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NSAI Standards

Irish Standard
I.S. EN 62282-6-100:2010

Fuel cell technologies -- Part 6-100: Micro fuel cell power systems - Safety (IEC 62282-6-100:2010 (EQV))

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I.S. EN 62282-6-100:2010

Incorporating amendments/corrigenda issued since publication:

EN 62282-6-100:2010/A1:2012

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 62282-6-100/A1

December 2012

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English version

Fuel cell technologies - Part 6-100: Micro fuel cell power systems - Safety

(IEC 62282-6-100:2010/A1:2012)

Technologies des piles à combustible - Partie 6-100: Système à micro-piles à combustible - Sécurité (CEI 62282-6-100:2010/A1:2012)

Brennstoffzellentechnologien - Teil 6-100: Mikro-Brennstoffzellen-Energiesysteme - Sicherheit (IEC 62282-6-100:2010/A1:2012)

This amendment A1 modifies the European Standard EN 62282-6-100:2010; it was approved by CENELEC on 2012-11-16. 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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European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
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Ref. No. EN 62282-6-100:2010/A1:2012 E

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Foreword

The text of document 105/402/FDIS, future edition 1 of IEC 62282-6-100:2010/A1, prepared by IEC TC 105, "Fuel cell technologies" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 62282-6-100:2010/A1:2012.

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)	2013-08-16
• latest date by which the national standards conflicting with the document have to be withdrawn	(dow)	2015-11-16

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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.

Addition *to Annex ZA of EN 62282-6-100:2010:*

Publication	Year	Title	EN/HD	Year
ISO 7010	2003[1]	Graphical symbols - Safety colours and safety signs - Safety signs used in workplaces and public areas	-	-

[1] ISO 7010:2003 is superseded by ISO 7010:2012, which is harmonised as EN ISO 7010:2012.

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

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April 2010

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Fuel cell technologies - Part 6-100: Micro fuel cell power systems - Safety

(IEC 62282-6-100:2010)

Technologies des piles à combustible - Partie 6-100: Système à micro-piles à combustible - Sécurité (CEI 62282-6-100:2010)

Brennstoffzellentechnologien - Teil 6-100: Mikro-Brennstoffzellen-Energiesysteme - Sicherheit (IEC 62282-6-100:2010)

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European Committee for Electrotechnical Standardization
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Foreword

The text of document 105/255/FDIS, future edition 1 of IEC 62282-6-100, prepared by IEC TC 105, Fuel cell technologies, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 62282-6-100 on 2010-04-01.

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The following dates were fixed:

– latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2011-01-01
– latest date by which the national standards conflicting with the EN have to be withdrawn	(dow)	2013-04-01

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 62282-6-100:2010 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 62282-5-1	NOTE	Harmonized as EN 62282-5-1.
IEC 61025	NOTE	Harmonized as EN 61025.
IEC 60812	NOTE	Harmonized as EN 60812.

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Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

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.

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 60050-426	2008	International Electrotechnical Vocabulary - Part 426: Equipment for explosive atmospheres	-	-
IEC 60079-15	2005	Electrical apparatus for explosive gas atmospheres - Part 15: Construction, test and marking of type of protection "n" electrical apparatus	EN 60079-15	2005
IEC 60086-4	-	Primary batteries - Part 4: Safety of lithium batteries	EN 60086-4	-
IEC 60086-5	-	Primary batteries - Part 5: Safety of batteries with aqueous electrolyte	EN 60086-5	-
IEC 60695-1-1	-	Fire hazard testing - Part 1-1: Guidance for assessing the fire hazard of electrotechnical products - General guidelines	EN 60695-1-1	-
IEC 60695-2-11	-	Fire hazard testing - Part 2-11: Glowing/hot-wire based test methods - Glow-wire flammability test method for end-products	EN 60695-2-11	-
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) + A1 (mod) + A2 (mod) - - - - - -	1999 2003 2007 - - - - - -	Automatic electrical controls for household and similar use - Part 1: General requirements	EN 60730-1 + corr. August + A1 + A2 + A11 + A14 + A13 + A12 + A15 + A16 + corr. March	2000 2007 2004 2008 2002 2005 2004 2003 2007 2007 2010
IEC 60950-1 (mod)	2005	Information technology equipment - Safety - Part 1: General requirements	EN 60950-1 + A11	2006 2009
IEC 61032	1997	Protection of persons and equipment by enclosures - Probes for verification	EN 61032	1998

Publication	Year	Title	EN/HD	Year
IEC 62133	2002	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	2003
IEC 62281	2004	Safety of primary and secondary lithium cells and batteries during transport	EN 62281	2004
ISO 175	-	Plastics - Determination of the effects of liquid chemicals, including water	-	-
ISO 188	-	Rubber, vulcanized or thermoplastic - Accelerated ageing and heat-resistance tests	-	-
ISO 1817	-	Rubber, vulcanized - Determination of the effect of liquids	-	-
ISO 9772	-	Cellular plastics - Determination of horizontal burning characteristics of small specimens subjected to a small flame	-	-
ISO 15649	-	Petroleum and natural gas industries - Piping	-	-
ISO 16000-3	-	Indoor air - Part 3: Determination of formaldehyde and other carbonyl compounds - 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/FID	-	-
ISO 16017-1	-	Indoor, ambient and workplace air - Sampling and analysis of volatile organic compounds by sorbent tube/thermal desorption/capillary gas chromatography - Part 1: Pumped sampling	-	-

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CONTENTS

FOREWORD 9

1 Scope 12
1.1 General 12
1.2 Fuels and technologies covered 12
1.3 Equivalent level of safety 14
2 Normative references 14
3 Terms and definitions 15
4 Materials and construction of micro fuel cell power systems, micro fuel cell power units and fuel cartridges 19
4.1 General 19
4.2 FMEA / hazard analysis 19
4.3 General materials 19
4.4 Selection of materials 19
4.5 General construction 20
4.6 Fuel valves 20
4.7 Materials and construction – system 21
4.8 Ignition sources 21
4.9 Enclosures and acceptance strategies 22
4.9.1 Parts requiring a fire enclosure 22
4.9.2 Parts not requiring a fire enclosure 22
4.9.3 Materials for components and other parts outside fire enclosures 23
4.9.4 Materials for components and other parts inside fire enclosures 24
4.9.5 Mechanical enclosures 25
4.10 Protection against fire, explosion, corrosivity and toxicity hazard 25
4.11 Protection against electrical hazards 26
4.12 Fuel supply construction 26
4.12.1 Fuel cartridge construction 26
4.12.2 Fuel cartridge fill requirement 27
4.13 Protection against mechanical hazards 27
4.13.1 Piping and tubing other than fuel lines 27
4.13.2 Exterior surface and component temperature limits 27
4.13.3 Motors 28
4.14 Construction of electric device components 29
4.14.1 Limited power sources 29
4.14.2 Devices that use electronic controllers 30
4.14.3 Electrical conductors/wiring 30
4.14.4 Output terminal area 31
4.14.5 Electric components and attachments 31
4.14.6 Protection 31
5 Abnormal operating and fault conditions testing and requirements 32
5.1 General 32
5.2 Compliance testing 32
5.3 Passing criteria 33

This is a free 23 page sample. Access the full version online.

5.4 Simulated faults and abnormal conditions for limited power and SELV circuits 33
5.5 Abnormal operation – electromechanical components 33
5.6 Abnormal operation of micro fuel cell power systems or units with integrated batteries 34
5.7 Abnormal operation – simulation of faults based on hazard analysis.....34
6 Instructions and warnings for micro fuel cell power systems, micro fuel cell power units and fuel cartridges 35
6.1 General 35
6.2 Minimum markings required on the fuel cartridge.....35
6.3 Minimum markings required on the micro fuel cell power system 35
6.4 Additional information required either on the fuel cartridge or on accompanying written information or on the micro fuel cell power system or micro fuel cell power unit.....36
6.5 Technical documentation.....36
7 Type tests for micro fuel cell power systems, micro fuel cell power units and fuel cartridges 37
7.1 General 37
7.2 Leakage measurement of methanol and the measuring procedure.....38
7.3 Type tests 45
7.3.1 Pressure differential tests 45
7.3.2 Vibration test 47
7.3.3 Temperature cycling test 48
7.3.4 High temperature exposure test.....49
7.3.5 Drop test 49
7.3.6 Compressive loading test 50
7.3.7 External short-circuit test.....51
7.3.8 Surface, component and exhaust gas temperature test.....52
7.3.9 Long-term storage test 52
7.3.10 High-temperature connection test 57
7.3.11 Connection cycling tests 57
7.3.12 Emission test.....60

Annex A (normative) Formic acid micro fuel cell power systems.....65
Annex B (normative) Hydrogen stored in hydrogen absorbing metal alloy and micro fuel cell power systems.....97
Annex C (normative) Reformed methanol micro fuel cell power systems 146
Annex D (normative) Methanol clathrate compound micro fuel cell power systems.....160
Annex E (normative) Borohydride micro fuel cell power systems: Class 8 (corrosive) compounds in indirect borohydride fuel cells 184
Annex F (normative) Borohydride micro fuel cell power systems: Class 4.3 (water reactive) compounds in indirect borohydride fuel cells 242
Annex G (normative) Borohydride micro fuel cell power systems: Class 8 (corrosive) compounds in direct borohydride fuel cells.....300
Annex H (normative) Butane solid oxide micro fuel cell power systems.....347
Bibliography.....386

This is a free 23 page sample. Access the full version online.

Figure 1 – Micro fuel cell power system block diagram 13

Figure 2 – Fuel cartridge leakage and mass loss test flow chart for pressure differential, vibration, drop, and compressive loading tests 39

Figure 3 – Fuel cartridge leakage and mass loss test flow chart for temperature cycling test and high temperature exposure test 40

Figure 4 – Micro fuel cell power system or micro fuel cell power unit leakage and mass loss test flow chart for pressure differential, vibration, temperature cycling, drop and compressive loading tests 41

Figure 5 – Micro fuel cell power system or micro fuel cell power unit leakage and mass loss test flow chart for external short-circuit test 42

Figure 6 – Micro fuel cell power system or micro fuel cell power unit leakage and mass loss test flow chart for 68 kPa low external pressure test 43

Figure 7 – Micro fuel cell power system or micro fuel cell power unit leakage and mass loss test flow chart for 11,6 kPa low external pressure test 44

Figure 8 – Temperature cycling 49

Figure 9 – Fuel cartridge leakage and mass loss test flow chart for long-term storage test 56

Figure 10 – Operational emission rate testing apparatus 61

Figure 11 – Operational emission concentration testing apparatus 61

Figure A.1 – Formic acid micro fuel cell power system block diagram – Replaces Figure 1 65

Figure A.2 – Fuel cartridge leakage and mass loss test flow chart for pressure differential, vibration, drop, and compressive loading tests – Replaces Figure 2 71

Figure A.3 – Fuel cartridge leakage and mass loss test flow chart for temperature cycling test and high temperature exposure test – Replaces Figure 3 72

Figure A.4 – Micro fuel cell power system or micro fuel cell power unit leakage and mass loss flow chart for pressure differential, vibration, temperature cycling test, drop, and compressive loading tests – Replaces Figure 4 73

Figure A.5 – Micro fuel cell power system or micro fuel cell power unit leakage and mass loss test flow chart for external short-circuit test – Replaces Figure 5 74

Figure A.6 – Micro fuel cell power system or micro fuel cell power unit leakage and mass loss test flow chart for 68 kPa low external pressure test – Replaces Figure 6 75

Figure A.7 – Micro fuel cell power system or micro fuel cell power unit leakage and mass loss test flow chart for 11,6 kPa low external pressure test – Replaces Figure 7 76

Figure A.9 – Fuel cartridge leakage and mass loss test flow chart for long-term storage test – Replaces Figure 9 83

Figure A.10 – Operational emission rate testing apparatus – Replaces Figure 10 84

Figure A.11 – Operational emission concentration testing apparatus – Replaces Figure 11 85

Figure A.12 – Hydrogen emission test procedure for operating micro fuel cell power system 93

Figure B.2 – Fuel cartridge leakage test flow chart for pressure differential, vibration, drop, and compressive loading tests – Replaces Figure 2 108

Figure B.3 – Fuel cartridge leakage test flow chart for temperature cycling test and high temperature exposure test – Replaces Figure 3 109

Figure B.4 – Micro fuel cell power system or micro fuel cell power unit leakage and mass loss flow chart for pressure differential, vibration, temperature cycling, drop, and compressive loading tests – Replaces Figure 4 110

Figure B.5 – Micro fuel cell power system or micro fuel cell power unit leakage and mass loss test flow chart for external short-circuit test – Replaces Figure 5 111

This is a free 23 page sample. Access the full version online.

Figure B.8 – Temperature cycling – Replaces Figure 8 121

Figure B.9 – Fuel cartridge hydrogen leakage and mass loss test flow chart for long-term storage test – Replaces Figure 9 132

Figure B.10 – Operational emission rate testing apparatus – Replaces Figure 10 138

Figure B.12 – Hydrogen emission test procedure for operating micro fuel cell power system 142

Figure C.1 – General block diagram of a reformed methanol micro fuel cell power system – Replaces Figure 1 146

Figure C.10 – Operational emission rate testing apparatus – Replaces Figure 10 150

Figure C.11 – Operational emission concentration testing apparatus – Replaces Figure 11 151

Figure C.12 – Hydrogen emission test procedure for operating micro fuel cell power system 156

Figure D.1 – Methanol clathrate compound micro fuel cell power system block diagram – Replaces Figure 1 160

Figure D.2 – Fuel cartridge leakage and mass loss test flow chart for pressure differential, vibration, drop, and compressive loading tests – Replaces Figure 2 166

Figure D.3 – Fuel cartridge leakage and mass loss test flow chart for temperature cycling test and high temperature exposure test – Replaces Figure 3 167

Figure D.4 – Micro fuel cell power system or micro fuel cell power unit leakage and mass loss test flow chart for pressure differential, vibration, temperature cycling, drop and compressive loading tests – Replaces Figure 4 168

Figure D.5 – Micro fuel cell power system or micro fuel cell power unit leakage and mass loss test flow chart for external short-circuit test – Replaces Figure 5 169

Figure D.9 – Fuel cartridge leakage and mass loss test flow chart for long-term storage test – Replaces Figure 9 180

Figure D.12 – Fuel cartridge of methanol clathrate compound 161

Figure D.13 – Usage of methanol clathrate compound with micro fuel cell power unit 161

Figure E.1 – Micro fuel cell power system block diagram for liquid Class 8 (corrosive) borohydride compound fuel with onboard fuel processing – Replaces Figure 1 184

Figure E.2 – Fuel cartridge leakage and hydrogen leakage and test flow chart for vibration, drop, compressive loading – Replaces Figure 2 199

Figure E.3 – Fuel cartridge leakage and ~~mass loss~~ hydrogen leakage test flow chart for temperature cycling test and high temperature exposure test – Replaces Figure 3 201

Figure E.4 – Micro fuel cell power system or micro fuel cell power unit leakage and ~~mass~~ hydrogen gas loss test flow chart for pressure differential, vibration, temperature cycling, drop and compressive loading tests – Replaces Figure 4 203

Figure E.5 – Micro fuel cell power system or micro fuel cell power unit leakage and ~~mass~~ hydrogen gas loss test flow chart for external short-circuit test – Replaces Figure 5 205

Figure E.6 – Micro fuel cell power system or micro fuel cell power unit leakage and ~~mass~~ hydrogen gas loss test flow chart for 68 kPa low external pressure test – Replaces Figure 6 206

Figure E.7 – Micro fuel cell power system or micro fuel cell power unit leakage and ~~mass~~ hydrogen gas loss test flow chart for 11,6 kPa low external pressure test – Replaces Figure 7 207

Figure E.8 – Temperature cycling – Replaces Figure 8 213

Figure E.9 – Fuel cartridge hydrogen leakage and mass loss test flowchart for long-term storage test – Replaces Figure 9 220

This is a free 23 page sample. Access the full version online.

Figure E.10 – Operational emission rate testing apparatus – Replaces Figure 10 230

Figure E.11 – Operational emission concentration testing apparatus – Replaces Figure 11 231

Figure E.12 – Hydrogen emission test procedure for operating micro fuel cell power system – Replaces Figure 12 237

Figure E.13 – Micro fuel cell power system block diagram for liquid Class 8 (corrosive) borohydride compound fuel with fuel cartridge fuel processing 185

Figure E.14 – Micro fuel cell power system block diagram for solid Class 8 (corrosive) borohydride compound fuel with fuel cartridge fuel processing and cartridge fuel management 186

Figure E.15 – Micro fuel cell power system block diagram for solid Class 8 (corrosive) compound fuel with cartridge fuel processing and fuel management internal to the micro fuel cell power unit 187

Figure E.16 – Fuel cartridge leakage test flow chart for low external pressure test 239

Figure F.1 – Borohydride micro fuel cell power system block diagram for Class 4.3 (water reactive) compound fuel in indirect borohydride fuel cell system; fuel management in micro fuel cell power unit – Replaces Figure 1 243

Figure F.2 – Fuel cartridge leakage and hydrogen leakage test flow chart for pressure differential, vibration, drop, and compressive loading tests – Replaces Figure 2 257

Figure F.3 – Fuel cartridge leakage and ~~mass loss~~ hydrogen leakage test flow chart for temperature cycling test and high temperature exposure test – Replaces Figure 3 259

Figure F.4 – Micro fuel cell power system or micro fuel cell power unit leakage and ~~mass~~ hydrogen gas loss test flow chart for pressure differential, vibration, temperature cycling, drop and compressive loading tests – Replaces Figure 4 261

Figure F.5 – Micro fuel cell power system or micro fuel cell power unit leakage and ~~mass~~ hydrogen gas loss test flow chart for external short-circuit test – Replaces Figure 5 263

Figure F.6 – Micro fuel cell power system or micro fuel cell power unit leakage and ~~mass~~ hydrogen gas loss test flow chart for 68 kPa low external pressure test – Replaces Figure 6 264

Figure F.7 – Micro fuel cell power system or micro fuel cell power unit leakage and ~~mass~~ hydrogen gas loss test flow chart for 11,6 kPa low external pressure test – Replaces Figure 7 265

Figure F.8 – Temperature cycling – Replaces Figure 8 271

Figure F.9 – Fuel cartridge hydrogen leakage and mass loss test flow chart for long-term storage test – Replaces Figure 9 278

Figure F.10 – Operational emission rate testing apparatus – Replaces Figure 10 288

Figure F.11 – Operational emission concentration testing apparatus – Replaces Figure 11 288

Figure F.12 – Borohydride micro fuel cell power system block diagram for Class 4.3 (water reactive) compound fuel in indirect borohydride fuel cell system; fuel management in fuel cartridge 244

Figure F.13 – Hydrogen emission test procedure for operating micro fuel cell power system 295

Figure F.14 – Fuel cartridge leakage test flow chart for ~~low~~ external pressure test 297

Figure G.1 – Direct borohydride micro fuel cell power system block diagram – Replaces Figure 1 300

Figure G.2 – Fuel cartridge leakage test flow chart for pressure differential, vibration, drop, and compressive loading tests – Replaces Figure 2 311

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Figure G.3 – Fuel cartridge leakage and mass loss test flow chart for temperature cycling test and high temperature exposure test – Replaces Figure 3 312

Figure G.4 – Micro fuel cell power system or micro fuel cell power unit leakage and mass loss flow chart for pressure differential, vibration, temperature cycling, drop, and compressive loading tests – Replaces Figure 4 313

Figure G.5 – Micro fuel cell power system or micro fuel cell power unit leakage and mass loss test flow chart for external short-circuit test – Replaces Figure 5 314

Figure G.6 – Micro fuel cell power system or micro fuel cell power unit leakage and mass loss test flow chart for 68 kPa low external pressure test – Replaces Figure 6 315

Figure G.7 – Micro fuel cell power system or micro fuel cell power unit leakage and mass loss test flow chart for 11,6 kPa low external pressure test – Replaces Figure 7 316

Figure G.8 – Temperature cycling – Replaces Figure 8 322

Figure G.9 – Fuel cartridge hydrogen leakage and mass loss test flow chart for long-term storage test – Replaces Figure 9 327

Figure G.10 – Operational emission rate testing apparatus – Replaces Figure 10 336

Figure G.11 – Operational emission concentration testing apparatus – Replaces Figure 11 337

Figure G.12 – Hydrogen emission test procedure for operating micro fuel cell power system 344

Figure G.13 – Fuel cartridge leakage test flow chart for low external pressure test 317

Figure H.1 – Butane solid oxide micro fuel cell power system block diagram – Replaces Figure 1 347

Figure H.2 – Fuel cartridge leakage and mass loss test flow chart for vibration, drop and compressive loading tests – Replaces Figure 2 354

Figure H.3 – Fuel cartridge leakage and mass loss test flow chart for temperature cycling test and high temperature exposure test – Replaces Figure 3 355

Figure H.4 – Micro fuel cell power system or micro fuel cell power unit leakage and mass loss test flow chart for pressure differential, vibration, temperature cycling, drop and compressive loading tests – Replaces Figure 4 356

Figure H.5 – Micro fuel cell power system or micro fuel cell power unit leakage and mass loss test flow chart for external short-circuit test – Replaces Figure 5 357

Figure H.6 – Micro fuel cell power system or micro fuel cell power unit leakage and mass loss test flow chart for 68 kPa low external pressure test – Replaces Figure 6 358

Figure H.7 – Micro fuel cell power system or micro fuel cell power unit leakage and mass loss test flow chart for 11,6 kPa low external pressure test – Replaces Figure 7 359

Figure H.8 – Temperature cycling – Replaces Figure 8 365

Figure H.9 – Fuel cartridge leakage and mass loss test flow chart for long-term storage test – Replaces Figure 9 372

Figure H.10 – Operational emission rate testing apparatus – Replaces Figure 10 377

Figure H.11 – Operational emission concentration testing apparatus 378

Table 1 – Summary of material flammability requirements 23

Table 2 – Temperature limits 28

Table 3 – Limits for inherently limited power sources 29

Table 4 – Limits for power sources not inherently limited (Over-current protection required) 30

This is a free 23 page sample. Access the full version online.

Table 5 – List of type tests 37
Table 6 – Laboratory standard conditions 38
Table 7 – Emission limits 64
Table A.5 – List of type tests – Replaces Table 5 69
Table A.6 – Laboratory standard conditions – Replaces Table 6 70
Table A.7 – Emission limits – Replaces Table 7 94
Table A.8 – Occupational exposure limits 94
Table B.5 – List of type tests – Replaces Table 5 106
Table B.6 – Laboratory standard conditions – Replaces Table 6 107
Table B.7 – Emission limits – Replaces Table 7 143
Table C.5 – List of type tests – Replaces Table 5 149
Table C.6 – Laboratory standard conditions – Replaces Table 6 150
Table C.7 – Emission limits – Replaces Table 7 157
Table C.8 – Occupational exposure limits 157
Table D.5 – List of type tests – Replaces Table 5 164
Table D.6 – Laboratory standard conditions – Replaces Table 6 165
Table E.5 – List of type tests – Replaces table 5 195
Table E.6 – Laboratory standard conditions – Replaces Table 6 196
Table E.7 – Emission limits – Replaces Table 7 236
Table F.5 – List of type tests – Replaces Table 5 252
Table F.6 – Laboratory standard conditions – Replaces Table 6 253
Table F.7 – Emission limits – Replaces Table 7 294
Table G.5 – List of type tests – Replaces Table 5 308
Table G.6 – Laboratory standard conditions – Replaces Table 6 309
Table G.7 – Emission limits – Replaces Table 7 343
Table H.5 – List of type tests – Replaces Table 5 352
Table H.6 – Laboratory standard conditions – Replaces Table 6 353
Table H.7 – Emission Limits – Replaces Table 7 381
Table H.8 – Occupational exposure limits 382

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

FUEL CELL TECHNOLOGIES –

Part 6-100: Micro fuel cell power systems – Safety

FOREWORD

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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.
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This consolidated version of IEC 62282-6-100 consists of the first edition (2010) [documents 105/255/FDIS and 105/261/RVD], its amendment 1 (2012) [documents 105/402/FDIS and 105/408/RVD] and its corrigendum of December 2011. It bears the edition number 1.1.

The technical content is therefore identical to the base edition and its amendment and has been prepared for user convenience. A vertical line in the margin shows where the base publication has been modified by amendment 1. Additions and deletions are displayed in red, with deletions being struck through.

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International Standard IEC 62282-6-100 has been prepared by IEC technical committee 105: Fuel cell technologies

This standard cancels and replaces IEC/PAS 62282-6-1 published in 2006. This first edition constitutes a technical revision.

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

How to use this standard:

The subclauses and clauses of the main body of the text are modified, replaced or applied as they are in each of the annexes, which applies to a different technology. Instructions are written in Italic type.

a) For the methanol, and methanol and water fuels covered by Clauses 1 through 7, all requirements are given in Clauses 1 through 7 and the annexes should not be used for these fuels.

b) For the specific fuels and technologies covered by Annexes A through H, each annex outlines the additional or modified requirements with respect to the requirements contained in Clauses 1 through 7 for certification of such micro fuel cell power systems, micro fuel cell power units and their respective fuel cartridges covered by the specific annex.

c) Where possible, the numbering system of the annexes corresponds to the numbering of Clauses 1 through 7 and their subclauses. Requirements from Clauses 1 through 7 and their subclauses not specifically addressed in an annex apply to the fuels and technologies covered by that particular annex as written in Clauses 1 through 7.

d) Where an annex gives specific subclause direction – preceded by the annex letter designator – those specific subclauses in the annex reflect the additional or modified requirements for the fuels and technologies covered by the particular annex and shall be followed for that annex. Any additional subclauses have been assigned new numbers and shall be followed.

e) Modified or replacement figures or tables have been given modified table or figure designators – based on the figure or table number in Clauses 1 through 7 preceded by the annex letter designator. New figures or tables in the annexes have been given new figure or table designators and shall also be used.

A list of all parts of the IEC 62282 series, under the general title *Fuel cell technologies*, can be found on the IEC website.

The committee has decided that the contents of the base publication and its amendments 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.

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NOTE The attention of National Committees is drawn to the fact that equipment manufacturers and testing organizations may need a transitional period following publication of a new, amended or revised IEC publication or one that replaces an existing Publicly Available Specification (PAS) in which to make products in accordance with the new requirements and to equip themselves for conducting new or revised tests.

It is the recommendation of the committee that the content of this publication be adopted for implementation nationally not earlier than 12 months from the date of publication.

In the meantime, IEC/PAS 62282-6-1 can still be ordered by contacting the local IEC member National Committee or the IEC Central Office.

A bilingual version of this publication may be issued at a later date.

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.

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FUEL CELL TECHNOLOGIES –

Part 6-100: Micro fuel cell power systems – Safety

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1 Scope

1.1 General

a) This consumer safety standard covers micro fuel cell power systems, micro fuel cell power units and fuel cartridges that are wearable or easily carried by hand, providing d.c. outputs that do not exceed 60 V d.c. and power outputs that do not exceed 240 VA. Portable fuel cell power systems that provide output levels that exceed these electrical limits are covered by IEC 62282-5-1.

b) Externally accessible circuitry is therefore considered to be safety extra low voltage (SELV) circuitry as defined in IEC 60950-1:2005, and as limited power circuits if further compliance with 2.5 of IEC 60950-1:2005 is demonstrated. Micro fuel cell power systems or units that have internal circuitry exceeding 60 V d.c. or 240 VA should be appropriately evaluated in accordance with the separate criteria of IEC 60950-1:2005.

c) This consumer safety standard covers all micro fuel cell power systems, micro fuel cell power units and fuel cartridges. This standard establishes requirements for all micro fuel cell power systems, micro fuel cell power units and fuel cartridges to ensure a reasonable degree of safety for normal use, reasonably foreseeable misuse, and consumer transportation of such items. The fuel cartridges covered by this standard are not intended to be refilled by the consumer. Fuel cartridges refilled by the manufacturer or by trained technicians shall meet all requirements of this standard.

d) These products are not intended for use in hazardous areas as defined by IEV 426-03-01.

1.2 Fuels and technologies covered

a) A micro fuel cell power system block diagram is shown in Figure 1.

b) All portions of this standard, including all annexes, apply to micro fuel cell power systems, micro fuel cell power units and fuel cartridges as defined in Subclause 1.1 above.

c) Clauses 1 through 7 of this standard cover direct methanol fuel cells using methanol or methanol and water solutions as fuel. Clauses 1 through 7 cover specific requirements for direct methanol fuel cells using proton exchange membrane technologies. Clauses 1 through 7 also cover general requirements applicable to all fuel cell technologies and all fuels covered in Annexes A through H.

d) Annexes A through H cover fuels and fuel cell technologies as follows.

   1) Annex A covers micro fuel cell power systems, micro fuel cell power units and fuel cartridges that use formic acid in water solutions – that are comprised of less than 85 % formic acid by weight – as fuel. These systems and units use direct formic acid fuel cell technologies.

   2) Annex B covers micro fuel cell power systems, micro fuel cell power units and fuel cartridges that use hydrogen gas – that has been stored in a hydrogen absorbing metal alloy – as fuel. These systems and units use proton exchange membrane fuel cell technologies.

   3) Annex C covers micro fuel cell power systems, micro fuel cell power units and fuel cartridges that convert methanol or methanol and water solutions through a reformer into hydrogen rich methanol reformate – which is then immediately fed to the fuel cell or fuel cell stack – as fuel. These systems and units use proton exchange membrane fuel cell technologies.

4) Annex D covers micro fuel cell power systems, micro fuel cell power units and fuel cartridges that use methanol or methanol and water solutions – derived from methanol clathrate compounds – as fuel. These systems and units use direct methanol fuel cell technologies.

5) Annex E covers micro fuel cell power systems, micro fuel cell power units and fuel cartridges using hydrogen produced from Class 8 (corrosive) borohydride compounds as fuel. These systems and units use proton exchange membrane fuel cell technologies. The designs may include fuel processing subsystems to derive hydrogen gas from the borohydride compound fuel.

6) Annex F covers micro fuel cell power systems, micro fuel cell power units and fuel cartridges using hydrogen produced from Class 4.3 (water reactive) borohydride compounds as fuel. These systems and units use proton exchange membrane fuel cell technologies. The designs may include fuel processing subsystems to derive hydrogen gas from the borohydride compound fuel.

7) Annex G covers micro fuel cell power systems, micro fuel cell power units and fuel cartridges that use Class 8 (corrosive) borohydride compounds as fuel. These systems and units use direct borohydride fuel cell technologies.

8) Annex H covers micro fuel cell power systems, micro fuel cell power units and fuel cartridges that use butane and butane/propane mixtures – consisting of at least 75 % butane by mass – as fuel. These systems and units use solid oxide fuel cell technologies.

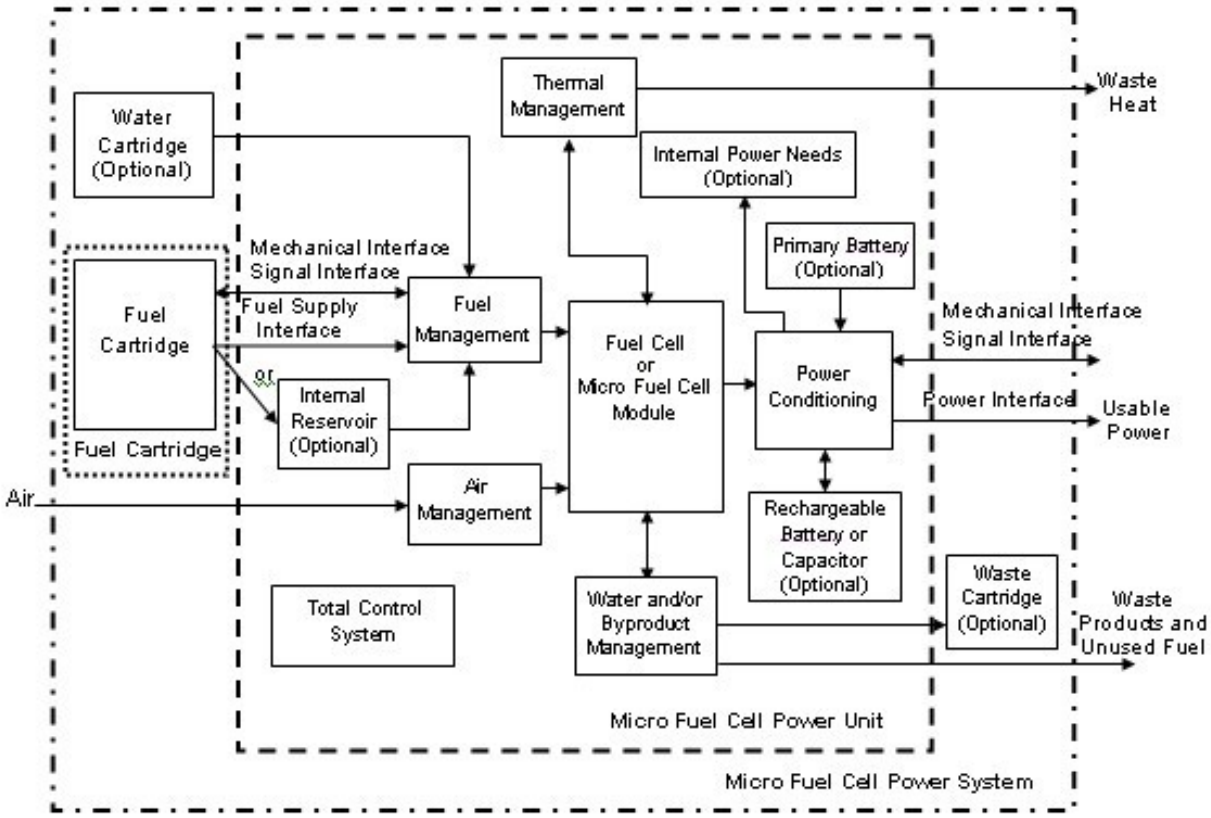

Figure 1 – Micro fuel cell power system block diagram

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1.3 Equivalent level of safety

a) The requirements of this standard are not intended to constrain innovation. The manufacturer may consider fuels, materials, designs or constructions not specifically dealt with in this standard. These alternatives should be evaluated as to their ability to yield levels of safety equivalent to those prescribed by this standard.

b) It is understood that all micro fuel cell power systems, micro fuel cell power units and fuel cartridges shall comply with applicable country and local requirements including, but not limited to, those concerning transportation, child-resistance and storage, where required.

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 60050-426:2008, *International Electrotechnical Vocabulary – Part 426: Equipment for explosive atmospheres*

IEC 60079-15:2005, *Electrical apparatus for explosive gas atmospheres – Part 15: Construction, test and marking of type of protection 'n' electrical apparatus*

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

IEC 60086-5, *Primary batteries – Part 5: Safety of batteries with aqueous electrolyte*

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

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

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

IEC 60730-1:1999, *Automatic electrical controls for household and similar use – Part 1: General requirements*
Amendment 1 (2003)
Amendment 2 (2007)[1)]

IEC 60950-1:2005, *Information technology equipment – Safety – Part 1: General requirements*

IEC 61032:1997, *Protection of persons and equipment by enclosures – Probes for verification*

IEC 62133:2002, *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 62281:2004, *Safety of primary and secondary lithium cells and batteries during transport*

ISO 175, *Plastics – Methods of test for determination of the effects of immersion in liquid chemicals*

ISO 188, *Rubber, vulcanized or thermoplastic – Accelerated ageing and heat resistance tests*

ISO 1817, *Rubber, vulcanized – Determination of the effect of liquids*

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1) There exists a consolidated edition 3.2 (2007) that comprises IEC 60730-1 (1999), its Amendment 1 (2003) and its Amendment 2 (2007).

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