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GB/T 29838-2013

Fuel cell modules

(IEC 62282-2:2012, MOD)

燃料电池　模块

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Standardization Administration Committee.

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Foreword

This Standard was drafted in accordance with the rules given in GB/T 1.1-2009.

This Standard uses redrafting method to modify and adopt IEC 62282-2 Ed.2:2012 "Fuel cell technologies Part 2: Fuel cell modules".

This Standard is technically consistent with IEC 62282-2:2012. The modifications are as follows:

- deleted the foreword and introduction of IEC 62282-2:2012, added the foreword of this Standard;
- for the normative references, all Chinese standards that correspond to IEC (or ISO) standards are replaced by Chinese standards;
- the safety standard in this Standard incorporated Chinese specific safety requirements, added "5.10 Insulation (static) test" in Clause 5 "Type tests".

This Standard was proposed by China Electrical Appliance Industry Association.

This Standard shall be under the jurisdiction of National Technical Committee on Fuel Cell and Flow Battery of Standardization Administration of China (SAC/TC 342).

The drafting organizations of this Standard: Xinyuan Power Co., Ltd., Machinery Industry Beijing Institute of Electrotechnics and Economics, Shanghai Shenli Technology Co., Ltd., Wuhan Yintai Technology Fuel Cell Co., Ltd., Ningbo Baite Measurement & Control Technology Co., Ltd., Wuhan University of Technology, Dalian Institute of Chemical Physics, Chinese Academy of Sciences, Shanghai Panye Hydrogen Energy Technology Co., Ltd., Tsinghua University, Tongji University, Kunshan Institute of Innovation, Nanjing University, Shenzhen Huachen Detection Technology Co., Ltd., etc.

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Fuel cell modules

1 Scope

This Standard provides the minimum requirements for safety and performance of fuel cell modules and applies to fuel cell modules with the following electrolyte chemistry:

- alkaline;
- polymer electrolyte (including direct methanol fuel cells);
- phosphoric acid;
- molten carbonate;
- solid oxide;
- aqueous solution of salts.

Fuel cell modules can be provided with or without an enclosure and can be operated at significant pressurization levels or close to ambient pressure.

This Standard deals with conditions that can yield hazards to persons and cause damage outside the fuel cell modules. Protection against damage inside the fuel cell modules is not addressed in this Standard, provided it does not lead to hazards outside the module.

These requirements may be superseded by other standards for equipment containing fuel cell modules as required for particular applications.

This Standard does not cover road vehicle applications.

This Standard is not intended to limit or inhibit technological advancement. An appliance employing materials or having forms of construction differing from those detailed in the requirements of this Standard may be examined and tested according to the purpose of these requirements and, if found to be substantially equivalent, may be considered to comply with this Standard.

The fuel cell modules are components of final products. These products require evaluation to appropriate end-product safety requirements.

This Standard covers only up to the d.c. output of the fuel cell module.

This Standard does not apply to peripheral devices as illustrated in Figure 1.

GB/T 4728 (all parts), *Graphical symbols for diagrams* [IEC 60617 (all parts)]

GB 4943.1, *Information technology equipment -Safety - Part 1: General requirements* (GB 4943.1-2011, IEC 60950-1:2005, MOD)

GB/T 516 (all parts), *Fire hazard testing* [IEC 60695 (all parts)]

GB 5226.1, *Electrical Safety of Machinery - Electrical Equipment of Machines - Part 1: General Requirements* (GB 5226.1-2008, IEC 60204-1:2005, IDT)

GB 7260.4, *Uninterruptible Power Systems(UPS) - Part 1-2: General and safety requirements for UPS used in restricted access locations* (GB 7260.4-2008, IEC 62040-1-2:2002, MOD)

GB 14536.1, *Automatic electrical controls for household and similar use - Part 1: General requirements* [GB 14536.1-2008, IEC 60730-1:2003 (Ed3.1), IDT]

GB/T 16855.1, *Safety of machinery - Safety-related parts of control systems - Part 1: General principles for design* (GB/T 16855.1-2008, ISO 13849-1:2006, IDT)

GB/T 18290 (all parts), *Solderless connections* [IEC 60352 (all parts)]

GB/T 20438 (all parts), *Functional safety of electrical / electronic / programmable electronic safety-related systems* [IEC 61508 (all parts)]

GB 28526, *Electrical safety of machinery - Functional safety of safety-related electrical, electronic and programmable electronic control systems* (GB 28526-2012, IEC 62061:2005, IDT)

IEC 60512-15 (all parts), *Connectors for electronic equipment - Tests and measurements - Part 15: Connector tests (mechanical)*

IEC 60512-16(all parts), *Connectors for electronic equipment -Tests and measurements - Part 16: Mechanical tests on contacts and terminations*

ISO 23550, *Safety and control devices for gas burners and gas-burning appliances - General requirements*

EN 50178, *Electronic equipment for use in power installations*

3 Terms and definitions

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

3.1 acceptance test

A.3.3 Allowable working pressure test

In the case where the fuel cell module is encapsulated by a pressure vessel already approved by the relevant national regulations, this test is not applicable.

Using a sampling plan mutually agreeable to the manufacturer and the testing agency, the fuel cell module should be tested as described in 5.5.

A.3.4 Pressure withstanding test of cooling system

Using a sampling plan mutually agreeable to the manufacturer and the testing agency, the fuel cell module should be tested as described in 5.6.

A.3.5 Overload test

Using a sampling plan mutually agreeable to the manufacturer and the testing agency, the fuel cell module should be tested as described in 5.8.

A.3.6 Differential pressure test

Using a sampling plan mutually agreeable to the manufacturer and the testing agency, the fuel cell module should be tested as described in 5.11.

A.3.7 Safety controls

The manufacturer should verify that all safety controls are as specified during type testing for all units manufactured.

Using a sampling plan mutually agreeable to the manufacturer and the testing agency, the fuel cell module safety devices should be proven to meet their intended use, when possible.

Bibliography

[1] GB/T 2900.83-2008, Electrotechnical terminology - Electrical and magnetic devices (IEC 60050-151:2001, IDT)

[2] GB/T 28816-2012, Fuel cell - Terminology (IEC 62282-1:2010, IDT)

[3] GB/T 3683-2011, Rubber hoses and hose assemblies - Wire-braid-reinforced hydraulic types for oil-based or water-based fluids - Specification (ISO 1436:2009, IDT)

[4] GB/T 5564-2006, Rubber and plastics hoses - Sub-ambient temperature flexibility tests (ISO 4672:1997, IDT)

[5] GB/T 528-2009, Rubber，vulcanized or thermoplastic - Determination of tensile stress-strain properties (ISO 37:2005, IDT)

[6] GB/T 7826-2012, Analysis techniques for system reliability - Procedure for failure mode and effects analysis (FMEA) (IEC 60812: 2006, IDT)

[7] IEC 60079-20-1, Explosive atmospheres - Part 20-1: Material characteristics for gas and vapour classification - Test methods and data

[8] IEC 61025, Fault tree analysis (FTA)

[9] ISO 188:2007, Rubber, vulcanized or thermoplastic - Accelerated ageing and heat resistance tests

[10] ISO 1307:2006, Rubber and plastics hoses - Hose sizes, minimum and maximum inside diameters, and tolerances on cut-to-length hoses

[11] ISO 1402:2009, Rubber and plastics hoses and hose assemblies - Hydrostatic testing

[12] SAEJ 1739, Potential Failure Mode and Effects Analysis in Design (Design FMEA), Potential Failure Mode and Effects Analysis in Manufacturing and Assembly Processes (Process FMEA)

[13] UL 132, Safety Relief Valves for Anhydrous Ammonia and LP-Gas

[14] ANSI/CSANGV2-2000, Basic Requirements for Compressed Natural Gas Vehicle (NGV) Fuel Containers

[15] ANSI/IAS PRD 1-1998, Pressure Relief Devices for Natural Gas Vehicles (NGV) Fuel Containers

[16] CGA 12.6-M94, Vehicle Refueling Appliance

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