IEC 62282-6-300

Edition 2.0 2012-12

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Fuel cell technologies –
Part 6-300: Micro fuel cell power systems – Fuel cartridge interchangeability

Technologies des piles à combustible –
Partie 6-300: Systèmes à micro-piles à combustible – Interchangeabilité de la cartouche de combustible

IEC 62282-6-300:2012

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CONTENTS

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FUEL CELL TECHNOLOGIES –

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FOREWORD

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International Standard IEC 62282-6-300 has been prepared by IEC technical committee 105: Fuel cell technologies.

This second edition cancels and replaces the first edition, published in 2009, and constitutes a technical revision.

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

a) The status of designs yet to be included in the standard is clarified.
b) Type A to D interchangeable connectors are updated, and Type E is added.
c) The procedures, criteria and figures of the type tests for interchangeable connectors are updated to ensure they produce accurate and consistent results.
d) The fuel quality requirements are updated including the test procedures for residue and impurities.

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

CDV	Report on voting
105/370/CDV	105/409/RVC

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

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

A list of all 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 tshe contents of this publication will remain unchanged until the stability date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

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- withdrawn,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

INTRODUCTION

The International Electrotechnical Commission (IEC) draws attention to the fact that it is claimed that compliance with this document may involve the use of patents concerning fuel connectors given in 4.3.1, 4.3.2, 4.3.3 and 4.3.4, patents concerning mechanical keys given in 4.2.3, and patents concerning fuel quality in 5.5.

IEC takes no position concerning the evidence, validity and scope of this patent right.

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FUEL CELL TECHNOLOGIES –

Part 6-300: Micro fuel cell power systems – Fuel cartridge interchangeability

1 Scope

This part of IEC 62282 covers interchangeability of micro fuel cell (MFC) fuel cartridges to provide the cartridge compatibility for a variety of MFC power units while maintaining the safety and performance of MFC power systems. For this purpose, the standard covers fuel cartridges and their connector designs. Fuel type, fuel concentration and fuel quality are also covered. This standard also provides for the means to avoid the miss-connection of an improper fuel cartridge. Test methods for verifying the compliance with the interchangeability requirements for fuel and fuel cartridges are also provided in this standard.

IEC 62282-6-100 and IEC 62282-6-200 do not cover fuel cartridge or fuel from the cartridge. IEC 62282-6-300 describes the performance test methods of fuel cartridges, the fuel from the cartridge, and markings to realize the interchangeability of fuel cartridges. These include performance effect of fuel cartridges, such as fuel quality which may affect the performance of MFC power units and usable fuel volume from fuel cartridges.

A MFC power system block diagram is shown in Figure 1. MFC power systems and MFC power units are defined as those wearable or easily carried by hand, providing d.c. outputs that do not exceed 60 V and power outputs that do not exceed 240 VA. This standard covers the fuel cartridge for MFC power units and the mechanical interface of connectors between fuel cartridges and MFC power units. The main body of this standard includes methanol liquid fuel cartridges, including methanol and water solution. Annex A shows the background used to determine the forces expected in normal operation and in foreseeable misuse. Annex B shows the example design for test fixtures for the fuel connector and fuel cartridge type tests.

NOTE Liquid fuel means fuel transported from a cartridge to a MFC power unit in the liquid state, and gas fuel means fuel transported from a cartridge to a power unit in the gaseous state.

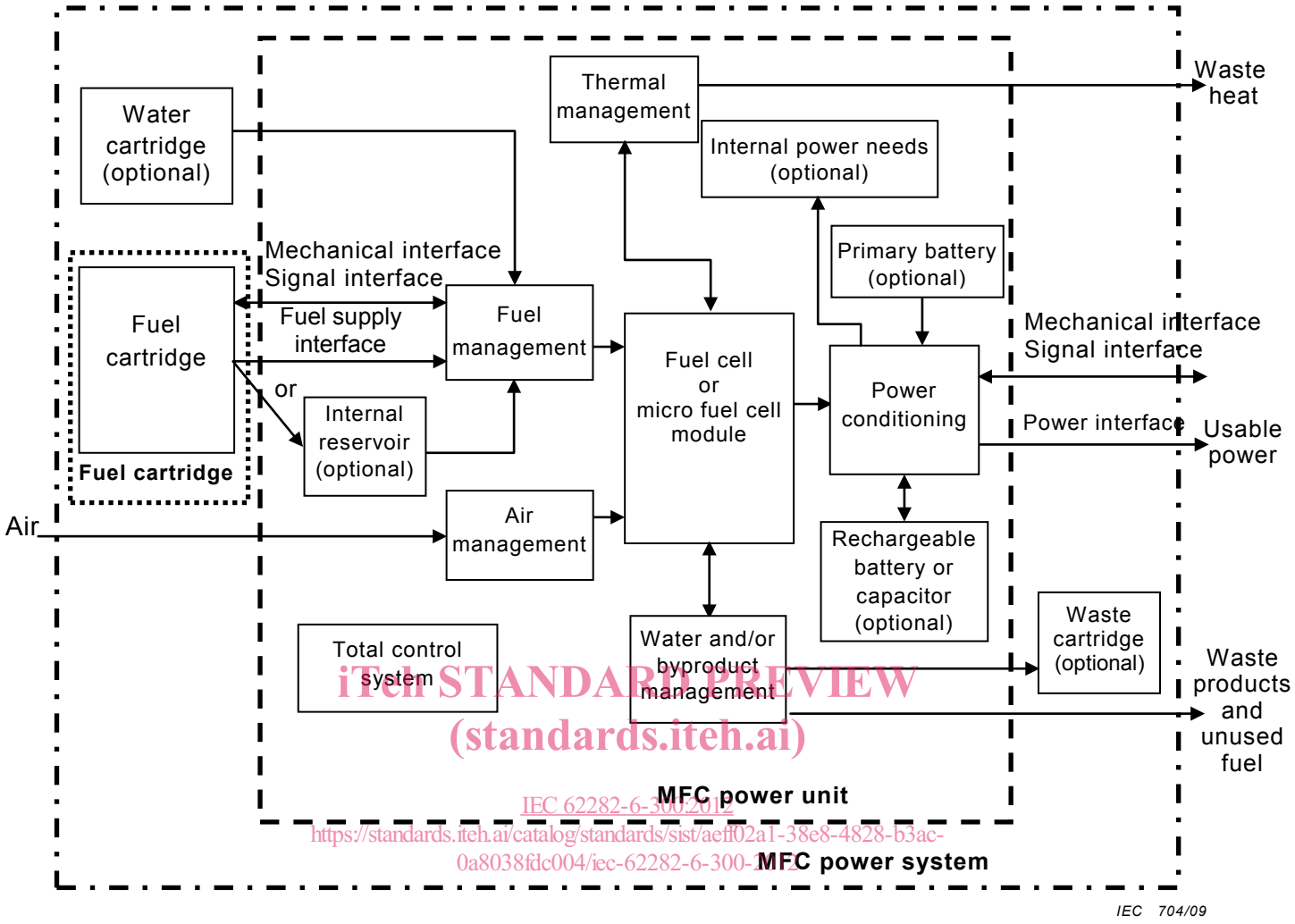

Figure 1 – MFC power system block diagram

2 Normative references

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.

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

IEC 62282-6-100:2010, *Fuel cell technologies – Part 6-100: Micro fuel cell power systems – Safety*

IEC 62282-6-200, *Fuel cell technologies – Part 6-200: Micro fuel cell power systems – Performance test methods*

ISO 1302:2002, *Geometrical product specifications (GPS) – Indication of surface texture in technical product documentation*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
base level
reference plane on the MFC power unit side connector

Note 1 to entry: All dimensions as shown in the connector figures (see 4.3) are relative to this reference plane.

Note 2 to entry: See Figures 3, 6 and 7 in 4.3.2.2 and 4.3.2.3; Figures 13 and 15 in 4.3.3.2 and 4.3.3.3; Figures 22 and 24 in 4.3.4.2 and 4.3.4.3; Figures 29 and 31 in 4.3.5.2 and 4.3.5.3; and Figures 37, 39 and 40 in 4.3.6.2 and 4.3.6.3.

3.2
base plane
surface of the power unit to which the cartridge mates

Note 1 to entry: See Figures 3, 6 and 7 in 4.3.2.2 and 4.3.2.3; Figures 13 and 15 in 4.3.3.2 and 4.3.3.3; Figures 22 and 24 in 4.3.4.2 and 4.3.4.3; Figure 29 and 31 in 4.3.5.2 and 4.3.5.3; and Figures 37, 39 and 40 in 4.3.6.2 and 4.3.6.3.

3.3
connector retainer
mechanical means that secures the connection between the fuel cartridge side connector and the MFC power unit connector

3.4
connector seal position
point where seal is established after the sealing section of the MFC power unit makes contact with the sealing section of the cartridge (seal complete position)

3.5
distance to open valve
distance between the base level of the MFC power unit side connector and the point where the valve starts to open during valve opening sequence

Note 1 to entry: The distance to open the valve is the same as the point where fluid stops flowing during the closing sequence.

Note 2 to entry: See Figure 3 and Table 1 in 4.3.2.2; Figure 13 and Table 6 in 4.3.3.2; Figure 22 and Table 10 in 4.3.4.2; and, Figure 29, Table 14, Figure 37 and Table 19 in 4.3.6.2.

3.6
distance to stop valve
distance between the base level of the MFC power unit side connector and the final position of the end of the valve actuator during the valve opening sequence

Note 1 to entry: The valve actuator is a component responsible for opening of the valve.

Note 2 to entry: See Figure 3 and Table 1 in 4.3.2.2; Figure 13 and Table 6 in 4.3.3.2; Figure 22 and Table 10 in 4.3.4.2; and Figure 29, Table 14, Figure 37 and Table 19 in 4.3.6.2.

3.7
electronic device
any of such electronic devices as cellular phone, music player, digital camera, camcorder, personal digital assistant (PDA), mobile game machine and mobile PC which uses a MFC power unit/system

3.8
force to open valve
force required to push the MFC power unit valve to the stop position (distance to stop valve)

3.9
fractures
visually detectable cracks or breaks in the exterior of the fuel connector, valve and all the casings around the connector

3.10
fuel
liquid or gas substance, which is supplied from fuel cartridge to the MFC power unit and is used to produce electricity in a MFC power system

Note 1 to entry: Liquid fuels of methanol and methanol/water solutions are considered fuels in the main body of this standard.

Note 2 to entry: Liquid fuels such as ethanol, ethanol/water solution, formic acid and formic-acid/water solution will be covered as per the supplement to this standard. Gaseous fuel, which have to use different types of fuel connectors, will be covered as per the supplement to this standard.

3.11
fuel cartridge
removable article that contains and supplies fuel to the MFC power unit or internal reservoir, not to be refilled by user

Note 1 to entry: See Figure 2 for cartridge types.

3.11.1
insert cartridge
fuel cartridge which has its own enclosure and is installed within the enclosure of the electronic device powered by the MFC power system

3.11.2
exterior cartridge
fuel cartridge which has its own enclosure that forms a portion of the enclosure of the electronic device powered by the MFC power system

3.11.3
attached cartridge
fuel cartridge, which has its own enclosure that connects to the electronic device powered by the MFC power system

3.11.4
satellite cartridge
fuel cartridge that is intended to be connected to and removed from the MFC power unit to transfer fuel to the internal reservoir inside the MFC power unit

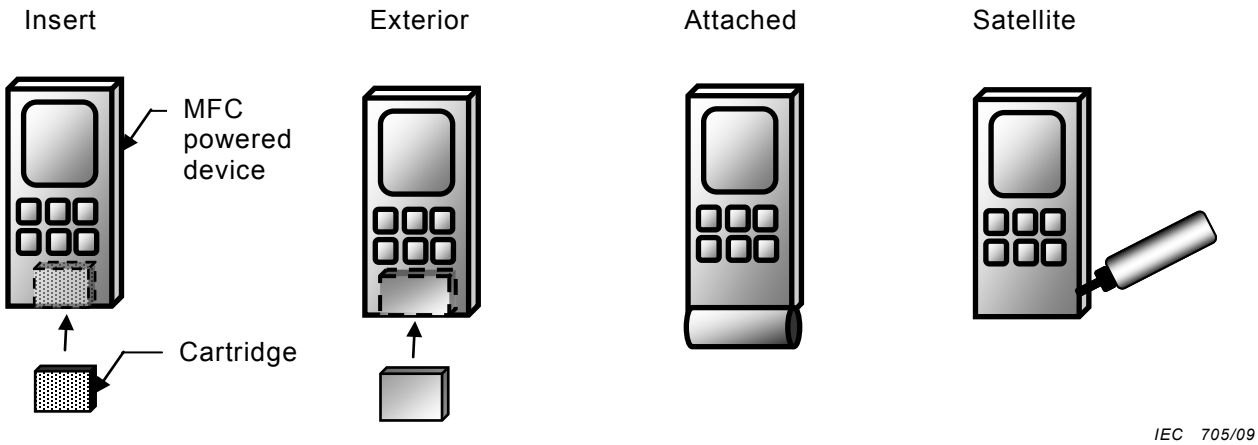

Figure 2 – Fuel cartridge types

3.12
pressurized fuel cartridge
fuel supply unit in which the internal pressure exceeds a gauge pressure of 34,5 kPa measured at 24 °C without external forces

3.13
non-pressurized fuel cartridge
fuel supply unit in which the internal pressure does not exceed a gauge pressure of 34,5 kPa measured at 24 °C without external forces

3.14
fuel connector
attachment means between the fuel cartridge and MFC power unit that allows for the passage of fuel from the cartridge to the power unit

3.15
internal reservoir
structure in a MFC power unit that stores fuel and cannot be removed

3.16
impurity
materials in any form of metal, inorganic material, organic material, molecule, ion, complex, polymer and oligomer, which are contained in the fuel and may disturb the power generation performance of MFC power unit

3.17
leakage
accessible hazardous liquid fuel outside the MFC power system or fuel cartridge

3.18
mechanical key
structure, installed around the fuel connector, that prevents the MFC power unit from being connected to cartridges with improper properties (e.g. fuel type, fuel concentration, internal pressure and connector strength)

3.19
MFC power unit
electric generator as defined in Figure 1, providing direct current output that does not exceed 60 V d.c. and power output that does not exceed 240 VA

Note 1 to entry: The MFC power unit does not include a fuel cartridge.

3.20
MFC power system
MFC power unit with associated cartridges that is wearable or easily carried by hand

3.21
no fuel vapour loss
fuel vapour escaping from the fuel cartridge or MFC power system or unit that is less than or equal to 0,08 g/h

4 Fuel connectors

4.1 Basic requirements

4.1.1 Safety

Fuel connectors shall comply with the safety requirements in IEC 62282-6-100:2010, 4.6 (fuel valves) and 4.12 (fuel supply construction), and shall pass type tests described Clause 7 of that standard.