

Information Exchange Meeting with CONSUEL

Electrical Safety Inspection Scheme for Residential Housing and Commercial Facilities in Japan

Forum of Electrical Safety Inspection Associations

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2023.10.18



Table of Contents

- Overview of Electricity-Related Laws and Glossary of Terms
 - Electricity-Related Laws
 - The Purpose of the Electricity Business Act and Legally Protected Interests
 - Classification of Electrical Facilities
 - Voltage Classification

Safety Inspection Scheme for Residential Housing

- Overview of the Safety Inspection Scheme for Residential Housing
- Investigation Details

Safety Inspection Scheme for Commercial Facilities

- · Overview of the Safety Inspection Scheme for Commercial Facilities
- Licensed Chief Electricity Engineer Qualifications and Scope of Oversight
- Licensed Chief Electricity Engineer Outsourcing Approval Scheme
- Outsourcing and Electrical Safety Inspection Associations
- Inspection Frequency
- Pre-Use Self-Inspection
- · safety management Services Details
- Challenges for the Safety Inspection Scheme for Commercial Facilities
 - Current Issues and Countermeasures

Reference documents

- Reference Document 1: The Purpose of the Electricity Business Act and Legally Protected Interests
- Reference Document 2: Safety Inspection Scheme for Residential Housing
- Reference Document 3: Safety Inspection Scheme for Commercial Facilities
- Reference Document 4: Electric Work Qualifications
- Reference Document 5: Mix Ratio of Generated Power
- Reference Document 6: Power Outage Durations





Overview of Electricity-Related Laws and Glossary of Terms



Electricity-Related Laws

Schematic of the Legal Structure of Japan's Electricity Business Act and Other Laws



The Purpose of the Electricity Business Act and Legally Protected Interests



See Reference Document 1 for details.

The purpose of the Electricity Business Act is to ensure "public safety" and "environmental preservation." The legal interests to be protected by safety regulations are (1) to not adversely affect the human body or other facilities (e.g., prevent electric shock and leakage) and (2) to not cause significant interference to the supply of electricity. In order to realize these requirements, the Act regulates the construction, maintenance, and operation of "electrical facilities" as its main legal subject.





Classification of Electrical Facilities





Voltage Classification





Safety Inspection Scheme for Residential Housing

(Electrical Facilities for General Use)

Overview of the Safety Inspection Scheme for Residential Housing



See Reference Document 2 for details.

Residential housings fall under the category of Electrical Facilities for General Use.

During electric work

Electricians_{*1} who perform the work are obligated to comply with the Technical Standards for Electric Equipment.

After electric work completion

After the electric work is completed, the person maintaining and operating electric lines_{*2} conducts an investigation to make sure that the work conforms with the Technical Standards for Electric Equipment. This investigation may be outsourced to a national governmentregistered investigation bodies_{*3}.

During use

There is an obligation to conduct an investigation once every four years to ensure conformity with the Technical Standards for Electric Equipment.

These investigations are typically outsourced by the person maintaining and operating electric lines to a registered investigation bodies.

Completion investigation

Periodic investigations

- *1: An electrician is a person with national certification to perform electric work. See Reference Document 4 for details.
- *2: An person maintaining and operating electric lines is an entity that maintains and operates electric wire facilities that are directly electrically connected to Electrical Facilities for General Use. (Mostly general transmission and distribution companies)
- *3: A registered investigation bodies is an entity registered with the national government. Electrical Safety Inspection Associations that are a member of the Forum of Electrical Safety Inspection Associations are also registered investigative bodies.



Investigation Details

• The completion investigation includes (1) visual inspections, (2) grounding resistance measurements, (3) insulation resistance measurements, and (4) circuit checks, etc.

2

· The following checks are performed in periodic investigations





Inspection of outdoor electric equipment



Inspection of lead-in equipment







3

Leakage current measurements_{*1}





Inspection results report



*1: Insulation resistance measurements are performed if the leakage current exceeds 1 mA.



Safety Inspection Scheme for Commercial Facilities

(Electric Facilities for Private Use)



Overview of the Safety Inspection Scheme for Commercial Facilities [1]

Commercial facilities fall under the category of Electric Facilities for Private Use. The responsibility for establishing Independent Safety Measures is imposed on Electric Facilities for Private Use.

Breakdown of Electric Facilities for Private Use



- Low voltage
- High-voltage
- Less than 50 kW
- 50 kW to less than 500 kW
- 500 kW to less than 1000 kW
- 1000 kW or greater
- Extra-high-voltage

(2020) Source: Ministry of Economy, Trade and Industry (METI) documents

Overview of the Safety Inspection Scheme for Commercial Facilities [2]

Equipment.

Before and after electric work

Formulating safety regulations

· Electricians who perform the

work are obligated to comply

with the Technical Standards

Appointing a Licensed chief

electricity engineer

四国電気保安協会

See Reference Document 3 for details.

During use

In addition to complying with safety regulations, the installer is obligated to maintain electrical facilities in conformity with the Technical Standards for Electric Equipment.



After electric work completion

The installer conducts a self-inspection

before starting the use of the electrical

with the Technical Standards for Electric

facilities to confirm that they conform



Licensed Chief Electricity Engineer Qualifications and Scope of Oversight

Licensed chief electricity engineer licenses come in three-classes—first, second, and third-class—with oversight over different voltages and outputs depending on class.



Licensed chief electricity engineer Outsourcing Approval Scheme

Because of the difficulties in securing Licensed chief electricity engineers for all commercial facilities due to the number of qualified personnel available and economic reasons, installers are permitted to outsource this work to businesses who employ qualified personnel or to individuals.





Regulations regarding outsourcing

• At least 3 years of work experience (has attended a training course)

-般財団法人

- The Licensed chief electricity engineer is to personally perform inspections. As for the number of cases that one Licensed chief electricity engineer is allowed to inspect, the total of points as calculated based on the type and/or scale of the electric facility shall be smaller than 33.
- Facilities interconnected at high voltage (7 kV or lower)
- The output of power generation facilities for which services are allowed to be outsourced are shown in the table below.

PV power plant, power storage plant	Less than 5 MW
Thermal, hydro, wind power plant	Less than 2 MW



Outsourcing and Electrical Safety Inspection Associations

Our organization, the "Forum of Electrical Safety Inspection Associations (FESIA)" enjoys the largest share in Japan as an outsourcing partner.



As of January 31, 2023

As of March 31, 2022

Source: Compiled based on Ministry of Economy, Trade and Industry (METI) documents



Inspection Frequency

	Demand facilities			Power generation facilities		
		*1	*2	Thermal power plant	PV power plant	Wind power facility
Inspection frequency (times/month[s])	1/1	1/2	1/3	1/1	1/6	1/1

*1: Highly reliable demand facilities with 24-hour leakage monitoring by insulation monitoring device or facilities of 100 kVA or lower.

*2: Small-scale high-voltage demand facilities (64 kVA or lower) or indoor cubicle-type facilities of 100 kVA or lower

Electrical facility for which an outsourcing contract has been entered



(Switches, transformers, etc., contained in a metal enclosure)



Pre-Use Self-Inspection

When electric work is completed on Electric Facilities for Private Use, a completion inspection consisting of inspections, tests, and other means is conducted, in which the installer voluntarily checks that the work has been performed in conformity with the construction plan and laws and regulations, and that the facilities provide the necessary capacity.

Inspection items

- Visual inspection
- Grounding resistance
 measurements
- Insulation resistance measurements
- Dielectric strength tests
- Protective relay tests
- Circuit breaker related tests
- Load tests (output tests)
- Noise measurements (for specific substations only)
- Vibration measurements (for specific substations only)
- Other tests deemed necessary







safety management Services Details

2

5



Emergency generator start-up test





Visual inspections and highvoltage equipment cleanup



High and low voltage insulation resistance measurements







Protective relay test



* Items 4 - 6 are items for closer inspection in the event of power outage.



Challenges for the Safety Inspection Scheme



Current Issues and Countermeasures

Challenges

In the wake of the Great East Japan Earthquake, many PV plants and other renewable energy sources have been installed, increasing the demand for Licensed chief electricity engineers.

However, the number of Licensed chief electricity engineers is expected to decrease going forward due to the declining population, declining birthrate, and aging population, and there is real concern that we may eventually face a serious shortage of personnel.



Source: Ministry of Economy, Trade and Industry (METI)

Countermeasures

With the aim of alleviating labor shortages, the national government is taking the lead in reviews to "make electrical safety operations smarter" by improving the quality of electrical safety through digital technologies such as constant remote monitoring using IoT and AI, and relaxing the frequency of inspections, etc.

Various research and development efforts are also underway at Electrical Safety Inspection Associations that are members of the Forum of Electrical Safety Inspection Associations.



Reference documents



Reference Document 1: The Purpose of the Electricity Business Act and Legally Protected Interests

Article 1 (Purpose)

The purpose of this Act is to protect the interests of electricity users by ensuring the proper and streamlined operation of electricity businesses, and to ensure public safety and protect the environment by regulating the construction, maintenance and operation of electrical facilities while promoting the sound development of electricity businesses.

Article 39 (Maintenance of Electrical Facilities for Business Use)

Those who install Electrical Facilities for Business Use shall maintain the Electrical Facilities for Business Use in conformity with technical standards prescribed by order of the competent ministry.

- 2. The order of the competent ministry mentioned in the preceding paragraph shall conform to the following:
 - (i) Electrical Facilities for Business Use shall not cause harm to the human body or damage to property.
 - (ii) Electrical Facilities for Business Use shall not cause any electrical or magnetic impairment to the functions of other electrical equipment or other property.
 - (iii) Ensure that damage to or destruction of the Electrical Facilities for Business Use does not cause significant interference to the supply of electricity by General Electricity Transmission and Distribution Utilities or Electricity Distribution Utilities.
 - (iv) Where Electrical Facilities for Business Use are provided for use at a General Electricity Transmission and Distribution Utility or Electricity Distribution Utility, ensure that damage to or destruction of said Electrical Facilities for Business Use do not cause significant interference to the supply of electricity associated with the General Electricity Transmission and Distribution Utility or Electricity Distribution Utility.



Reference Document 2: Safety Inspection Scheme for Residential Housing

O Construction and manufacturing stage Electricians are obligated to comply with the Technical Standards for Electric Equipment. (Electricians Act, Article 5)

O Maintenance and operation stage

- The person maintaining and operating electric lines shall investigate whether the Electrical Facilities for General Use conform with the Technical Standards for Electric Equipment. (Electricity Business Act, Article 57)
- The person maintaining and operating electric lines may outsource this investigation to a registered investigation bodies. (Electricity Business Act, Article 57-2)
- The national government may order repairs or modifications to ensure conformity with the Technical Standards for Electric Equipment. (Electricity Business Act, Article 56)

m A The principle of separation of maintenance and construction

While no explicit regulation exists, it has become a well-established and customary practice in electricity safety administration that "electric work and maintenance must be performed by different entities."



Reference Document 3: Safety Inspection Scheme for Commercial Facilities

O Electric work and manufacturing stage

- The installer is required to conduct a self-inspection before starting the use of electrical facilities to check that they conform with the Technical Standards for Electric Equipment, and to keep records of the self-inspection. (Electricity Business Act, Article 51)
- The installer is obligated to maintain electrical facilities in conformity with the Technical Standards for Electric Equipment. (Electricity Business Act, Article 39)
 The national government may order repairs or temporary shutdowns to ensure conformity with the Technical Standards. (Electricity Business Act, Article 40)

O Maintenance and operation stage

- The installer is obligated to maintain electrical facilities in conformity with the Technical Standards for Electric Equipment. (Electricity Business Act, Article 39)
 The national government may order repairs or temporary shutdowns to ensure conformity with the Technical Standards. (Electricity Business Act, Article 40)
- The installer is required to establish safety regulations that prescribe specific safety details, file these with the national government, and comply with these regulations. (Electricity Business Act, Article 42) The national government may order changes to these safety regulations in light of changes in circumstances. (Electricity Business Act, Article 42)
- The installer is required to appoint a Licensed chief electricity engineer for each facility. The appointed Licensed chief electricity engineer is obligated to perform his/her duties with integrity. (Electricity Business Act, Article 43)

The national government may order a Licensed chief electricity engineer to relinquish his/her license if they are in violation of the law, etc. (Electricity Business Act, Article 44)



Reference Document 4: Electric Work Qualifications

Electrical Facilities for Electricity Business Use (facilities at power companies, etc.)	Electric Facilities	Electrical Facilities for General Use			
	Demand facilities 500 kW or greater	Demand facilities			
		Neon equipment and emergency backup power generation equipment	Demand facilities excluding electric wire facilities 600 V or smaller	Other demand facilities	
Electric work to be performed under the supervision of a Licensed chief electricity engineer in accordance with the Electricity Business Act (no		Electrician qualified for designated electric work	Approved electric work electrician	First-class electrician	Second-class electrician
specific constructi required).	on qualification is		First-class electrician		



Reference Document 5: Mix Ratio of Generated Power





Reference Document 6: Power Outage Durations



Notwithstanding the fact that Japan has experienced numerous natural disasters including earthquakes and typhoons, and is an island nation that is poor in energy resources, the number and duration of power outages are among the lowest in the world, indicating the high quality of its electric power.

Electricity safety regulations are believed to be one of the factors contributing to the low number of outages and their shorter durations.