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**Testing methods for environment of
small polymer electrolyte fuel cell
power systems**

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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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Testing methods for environment of small polymer electrolyte fuel cell power systems

1 Scope

This Japanese Industrial Standard specifies the testing methods for environment of the stationary and portable small polymer electrolyte fuel cell power system (hereafter referred to as “fuel cell system”).

This Standard is not intended to be used as the completed design documentation or the instruction for use.

This Standard is applicable to the fuel cell systems satisfying the following conditions:

- a) **Type of fuel cell** Polymer electrolyte fuel cell
- b) **Output** Rated transmission output, less than 10 kW
- c) **Output mode** Grid-connected operation, grid-independent operation or independent operation of dc output or ac output, 220 V or less
- d) **Raw fuel** Gaseous fuel (city gas, liquefied petroleum gas, etc.), liquid fuel (kerosene, etc.) or hydrogen
- e) **Operating pressure** Maximum allowable working pressure of the portion through which fuel gas passes, less than 0.1 MPa
- f) **System configuration** Stationary and portable dedicated power generation system or cogeneration system stored in a package (except a micro fuel cell)

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 7951 *Continuous analyzer for carbon monoxide in ambient air*

JIS B 7956 *Continuous analyzers for hydrocarbons in ambient air*

JIS B 7981 *Automated measuring systems and analyzers for sulfur dioxide in flue gas*

JIS B 7982 *Automated measuring systems and analyzers for nitrogen oxides in flue gas*

JIS B 7983 *Continuous analyzers for oxygen in flue gas*

JIS C 8800 *Glossary of terms for fuel cell power system*

JIS C 8960 *Glossary of terms for photovoltaic power generation*

JIS D 1030 *Automobiles—Analytical procedure for measurement of carbon monoxide, carbon dioxide, total hydrocarbons and oxides of nitrogen in exhaust gas*

- JIS K 0098 *Methods for determination of carbon monoxide in flue gas*
- JIS K 0102 *Testing methods for industrial wastewater*
- JIS K 0103 *Methods for determination of sulfur oxides in flue gas*
- JIS K 0104 *Methods for determination of nitrogen oxides in flue gas*
- JIS K 0301 *Methods for determination of oxygen in flue gas*
- JIS K 0304 *Methods for determination of carbon dioxide in air*
- JIS K 2201 *Gasoline for industrial purpose*
- JIS K 2202 *Motor gasoline*
- JIS K 2203 *Kerosine*
- JIS K 2240 *Liquefied petroleum gases*
- JIS K 2249 *Crude petroleum and petroleum products—Determination of density and petroleum measurement tables based on a reference temperature (15 °C)*
- JIS S 2093 *Test methods of gas burning appliances for domestic use*
- JIS S 2109 *Gas burning water heaters for domestic use*
- JIS S 3031 *General rules for test methods of oil burning appliances*
- JIS Z 8703 *Standard atmospheric conditions for testing*

3 Terms and definitions

For the purpose of this Standard, the terms and definitions in **JIS C 8800** and **JIS C 8960** and the following apply.

3.1 cold state

state in which energy is not supplied from the outside and a polymer electrolyte fuel cell power generation unit (hereafter referred to as “power generation unit”) stops near at ordinary temperature

3.2 transmission output

electric output of an output terminal which is taken out from a power generation unit to the outside except the auxiliary equipment power of the power generation unit

3.3 thermal output

heat quantity of exhaust heat recovery which can be recovered from a power generation unit

3.4 package

container in which main devices constituting a power generation unit such as a fuel cell stack, a fuel reformer, a power conditioner, a control unit, auxiliary equipment are stored

The container in which a power conditioner and others are stored may be separated from the package of a power generation unit.

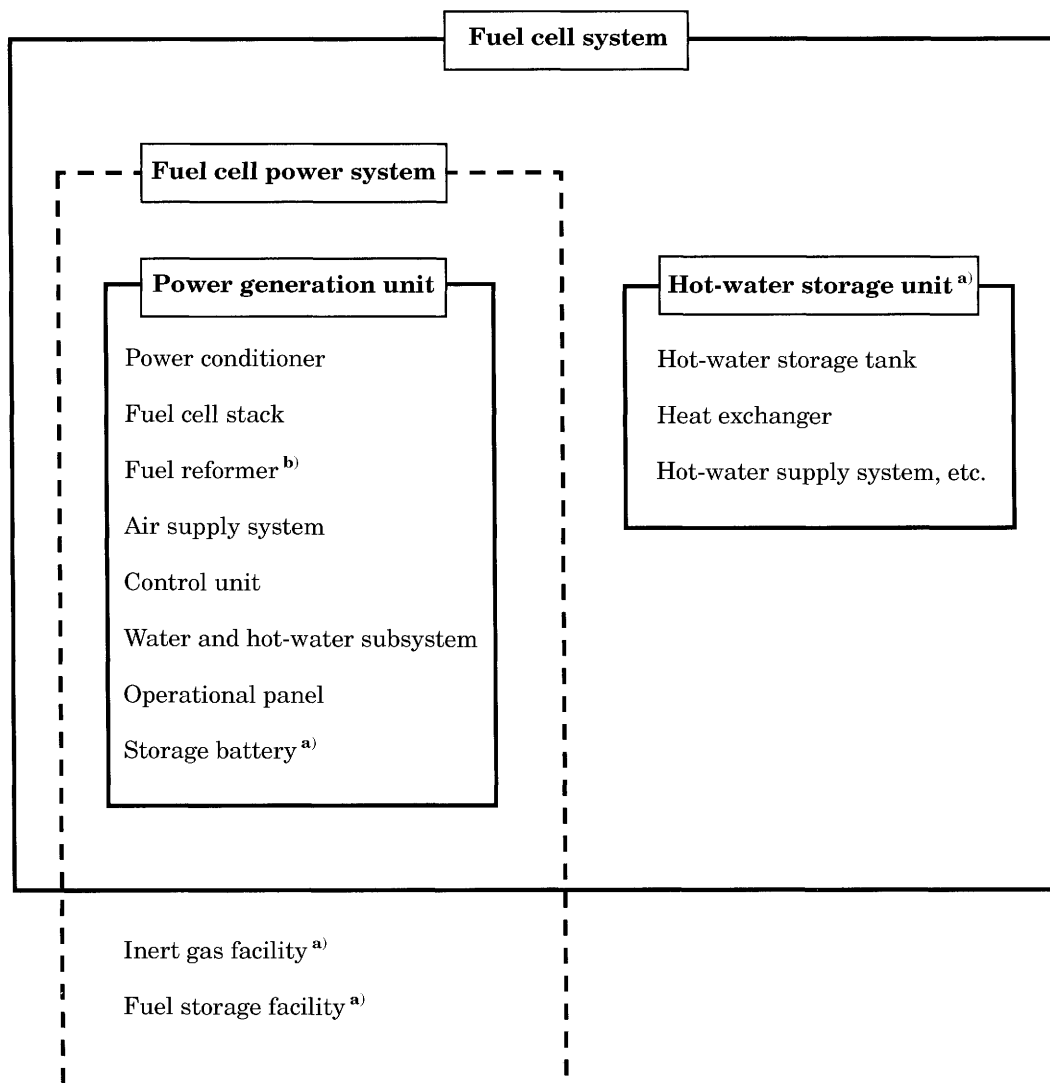
3.5 hot-water storage unit

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

It consists of a hot-water storage tank, a heat exchanger, a hot-water supply system, etc. Furthermore, heat functions by using gaseous fuel, liquid fuel, electricity, etc. are added to it as necessary.

4 Configuration and scope

The basic configuration of the fuel cell system in the scope of this Standard shall be as shown in figure 1.



NOTE : Installation location of device, etc. is not limited to that in one package.

Notes ^{a)} Equipment or unit installed as necessary.

^{b)} It is not used when raw fuel is hydrogen.

Figure 1 Basic configuration of fuel cell system

5 Conditions on test

5.1 Test conditions

The test conditions shall be as follows.

- a) **Condition of testing laboratory** The condition of a testing laboratory shall be as given in table 1 unless otherwise specified. However, in the case where the result of test items is not likely to be affected by this condition, the conformance to table 1 is not necessary.

Table 1 Condition of testing laboratory

Item	Condition
Temperature of testing laboratory ^{a)}	The temperature of a testing laboratory shall be the “ordinary temperature” (standard temperature state class 15: 20 °C ± 15 °C) specified in table 1 of JIS Z 8703 , and the temperature fluctuation during test shall be ± 5 K.
Humidity of testing laboratory	The humidity of a testing laboratory shall be the “ordinary humidity” [standard humidity state class 20: (65 ± 20) %] specified in table 2 of JIS Z 8703 .
Indoor atmosphere	The indoor atmosphere shall not contain more than 0.2 % of carbon dioxide and more than 0.002 % of carbon monoxide. Furthermore, there shall not be any air flow which affects combustion.
Note ^{a)} The measurement of temperature of a testing laboratory shall normally be performed at a distance of about 1 m away from the equipment by fixing the temperature measurement part to almost the same height as that of the top surface of the equipment (when this height exceeds 1.5 m from the floor surface, the fixation height shall be 1.5 m from the floor surface), and at the four positions, i.e. in front and behind, to the left and to the right of the equipment. The arithmetic mean of thus obtained four measurements shall be taken as the room temperature. Care needs to be taken that the temperature measurement part is not directly affected by the combustion gas, radiant heat, etc. from the equipment.	

- b) **Installation condition and usage state of equipment** The installation condition and usage state of the equipment shall be as specified by the manufacturer (the state described in an operation manual, etc.) unless otherwise specified. However, this need not be observed in the case where the result of test items is not likely to be affected by this condition.
- c) **Condition of power supply** The condition of a power supply for a test, etc. shall be as follows unless otherwise specified. However, this need not be observed in the case where the result of test items is not likely to be affected by this condition.
- 1) **Equipment using household power supply** For the equipment using a household power supply, the test shall be performed by applying rated voltage with rated frequency.
 - 2) **Equipment using dry battery and storage battery** For the equipment using a dry battery and a storage battery, the test shall be performed by using the dry battery and the storage battery specified in an operation manual, etc.