

# Some International Comparisons of Inspection Systems for Electrical Users' Facilities

*FESIA*

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# 1. Importance of electrical safety inspection at each stage

|                            |              |  |
|----------------------------|--------------|--|
|                            |              | Electrical safety inspection at each stage   |
| New and renovated facility | Design       | Inspection of design for compliance with safety standards<br>Including: selection of equipment and materials |
|                            | Construction | Completion inspection  |
| Existing facility          | Operation    | Periodic and other inspections   |

## **2. Examples of fisuel's activities**

**A) World barometer of the electrical safety**

**B) Verification system report (Asia Pacific WG, 2017)**

- Korea, Indonesia, New Caledonia and Japan
- High voltage user's installation ( $> 1\text{kV}$ )
- Low voltage installation in commercial premise
- Low voltage installation in domestic premise
- PV connected to high voltage grid
- PV connected to low voltage grid
- Regulations for electric works

## Verification System of New or Existing Electrical Installations according to Law or Regulations

Country: JAPAN



**Electrical Installation: Users' Installations of High Voltage (Buildings, Factories, Multi-dwellings...etc) >1kV**

### **1. Applicable Law or Regulation**

National Law (Electricity Utilities Industry Act)

### **2. Obligation or Recommendation**

Obligation

### **3. Person or Organization who have Obligation or Responsibility**

Owner or Occupant of the Installations

### **4. Defrayer of the Costs, Contractual Relationship, Manner of Payment**

Owner or Occupant of the Installations must Defray the Cost for Verification and Maintenance. Owner or Occupant must employ an Electric Engineer who has National License "Electrical Chief Engineer" for Verification and Maintenance. Alternatively, Owner or Occupant of 6.6kV Installation can Outsource them with Government Authorization. Recently, Most of Owners and Occupants of 6.6kV Installations outsource them.

## **5. Authorization or Registration System of Verification Body**

No Special Authorization System for Verification Body.

ESIAs are Registered as "General Incorporated Foundations".

## **6. Major Verification Body and its Legal Status**

ESIAs (Electrical Safety Inspection Associations) have Top Share (non-Exclusive).

They are Private Non-Profit Foundations (General Incorporated Foundations).

## **7. Qualification System of Engineers for Verification or Safety-Maintenance**

National License "Electrical Chief Engineer" is needed.

## **8. Time and Frequency of Verification**

Owner or Occupant of the Installations should Establish Self-Directed "Safety Regulations" including Verification Plan and Notify to the Government.

Typical Verifications;

[1] Initial Verification for New Installations

[2] Verification during Construction Work

[3] Periodic Verification (Monthly and Yearly)

[4] Ad hoc Verification in the Event of Failure or Symptom of Failure



## **9. Major Verification Items, Power Interruption during Verification**

### **[1] Live Testing/Inspection**

Measuring the Leakage Current of LV(Low Voltage) Circuits, Inspection and Measurement of Heating Points, Inspection and Measurement of Discharging Points thru Ultra-phone

### **[2] Testing /Inspection with Suspended Power Supply (Yearly Verification)**

Measuring the Grounding Resistance, Measuring the Insulation Resistance, Testing Protective Relays, Inspecting Transformers

### **[3] State Monitoring**

Continuous Insulation Monitoring of Circuits





Requirements for the Verification of New or Existing  
Electrical Installations according to Law or Regulations

Country: JAPAN

**Electrical Installation: Commercial Premises (Shops, Schools,...etc)  
(Users' Installations of Low Voltage) <1kV**

**1. Applicable Law or Regulation**

National Law (Electricity Utilities Industry Act)

**2. Obligation or Recommendation**

Obligation

**3. Person or Organization who have Obligation or Responsibility**

Electrical Suppliers (Electrical Companies)

**4. Defrayer of the Costs, Contractual Relationship, Manner of Payment**

Electrical Suppliers (included in Electric Charges)

**5. Authorization or Registration System of Verification Body**

Organizations Authorized by Government





## **6. Major Verification Body and its Legal Status**

ESIAs (Electrical Safety Inspection Associations) (non-Exclusive)  
Private Non-Profit Foundations (General Incorporated Foundations)

## **7. Qualification System of Engineers for Verification or Safety-Maintenance**

National License "Electrical Chief Engineer", National License "Electrician" or  
High School Diploma of Electrical Engineering

## **8. Time and Frequency of Verification**

[1] Initial Verification for New Installations

[2] Verification for Renovated Installation

[3] Periodic Verification

Every Year for: Public Swimming Pools, Community Bathhouses, Schools,  
Kindergartens, Hospitals, Welfare Facilities for the Aged and Important Cultural  
Properties

Every 4 Years for Others

## **9. Major Verification Items, Power Interruption during Verification**

Measuring the grounding resistance (New or Renovated), Measuring the  
Insulation Resistance (Power Interruption), External appearance check, Interview,  
Safety Guidance

Requirements for the Verification of New or Existing  
Electrical Installations according to Law or Regulations

Country: JAPAN

**Electrical Installation: Domestic Premises (Apartments, Single-Family Houses,...)**

**(Users' Installations of Low Voltage) <1kV**



**1. Applicable Law or Regulation**

National Law (Electricity Utilities Industry Act)

**2. Obligation or Recommendation**

Obligation

**3. Person or Organization who have Obligation or Responsibility**

Electrical Suppliers (Electrical Companies)

**4. Defrayer of the Costs, Contractual Relationship, Manner of Payment**

Electrical Suppliers (included in Electric Charges)

**5. Authorization or Registration System of Verification Body**

Authorization by Government

## **6. Major Verification Body and its Legal Status**

ESIAs (Electrical Safety Inspection Associations) (non-Exclusive)

Private Non-Profit Foundations (General Incorporated Foundations)

## **7. Qualification System of Engineers for Verification or Safety-Maintenance**

National License "Electrical Chief Engineer", National License "Electrician" or High School Diploma of Electrical Engineering

## **8. Time and Frequency of Verification**

[1] Initial Verification for New Installations

[2] Verification for Renovated Installation

[3] Periodic Verification

Every Year for: Houses of Bedridden Elderly

Every 4 Years for Others

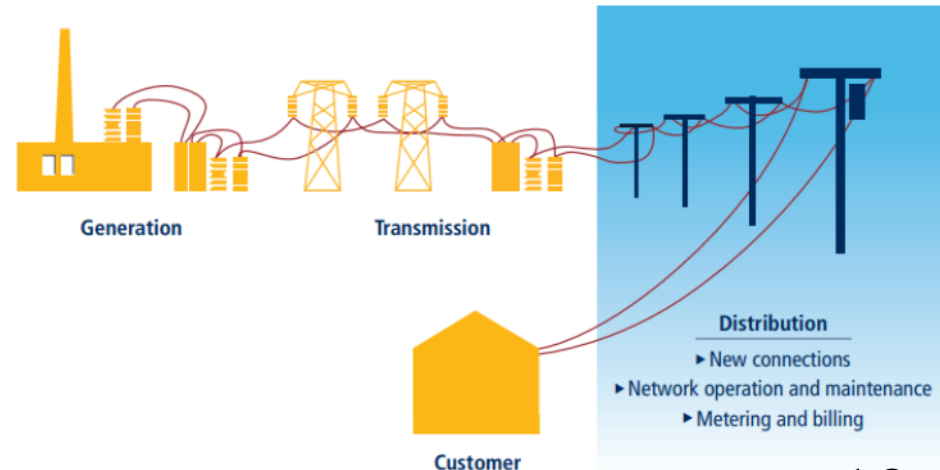


## **9. Major Verification Items, Power Interruption during Verification**

Measuring the grounding resistance (New or Renovated), Measuring the Insulation Resistance (Power Interruption), External appearance check, Interview, Safety Guidance

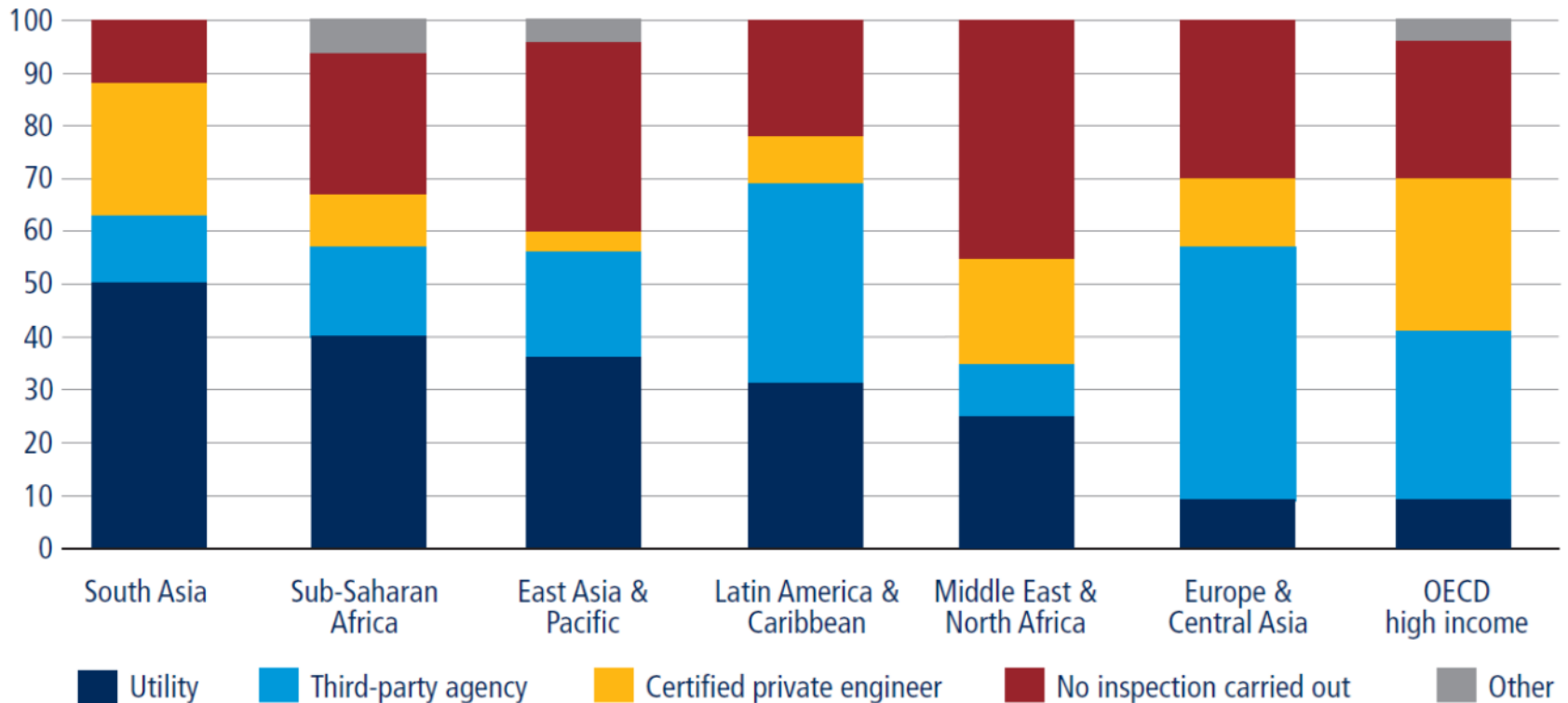
### 3. Doing Business report (World Bank and IFC)

- “Doing Business” measures regulations related to business in 190 economies.
- “Doing Business” records all procedures required to obtain a permanent electricity connection and supply including applications and all necessary inspections in 2019.
- This is a case-study of new warehouse (3 please, 140kVA).



Who conducts the inspection of the internal wiring installation prior to the electrification of a commercial building?

Share of economies with internal wiring inspection method (%)





Source: Doing Business database.





## 4. Comparison of inspection system between France and Japan by consuel and FESIA in 2023

- By facility capacity (kVA)
- Domestic and non-domestic
- Completion inspection, annual inspection, monthly inspection and others

# 1. Installed capacity 2,000 kVA or higher



|                       | France   | Japan   |
|-----------------------|---|--|
| Voltage               | 20 kV – 63 kV   | 22 kV - 66 kV  |
| Form                  | Factories, large commercial facilities, etc.  | Factories, large commercial facilities, etc.   |
| Completion inspection | <ul style="list-style-type: none"> <li>• Inspection methods are stipulated by law and standards</li> <li>• Inspections are conducted by inspection body that is accredited by COFRAC (accreditation body)</li> <li>• Inspection bodies are also approved by the ministry of labor.</li> <li>• CONSUEL issues the certificates of conformity, analyses the technical files and inspection results and stamps the certificates</li> </ul>   | <ul style="list-style-type: none"> <li>• Inspection methods are stipulated in "Security Rules" that are self-formulated based on private sector standards</li> <li>• Mostly performed by construction companies</li> <li>• Supervised by 2CEE</li> </ul>                         |
| Annual inspection     | <ul style="list-style-type: none"> <li>• Inspection methods are stipulated by law</li> <li>• Key items are earthing system checking, continuity, residual current devices trip setting, insulation resistance, relay tests, emergency systems</li> <li>• Inspection body (accredited) conducts inspection annually (extended to two years if no findings are cited)</li> <li>• The inspection body issues a report</li> <li>• The head of establishment is in charge of implementing the rectification process in case of nonconforming points</li> </ul> | <ul style="list-style-type: none"> <li>• Inspection methods are stipulated in self-formulated "Security Rules"</li> <li>• Insulation resistance measurements, grounding resistance measurements, relay tests, etc.</li> <li>• 2CEE conducts or supervises inspections</li> </ul> |
| Monthly inspection    | <ul style="list-style-type: none"> <li>• Specific buildings with very high risk level like labs, nuclear industry, chemical industry,...</li> <li>• Inspectors from accredited bodies carry out these inspections.</li> </ul>   | <ul style="list-style-type: none"> <li>• Inspection methods are stipulated in self-formulated "Security Rules"</li> <li>• Key items are inspected visually (unusual noises, odors, discoloration, etc.)</li> <li>• 2CEE conducts or supervises inspections</li> </ul>            |
| Weekly patrol         | <ul style="list-style-type: none"> <li>• No regulatory inspection</li> </ul>  | <ul style="list-style-type: none"> <li>• Conducted or supervised by 2CEE</li> </ul>  |

## 2. Installed capacity 50-2,000 kVA

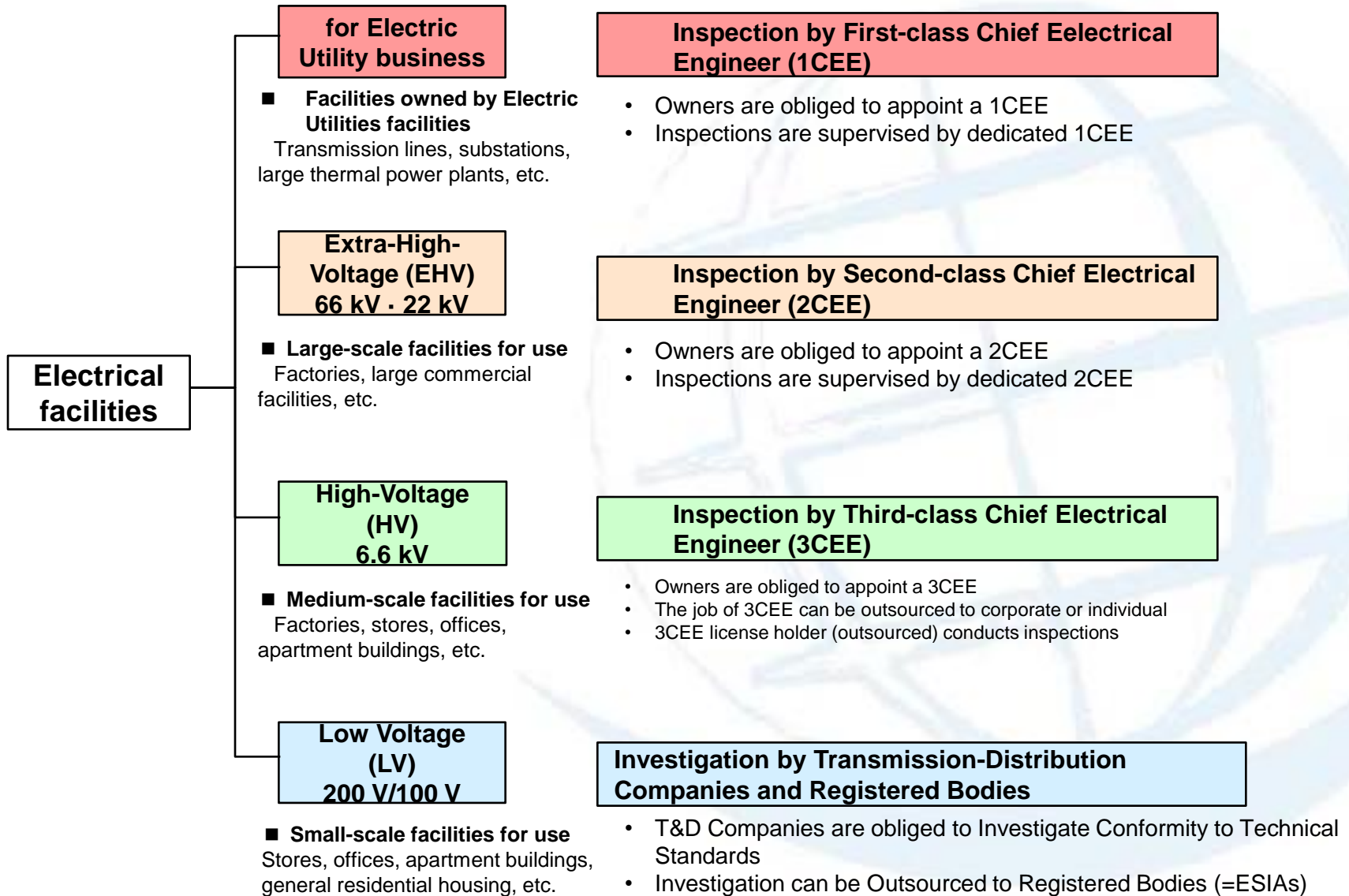
|   | France    |   | Japan    |
|---|--|---|---|
| Voltage                                   | 400 V/230 V(50-250kVA) or 20kV(250-2,000kVA)   |   | 6 .6kV  |
| Form                                      | Factories, stores, offices, etc.   | Apartment buildings, general residential housing  | Factories, stores, offices, apartment buildings, etc.   |
| Completion inspection                     | <ul style="list-style-type: none"> <li>• Inspection methods are stipulated by law and standards</li> <li>• Inspection is conducted by accredited inspection body</li> <li>• CONSUEL issues the certificates of conformity, analyses the technical files and inspection results and stamps the certificates</li> </ul>  | <ul style="list-style-type: none"> <li>• Inspection methods are stipulated by law and standards</li> <li>• Contractors conduct inspections</li> <li>• CONSUEL conducts sampling survey on-site</li> <li>• CONSUEL issues the certificates of conformity, analyses the technical files and inspection results and stamps the certificates</li> </ul> | <ul style="list-style-type: none"> <li>• Inspection methods are stipulated in Security Rules. Provisions are given in law (bylaws) for instances where inspection is outsourced.</li> <li>• Electrical safety inspection association or construction company conducts inspections</li> <li>• Supervised by 3CEE (outsourced)</li> </ul>           |
| Annual inspection                         | <ul style="list-style-type: none"> <li>• Inspection methods are stipulated by law and standards</li> <li>• Key items are Key items are are earthing system checking, continuity, residual current devices trip setting, insulation resistance, relay tests, emergency systems, installation cut-off</li> <li>• Inspection body (accredited) conducts inspection</li> </ul> | <ul style="list-style-type: none"> <li>• None</li> </ul>  | <ul style="list-style-type: none"> <li>• Inspection methods are stipulated in Security Rules. Provisions are given in law (bylaws) for instances where inspection is outsourced.</li> <li>• Insulation resistance measurements, grounding resistance measurements, relay tests, etc.</li> <li>• 3CEE (outsourced) conducts inspections</li> </ul> |
| Monthly inspection                        | <ul style="list-style-type: none"> <li>• No regulatory inspection</li> </ul>   | <ul style="list-style-type: none"> <li>• No regulatory inspection</li> </ul>  | <ul style="list-style-type: none"> <li>• Inspection methods are stipulated in Security Rules. Provisions are given in law (bylaws) for instances where inspection is outsourced.</li> <li>• Key items are inspected visually (unusual noises, odors, discoloration, etc.)</li> <li>• 3CEE (outsourced) conducts inspections</li> </ul>            |
| Other inspection to existing installation | <ul style="list-style-type: none"> <li>• In case of total renovation</li> </ul>  | <ul style="list-style-type: none"> <li>• Conducted upon change of ownership or renewal of lease or in case of total renovation.</li> <li>• CONSUEL issues the certificates of conformity.</li> </ul>  | <ul style="list-style-type: none"> <li>• In case of renovation.</li> </ul>  |



### 3. Installed capacity up to 50 kVA

|   | France    | Japan    |
|---|--|---|
| Voltage                                   | 400 V/230 V  | 200 V/100 V   |
| Form                                      | Stores, offices, etc.  | General residential housing   |
| Completion inspection                     | <ul style="list-style-type: none"> <li>• Inspection methods are stipulated by law and standards</li> <li>• Inspection is conducted by accredited inspection body</li> <li>• CONSUEL issues the certificates of conformity, analyses the technical files and inspection results and stamps the certificates</li> </ul>  | <ul style="list-style-type: none"> <li>• Investigation methods are stipulated by law (bylaws)</li> <li>• Investigation is conducted by a registered body outsourced by the T&amp;D company</li> </ul> |
| Periodic inspection                       | <ul style="list-style-type: none"> <li>• Inspection methods are stipulated by law and standards</li> <li>• Key items are Key items are are earthing system checking, continuity, residual current devices trip setting, insulation resistance, relay tests, emergency systems, installation cut-off</li> <li>• Inspection body (accredited) conducts inspection</li> </ul> | <ul style="list-style-type: none"> <li>• None</li> </ul>  |
| Other inspection to existing installation | <ul style="list-style-type: none"> <li>• In case of total renovation</li> </ul>  | <ul style="list-style-type: none"> <li>• Conducted upon change of ownership or renewal of lease or in case of total renovation.</li> <li>• CONSUEL issues the certificates of conformity.</li> </ul>  |

# [appendix] Outline of Electrical Safety System in Japan



**MERCI - THANKS**

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