safety of transformers, reactors, power supply units and combinations thereof - Part 1: General requirements and tests	EN IEC 61558-1	-
IEC 62477-1	-	Safety requirements for power electronic converter systems and equipment - Part 1: General	EN 62477-1	-
IEC 62133-1	-	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 - Part 1: Nickel systems	EN 62133-1	-
IEC 62282-2-100	-	Fuel cell technologies - Part 2-100: Fuel cell modules - Safety	EN IEC 62282-2-100	-
IEC 62391-1	-	Fixed electric double-layer capacitors for use in electric and electronic equipment - Part 1: Generic specification	EN 62391-1	-
IEC 62391-2	-	Fixed electric double-layer capacitors for use in electronic equipment - Part 2: Sectional specification - Electric double layer capacitors for power application	EN 62391-2	-
IEC 62619	-	Secondary cells and batteries containing alkaline or other non-acid electrolytes - Safety requirements for secondary lithium cells and batteries, for use in industrial applications	EN IEC 62619	-
IEC/ISO 31010	-	Risk management - Risk assessment techniques	EN IEC 31010	-
ISO 179	series	Plastics - Determination of Charpy impact properties	EN ISO 179	series
ISO 180	-	Plastics - Determination of Izod impact strength	EN ISO 180	-
ISO 877	series	Plastics - Methods of exposure to solar radiation	EN ISO 877	series
ISO 1419	-	Rubber- or plastics-coated fabrics - Accelerated-ageing tests	-	-
ISO 1421	-	Rubber- or plastics-coated fabrics – Determination of tensile strength and elongation at break	EN ISO 1421	-
ISO 1798	-	Flexible cellular polymeric materials - Determination of tensile strength and elongation at break	EN ISO 1798	-
ISO 2440	-	Flexible and rigid cellular polymeric materials - Accelerated ageing tests	EN ISO 2440	-

ISO 2626	-	Copper - Hydrogen embrittlement test	EN ISO 2626	-
ISO 3691-1	-	Industrial trucks - Safety requirements and verification - Part 1: Self-propelled industrial trucks, other than driverless trucks, variable-reach trucks and burden-carrier trucks	EN ISO 3691-1	-
ISO/TS 3691-7	-	Industrial trucks - Safety requirements and verification - Part 7: Regional requirements for countries within the European Community	-	-
ISO/TS 3691-8	-	Industrial trucks - Safety requirements and verification - Part 8: Regional requirements for countries outside the European Community	-	-
ISO 3864-1	-	Graphical symbols - Safety colours and safety signs - Part 1: Design principles for safety signs and safety markings	-	-
ISO 4038	-	Road vehicles - Hydraulic braking systems - Simple flare pipes, tapped holes, male fittings and hose end fittings	-	-
ISO 4080	-	Rubber and plastics hoses and hose assemblies - Determination of permeability to gas	EN ISO 4080	-
ISO 4675	-	Rubber- or plastics-coated fabrics - Low-temperature bend test	-	-
ISO 5053-1	-	Industrial trucks - Vocabulary - Part 1: Types of industrial trucks	-	-
ISO 7010	-	Graphical symbols - Safety colours and safety signs - Registered safety signs	EN ISO 7010	-
ISO 10380	-	Pipework - Corrugated metal hoses and hose assemblies	EN ISO 10380	-
ISO 10442	-	Petroleum, chemical and gas service industries - Packaged, integrally geared centrifugal air compressors	EN ISO 10442	-
ISO 10806	-	Pipework - Fittings for corrugated metal hoses	EN ISO 10806	-
ISO 11114-4	-	Transportable gas cylinders - Compatibility of cylinder and valve materials with gas contents - Part 4: Test methods for selecting steels resistant to hydrogen embrittlement	EN ISO 11114-4	-
ISO 12100	-	Safety of machinery - General principles for design - Risk assessment and risk reduction	EN ISO 12100	-
ISO 13226	-	Rubber - Standard reference elastomers (SREs) for characterizing the effect of liquids on vulcanized rubbers	-	-
ISO 13849-1	-	Safety of machinery - Safety-related parts of control systems - Part 1: General principles for design	EN ISO 13849-1	-

ISO 13849-2	-	Safety of machinery - Safety-related parts of control systems - Part 2: Validation	EN ISO 13849-2	-
ISO 14113	-	Gas welding equipment – Rubber and plastics hose and hose assemblies for use with industrial gases up to 450 bar (45 MPa)	EN ISO 14113	-
ISO 15649	-	Petroleum and natural gas industries - Piping	-	-
ISO/TR 15916	-	Basic considerations for the safety of hydrogen systems	-	-
ISO 16010	-	Elastomeric seals - Material requirements for seals used in pipes and fittings carrying gaseous fuels and hydrocarbon fluids	-	-
ISO 16111	2018	Transportable gas storage devices - Hydrogen absorbed in reversible metal hydride	-	-
ISO 17268	-	Gaseous hydrogen land vehicle refuelling connection devices	EN ISO 17268	-
ISO 19881	-	Gaseous hydrogen - Land vehicle fuel containers	-	-
ISO 19882	-	Gaseous hydrogen - Thermally activated pressure relief devices for compressed hydrogen vehicle fuel containers	-	-
ISO 20898	-	Industrial trucks - Electrical requirements	-	-
ISO 21927-3	-	Smoke and heat control systems - Part 3: Specification for powered smoke and heat exhaust ventilators	-	-
ISO 23551-1	-	Safety and control devices for gas burners and gas-burning appliances - Particular requirements - Part 1: Automatic and semi-automatic valves	-	-
UN GTR No. 13	-	Global Technical Regulation concerning the hydrogen and fuel cell vehicles	-	-
UN Regulation No.-134		Uniform provisions concerning the approval of motor vehicles and their components with regard to the safety-related performance of hydrogen-fuelled vehicles (HFCV)	-	-

IEC 62282-4-101

Edition 2.0 2022-08

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Fuel cell technologies –
Part 4-101: Fuel cell power systems for electrically powered industrial trucks – Safety

Technologies des piles à combustible –
Partie 4-101: Systèmes à pile à combustible pour chariots de manutention électriques – Sécurité

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

ICS 27.070

ISBN 978-2-8322-4167-7

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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FUEL CELL TECHNOLOGIES –

Part 4-101: Fuel cell power systems for electrically powered industrial trucks – 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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International Standard IEC 62282-4-101 has been prepared by IEC technical committee 105: Fuel cell technologies.

This second edition cancels and replaces the first edition published in 2014. This edition constitutes a technical revision.

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

a) revision of the title of this document;
b) revision of reference standards;
c) addition of new subclauses (4.3, 4.14.5, 4.15.3, 4.15.4, 4.16, 5.6, and 5.23);
d) previous 4.15 was revised as “4.16 Risk assessment and risk reduction”;
e) revision of 4.6 3), access to the manual shutoff valve;
f) revision of requirements for battery terminals that are threaded (4.14.10.1);

g) revision of requirements for double layer capacitors (4.14.10.2);

h) revision of external leakage test (5.5) and ultimate strength test (5.7);

i) revision of temperature limits on capacitors depending on the temperature rating of the material (Table 3);

j) revision of markings that are not relevant (Clause 7);

k) added “Significant hazards, hazardous situations and events dealt with in this document” as a new informative annex (Annex B).

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

Draft	Report on voting
105/912/FDIS	105/922/RVD

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

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/standardsdev/publications.

A list of all parts of 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 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.

INTRODUCTION

The IEC 62282-4 series deals with categories such as safety, performance and interchangeability of fuel cell power systems for propulsion other than road vehicles and auxiliary power units (APU). Among the categories mentioned above, this document, IEC 62282-4-101, focuses on safety of electrically powered industrial trucks with fuel cell power systems because such applications are urgently demanded in the world. Future documents in this part of IEC 62282-4 will deal with other applications related to onboard vehicles other than road vehicles and auxiliary power units (APU).

FUEL CELL TECHNOLOGIES –

Part 4-101: Fuel cell power systems for electrically powered industrial trucks – Safety

1 Scope

This document deals with safety of fuel cell power systems for propulsion other than road vehicles and auxiliary power units (APU).

This part of IEC 62282 covers safety requirements for fuel cell power systems intended to be used in electrically powered industrial trucks as defined in ISO 5053-1, except for:

– rough-terrain trucks;
– non-stacking low-lift straddle carriers;
– stacking high-lift straddle carriers;
– rough-terrain variable-reach trucks;
– slewing rough-terrain variable-reach trucks;
– variable-reach container handlers;
– pedestrian propelled trucks.

This document applies to gaseous hydrogen-fuelled fuel cell power systems and direct methanol fuel cell power systems for electrically powered industrial trucks.

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

– gaseous hydrogen;
– methanol.

This document covers the fuel cell power system as defined in 3.8 and Figure 1.

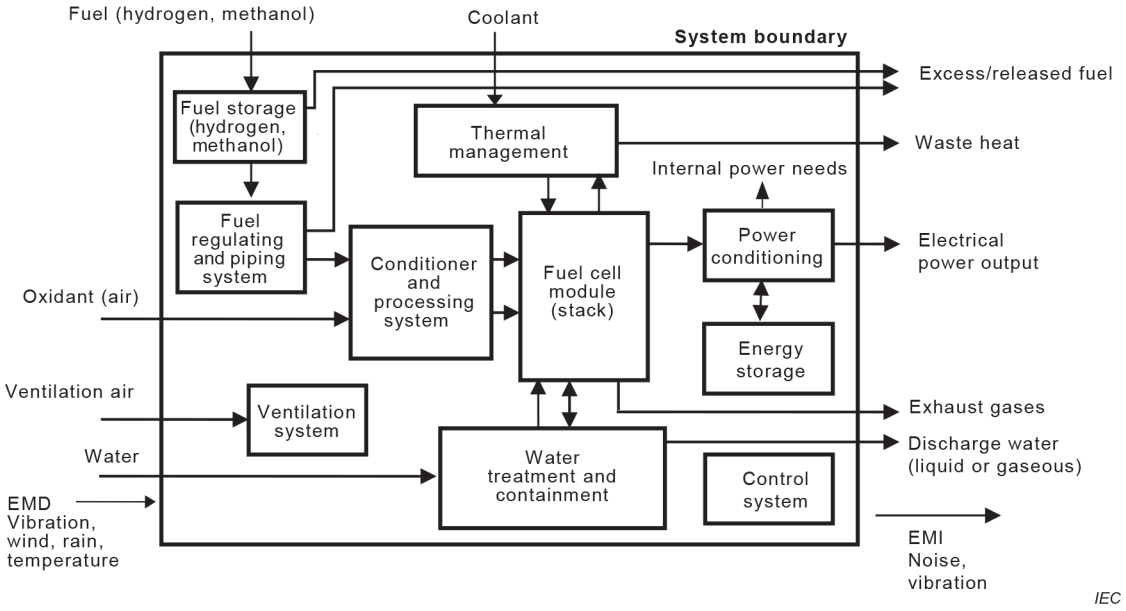
This document applies to DC type fuel cell power systems, with a rated output voltage not exceeding 150 V DC for indoor and outdoor use.

This document covers fuel cell power systems whose fuel source container is permanently attached to either the industrial truck or the fuel cell power system.

In accordance with IEC Guide 116, significant hazards, hazardous situations and events dealt with in this document are shown in Annex B.

The following are not included in the scope of this document:

– detachable type fuel source containers;
– hybrid trucks that include an internal combustion engine;
– reformer-equipped fuel cell power systems;
– fuel cell power systems intended for operation in potentially explosive atmospheres;
– fuel storage systems using liquid hydrogen.



Key

EMD electromagnetic disturbance

EMI electromagnetic interference

NOTE A fuel cell power system can contain all or some of the above components.

Figure 1 – Fuel cell power systems for industrial trucks

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 60050-485, *International Electrotechnical Vocabulary (IEV) – Part 485: Fuel cell technologies*

IEC 60079-0, *Explosive atmospheres – Part 0: Equipment – General requirements*

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

IEC 60079-29-1, *Explosive atmospheres – Part 29-1: Gas detectors – Performance requirements of detectors for flammable gases*

IEC 60079-29-4, *Explosive atmospheres – Part 29-4: Gas detectors – Performance requirements of open path detectors for flammable gases*

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

IEC 60227-3, *Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V – Part 3: Non-sheathed cables for fixed wiring*

IEC 60227-5, *Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V – Part 5: Flexible cables (cords)*

IEC 60335-2-41, *Household and similar electrical appliances – Safety – Part 2-41: Particular requirements for pumps*

IEC 60335-2-80, *Household and similar electrical appliances – Safety – Part 2-80: Particular requirements for fans*

IEC 60364-4-41:2005, *Low-voltage electrical installations – Part 4-41: Protection for safety – Protection against electric* shock
IEC 60364-4-41:2005/AMD1:2017

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IEC 60584-1, *Thermocouples – Part 1: EMF specifications and tolerances*

IEC 60664-1, *Insulation coordination for equipment within low-voltage systems – Part 1: Principles, requirements and tests*

IEC 60695 (all parts), *Fire hazard testing*

IEC 60695-1-30, *Fire hazard testing – Part 1-30: Guidance for assessing the fire hazard of electrotechnical products – Preselection testing process – General guidelines*

IEC 60695-10-2, *Fire hazard testing – Part 10-2: Abnormal heat – Ball pressure test method*

IEC 60695-11-4, *Fire hazard testing – Part 11-4: Test flames – 50 W flame – Apparatus and confirmational test method*

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

IEC 60730-1:2013, *Automatic electrical controls – Part 1: General requirements*
IEC 60730-1:2013/AMD1:2015
IEC 60730-1:2013/AMD2:2020

IEC 60812, *Failure modes and effects analysis (FMEA and FMECA)*

IEC 60947-3, *Low-voltage switchgear and controlgear – Part 3: Switches, disconnectors, switch-disconnectors and fuse-combination units*

IEC 60947-5-1, *Low-voltage switchgear and controlgear – Part 5-1: Control circuit devices and switching elements – Electromechanical control circuit devices*

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 61025, *Fault tree analysis (FTA)*

IEC 61204-7, *Low-voltage switch mode power supplies – Part 7: Safety requirements*

IEC TS 61430, *Secondary cells and batteries – Test methods for checking the performance of devices designed for reducing explosion hazards – Lead-acid starter batteries*

IEC 61508 (all parts), *Functional safety of electrical/electronic/programmable electronic safety-related systems*

IEC 61558-1, *Safety of transformers, reactors, power supply units and combinations thereof – Part 1: General requirements and tests*

IEC 62477-1, *Safety requirements for power electronic converter systems and equipment – Part 1: General*

IEC 62133-1, *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 – Part 1: Nickel systems*

IEC 62282-2-100, *Fuel cell technologies – Part 2-100: Fuel cell modules – Safety*

IEC 62391-1, *Fixed electric double-layer capacitors for use in electric and electronic equipment – Part 1: Generic specification*

IEC 62391-2, *Fixed electric double-layer capacitors for use in electronic equipment – Part 2: Sectional specfication – Electric double layer capacitors for power application*

IEC 62619, *Secondary cells and batteries containing alkaline or other non-acid electrolytes – Safety requirements for secondary lithium cells and batteries, for use in industrial applications*

IEC/ISO 31010, *Risk management – Risk assessment techniques*

ISO 179 (all parts), *Plastics – Determination of Charpy impact properties*

ISO 180, *Plastics – Determination of Izod impact strength*

ISO 877 (all parts), *Plastics – Methods of exposure to solar radiation*

ISO 1419, *Rubber- or plastics-coated fabrics – Accelerated-ageing tests*

ISO 1421, *Rubber- or plastics-coated fabrics – Determination of tensile strength and elongation at break*

ISO 1798, *Flexible cellular polymeric materials – Determination of tensile strength and elongation at break*

ISO 2440, *Flexible and rigid cellular polymeric materials – Accelerated ageing tests*

ISO 2626, *Copper – Hydrogen embrittlement test*

ISO 3691-1, *Industrial trucks – Safety requirements and verification – Part 1: Self-propelled industrial trucks, other than driverless trucks, variable-reach trucks and burden-carrier trucks*

ISO/TS 3691-7, *Industrial trucks – Safety requirements and verification – Part 7: Regional requirements for countries within the European Community*

ISO/TS 3691-8, *Industrial trucks – Safety requirements and verification – Part 8: Regional requirements for countries outside the European Community*

ISO 3864-1, *Graphical symbols – Safety colours and safety signs – Part 1: Design principles for safety signs and safety markings*

ISO 4038, *Road vehicles – Hydraulic braking systems – Simple flare pipes, tapped holes, male fittings and hose end fittings*

ISO 4080, *Rubber and plastics hoses and hose assemblies – Determination of permeability to gas*

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ISO 13226, *Rubber – Standard reference elastomers (SREs) for characterizing the effect of liquids on vulcanized rubbers*

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ISO 13849-2, *Safety of machinery – Safety-related parts of control systems – Part 2: Validation*

ISO 14113, *Gas welding equipment – Rubber and plastics hose and hose assemblies for use with industrial gases up to 450 bar (45 MPa)*

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

ISO/TR 15916, *Basic considerations for the safety of hydrogen systems*

ISO 16010, *Elastomeric seals – Material requirements for seals used in pipes and fittings carrying gaseous fuels and hydrocarbon fluids*

ISO 16111:2018, *Transportable gas storage devices – Hydrogen absorbed in reversible metal hydride*

ISO 17268, *Gaseous hydrogen land vehicle refuelling connection devices*

ISO 19881, *Gaseous hydrogen – Land vehicle fuel containers*

ISO 19882, *Gaseous hydrogen – Thermally activated pressure relief devices for compressed hydrogen vehicle fuel containers*

ISO 20898, *Industrial trucks – Electrical requirements*

ISO 21927-3, *Smoke and heat control systems – Part 3: Specifications for powered smoke and heat exhaust ventilators*

ISO 23551-1, *Safety and control devices for gas burners and gas-burning appliances – Particular requirements – Part 1: Automatic and semi-automatic valves*

UN GTR No. 13, *Global Technical Regulation concerning the hydrogen and fuel cell vehicles*

UN Regulation No. 134, *Uniform provisions concerning the approval of motor vehicles and their components with regard to the safety- related performance of hydrogen-fuelled vehicles (HFCV)*