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(JEMA)

**Testing procedure of islanding prevention
measures for utility-interconnected
small polymer electrolyte fuel cell power
system power conditioners**

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Contents

	Page
1 Scope.....	1
2 Normative references.....	1
3 Terms and definitions.....	1
4 Test circuit.....	3
5 Test apparatus.....	5
5.1 Measuring instrument	5
5.2 DC power supply.....	5
5.3 AC power supply	6
5.4 Load device	6
6 Test method	7
6.1 Test condition	7
6.2 Load condition	8
6.3 Measurement method of islanding time	10
6.4 Judgment condition	10
7 Example of test result table.....	11
8 Example of description of specifications of test apparatus.....	11

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 procedure of islanding prevention measures for utility-interconnected small polymer electrolyte fuel cell power system power conditioners

1 Scope

This Japanese Industrial Standard specifies the testing procedure of islanding prevention measures for utility-interconnected power conditioners in the stationary small polymer electrolyte fuel cell power system (hereafter referred to as “fuel cell system”) applicable to the following items.

- a) **Type of fuel cell** Polymer electrolyte fuel cell
- b) **Output** Rated power transmission output of less than 10 kW
- c) **AC output voltage** 220 V or less
- d) **Operating mode** Utility-interconnected operation
- e) **Raw fuel** Gas fuel (city gas, liquefied petroleum gas, etc.), liquid fuel (kerosene etc.) or hydrogen
- f) **Operating pressure** Maximum allowable working pressure of less than 0.1 MPa, for the section where fuel gas flows (less than 1.0 MPa for the section where liquid gas flows)
- g) **System configuration** Stationary generation dedicated system or cogeneration system stored in a package

NOTE : Conformance to this Standard does not ensure exemption from the responsibilities to observe other related regulations.

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

JIS C 8823 *Testing methods for small polymer electrolyte fuel cell power systems*

JIS C 8826 *Testing methods of power conditioner for grid interconnected small polymer electrolyte fuel cell power systems*

3 Terms and definitions

For the purposes of this Standard, the terms and definitions given in **JIS C 8800** and **JIS C 8826** together with the following apply.

3.1 power conditioner

equipment with a function that supplies the output of DC power generating facilities by converting it into the power required, which includes a part or all of the following: supervisory equipment, a DC converter, a utility-interconnected converter and attached equipment

3.2 EUT

equipment under testing

NOTE : In this Standard, EUT is a power conditioner with an inverter function and islanding prevention measures.

3.3 fuel cell simulated power unit

DC power unit that can simulate the output characteristics (V-I characteristics) of a fuel cell stack

3.4 islanding prevention measures

function that detects islanding even in such an islanding state that an ordinary overvoltage relay, under-voltage relay, over-frequency relay or under-frequency relay cannot detect it

There are a passive method and an active method to this prevention measures, based on respective detection principles.

3.5 utility-interconnected

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

NOTE : Connecting power generating facilities to the commercial power system is referred to as parallel, separating power generating facilities from the commercial power system as parallel-off and the spot where parallel-off can be performed from the commercial power system using a breaker as parallel-off spot.

3.6 islanding [duration] time ¹⁾

time from occurrence of islanding to the parallel-off of a power conditioner

Note ¹⁾ The above term may be used without the bracketed word, as long as there is no possibility of confusion.

3.7 quality factor (Q_f)

factor that indicates the sharpness of the resonance curve of a parallel resonance circuit used in the test of islanding prevention measures

The factor is defined by the following formula:

$$Q_f = R \sqrt{\frac{C}{L}}$$

where,

Q_f : quality factor

R : resistance load

C : capacitive load (including shunt capacitance)

L : inductive load