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(JEMA)

**Small solid oxide fuel cell power
systems—Part 1: General rules**

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Foreword

This translation has been made based on the original Japanese Industrial Standard established by the Minister of Economy, Trade and Industry through deliberations at the Japanese Industrial Standards Committee according to the proposal for establishment of Japanese Industrial Standard submitted by the Japan Electrical Manufacturers' Association (JEMA) with the draft being attached, based on the provision of Article 12 Clause 1 of the Industrial Standardization Law.

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JIS C 8841 series consists of the following 3 parts under the general title "*Small solid oxide fuel cell power systems*".

Part 1: General rules

Part 2: General safety codes and safety testing methods

Part 3: Performance testing methods and environment testing methods

Small solid oxide fuel cell power systems— Part 1: General rules

1 Scope

This Japanese Industrial Standard specifies the general rules, such as the composition, structure, method of connection to the outside of a package and inspection for stationary small solid oxide fuel cell power systems (hereafter referred to as “fuel cell systems”) that are in accordance with the following **a)** to **h)**.

- a) **Type of fuel cell** Solid oxide fuel cell
- b) **Output** Rated power transmission output of less than 10 kW
- c) **Output mode** DC output, AC output or both outputs of DC output and AC output
- d) **Output voltage** 220 V or less in the case of AC output
- e) **Operation mode** Grid-connected operation, grid-independent operation or independent operation
- f) **Raw fuel** Gaseous fuel (city gas, liquefied petroleum gas, etc.), liquid fuel (kerosene, etc.) or hydrogen
- g) **Operating pressure** Maximum working pressure of the section where fuel gas flows shall be less than 0.1 MPa. That of the section where liquid fuel flows shall be less than 1.0 MPa.
- h) **System configuration** Stationary generation dedicated system or cogeneration system stored in a package

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this Standard. The most recent editions of the standards (including amendments) indicated below shall be applied.

JIS B 7411 *Solid-stem general purpose liquid-in-glass thermometers*

JIS B 7505-1 *Aneroid pressure gauges—Part 1: Bourdon tube pressure gauges*

JIS B 7547 *Procedures of characterization and calibration for digital pressure gauges*

JIS B 7920 *Hygrometers—Test method*

JIS B 8392-3 *Compressed air—Part 3: Test methods for measurement of humidity*

JIS C 1102-2 *Direct acting indicating analogue electrical measuring instruments and their accessories Part 2: Special requirements for ammeters and voltmeters*

JIS C 1102-3 *Direct acting indicating analogue electrical measuring instruments and their accessories Part 3: Special requirements for wattmeters and varmeters*

- JIS C 1211-1 *Alternating-current watt-hour meters (for direct connection)—Part 1: General measuring instrument*
- JIS C 1302 *Insulation resistance testers*
- JIS C 1509-1 *Electroacoustics—Sound level meters—Part 1: Specifications*
- JIS C 1602 *Thermocouples*
- JIS C 4003 *Electrical insulation—Thermal evaluation and designation*
- JIS C 8800 *Glossary of terms for fuel cell power system*
- JIS C 8825 *Testing and measurement techniques of small polymer electrolyte fuel cell power systems*
- JIS C 8826 *Testing methods of power conditioner for grid interconnected small fuel cell power systems*
- JIS C 8841-2 *Small solid oxide fuel cell power systems—Part 2: General safety codes and safety testing methods*
- JIS C 8841-3 *Small solid oxide fuel cell power systems—Part 3: Performance testing methods and environment testing methods*
- JIS K 0151 *Non-dispersive infrared gas analyzer*
- JIS K 0400-12-10 *Water quality—Determination of pH*
- JIS K 2201 *Gasoline for industrial purpose*
- JIS K 2202 *Motor gasoline*
- JIS K 2203 *Kerosine*
- JIS K 2240 *Liquefied petroleum gases*
- JIS K 2279 *Crude petroleum and petroleum products—Determination and estimation of heat of combustion*
- JIS K 2301 *Fuel gases and natural gas—Methods for chemical analysis and testing*
- JIS S 2093 *Test methods of gas burning appliances for domestic use*
- JIS S 3031 *General rules for test methods of oil burning appliances*
- JIS T 8202 *Anemometer for general use*
- JIS Z 8703 *Standard atmospheric conditions for testing*
- JIS Z 8806 *Humidity—Measurement methods*

3 Terms and definitions

For the purpose of this Standard, the terms and definitions given in **JIS C 8800** and the following apply.

3.1 fuel cell system

system that transforms chemical energy into electric energy (DC or AC) and thermal energy electrochemically

Normally, it is comprised of a power generation unit and a hot-water storage unit.

NOTE : The basic constitution of a general fuel cell system is shown in figure 1.

3.2 power generation unit

unit comprised of a module, a power conditioner, a fuel reformer, an air supply system, water treatment equipment, exhaust heat recovery equipment, a control device, etc.

3.3 hot-water storage unit

unit that stores heat recovered from a power generation unit as hot water and supplies it to the outside as necessary

It is comprised of a hot-water storage tank, an auxiliary heat source equipment, etc. The auxiliary heat source equipment has a heating function by gaseous fuel, liquid fuel, electricity, etc.

3.4 module

basic constitution unit of a power generation unit comprised of one or multiple cell stacks, joints of fuel, air, exhaust gas and electric power, a storage container, etc. in order to obtain a given output

The module may include an offgas combustor, a reformer, etc.

3.5 power conditioner

equipment that has a function that transforms the output of DC power generating facilities into a required electric power and supplies it

It includes some or all of supervisory equipment, a DC converter, an interconnection converter and attached equipment

3.6 fuel reformer

equipment that supplies raw fuel and/or chemical processing equipment that converts raw fuel into compositions that can be used in a module, which is comprised of a blower, a reformer, a desulfurizer, preheater, etc.

3.7 air supply system

system that supplies oxidizing agents such as air, which is comprised of a blower, preheater, etc.

3.8 water treatment equipment

equipment that supplies and/or purifies the recovered water or the added water in order to use it in a power generation unit, which is comprised of a pump, a tank, a filter, ion exchange equipment, etc.

3.9 exhaust heat recovery equipment

equipment that recovers potential heat such as exhaust gas of a power generation unit by changing it into hot water, which is comprised of an ion exchange equipment

3.10 package

container that stores a module, a fuel reformer, a power conditioner, a control device, auxiliary equipment, etc. that are the major equipment constituting a power generation unit

The container that stores a power conditioner etc. may be independent from the package of a power generation unit.

3.11 power transmission output

electric output of the output end that is taken out to the outside from a power generation unit, which is an output obtained by subtracting the auxiliary equipment motive power of the power generation unit from the generating-end electric output

3.12 grid-connected operation

state in which power generating facilities connected to the commercial power system are being operated

3.13 grid-independent operation

state in which power generating facilities disconnected from the commercial power system are being operated

In this state, electric power is supplied to a specific load.

3.14 independent operation

state in which power generating facilities are independently being operated irrespective of the commercial power system

3.15 thermal power

exhaust heat recovery heating value that can be recovered from a power generation unit

3.16 indoor type

type that is installed and used indoors

3.17 outdoor type

type that is installed and used outdoors

3.18 open type

type in which combustion air is taken from the surroundings of a power generation unit and combustion gas is discharged to the surroundings of the power generation unit

3.19 semi-closed type

type in which combustion air is taken from the inside of a room and combustion gas is discharged to the outside of the room

There are a natural draft vent type and a forced exhaust type.

NOTE : This Standard is only applicable to the forced exhaust type.