

# SAFE ELECTRIFICATION FACT SHEET

## ELECTRICAL VEHICLE CHARGING POINT

### INTRODUCTION

The safe electrification fact sheets initiated by the Forum for European Electrical Safety (FEEDS, [www.feedsnet.org](http://www.feedsnet.org)) aim to provide the installer and the user with essential information regarding the electrical safety of the installation. This sheet is proposed in collaboration with AVERE - The European Association for Electromobility which regroups national association, charging point operators, manufacturers, OEMs, eMSP, EV users, governmental and research organizations.



### DESCRIPTION

Electric vehicles home charging points are devices installed in garages, garages entrances and underground garages to recharge your battery-electric vehicles. These home charging points have maximum charging power output that can go up to 22kW but generally offer a power output that goes up to 7kW. Home charging points have on average a size of 30 x 20 x 15 cm.

### ← BEFORE INSTALLATION

#### CLIENT

- Make sure to ask for a qualified and, where relevant, certified installer.
- Assess your needs as a client (See annexe a) in terms of charging point (Power of recharging point, type of recharging point, AC or DC, and smart or bidirectional recharging point).
- Check with local authorities if a permit is required.
- Check the existence of an electrical inspection report. The report can assess the safety, the readiness to accept new equipment. If no report is available, or if the existing report doesn't give the useful information, it is recommended to ask one if the electrical installation has more than 5 years.
- Check whether the available power reserve of the electrical installation is sufficient to supply the intended car charger; if not:
  - consider, together with the installer, the possibility of improving the load management (either manually or through a load management system) to allow charging of the electric vehicle with the current reserve power,
  - if the previous measure is not sufficient, contact the energy utility/Distribution System Operator (DSO). In this case, it may be necessary to increase the building's connected power or ask for a 3 phases alimentation or provide a new power supply line for the charger from the power grid.
- For shared housing, verify if other tenants/homeowners agree with the necessary works.
- Verify if the area is influenced by fire safety norms.
- Check if and which subsidies are available, and if electrical upgrades are covered.
- Check if any legal permission by interested subjects is required to install.

#### INSTALLER

- Plan cables paths and ensure all cables from the power source to the charger will have the appropriate cross-section (See annex b) and that all necessary electrical protection devices will be installed.
- Check connectivity: Wi-Fi, Long Term Evolution (LTE)/4G/5G (Apps are often required to install the electric vehicle supply equipment and for the management of advanced functions).
- Check socket-type required (Type 1, Type 2, etc.).
- Make sure that the planned recharging point model has a declaration of conformity.
- Execute and release electrical inspection report on the existing installation to ascertain that the existing installation is safe and is prepared to accommodate the new circuit in a safe and efficient way. Especially:
  - Verify electrical panel size and the space availability for new protections like OCPD (Overcurrent Protection Device) and RCD (Residual Current Device), RCD-DD (Residual Direct Current Detecting Device), SPD (Surge Protection Device)... (Depending on the country and the charger model).
  - Determine reserve circuit breaker or space for the installation of one, rated to a nominal current complying with planned charging station power demand.
  - Determine electrical protections that the planned charger model and its configuration will contain.
  - Verify one or three-phase power supply.
  - Control the earthing system.

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### DURING INSTALLATION

#### INSTALLER

- Follow the recommendations given by the manufacturer, legal requirements, standards and local specifications.
- Before commissioning the station, measure its power supply installation, confirming the measurements with appropriate protocols that contain in particular:
  - details of the location of the charger and measured installation,
  - qualifications of an electrician performing measurements,
  - earth continuity and its resistance,
  - insulation resistances,
  - voltage drop at the end of the supply line,
  - fault loop impedance and correct operation of all protection devices, in particular RCD.
- Leave enough empty space around the wall box, to prevent overheating and damages because of other electrical appliances.
- Install the wall box at the recommended height and check for norms on accessibility.

### AFTER INSTALLATION

#### CLIENT

- Declare the installation to all relevant counterparties (landlord, condominium administrator, the local fire brigade, the insurance company).
- Ask and keep carefully the documentation provided by the installer, related to the equipment, its installation and legalisation and respect the maintenance plan.
- Never store any combustible materials (Paper, cardboard, paint, wood...) near the electrical board and the charging point.
- Consult an electrician if you observe any electrical problem such as overheating of the cables, deterioration of components, regular blowing of fuses...

### STANDARDS

#### List of useful standards related to the equipment and its installation:

- EN IEC 61851-1:2019: Electric vehicle conductive charging system General requirements.
- EN 62196: Plugs, socket-outlets, vehicle connectors and vehicle inlets - Conductive charging of electric vehicles - Part 3: Dimensional compatibility requirements for DC and AC/DC pin and contact-tube vehicle couplers.
- IEC 60364-7-722:2018 Low voltage electrical installations - Part 7-722: Requirements for special installations or locations - Power supply for electric vehicles.
- IEC 60364-series 5-Low-voltage electrical installations.
- EN IEC 60947-1:2021 Low voltage switchgear and control gear - Part 1: General rules
- ISO 15118 Road vehicles - Vehicle to grid communication interface.

### ANNEX – CABLES SIZING

To avoid losses and risks of overheating, it is crucial to choose the right cables diameter for the electrical installation. The cables cross section, from the main board to the charger (for lengths 10 to 30m), is determined according to the charger type, the voltage and the typical distance covered in a week by the electrical vehicle. It is also possible to consider cable optimisation that allows a better energy efficiency along the installation life time according to IEC 60 287-3-2 standard.

#### Minimum and optimised cables section for lengths 10 to 30m

Charger type kW	Power supply type	Voltage	Km traveled/week	Minimal cross section [mm <sup>2</sup> ]	Optimised cross section [mm <sup>2</sup> ]
3.7	1-phase	230	250	2.5	10
3.7	1-phase	230	500	2.5	16
7.4	1-phase	230	250	10	16
7.4	1-phase	230	500	10	25
11	3-phase	380	250	2.5	6
11	3-phase	380	500	2.5	10
22	3-phase	380	250	10	10
22	3-phase	380	500	10	16