

Photovoltaics

Spain

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Installation requirements

- ✦ Electrical wiring rules in Spain are mandatory by law (Royal Decree 842/2002).
- ✦ REBT: Reglamento Electrotécnico para Baja Tensión
- ✦ These rules include a chapter developing the requirements applicable to LV generation systems (ITC-BT-40)

- ✳ Installations subject to initial inspections according to REBT:
- a) Industrial installations that require a Project ($P > 20\text{kW}$ and others) and have an installed power of more than 100 kW;
 - b) Public premises;
 - c) Class 1 premises where there is a risk of fire or explosion, excepting garages with less than 25 parking places;
 - d) **Wet premises with an installed power of more than 25 kW;**
 - e) Swimming pools with an installed power of more than 10 kW;
 - f) Operating theatres and medical intervention rooms
 - g) External lighting installations with an installed power of more than 10kW
 - h) Installations of electric vehicle charging stations, which require the preparation of a project for their execution (all DC, AC indoor where $P > 10\text{ kW}$ and outdoors where $P > 50\text{ kW}$)

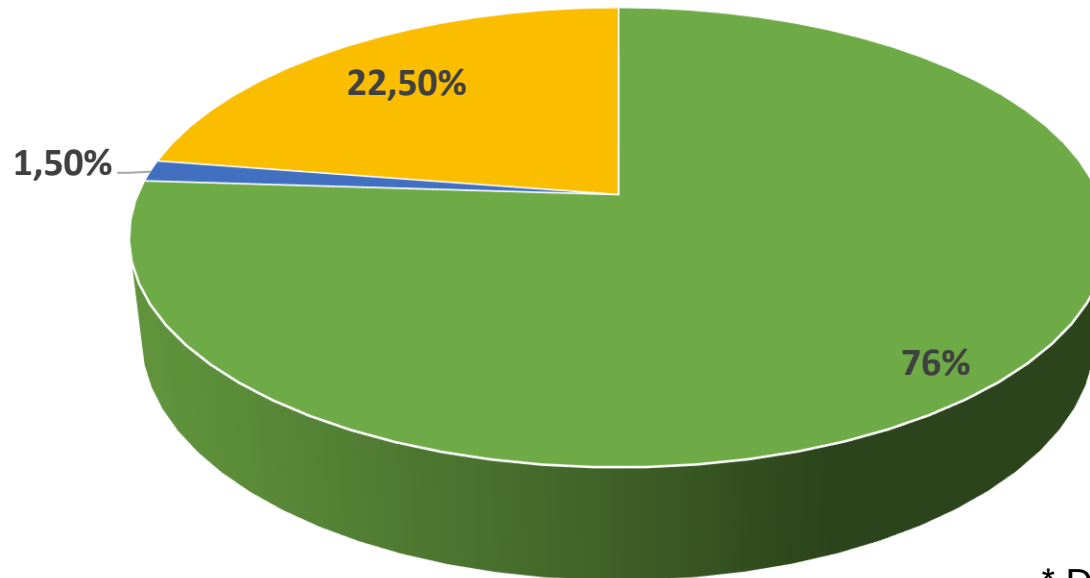
✳ Periodic inspections

- a) Every 5 years: electrical installations requiring an initial inspection
- b) Every 10 years: Common installations of residential buildings with a total installed power of more than 100 kW

Conclusion: In Spain PV systems are only inspected by a third party inspection body (initially and periodically) where the PV installation has an installed power of more than 25kW

In any case, all LV generation systems are subject to initial verification by the installer before the installation is put into service

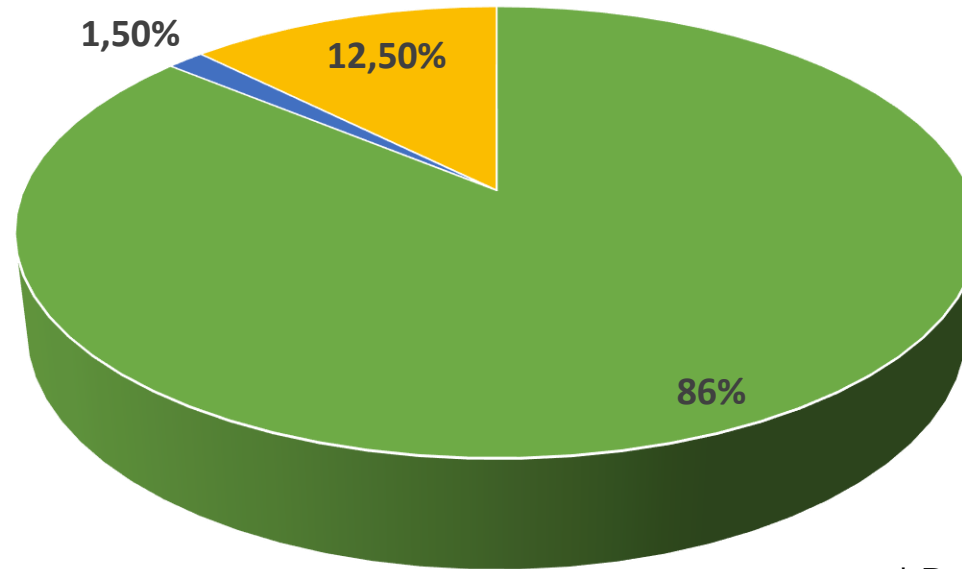
✘ Results of the initial inspections*



* Data from Inspection Bodies

■ No deficiencies ■ Minor deficiencies ■ Serious deficiencies

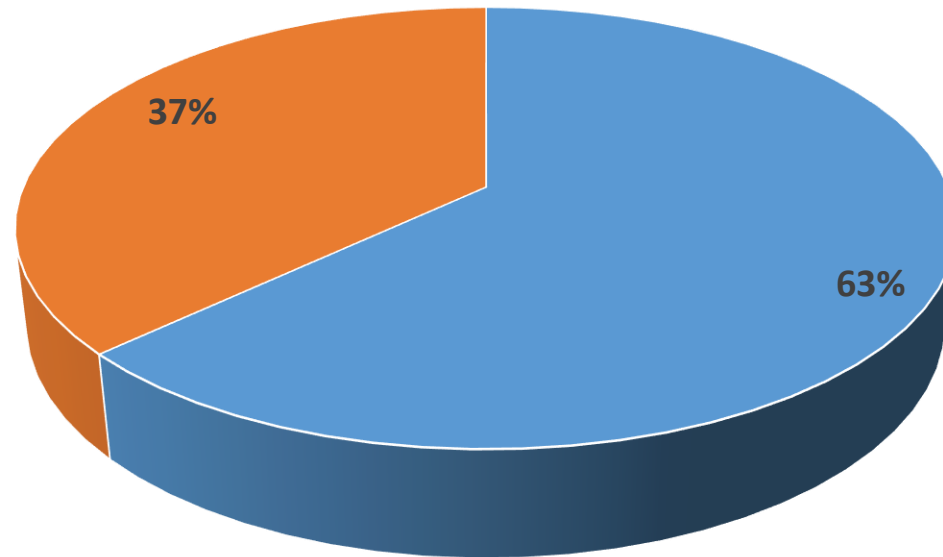
✪ Results of the periodic inspections*



* Data from Inspection Bodies

■ No deficiencies ■ Minor deficiencies ■ Serious deficiencies

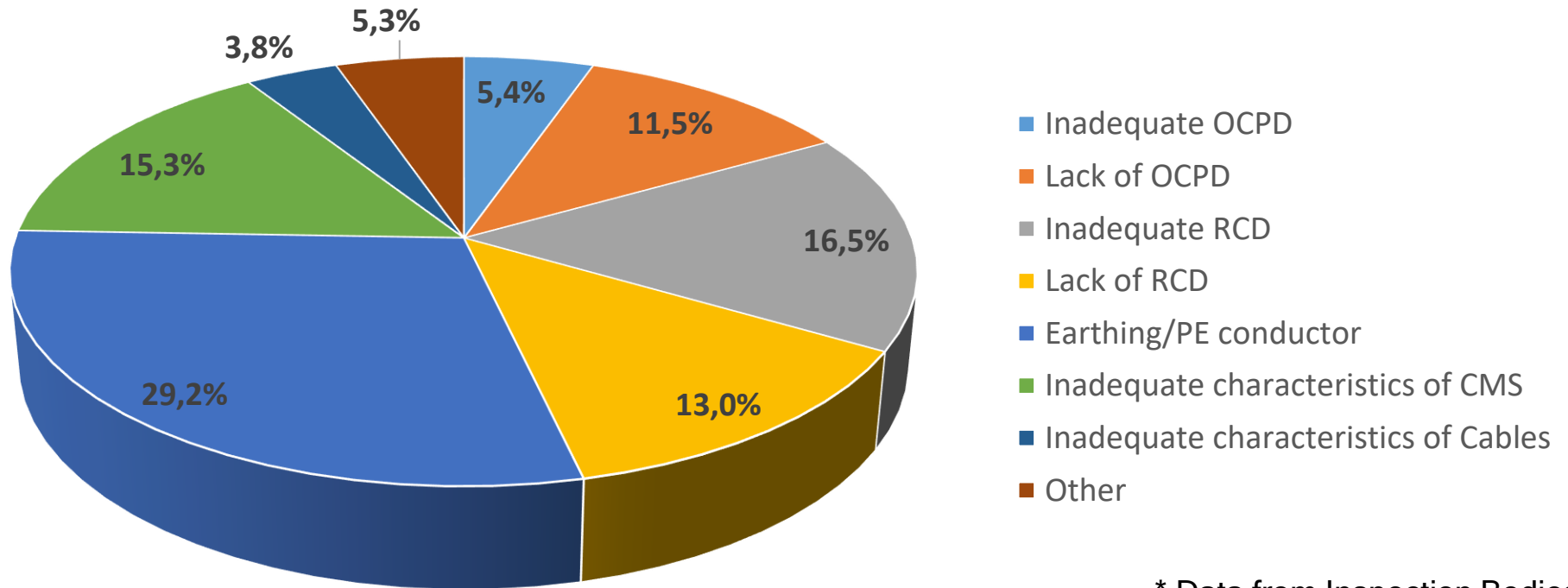
☒ Type of deficiencies (including initial and periodic)*



* Data from Inspection Bodies

■ documentary deficiencies ■ installation deficiencies

☒ Type of deficiencies in the installation*



* Data from Inspection Bodies

🚩 Fires in PV installations*

According to Tecnifuego Aespi the most common causes of fires in photovoltaic installations are:

- Overheating: Solar cells and electrical cables can overheat if they are exposed to high temperatures or if there is an electrical overload.
- Short circuits: These can occur if electrical cables are damaged or incorrectly connected.
- Inverter failures: can cause overheating and fire.
- Electrical discharges: can occur during maintenance or installation of the solar panels, which can cause a fire.
- Battery failures: Energy storage systems can fail and cause overheating and fire.
- Failure of low quality products



✦ Fires in PV installations

Measures to minimize the fires:

- Improve the training of professionals involved in design, installation, maintenance personnel and firefighters.
- Use only high-quality materials and good selection of components.
- Proper design and erection of the installations.
- Regular maintenance of the installations.
- Periodic inspection of the installation

- ✦ Update of the Spanish wiring rules (REBT)
- ✦ A new chapter covering the installation requirements for PV systems is under development (ITC-BT-53)
- ✦ The requirements of the new chapter are base on HD 60364-7-712
- ✦ Initial inspections

In the present revision of the REBT, a new item i) is introduced:

- i) Interconnected generation facilities, with or without storage:
 - with surpluses: with a power of more than 15 kW and
 - self-consumption facilities, without surpluses, with power of more than 100kW.

