TECHNICAL REGULATORY SHEET	**: RIC N°15**
SUBJECT	**: ELECTRIC VEHICLE CHARGING INFRASTRUCTURE**
LEGAL SOURCE	**: DECREE WITH FORCE OF LAW N°4/20,018, FROM THE YEAR 2006, FROM THE MINISTRY OF ECONOMY, DEVELOPMENT AND RECONSTRUCTION, GENERAL LAW ON ELECTRICAL SERVICES**
REGULATORY SOURCE	**: DECREE N°8 FROM THE YEAR 2019, FROM THE MINISTRY OF ENERGY, SAFETY REGULATIONS OF FACILITIES FOR ELECTRICAL POWER CONSUMPTION**
ISSUED BY	**: EXEMPT RESOLUTION N° 33,374, DATED 30/09/2020, FROM THE SUPERINTENDENCE OF ELECTRICITY AND FUELS**

1 PURPOSE AND SCOPE OF APPLICATION

The purpose of the present technical sheet is to establish the requirements of safety that the facilities of electrical power consumption dedicated to charging electric vehicles must fulfil, located in public and private areas in the country.

2 RANGE AND FIELD OF APPLICATION

This technical sheet applies entirely to the infrastructure of electrical power consumption dedicated to charging electric vehicles, located in public or private areas.

The provisions of this technical sheet will specifically apply in facilities located in the indicated following areas:

a) Car parks of individual homes.
b) Car parks of buildings and residential complexes.
c) Car parks of offices, commercial, social, industrial premises.
d) Car parks of private usage.
e) Public car parks, being free of charge or paid.
f) Charging plugs in transit routes of public and/or private usage.
g) Charging points aimed at providing services of charging electric vehicles.
h) Electric terminals and charging centres for public transport.

3 REGULATORY REFERENCES

The following technical regulations are an integral part of the present section and can only be applied in the items in which are cited.

3,1	IEC 61851-1	2017	Electric vehicle conductive charging system - Part 1: General requirements.
3,2	IEC 61851-23	2014	Electric vehicle conductive charging system - Part 23: DC electric vehicle charging plug
3,3	IEC 62196-1	2014	Plugs, socket-outlets, vehicle connectors and vehicle inlets - Conductive charging of electric vehicles - Part 1: General requirements.
3,4	IEC 62196-2	2016	Plugs, socket-outlets, vehicle connectors and vehicle inlets - Conductive charging of electric vehicles - Part 2: Dimensional compatibility and interchangeability requirements for a.c. pin and contact-tube accessories.
3,5	IEC 62196-3	2014	Plugs, socket-outlets, vehicle connectors and vehicle inlets - Conductive charging of electric vehicles - Part 3: Dimensional compatibility and interchangeability requirements for d.c. and a.c./d.c. pin and contact-tube vehicle couplers
3,6	IEC 61851-21-2	2018	Electric vehicle requirements for conductive connection to an AC/DC supply- EMC requirements for off-board electric vehicle charging systems
3,7	IEC 62752	2018	In-cable control and protection device for mode 2 charging of electric road vehicles (IC-CPD)
3,8	IEC 61643-11	2011	Low-voltage surge protective devices - Part 11: Surge protective devices connected to low-voltage power systems - Requirements and test methods
3,9	IEC 62053-21	2020	Electricity metering equipment - Particular requirements - Part 21: Static metres for AC active energy (classes 0,5, 1 and 2)
3,10	ISO 15118-2	2019	Road vehicles -- Vehicle-to-Grid Communication Interface - Part 2: Network and application protocol requirements
3,11	UL 2594	2016	Standard for Safety Electric Vehicle Supply Equipment
3,12	UL 2202	2018	Standard for Safety Electric Vehicle (EV) Charging System Equipment

Note: For the application of this section, it can be used as a replacement for the IEC standards, the UNE, JEVS, SAE standards, or equivalents. The standards to use in replacement of the ones indicated must be in Spanish, or otherwise in English.

4 TERMINOLOGY

1.1 **Vehicle battery:** Storage device of electrical power, included in an electric vehicle, charged through a direct current (DC). The capacity of the battery, among other variables such as the performance of the electric vehicle and driving style, determine the autonomy of the vehicle for travelling.

1.2 **AC**: Alternating current.

1.3 **Charging cable IC-CPD:** Device that provides electrical power in AC to an electric vehicle, and performs the functions of control pilot, proximity, and safety. The denomination of IC-CPD means In Cable Control and Protection Device. These devices include a connector for the insertion to the inlet of electric vehicles and a plug to connect in charging plugs (CS), they can be categorised in
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4.3.1 **Mode 1 charging cable:** Charging cable IC-CPD whose plugs are connected to single-phase charging plugs (CS), that can be of L type (See figure 15.1.1 as defined by annex 15.1) or F type (See figure 15.1.1 b as defined by annex 15.1) and its rated current does not surpass the 10 A. The connectors thar are plugged to the inlet of electric vehicles can be of type 1 or type 2.

4.3.2 **Mode 2 charging cable:** Charging cable IC-CPD whose plugs are connected to charging plugs (CS) that can be single-phase industrial type (See figure 15.1.1 c as defined by Annex 15.1) or three-phased industrial type (See figure 15.1.1 d as defined by annex 15.1), respectively, and its rated current can be of 10 A, 16 A or 32 A. The connectors that are plugged to the inlet of electric vehicles can be type 1 or type 2.

1.4 **Mode 3 charging cable:** It is a cable that has two connectors, one Type 2 for EVSE and another Type 1 or 2, that interconnects the electric vehicle supply equipment (EVSE) with a charge mode 3 (point 6.1.3) and an electric vehicle, supplying electrical power in AC towards the inlet of the electric vehicle, also stablishing the functions of control pilot and proximity. The mode 3 charging cable must be designed in conformity with the IEC 62196-1 and IEC 62196-2 standards.

1.5 **Channelling**: Set formed by electrical conductors, components that support them and accessories that ensure its fixing and mechanical protection.

1.6 **DC**: Direct current.

1.7 **Charging centres for public transport:** Infrastructure that charges fleet of electric buses that operate in the public transport system.

1.8 **Cycle:** Non-motorised vehicle of one or more wheels, propelled exclusively by one or more persons in it, such as bicycles, or tricycles. It is also considered cycle vehicles with one or more wheels that count with an electrical auxiliary engine, with a continuous rated power of 0.25 kilowatts, in which the supply is reduced or interrupted when the vehicle reaches a maximum speed of 25 kilometres per hour or fewer if the rider stopped pedalling or propelling it.

1.9 **Individual recharge circuit**: Interior circuit of the facility that, starting from a plugboard or dedicated circuit, is provided to specifically supply the electric vehicle supply equipment (EVSE) or charging plugs (CS).

1.10 **Multiple recharge circuit:** Interior circuit of the facility that, starting from a plugboard, is provided to supply two or more electric vehicles supply equipment (EVSE) or charging plugs (CS).

1.11 **Connect:** For the purpose of this sheet, “connector” means the devices in which the supply for electric vehicles in DC or AC and the communication functions are established, such as control pilot and proximity. They are categorised in connectors:

4.11.1 **Type 1:** Connector with a cable that comes from an electric vehicle supply equipment (EVSE) or mode 3 charging cable and that supplies electric power in AC towards the inlet of the electric vehicle, also stablishing the functions of control pilot and proximity. See figure 15.1.2 as defined by Annex 15.1.

4.11.2 **Type 2:** Connector with a cable that comes from an electric vehicle supply equipment (EVSE) or mode 3 charging cable and that supplies electric power in AC towards the inlet of the electric vehicle, also stablishing the functions of control pilot and proximity. See figure 15.1.2 b as defined by Annex 15.1.

4.11.3 **Type 2 without cable:** Connector without cable in an electric vehicle supply equipment (EVSE) or mode 3 charging cable (point 6.1.3). See figure 15.1.2 c as defined by Annex 15.1.

4.11.4 **Type 2 to EVSE:** Connector included in a cable for charging mode 3, that is connected to a connector type 2 without cable installed in an electric vehicle supply equipment (EVSE). See Figure 15.1.2 d as defined by Annex 15.1.

4.11.5 **Configuration AA:** Connector with a cable that comes from an electric vehicle supply equipment (EVSE), with charging mode 4 (point 6.1.4), that supplies electric power in DC towards the inlet of an electric vehicle, also establishing the functions of communication and safety between the electric vehicle supply equipment (EVSE) and the electric vehicle. See figure 15.1.2 e as defined by Annex 15.1.

4.11.6 **Configuration BB:** Connector with a cable that comes from an electric vehicle supply equipment (EVSE), with charging mode 4 (point 6.1.4), that supplies electric power in DC towards the inlet of an electric vehicle, also stablishing the functions of communication and safety between the electric vehicle supply equipment (EVSE) and the electric vehicle. See figure 15.1.2 f as defined by Annex 15.1.

4.11.7 **Configuration EE:** Connector with a cable that comes from an electric vehicle supply equipment (EVSE), with charging mode 4 (point 6.1.4), that supplies electric power in DC towards the inlet of an electric vehicle, also establishing the functions of communication and safety between the electric vehicle supply equipment (EVSE) and the electric vehicle. See figure 15.1.2 g as defined by Annex 15.1.

4.11.8 **Configuration FF:** Connector with a cable that comes from an electric vehicle supply equipment (EVSE), with charging mode 4 (point 6.1.4), that supplies electric power in DC towards the inlet of an electric vehicle, also establishing the functions of communication and safety between the electric vehicle supply equipment (EVSE) and the electric vehicle. See figure 15.1.2 h as defined by Annex 15.1.

1.12 **AC/DC Converter:** Electronic power converter that performs the necessary functions to recharge the battery of the vehicle. It can be found:

4.12.1 **On board:** Mounted and designed to function inside the vehicle only.

4.12.2 **Externally:** Connected to an AC supply network, and located inside an EVSE with charge mode 4, designed to operate completely outside the EV. It supplies the vehicle of electric power in DC.

1.13 **Electrical Connection:** Set of elements and electric equipment that connects the unit of measure of the facility of the user or client to the distribution network.

1.14 **Distribution company or distributor:** Licenced distribution company(ies) of public services of distribution or any that provides distribution services, as an owner, lessee, usufructuary or that operates, in any capacity, facilities of electric power distribution.

1.15 **Charging points:** Petrol station that counts with an infrastructure to recharge electric vehicles with charge mode 3 or 4 (points 6.1.3 y 6.1.4), and that can supply at least a power range of 22kW each connector. It corresponds to facilities located in petrol stations or other compounds aimed mainly at charging electric vehicles that have an operator.

1.16 **Electric terminals:** Infrastructure to recharge fleets of buses or electric vehicles used for public or private transport of passengers.

1.17 **Self-service facilities with public access:** They correspond to the facilities located in public roads or national assets of public use (BNUP), streets, parks, public car parks in restaurants, hotels, malls, offices, and car parks (free of charge or paid), that are aimed to be used for users unfamiliar with the risks of electric power.

1.18 **Control pilot function:** Function used to monitor and control the interaction between the electric vehicle and the electric vehicle supply equipment (EVSE). There are two types of control pilot functions, first, the low level of communication which is established through the use of voltage signals PWM (Pulse Width Modulation) and the second one, with high level of communication, which is established through communication protocols, such as Power Line Communication (PLC) or others.

1.19 **Proximity detection function**: Any means, electric or mechanical, used to indicate the state of insertion of the connector to the inlet of the electric vehicle and/or to indicate the state of insertion of the connector to the electric vehicle supply equipment (EVSE).

1.20 **Charging plugs (CS)**: Charging plug in which a charging cable IC-CPD connected to supply in AC is an electric vehicle. They are installed stationarily and can be single-phased L type (See figure 15.4.1 as defined by Annex 15.1), F type (See figure 15.4.1 b as defined by Annex 15.1), industrial of 220 V (See figure 15.4.1 c as defined by Annex 15.1) or three-phase of 380 V (See figure 15.4.1 d as defined by Annex 15.1).

1.21 **Electric vehicle charging infrastructure (EVCI):** Set of physical and logical devices, aimed at charging electric vehicles that meet the safety requirements and availability intended for each case, with capacity to provide charging services in a complete and integral way. An EVCI includes the electric vehicle supply equipment (EVSE), charging plugs (CS), control system, electric channelling, boards, protections, when these are exclusively for charging the electric vehicle.

1.22 **Electric vehicle supply equipment (EVSE) or charger**: Set of mounted equipment with the purpose of supplying electric power in AC (charge mode 3) or in DC (charge mode 4) to an electric vehicle. It also has a device that establishes the communication between the electric vehicle and the fixed facility. They can include electric protections, connection cables and connectors, and the external AC/DC converter for the charging mode 4.

1.23 **Charging management system (CMS)**: System that allows us to perform the momentary reduction of power intended to charge the electric vehicle in function with the electric capacity of the board supply of the EVCI. This system can function disconnecting loads or regulating the intensity of recharging when the charge mode 3 (point 6.1.3) or 4 (point 6.1.4) are used. The order of disconnection or reconnection can act over a contactor, control system or equivalent.

1.24 **General cabling protection system of the facility (CPS):** System that allows for a momentary reduction of power intended to charge the electric vehicle in function with the electric capacity of the general cabling of a facility with multiple electrical connections. This system can act by disconnecting loads or regulating the intensity of recharging when the charge mode 3 (point 6.1.3) or 4 (point 6.1.4) are used. The order of disconnection or reconnection can act over a contactor, control system or equivalent.

1.25 **Superintendency**: Superintendency of Electricity and Fuel.

1.26 **Measurement unit:** Component of the measurement, monitor, and control system that refers to Article 3-3 of the Technical Annex of Measurement, Monitor and Control System of the Technical Standard of Quality Service for Distribution Systems.

1.27 **Measurement units EVSE or CS:** Power metre consumed by an electric vehicle supply equipment (EVSE) or charging plug (CS), as the case may be, for charging electric vehicles (EV) whose responsibility is of the owner of the electric vehicle supply equipment (EVSE) or charging plugs (CS). The measurement unit of EVSE or CS must be designed in conformity with the IEC 62053-21 standard or superior.

1.28 **Electric vehicle (EV):** Motorised vehicle suitable for roads, such as passenger cars, buses, trucks, electric motorcycles and similar, propelled fundamentally by one or more electric engines that receive current from the vehicle's battery, photovoltaic array, or other source of electric current. A Plug in Hybrid Electric Vehicle (PHEV) is considered an electric vehicle. For the purposes of this sheet, motorised electric vehicles that do not transit in public roads are not included, such as industrial trucks, cranes, front loaders, golf carts, ground support equipment for planes, boats or similar.

5 GENERAL ARRANGEMENTS

5.1 Every EVCI must be planned and implemented in strict compliance with the arrangements of this technical sheet and the current regulations.

5.2 Every EVCI must be implemented according to a technically conceived project, which must ensure that the facility will not present risks for operators, users, or artefacts, be efficient, provides good services and allows for an easy and adequate maintenance and has the necessary flexibility to permit modifications or extensions easily.

5.3 The communication of energisation of every EVCI must be performed through an authorised electrical installer that has a valid licence, according to the type it corresponds to, who will prove that said facility has been projected, implemented, and inspected, meeting the established arrangements in the different technical sheets that make up the regulations of consumption facilities. Therefore, the Superintendency will oversee defining the procedure of declaration of the communication of energisation of the EVCI.

5.4 The functionality of an EVCI connected to the distribution network to which this sheet refers must not cause malfunctions, decrease safety conditions, quality, nor alterations greater to the ones allowed in the network due the technical standard of service quality for distribution systems.

5.5 The arrangements of this sheet are made to be applied by specialised professionals. This text must not be interpreted as a manual.

5.6 In accordance with Law N°18,410, any doubt regarding the interpretation of the arrangements of this technical sheet will be solved by the Superintendency.

5.7 Throughout the duration of usage or operation of EVCI, their owners or operators must conserve the different studies and technical documents used in the design and construction of these, along with its modifications, as well as the audit trials, maintenance, certificates, and inspections on it, all of which must be available for the Superintendency.

5.8 In terms of design, construction, operation, maintenance, reparation, modification, inspection and end of operation, the Superintendency could allow the usage of different technologies to the ones established in the present technical sheet, provided that the level of safety that the regulatory text contemplates is maintained. These technologies must be technically supported in regulations, codes, or national or foreign specifications, as well as in recommended practices of internationally acknowledged engineering, or being part of testing facilities for new technologies. For that purpose, the installer must present the project and a complete copy of the last effective version of the regulation, code or foreign specification used duly translated, when corresponded, as well as any precedent that the Superintendency requests.

5.9 In the design of the EVCI the existing external factors must be considered on the site in which the facility will be located.

5.10 In facilities that are located in altitudes superior to 1,000 m above sea level, in addition to the requirements defined by this regulation, the correction factors and indications that the manufacturer of the equipment points out must be adopted.

5.11 For the purpose of this sheet, areas of high saline pollution the coastal strip will be acknowledged, defined as an area of 10 km in width, measured from the coastal edge, as well as facilities located in areas in which corrosive chemical components are processed, in conformity with the definition in Article 2 of the DS N°08/2019 from the Ministry of Energy.

5.12 This sheet is not applicable to electric vehicles charging systems by induction, nor through pantographs. For the systems aforementioned, the Superintendency will issue a general instruction where the safety requirements must be met.

6 CHARGING MODES AND CASES

6.1 The different charging modes and functions to transfer power to the electric vehicles or cycles, accordingly, will be defined hereunder:

6.1.1 **Charging mode 1:** Connection of an electric vehicle to the supply network of alternating current, with an intensity of no more than 10 A and voltage in the supply side of no more than 220 V, using live conductors and protection. This mode will not be allowed for charging electric vehicles.

6.1.2 **Charging mode 2:** It corresponds to the connection of an electric vehicle to a supply point of the electric current network through a charging cable IC-CPD connected to a CS. This charging mode is not allowed in facilities of self-service with public access nor charging points.

6.1.3 **Charging mode 3:** Direct connection of an electric vehicle to a supply network of alternating current using an EVSE, that provides electric power in AC to an AC/DC on board (see definition 4.12.1) of the electric vehicle and also performs the functions of control pilot and proximity.

6.1.4 **Charging mode 4:** Indirect connection of an electric vehicle to the supply network of alternating current using an EVSE that incorporates an external AC/DC converter (see definition 4.12.2), that provides electric power in DC to the battery of the electric vehicle and also performs the functions of control pilot, proximity, and communication.

6.2 **Connection cases:** It corresponds to the connection between the EVSE and the electric vehicle (EV) or cycle to the supply network. For the application of this sheet, there are three possible cases defined. The connection cases are shown graphically in Annex 15.2 of the present technical sheet.

6.2.1 **Case A:** Connection of an EV to the supply network with a cable and mobile connector attached to the electric vehicle or cycle permanently.

6.2.2 **Case B**: Connection of an EV to the supply network with a charging cable IC-CPD connected to a CS or a mode 3 charging cable connected to an EVSE with a type 2 connector without cable.

6.2.3 **Case C:** Connection of the electric vehicle to the supply network with cable and mobile connector removable from the EV and permanently in the EVSE.

7 ELECTRICAL CONNECTION

7.1 The electrical connections of every EVCI must be installed and designed in conformity with the methods stablished in the Technical Regulatory Sheet N°01.

7.2 The EVCI developed in facilities with electrical connections can use the configurations a) and b) indicated in the Figure 15.3.1 as defined by Annex 15.3. In the exceptional case of consumption facilities located in dependent constructions that count with an own unique municipal numbering, a second electrical connection can be installed, different to the one in the existing building, which must be specific for the EVCI and located in the areas of electrical connections or car parks as demonstrated in the configuration c) of the Figure 15.3.1 as defined by annex 15.3. The EVCI developed in facilities with multiple electrical connections can use the configurations d), e) and f) indicated in the Figure 15.3.1 as defined by Annex 15.3.

7.3 The EVCI supplied from the electrical connection of common services in facilities of multiple electrical connections (See Figure 15.3.1 f as defined by Annex 15.3) must count, prior to its energisation, with an authorisation of the administrator of the facility which establishes the implications of the power and output that means the incorporation of EVCI in common services. If the EVCI and the other loads connected to common services exceeds the capacity of the electrical connection, and it is not modified, then a QMS must be installed that prevents exceeding the available capacity.

7.4 The capacity of the electrical connection will be adjusted to the normalised values indicated in the Annex 1.3 of the Technical Regulatory Sheet RIC N°01, or higher values, in case that the requirement establishes that, nevertheless, the capacity of the electrical connection will be defined according to the installed output of the EVCI plus the output installed of other loads, connected to the same electrical connection, according to the Fig. 15.3.2 as defined by Annex 15.3.

7.5 The output installed from the EVCI will be the sum of the CS output and the output of each EVSE. If the EVCI uses a QMS, the output installed will be the sum of the power and the management factor of minimum load, imposed by the QMS, multiplied by the sum of the output of each EVSE. The aforementioned also applies to EVCI that use a CPS. See Figure as defined by Annex 15.3.

7.6 The measurement unit for the electrical connection, which is referred in the Technical Regulatory Sheet N°01, cannot be installed inside EVSE. The measurement Unit of EVSE or CS must be obligatory in the cases indicated in the Figure 15.3.1 as defined by Annex 15.3.

7.7 The electrical connection box, with the measurement unit will be in the electrical connection area or the cabinet aimed to keep its agglomerations, and in the case of not having enough space, a new facility or cabinet will be enabled.

7.8 The electrical connection box and measurement units in buildings that supply EVCI located in underground car parks can be multiple, distributed, or mixed types, or located in boxes or cabinets outside the site, in each floor or in individual car parks where the corresponding EVCI is installed.

8 BOARDS

8.1 The boards placed in every EVCI must be installed and designed in conformity with the established methods in the Technical Regulatory Sheet RIC N°02.

8.2 The interconnection between the consumption facility and the feeders, sub feeders or conductors that supply the EVCI must be performed in an electric board, through a bus bar or screw terminal connected to a bus bar.

8.3 The protections of the EVCI must be contained in a specific electric board for its use or in an existing electric board, which must count with a door, a cover and plaque that indicates “Supply of electric vehicle charging infrastructure EVCI”.

8.4 The protections aimed to charging electric vehicles must be clearly identifiable, including the bus bars where the EVCI is connected to, differentiating it from the other bus bars that are contained in the electric boards. The identification used in the protections, as well as bus bars, must be indicated in the unilinear diagram of the electric board.

8.5 Every board and connection box located outdoors must be installed in a way that all its channellings and conductors enter in the lower part, maintaining its IP protection rating. Boards that are protected indoors, without risk of rainwater, will be excluded of this requirement.

8.6 The minimum mounting height of the control or activation devices placed in a board will be 0.45 m and the maximum height will be 2.0 m, both distances measured according to the floor level. In self-service facilities with public access or charging points, the control or activation devices can be installed at a maximum height 4.0 m.

9 FEEDER

9.1 Feeders or sub-feeders of every EVCI must be installed and designed in conformity with the stablished methods in the Technical Regulatory Sheet RIC N°03.

9.2 The conductors from a feeder and sub-feeder of facilities for charging electric vehicles must be of copper and its section will not be less than 4.0 mm^2. In the case of facilities connected to medium voltage networks, feeders and sub-feeders of copper and aluminium can be used.

9.3 Feeders and sub-feeders must be protected of overloads and malfunctions such as short circuits, through the appropriate protections for each situation. It will be excluded of this requirement those derivations, of not more than 3 m long, originated from an existing board connected through a bus bar, channelled through a closed conduit and that supply power to a board dedicated for EVCI.

9.4 Charging estimate according to the type of facility for dimensioning feeders

9.4.1 For dimensioning the feeder of an EVCI it will be applied a demand factor of 1 to estimate the total charge of CS, as well as the total of EVCE. In the case of using a CMS it can be applied, as a minimum, the demand factors indicated in the N° table 15.1 according to the type of facility, to estimate the total charge defined for every EVSE.

Table N°15.1 Demand factor for infrastructures of electric charge

Type of facility	Recharging power for EV applied from the demand factor		DF Range
	Stretch	kW	
Individual Facilities and Buildings or Residential Complexes	Up to	10	1
	Between	10 to 120	0.5-1.0
	From	120	0.3-1
Self-service with public access and charging points	Up to	20	1
	Between	20 to 150	0.6-1.0
	From	150	0.5-1.0
Charging points or charging centres for public transport	Up to	20	1
	Between	20 to 150	1
	From	150	0.5-1.0

9.4.2 The feeders will be dimensioned to withstand the short circuit current and the power of the EVCI, which is supplied, considering a demand factor of 1.

10 CONDUCTORS AND CHANNELLING

10.1 All the connectors must be channelled in conformity with the established methods in the Technical Regulatory Sheet RIC N°04.

10.2 The conductors must be protected from overloads as well as short circuits, with the appropriate protections for each situation.

10.3 The electric conductors of the EVCI must be channelled in its whole length. It will just be permitted that the output cable of the EVSE, which contains the type of connector to plug in the electric vehicle's inlet, will not be channelled.

10.4 The minimum voltage service of the conductors to use in single-phase facilities will be 460/750 V, in three-phased facilities of 0.6/1 kV and in DC distribution systems of 1.5 kVcc.

10.5 The channelling necessary for EVCI must meet the regulatory arrangements in function of the type of establishment where the facility will be made (meeting spaces, establishments with special features, establishment with risks of explosions, etc.).

10.6 The necessary conductors for the EVCI cannot be channelled through the same channellings of other system's circuit, except for the connectors of both systems that are insulated with the same material or are channelled through plates, cable ladders or cable trays. In no cases the channellings can share DC circuits with AC circuits.

10.7 The conductors of the wiring of direct currents will be identified or marked with colour red for the positive conductor, black for the negative conductor and green or green/yellow for the protection earth conductor.

10.8 It must be avoided, if possible, the mix of channellings in metal ducts with non-metallic ducts. If this situation cannot be avoided, the electrical connection will be through a metallic pull box that will be connected to the protection conductor of the corresponding circuit; in case that the conductor does not exist in that section of the circuit, it must be laid out for these ends. Nevertheless, metal casings to avoid exposing the non-metallic channellings outdoors will be allowed to be used.

10.9 When the channellings are installed in a location under risks of mechanical damages, such as areas with transit of electric vehicles, these will present a resistance appropriate for mechanical damages. In these cases, metal channellings will be used, as well as non-metallic, accordingly, with the indicated codification in the table N° 15.2. If protective wiring ducts or cable trays are used, these will present a minimum resistance of IK08 from mechanical impacts.

Table N°15.2 Minimum characteristics for tubes in channellings subjected to transit areas of vehicles.

Digit N°	Characteristic	Code	Grade
1	Compressive strength	5	Very high
2	Impact resistance	4	High
3	Minimum facility and service temperature	2	-5 °C
4	Maximum facility and service temperature	2	+90 °C
5	Flexural strength	(1)/(2)/ (4)	Rigid / curvable / Flexible
6	Electric properties	(1) /(2)	Electric continuity / insulating
7	Penetration resistance to solid objects	5	Protected against dust
8	Penetration resistance to water.	4	Protected against splashes of water
9	Corrosion resistance of metal tubes and compounds	2 *	Medium interior and external protection
10	Tensile strength	0	Not declared
11	Resistance to flame propagation.	1	Not propagator
12	Resistance to suspended loads	0	Not declared

* It just applies to metal channellings. For non-metallic channellings it must be a digit of 0. In outdoor facilities in damp or wet environments with presence of active chemical agents or in coastal areas will be code 4 with high interior and external protection.
Note: The channellings not subjected to areas of vehicle transit will be defined in the Technical Regulatory Sheet RIC N°04.

10.10 The system of bus ducts must meet with everything indicated in the point 7.14 of the Technical Regulatory Sheet RIC N°04.

11 EARTHING SYSTEM

11.1 The earthing systems must be projected and implemented in conformity with what is established in the Technical Regulatory Sheet RIC N°06.

11.2 The electrical outlets of charging mode 1 and CS must be connected to a powering scheme TN-S or TT.

11.3 The EVSE can be connected to a powering scheme TN-S or TT.

11.4 Every metallic part of the EVCI must be connected to the protective earth.

11.5 The value of resistance from the protective earthing will be such, that any of the conductor pieces cannot lead to voltages superior to the ones defined in the point 5.8 of the Technical Regulatory Sheet RIC N°05 and must not be greater than the indicated in the point 7.3 of the Technical Regulatory Sheet RIC N°06.

11.6 The EVCI not established along with an existing facility, must have a new earthing system that meets the requirements in point 11.5. The new earthing system will be measured through a voltage drop method established in Annex 6.3 of the Technical Regulatory Sheet RIC N°06.

11.7 The established EVCI with an existing facility can:

11.7.1 Use an earthing system. For this, it must be verified that the earthing system, with an EVCI, meets the requirements of point 11.5. The earthing system will be measured through the voltage drop method or clamp metre, if appliable, established in Annex 6.3 of the Technical Regulatory Sheet RIC N°06.

11.7.2 In case of having a new earthing system that meets the requirements of point 11.5, the new earthing system will necessarily be connected to the existing earthing system. The conductor connection must maintain at least the same characteristics of the conductor with most sections to withstand the short circuit in the worst case. The splice of these earthing systems must be through exothermic welding or permanent compression methods, approved for the splice of this earthing, ensuring the electrical continuity. The new earthing system will be measured through the voltage drop method or clamp metre, both established in Annex 6.3 of the Technical Regulatory Sheet RIC N°06.

12 DIMENSIONING OF CIRCUITS AND PROTECTIONS

12.1 The circuits used must be of exclusive usage for EVSE or CS and must not feed other electric equipment, except for auxiliary loads that can provide the EVSE. For consumption associated with the EVCI, in which illumination can be included, specific circuits will be used according to the respective regulation.

12.2 Circuits of individual charge will be used for each EVSE or CS. The circuits of multiple charges only use bus bars.

12.3 The conductors, of each charging circuit must be dimensioned in a way that are protected by the respective protection device against overcurrent.

12.4 The minimum section of the installed conductors in circuits in EVCI must be 2.5 mm^2.

12.5 Protective measures against direct and indirect contacts.

12.5.1 The general measures for protection against direct and indirect contacts will be indicated in the Technical Regulatory Sheet RIC N° 05 considering the following.

12.5.2 The circuits that feeds electric outlets with charge mode 1 must be protected with a differential protection of at least type A and a sensitivity no greater than 30 mA. See Annex 15.4.

12.5.3 The circuits that feed CS with charge mode 2 must be protected with a differential protection of at least type A and a sensitivity no greater than 30 mA. See Annex 15.4.

12.5.4 The circuits that feed the EVSE with charge mode 3 must be protected with:

- Differential protection type B or
- Protection type A of sensitivity no greater than 30 mA, plus a protective equipment that disconnects the feed of the EVSE before a leakage of direct current greater than 6 mA.

In case that the EVSE includes one of the systems aforementioned, for each connector of charging mode 3, the differential protection to install in the circuit could be of type A with a sensitivity up to 300 mA. See annex 15.4.

12.5.5 For circuits that feed the EVSE with charge mode 4 differential type A of 30 mA must be installed. In case the EVSE has a power greater than 100 kW a sensitivity up to 300mA will be allowed to be uses mA. See Annex 15.4.

12.5.6 In this type of facility the measures established in the Technical Regulatory Sheet RIC N° 05 will be exclusively admitted against direct contact according to the point 7.4, protection by isolation of active parts, or 7.5, protection through barriers or envelopments, as well as the protective measures against indirect contacts according to the point 8.7 protection systems type B corresponding to the protection by automatic shutdown of the feed, 8.6.3, usage of protective insulation class II or double insulation, or 8.6.1 usage of isolation transformer.

12.6 Protective measure against overcurrent

12.6.1 The protective devices against overcurrent must be dimensioned to perform a continuous service avoiding an inopportune operation during the process of normal charging of an electric vehicle. Its capacity for circuits will be adjusted according to Table N°15.3.

Table N°15.3 Rated capacity of the protection against overcurrent

Value of current (*In*) defined for EVSE or CS, accordingly	Protection Capacity for overcurrent
0A < *In* < 80A	1.25 x *In*
80A < *In* < 180A	1.20 x *In*
180A < *In*	1.15 x *In*

12.6.2 The charging circuits, up to the point of connection, must be protected against overcurrent and short circuits through a bipolar magneto thermic switch, in the case of single-phase facilities and four-pole in case of three-phase facilities. In case that the EVSE include protection against four-pole overcurrent, the protection equipment of the circuit can be three-polar. See Annex 15.4.

12.6.3 The general protection of charging circuits and individual protection of EVSE must always be backed by a coordination study and protection selectivity. On the other hand, it is possible to have a configuration of a general protection D curve general protection and other internal C curve individual protection for each EVSE.

12.6.4 For other single-phase electric outlets charging mode 1, the protection device against overcurrent must be of a rated capacity of 10 A.

12.6.5 For single-phase CS charging mode 2, the protection device against overcurrent must be of a rated capacity of 16 A. For three-phased systems it must be of at least 16 A up to 40 A.

12.6.6 For protection devices against stationary and adjustable thermomagnetic overcurrent less than 630 A will be considered as the worst condition the maximum value of current the protection can withstand permanently or rated current.

12.6.7 In the case of an adjustable protection greater than 630 A the worst condition can be different to the maximum capacity it can withstand permanently or rated current, as long as:

12.6.7.1 The protection does not allow for modifications of the regulation defined in the protection, through the usage of an element, stablished by the manufacturer, that guarantees the setting of the regulation.

12.6.7.2 In the board is included a signage of danger that indicates that it cannot modify the regulation of the stablished protection.

12.7 Protective measure against overvoltage.

12.7.1 In self-service charging facilities with public access and charging points it will be obligatory to count with a protective equipment against transient overvoltage of at least type 2 in conformity to the regulation IEC 61643-11.

12.7.2 The protective devices against transient overvoltage must be installed in the charging circuit of the EVSE or be incorporated in its interior.

12.7.3 The protective devices against overvoltage must be installed downstream a protective device, that the manufacturer allows, with the purpose of allowing for the service continuity before a discharge.

13 CHARACTERISTICS ACCORDING TO THE TYPE OF FACILITY

13.1 Individual Facilities.

13.1.1 Individual facilities will consist of facilities aimed at providing charging infrastructures for electric vehicles of private use, residential users, offices, municipalities, concessionaire, workshops, or others. In case of being installed in buildings, the EVSE must meet the requirements of buildings or residential complexes facilities.

13.1.2 For charging cycles, motorcycles and quadricycles that use connection A and a charge current less than 10 A, it will be possible to provide facilities of charge mode 1.

13.1.3 For charging electric vehicles it can provide facilities with charging modes 2, 3 or 4.

13.1.4 For facilities with charge mode 3 or 4, the circuits of each EVSE must meet with the requirements indicated in the points 12.5, 12.6 and 12.7, accordingly. If the EVCI has only one EVSE with only one connector, located 3 metres away from the electrical connection and the protection mentioned are included in the EVSE, the EVSE can be connected directly to the electrical connection.

13.1.5 This type of facilities must meet the following indications, accordingly:

13.1.5.1 If it has charge mode 3, it must include at least a type 1 or type 2, or type 2 in EVSE connector. See Annex 15.4.

13.1.5.2 If it has a charge mode 4, it must include at least a connector with configuration EE, FF, AA, or BB, with cable. See Annex 15.4.

13.1.6 The EVSE that has a charge mode 3 installed in car parks of individual facilities can be used in the cases of connection B and C and for EVSE that has charge mode 4, it can only use C connections.

13.2 Buildings or residential complexes facilities.

13.2.1 The buildings prepared for electromobility are the ones that in their design will anticipate the future incorporation of an EVCI according to the following requirements:

13.2.1.1 The channelling and feeder originated from the public distribution network that gets to the first compound or enclosure that has the electrical connection box, must be dimensioned in function to the load of the building applying the factors of simultaneity correspondingly and must consider providing a power of at least 30% of the established car parks per underground floor, considering an EVSE of 7 kW per car park. See Annex 15.5, Figure 15.5.1.

13.2.1.2 If the building has a distributed or mixed electrical connection system, the shaft or vertical conduct of electrical connections must be dimensioned with the same length for the whole building, considering underground floors that have car parks, where it also must be provided access to it in every floor. See Annex 15.5, Figure 15.5.2.

13.2.1.3 If the building counts with a concentrated electrical connection system, the electrical connection area must be dimensioned considering an available space to install hubs for the car parks. The shaft or feeding vertical conduct must be dimensioned to store conductors that allow feeding in tis totality the car parks throughout the whole building, considering even the underground floors of the building, considering an EVSE of 7 kW per car park. See annex 15.5, Figure 15.5.3.

13.2.2 For charging cycles, motorcycles and quadricycles that use an A connection and a charging current less than 10 A, it will be possible to provide facilities with charge mode 1.

13.2.3 For charging electric vehicles it can be provided of facilities with charge mode 2, 3 or 4.

13.2.4 For facilities with charge mode 3 or 4 the circuits of each EVSE must meet the requirements indicated in the points 12.5, 12.6 and 12.7, accordingly. If the EVCI has only one EVSE with just one connector, located 3 metres away from the electrical connection and the protection mentioned are included in the EVSE, the EVSE can be connected directly to the electrical connection.

13.2.5 This type of facilities must meet the following indications, accordingly.

13.2.5.1 If it has a charge mode 3, it must include at least a connector type 1 or type 2 or type 2 in EVSE. See Annex 15.4.

13.2.5.2 If it has a charge mode 4, it must include at least a connector configuration EE, FF, AA, or BB. See Annex 15.4.

13.2.6 The EVSE that has charge mode 3 installed in car parks of individual buildings can be used in cases of connection B and C and for EVSE that counts with charge mode 4, only a C connection will be used. See Annex 15.2.

13.2.7 The power charge of EVSE, that are used in this type of facility, must be managed through a remote CMS and CPS.

13.3 Charging plugs for self-service with public access.

13.3.1 The facilities located in BNUP must have at least a minimum output power per connector of 22kW. They can use a lesser power just in justified cases and that counts with the authorisation of the owner and/or property manager, which must be presented before the Superintendency at the moment of registering the facility.

13.3.2 The EVSE used in this type of facility must have at least the communication protocol OCPP 1.6 or superior or compatible.

13.3.3 This type of facility will have charging modes 3 or 4 for charging electric vehicles. It is prohibited to use the charging mode 2 for electric vehicles.

13.3.4 This type of facilities located in BNUP that have a charging mode 3 must include type 2 connectors without cable with anti-vandalism protection.

13.3.5 This type of facility located in BNUP that have charging modes 4 must include a minimum of 2 connectors, one with configuration FF and other with configuration AA. See Annex 15.4.

13.3.6 This type of facilities that are NOT located in a BNUP that have a charging mode 4 must include a minimum of 2 connectors, one with configuration FF and other with configuration AA. See Annex 15.4.

13.3.6.1 If it provides a charging mode 3, it must include at least connectors type 2 or type 2 without cable. See Annex 15.4.

13.3.6.2 If it provides a charging mode 4, it must include at least a connector with configuration FF or AA.

13.3.7 This type of facility must count with a signage that identifies the EVCI, according to what is established by the competent authority. In absence of a signage, the one defined in Annex 15.6 must be used. The height of the sign must ensure its visibility. The recommended values for the height of the border or lower point of a sign regarding the highest part of the road will be between 1.8 m and 2.0 m according to what is shown in Annex 15.6.

13.3.8 The EVSE located in facilities of self-service with public access in BNUP must at least have an access system to the load through a radio frequency identification (RFID) or a quick response code (QR).

13.4 Charging points

13.4.1 The minimum power of the EVSE connectors installed in this type of facility must be at least 22kW.

13.4.2 The EVSE used in this type of facility must count with communication protocol OCPP 1.6 or superior or compatible.

13.4.3 In this type of facility charging modes 3 and 4 for charging electric vehicles are provided. It is prohibited to use charging mode 2 for electric vehicles.

13.4.4 This type of facility must meet the following indications:

13.4.4.1 The provision of charging modes 3 must include at least a type 2 or type 2 without cable connector. See Annex 15.4.

13.4.4.2 The provision of charging mode 4 must include at least 2 connectors with cable, one with configuration FF and other with configuration AA. See Annex 15.4.

13.4.5 This type of facility must count with a signage that identifies the EVCI, according to the competent authority. In absence of this signage, it the one defined by Annex 15.6 must be used. The height of the sign must ensure its visibility. The recommended values for the height of the border or lower point of a sign regarding the highest part of the road will be between 1.8 m and 2.0 m according to what is shown in Annex 15.6.

13.4.6 The EVSE located in charging points must at least have an access system to the load through a radio frequency identification (RFID) or a quick response code (QR).

13.4.7 The installed EVSE in charging points must count with an emergency stop button, which must be visible and rapidly accessible in case of an emergency.

13.5 Electric terminals and charging centres for public transport.

13.5.1 For charging vehicles and electric buses facilities with charging modes 3 or 4 can be provided. In the case of facilities in buildings, the EVSE must also meet the requirements of Buildings or Residential complexes facilities.

13.5.2 These facilities are aimed at being used for users familiarised with the risks of electric power.

13.5.3 These charging plugs must have an operation manual, a preventive maintenance manual and an emergency protocol, as well as contact information in case of emergencies.

13.5.4 The charging centres for public transport must contemplate in its design a backup emergency power system, in case of a loss of supply in the electricity network, which will be dimensioned by criteria of the operator.

13.5.5 The charging centres for public transport that surpass 1 MW of power in EVCI must be supplied with at least two transformers, considering that the transformer that malfunctions cannot affect more than 50% of the EVSE of the facility. Facilities that have an emergency backup of 100% are exempt of this requirement.

13.5.6 In the charging centres for public transport, the EVSE must be installed in a homogeneous way between the transformers of the facility, according to the capacity of the latter.

13.5.7 The electric terminals and charging centres of public transport must request the technical feasibility of supply in conformity with the Title 5-1 of the Technical Standard of Quality of Services for Distribution Systems.

13.5.8 In case that the charging centres for public transport operate in block schedules, according to the Technical Standard of Quality of Services for Distribution Systems article 5-3, point 1.10 and 1.11, the distribution company and the requesting, in mutual agreement, must establish the necessary mechanism to guarantee that the operation of the facility is adequate to what is requested, the former with the purpose of safeguarding the safety and quality of service in accordance with current regulations. If the parties cannot agree, the requesting must request that the Superintendency decide on it.

13.5.9 This type of facilities must meet the following indications, accordingly:

13.5.9.1 If provides of charging mode 3, it must include at least a connector Type 1, Type 2, or Type 2 without cable. See Annex 15.4.

13.5.9.2 If provides of charging mode 4, it must include at least a connector configuration AA, BB EE, or FF. See Annex 15.4.

14 MOUNTING AND EQUIPMENT ARRANGEMENT

14.1 The illumination system in the areas where the charging will happen must guarantee that during the operation and manoeuvring necessaries for the start and end of the charging exists a minimum horizontal light level at floor level of 20 lux for charging plugs outdoors and 50 lux in charging plugs indoors.

14.2 The EVSE must be installed at a height superior to 10 cm from the floor level to avoid risks of flooding, The EVSE that counts with base in its design of said height are exempt of this requirement. See Annex 15.7.2.

14.3 The EVSE must not be located at a distance greater than 5 metres in the inlet connection points for electric vehicles, as indicated in the Figure 15.7.2 as defined by Annex 15.7.

14.4 The connectors for the EVSE must be located and fixed in the structure of the EVSE as shown in the Figure 15.7.1 as defined by annex 15.7 or close to it under one metre horizontally. For mounted EVSE in the wall, the minimum height of installation of the connectors with or without cable must be 1 m above the floor level and a maximum height of 1.3 m. For totem type EVSE that counts with connectors with or without cables it will have a minimum height of 0.6 m above the floor level and a maximum height of 1.3 m. See Annex 15.7.

14.5 The cable that joins the CS or EVSE and the inlet of the electric vehicle must be able to withstand external influences, such as solar radiation, temperature, and any other agent that in normal conditions could harm it.

14.6 The cable that connects the EVSE and the inlet of the electric vehicle, must not be at any moment in contact with the floor. For this, a support system must be implemented in the EVSE or close to it under one metre horizontally. The cable can be in contact with the floor at the moment of charging the vehicle, just if the manufacturer indicates that the cable is designed to withstand that type of externalities and the surface of the floor is in such a way that the external cover of the charging cables is not harmed.

14.7 Protective measures in function to external influences. The main external influences that are considered in this type of facility are:

14.7.1 For outside facilities: Penetration of solid foreign bodies, penetration of water, corrosion in saline environments, resistance to ultraviolet rays, external hits, and winds.

14.7.2 The planner must pay special attention to the environmental conditions and existing environment, with the purpose of defining adequately the placement of the facility and what superior or additional characteristics must be included besides the ones stipulated in this section.

14.7.3 The grades of protection against penetration of solid bodies and access to dangerous parts, penetration of water and mechanical impacts of charging plugs can be obtained through the usage of multiple envelops providing of a grade of protection required for the set of envelopes completely mounted. In this case, in the documentation of the manufacturer of the charging plug must be perfectly defined the methods for obtaining the different grades of protection IP and IK or AG as defined by annex 4.1 of the Technical Regulatory Sheet RIC N°04.

14.8 The EVSE installed in places in which electric vehicles transit must be protected against external mechanical damage of impact type of high level of severity (AG3). The equipment protection will be guaranteed in any of the following ways:

14.8.1 Placing the EVSE in a location in which is not subject to a foreseeable risk of impact.

14.8.2 Providing of a type of additional mechanical protection in areas in which the equipment is subject to impacts. See Annex 15.7, Figure 15.7.3.

14.8.3 Selecting the electric material with a grade of protection adequate against damages.

14.8.4 Using a combination of some or every previous measures.

14.9 When EVSE are installed in areas with potentially explosive atmospheres, the arrangements of the regulatory sheet mut be applied.

15 FEEDING SYSTEMS FOR ELECTRIC VEHICLES

15.1 All the EVSE, and modes 1, 2 and 3 charging cable must meet with the defined in the analysis protocol and/or respective electric test items, established by the Superintendency. In absence of this, the EVSE, and modes 1, 2 and 3 charging cables must count with a previous authorisation of the Superintendency to be used in facilities of electric vehicle charging infrastructures. The superintendency will oversee issue the procedure of authorisation of the EVSE, and modes 1, 2 and 3 charging cables.

15.2 The requirements for the mode 2 charging cable IC-CPD will be:

15.2.1 It must have type 1 or type 2 connectors and meet the considerations indicated in the IEC 62752 or UL 2594 standards or equivalents.

15.2.2 The connectors and inlet devices of the electric vehicle must be approved or labelled for this usage. These connectors must be in conformity with the connectors mentioned in the IEC 62196-1 and IEC 62196-2 standards or equivalents.

15.2.3 The electrical connection box of the charging cable IC-CPD must have at least a grade of protection IP55. The grade of mechanical resistance must be of at least IK08.

15.2.4 The charging cable IC-CPD must be provided with copper wires and the minimum section of the cables that transfer power and the protective conductor will receive the maximum current of the charging cable IC-CPD. The sections are defined in Table N° 15.4. The section for the cable with pilot function of the equipment will be at least 0.5 mm^2 or 20 AWG.

Table N°15.4 Minimum transversal section of charging cables IC-CPD (power)

Maximum current of the IC-CPD	Minimum section mm^2	AWG 1O
< 13 A	1.5	16
13 A < *I* < 20 A	2.5	14
20 A < *I* < 32 A	6	10

15.2.5 The charging cable IC-CPD must be provided with a differential current device, that does not allow for a leakage of AC greater than 30 mA, even if it is of a pulsating or ripple type and has a DC component equal to 6 mA or greater.

15.3 The requirements of EVSE with charging mode 3 will be:

15.3.1 It must have type 1, type 2 or type 2 without cable connectors and meet the considerations indicated in the IEC 61851-1 or UL 2594 standards or equivalents.

15.3.2 The connectors and inlet devices for electric vehicles must be approved or labelled for this usage. These connectors must be in conformity with the connectors mentioned in the IEC 62196-1 and IEC 62196-2 standards or equivalents.

15.3.3 The connectors must have a locking system when charging the vehicle's battery, which must be mechanic or electronic.

15.3.4 The connectors that will be plugged in the electric vehicles must have a section greater than 2,5 mm^2 and have an extension greater than 3 metres and less than 8 metres.

15.3.5 The EVSE installed outdoors must have at least a grade of protection IP54, except the ones installed in homes, buildings or residential complexes that can be IP44. The grade of mechanical resistance outdoors will be of IK08 and especially equal or greater than an IK 10 when installed in a BNUP. The aforementioned, excludes parts such as, keyboards, LEDs, screens or ventilation grilles.

15.3.6 The EVSE installed indoors must have as a minimum a grade of protection IP44 and mechanical resistance of IK08 against external mechanical impacts. The aforementioned, exclude parts such as keyboards, LEDs, screens or ventilation grilles.

15.3.7 The EVSE must count with an overcurrent protection or disconnection that allows the proper functioning of the equipment.

15.3.8 Each connector must be protected with a differential current device that does not allow a leakage of AC greater than 30 mA even with it is of a pulsating or ripple type and has a DC component equal to 6 mA or greater. For EVSE in which can be charged with just one connector charging mode 3 at the time, this protection, can be installed in it externally.

15.3.9 The self-service facilities with public access in BNUP and charging points must have an alerting system of remote shutdown. In the case of connection B, the EVSE in self-service with public access and charging points will be equipped with an automatic reset device or remote operation for the differential protection that will only operate once is checked that the cable and the input connector of the EVSE are not connected.

15.3.10 When used in an EVCI with a total power greater than 100 kW, the EVSE used must have the ability to manage its maximum charging power through a remote CMS.

15.4 The requirements for EVSE with charging mode 4 will be:

15.4.1 It can only be used in cases of connection C.

15.4.2 The connectors must have a locking system when charging the vehicle's battery, which must be mechanic or electronic.

15.4.3 The EVSE installed outdoors must have at least a grade of protection IP54, except the ones installed in homes, buildings or residential complexes that can be IP44. The grade of mechanical resistance outdoors will be of IK08 and especially equal or greater than an IK 10 when installed in a BNUP. The aforementioned, excludes parts such as, keyboards, LEDs, screens or ventilation grilles.

15.4.4 The EVSE installed indoors must have as a minimum a grade of protection IP44 and mechanical resistance of IK08 against external mechanical impacts. The aforementioned, exclude parts such as keyboards, LEDs, screens or ventilation grilles.

15.4.5 The EVSE must have an overcurrent protection or disconnection that allows for the proper functioning of the equipment.

15.4.6 The EVSE must be protected by a differential current type A of 30 mA. In the case of EVSE with a power greater than 100 kW it will be allowed to use a sensitivity up to 400 mA. The indicated differential can be installed in it externally.

15.4.7 When used in an EVCI with an installed power greater than 100 kW, the used EVSE must have the ability to manage its maximum charging power through a remote CMS.

15.4.8 Its usage will only be permitted when they are installed permanently. Except in emergency situations in which the electric vehicle just has connectors with configuration AA, BB, EE, or FF and that it is urgent to charge its battery, a mobile EVSE with charging mode 4 connected to an industrial CS. will be allowed to be used.

15.4.9 The cables of the connectors plugged to the electric vehicle must have a greater section than 2,5 mm^2 and have an extension between 3 and 7,5 metres. Except electric stations or charging centres for public transport where those can have a length of 10 metres if the manufacturer allows for it.

15.4.10 For EVSE that have connectors type AA, BB, EE, or FF, the following must be met:

15.4.10.1 The considerations indicated with the IEC 61851-23 or UL 2202 standards or equivalents. For EVSE with connectors of type FF these must meet the ISO 15118-2 standard.

15.4.10.2 The requirements of electromagnetic compatibility indicated by the IEC 61851-21-2 standard or equivalents.

15.4.10.3 The connectors and inlet devices for the electric vehicle must be approved or labelled for that usage. These connectors must be in conformity with the IEC 62196-1 and IEC 62196-3 standards or equivalents.

15.4.10.4 The external AC/DC converter, that includes the EVSE must be designed as an IT system and count with a monitoring device of isolation for the complete charging circuit, including the electric vehicles, that detects symmetric or asymmetric faults.

16 LABELLING

16.1 All the labelling, signages, procedures and warnings required in this technical sheet must meet the following:

16.1.1 Be indelible.

16.1.2 Be legible.

16.1.3 Be designed and placed in a way that are legible during the useful life of the equipment or board that are attached or related to.

16.1.4 Be simple and comprehensible.

16.2 All the EVSE must have a plate that indicates the parameters of the equipment, such as input current, input power, output power, input voltage, output current and range of the output voltage.

16.3 The EVSE in facilities of self-service with public access and charging points must:

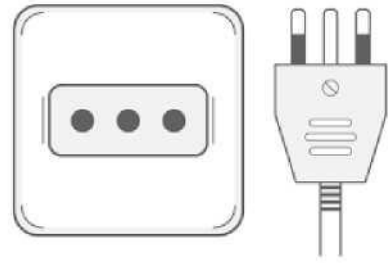
16.3.1 Have signalled the procedure in which the charge of the electric vehicle is performed in Spanish in a clear way, step by step. The procedure can be an infographic.

16.3.2 Have plate in which the contact information is indicated, such as phone number of the technical support of the equipment that will be in charge of the station.

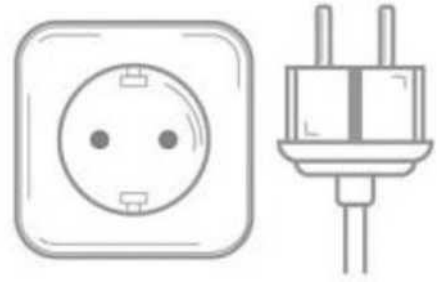
16.3.3 Have a summary procedure of emergency shutdown indicating the steps to follow in case of an emergency. The procedure can be an infographic.

ANNEX 15.1.
Outline of the physical interface of connectors

a)



b)



c)

d)

Figure 15.1.1 Charging plugs, Plugs

a) L Type
b) F Type
c) Industrial single-phase Charging plug
d) Industrial three-phase Charging plug
L1, L2, L3 (Line 1, 2 and 3) N (Neutral)
PE (earthed)

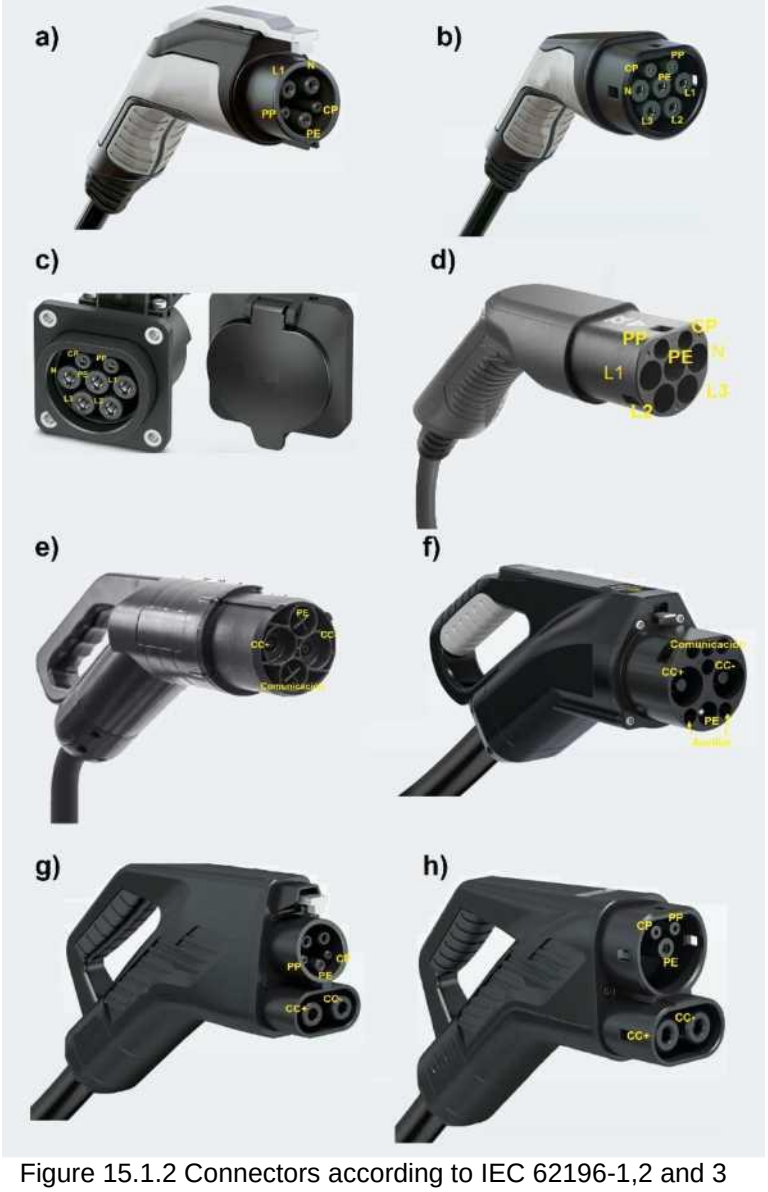


Figure 15.1.2 Connectors according to IEC 62196-1,2 and 3 standards.

a) Type 1
b) Type 2
c) Type 2 without cable
d) Type 2 for EVSE
e) Configuration AA
f) Configuration BB
g) Configuration EE
h) Configuration FF

Where:
L1, L2, L3 (Line 1,2 and 3)
N (Neutral)
PE (earthed)

Annex 15.2
Charging cases

The connection between the EVSE or CS and the electric vehicle according to cases A, B and C described in figures 15.2.1, 15.2.2 and 15.2.3.

Note: The figures 15.2.1, 15.2 and 15.2.3. do not imply a specific design.

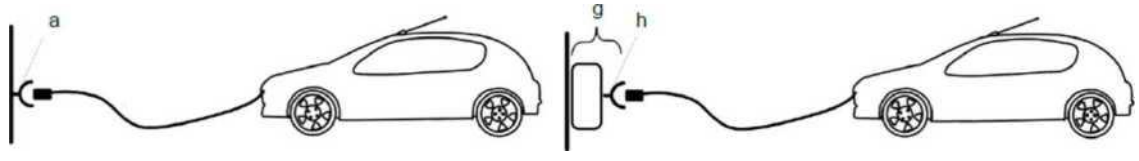


Figure 1. 2.1. Case A: Connection of an electric vehicle to a charging plug using a cable and a connector permanently joined to the ELECTRIC VEHICLE.

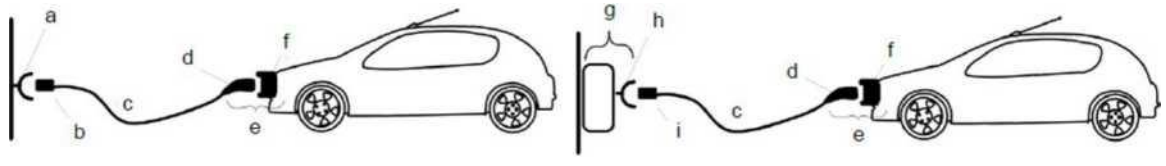


Figure 2. 2.2. Case B: Connection of an electric vehicle to a charging plug using a cable and removable connector in both ends.

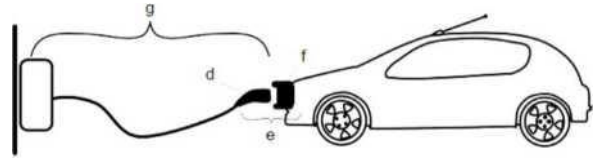
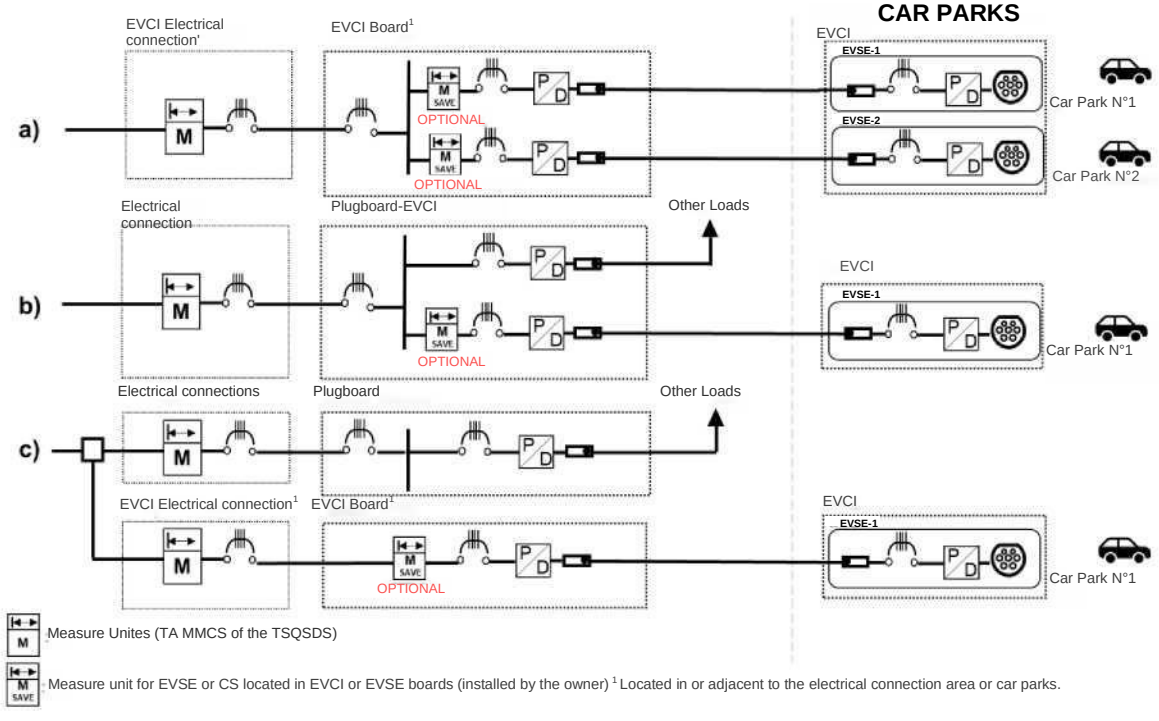
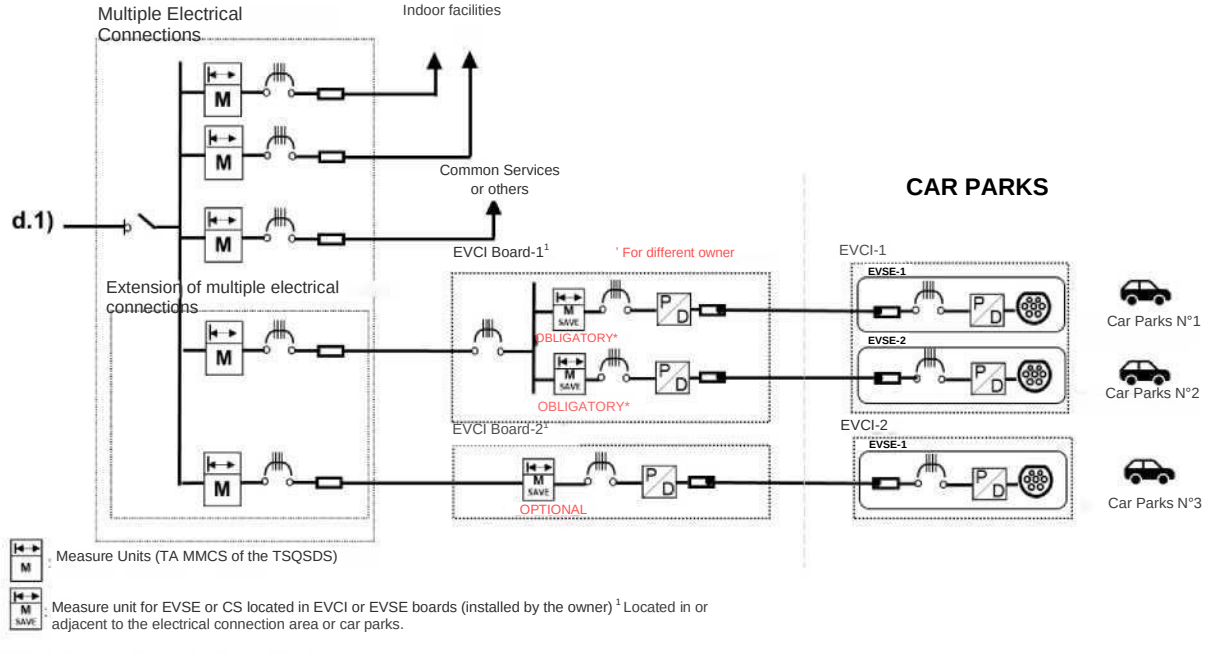


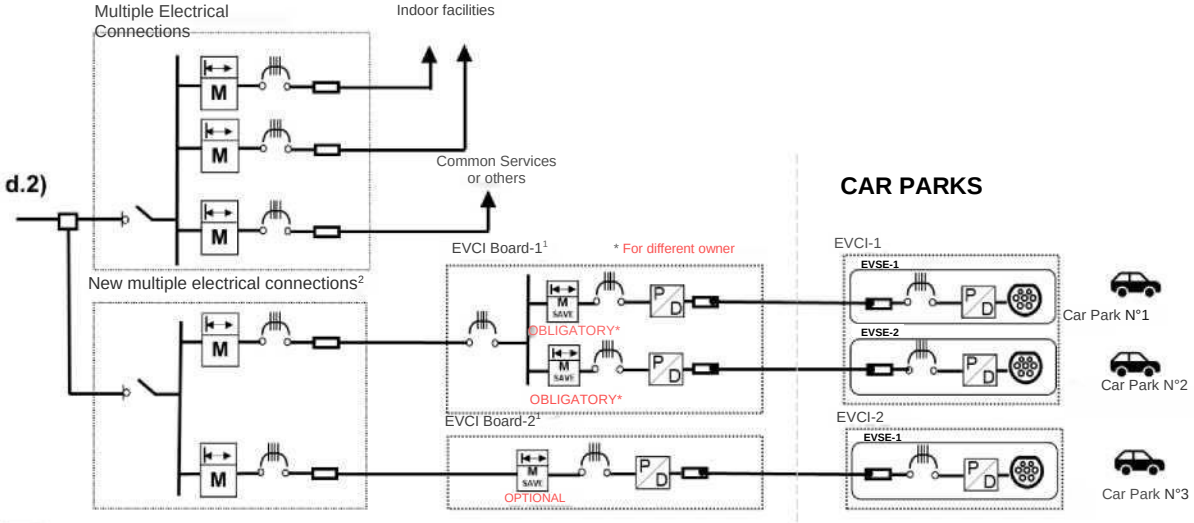
Figure 15.2.3. Case C: Connection of an electric vehicle to a charging station using a cable and connector permanently joined to the charging station.

(a) Charging stations (CS)
(b) Industrial plug L or F type
(c) Charging cable IC-CPD or mode 3 charging cable
(d) Connector with cable to vehicle
(e) Coupling system
(f) Vehicle inlet
(g) Electric vehicle supply equipment (EVSE)
(h) Connector without cable of EVSE
(i) Connector with cable to EVSE

Annex 15.3
Electrical connections



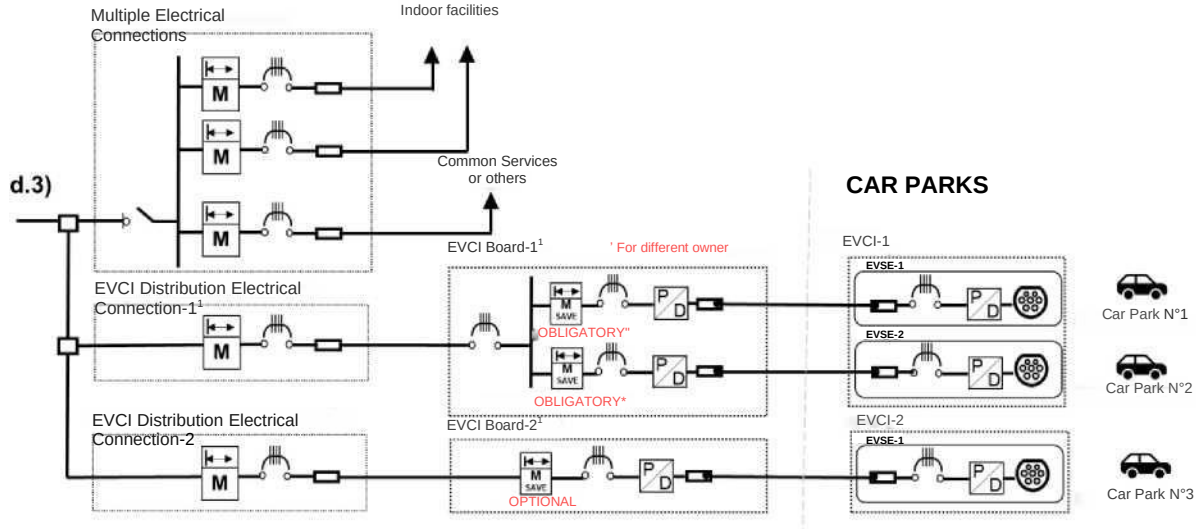




: Measure Units (TA MMCS of the TSQSDS)

: Measure unit for EVSE or CS located in EVCI or EVSE boards (installed by the owner)

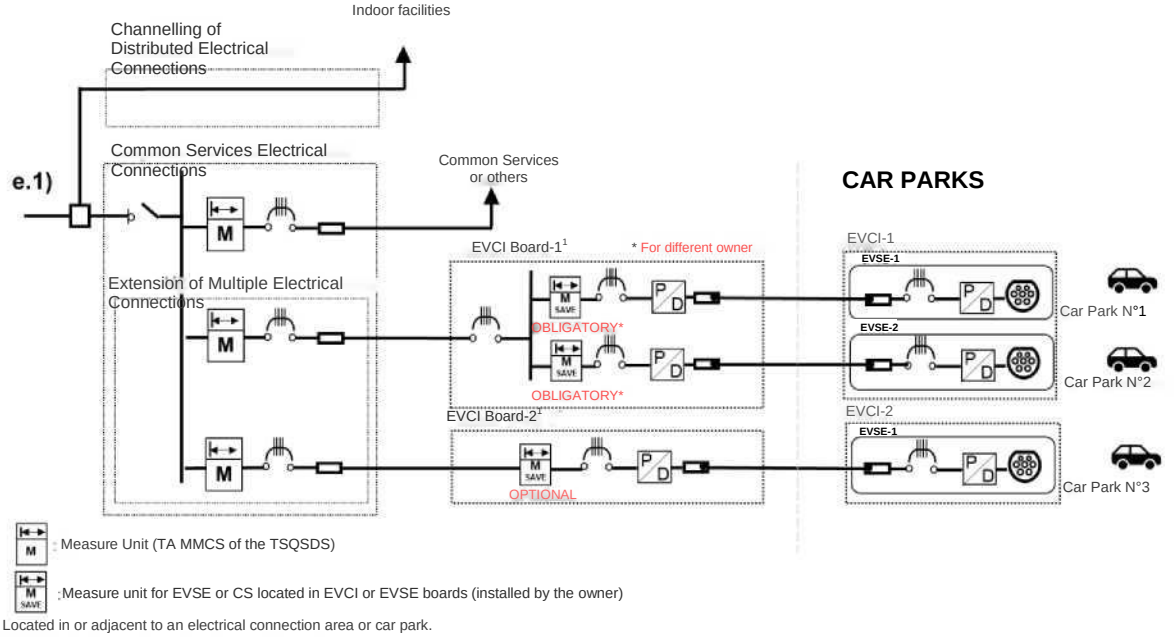
[1] Located in or adjacent to electrical connection areas in car parks.
[2] Located in or adjacent to an electrical connection area.

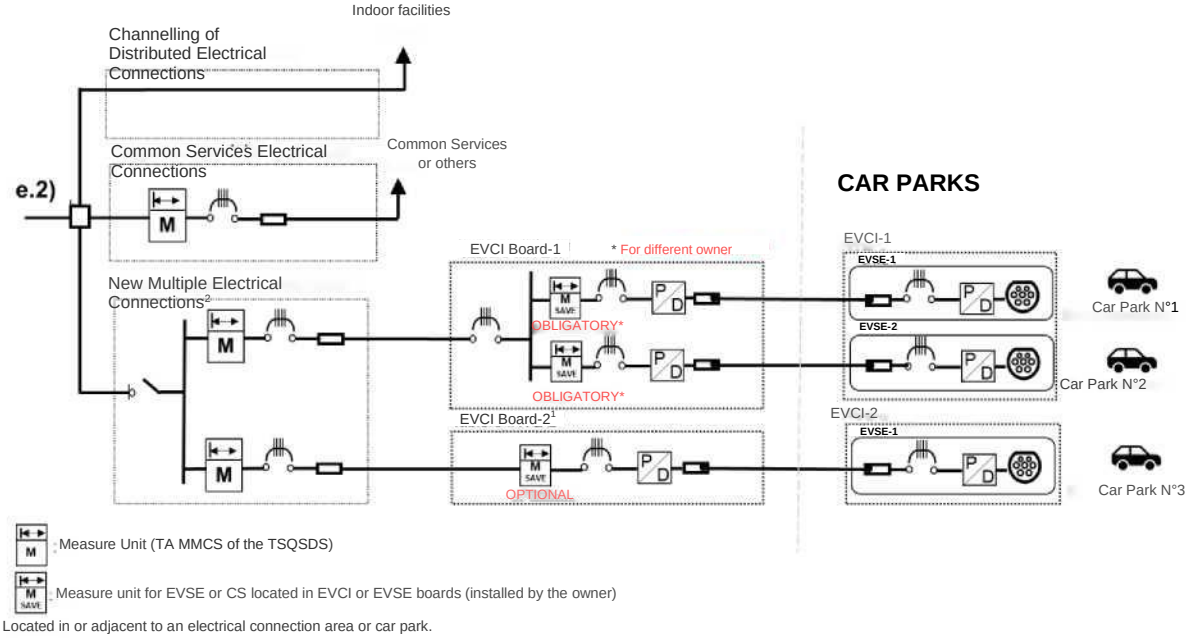


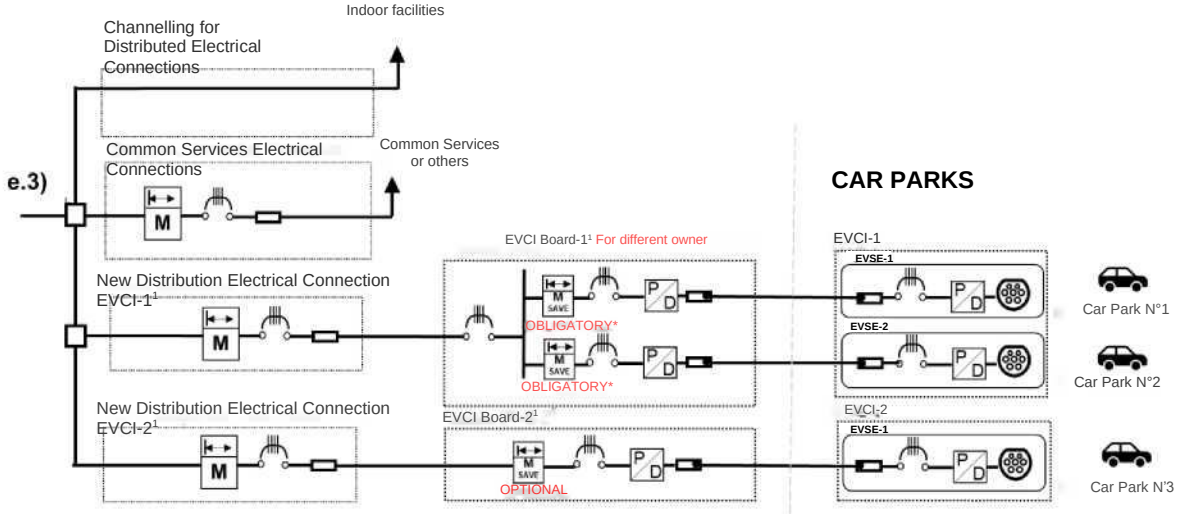
: Measure Unit (TA MMCS of the TSQSDS)

: Measure unit for EVSE or CS located in EVCI or EVSE boards (installed by the owner)

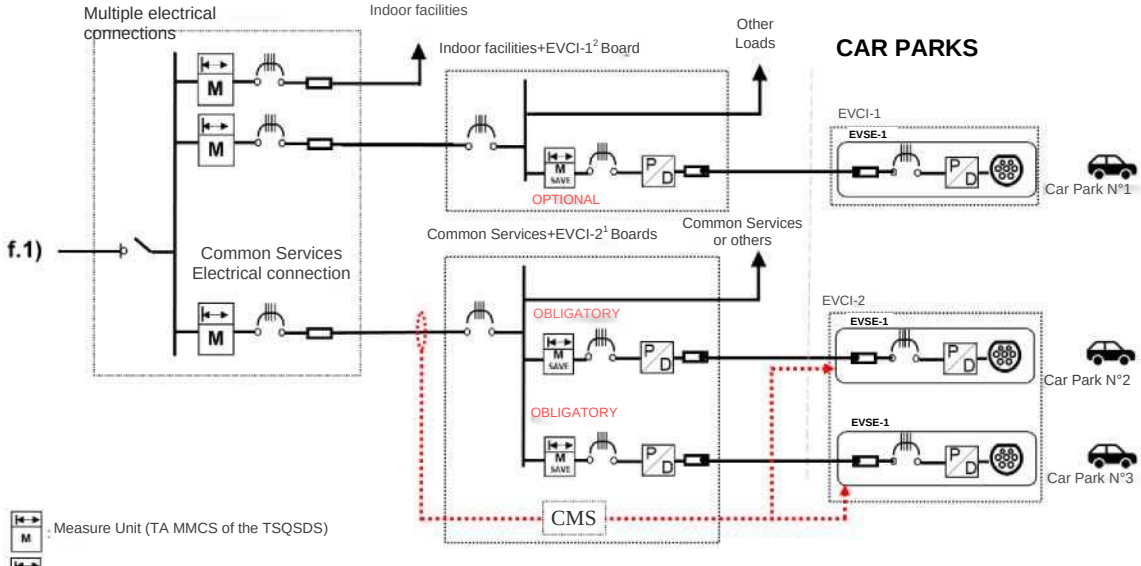
[1] Located in or adjacent to an electrical connection area or car park.


Indoor facilities
Channelling of Distributed Electrical Connections
e.1)
Common Services Electrical Connections
Common Services or others
CAR PARKS
Extension of Multiple Electrical Connections
EVCI Board-1[1]
* For different owner
OBLIGATORY*
OBLIGATORY*
EVCI Board-2[1]
OPTIONAL
EVCI-1
EVSE-1
EVSE-2
EVCI-2
EVSE-1
Car Park N°1
Car Park N°2
Car Park N°3
: Measure Unit (TA MMCS of the TSQSDS)
: Measure unit for EVSE or CS located in EVCI or EVSE boards (installed by the owner)
[1] Located in or adjacent to an electrical connection area or car park.

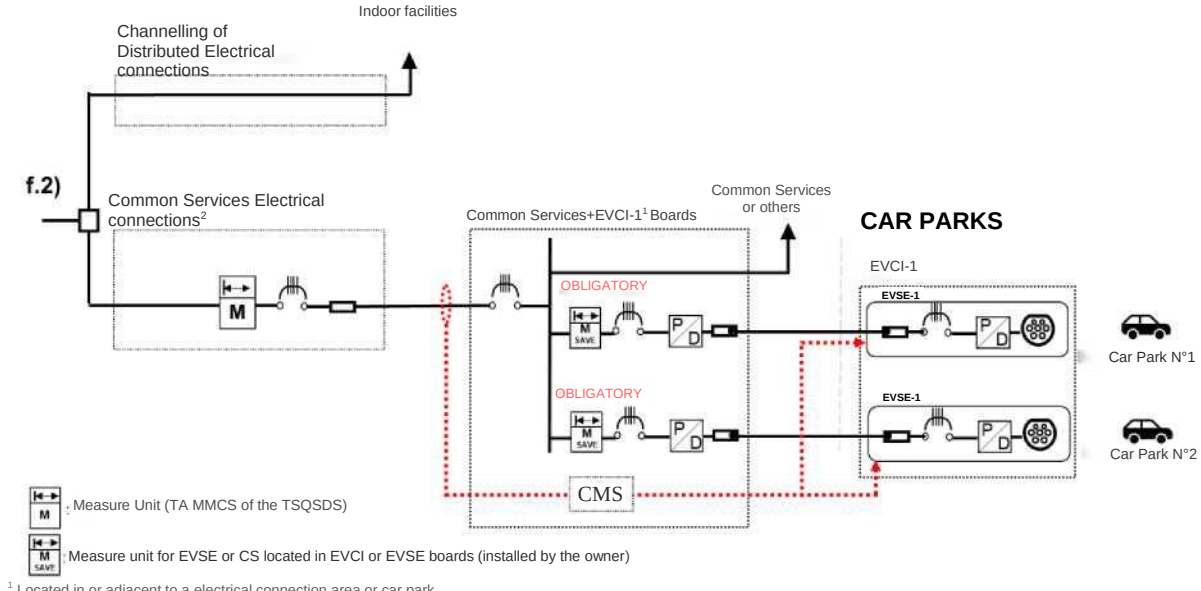

Indoor facilities
Channelling of Distributed Electrical Connections
e.2)
Common Services Electrical Connections
Common Services or others
CAR PARKS
New Multiple Electrical Connections[2]
EVCI Board-1
* For different owner
OBLIGATORY*
OBLIGATORY*
EVCI Board-2[1]
OPTIONAL
EVCI-1
EVSE-1
EVSE-2
EVCI-2
EVSE-1
Car Park N°1
Car Park N°2
Car Park N°3
: Measure Unit (TA MMCS of the TSQSDS)
: Measure unit for EVSE or CS located in EVCI or EVSE boards (installed by the owner)
[1] Located in or adjacent to an electrical connection area or car park.



[1] Located in or adjacent to a electrical connection area or car park.



' Located in or adjacent to a electrical connection area or car park [2] Located in or adjacent to a electrical connection area.



[1] Located in or adjacent to a electrical connection area or car park.
[2] Located in or adjacent to a electrical connection area.

Figure 3.1. Configurations in facilities with a unique electrical connection or multiple electrical connections.

a) Facilities with a unique electrical connection exclusively for EVCI.
b) Facilities with a unique electrical connection exclusively for EVCI and other loads.
c) Facilities with a unique electrical connection, plus one exclusive for EVCI.
d) 1) Facility with multiple electrical connections extended for EVCI.
d.2) Facility with multiple electrical connections for other loads and EVCI, separated.
d.3) Facility with multiple electrical connections and distributed for EVCI.
e.1) Facility with distributed and multiple electrical connections for EVCI and other loads.
e.2) Facility with distributed and multiple electrical connections for EVCI.
e.3) Facility with distributed electrical connections and distributed for EVCI, separated.
f.1) Facility with multiple electrical connections and EVCI connected to common services or existing electrical connection.
f.2) Facility with distributed electrical connections and EVCI connected to common services.

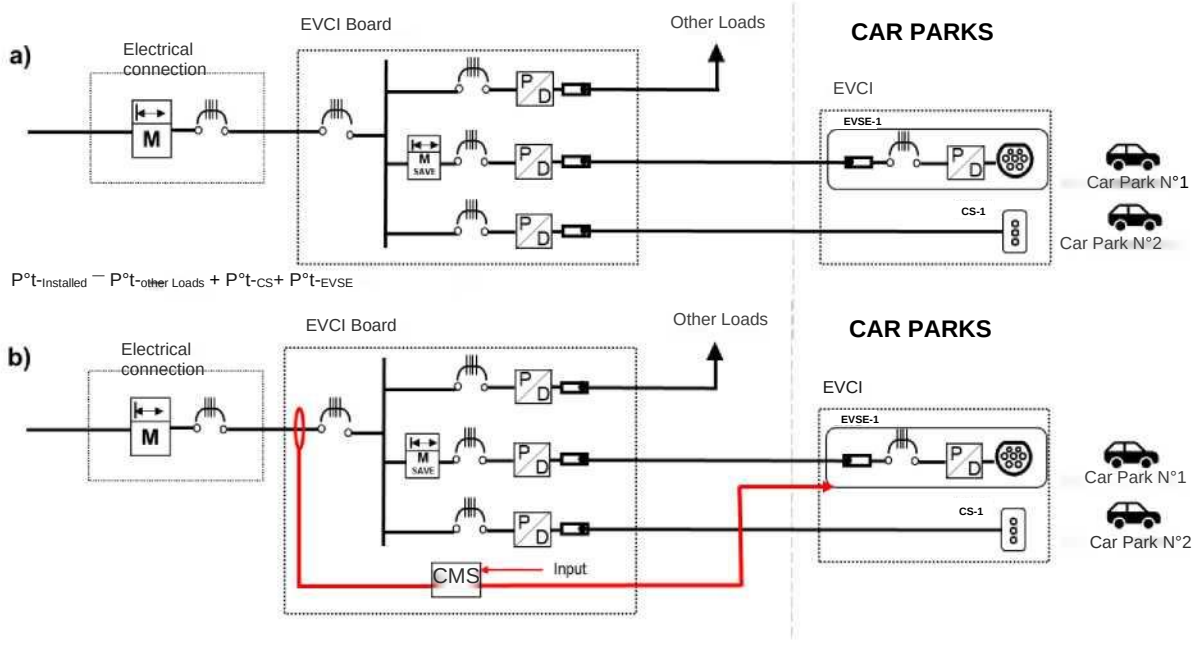


Figure 2. 3.2. Installed power.

a) Facility for EVCI and other loads, connected to the same electrical connection, without a Load Management System.

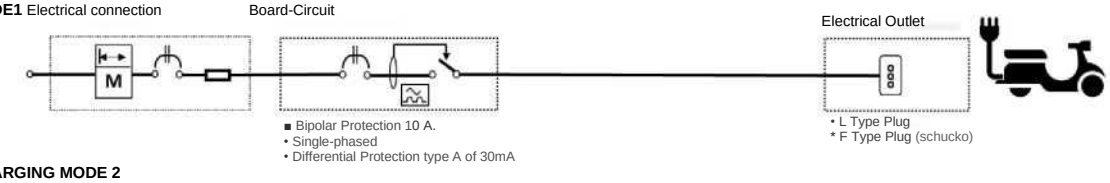
b) Facility for EVCI and other loads, connected to the same electrical connection, with a Load Management System.

c) Facility with multiple electrical connections with a general cabling protection system of the facility.

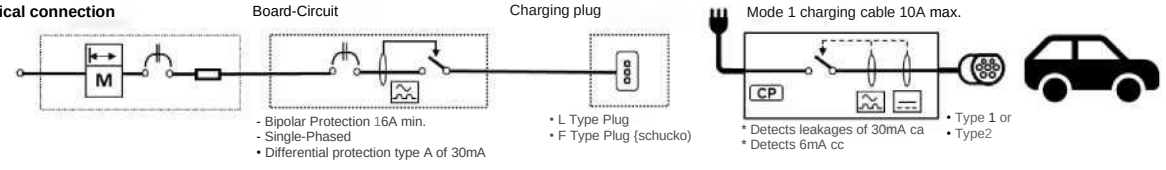
ANNEX 15.4

Configurations of overcurrent and direct and indirect contact protection

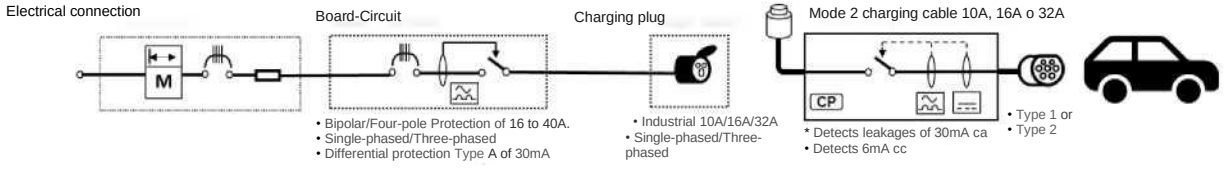
CHARGING
MODE1 Electrical connection



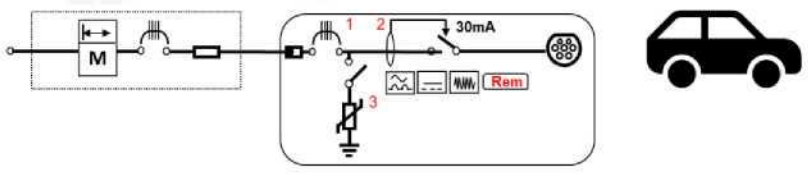
CHARGING MODE 2
Electrical connection



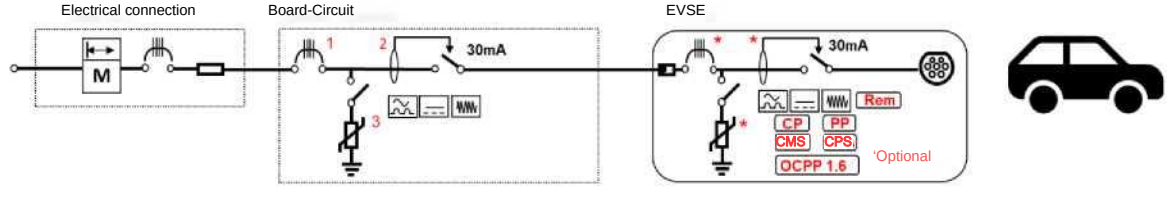
CHARGING MODE 2
Electrical connection

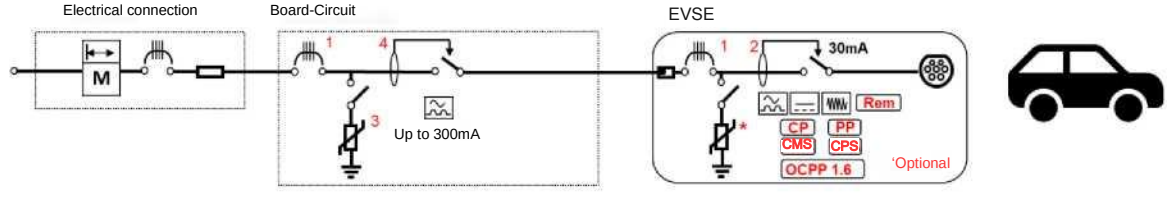


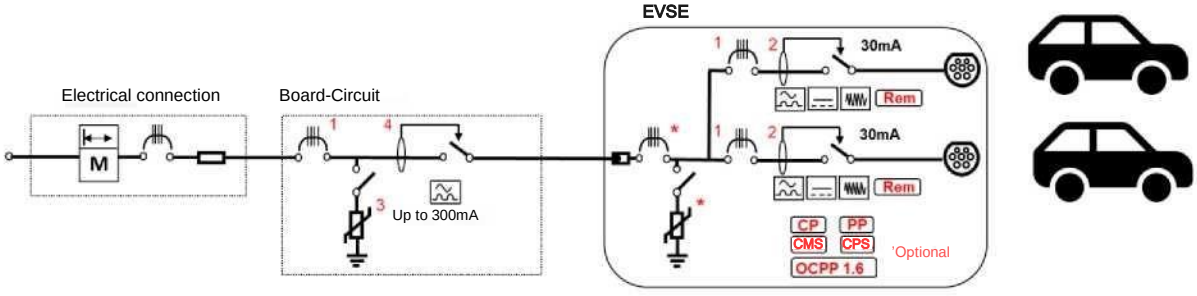
CHARGING MODE 3 Electrical connection EVSE



Allowed in individual facilities and building if the distance electrical connection-EVSE is less than 3m and the EVSE counts with just one connector and indicated protection.







Notes for charging mode 3:
1. Bipolar or four-polar protection accordingly.
2. Differential type B of 30 mA by connector in circuit or EVSE.
   • Optional: Differential Type A of 30mAac + Leakage detector of 6mAcc.
3. Protection against overvoltage Type 2.
   * Obligatory in self-services and charging points located in Boards or EVSE.
4. Differential Type A up to 300 mA if in the connector the EVSE has a differential type B.

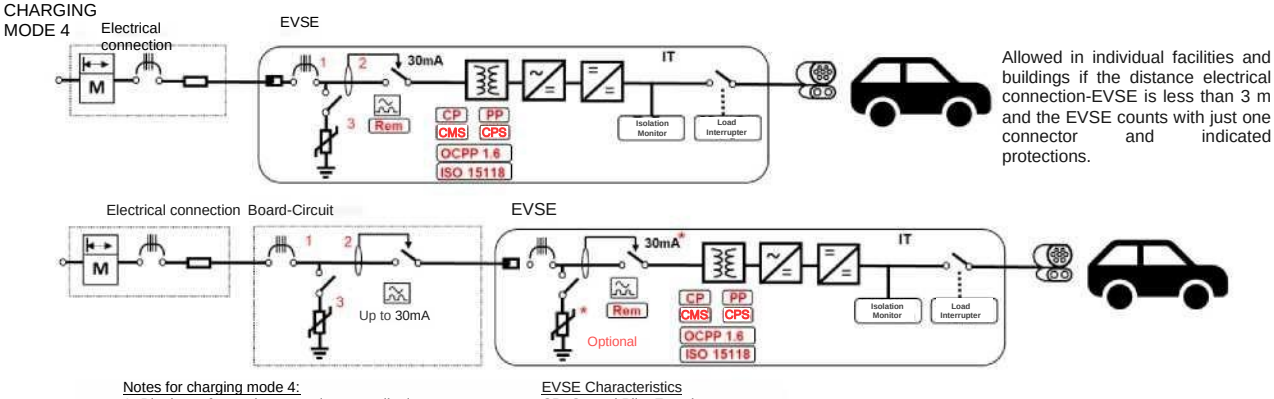
EVSE Characteristics
CP: Control Pilot Function.
PP: Proximity Pilot Function.
CMS: EVSE allows manage load.
- Obligatory in buildings.

CPS: EVSE allows to operate with a cabling protection system.
- Obligatory in buildings.

OCCP 1.6: Communication protocol
- Obligatory in self-services in BNUP and charging points.

REM: Differential protection with monitor and remote control.
- Obligatory in self-service and charging points with connectors without cable.

Connector Type 1, Type2 or Type 2 without cable.
- In BNUP Obligatory Type 2 without cable of at least 22kW.
- In electric station of at least 22kW.



Allowed in individual facilities and buildings if the distance electrical connection-EVSE is less than 3 m and the EVSE counts with just one connector and indicated protections.

Notes for charging mode 4:
1. Bipolar or four-polar protection accordingly.
2. Differential Type A of 30 mA ac per EVSE up to 100 kW or Type A up to 300 mA per EVSE over 100kW.
3. Protection against overvoltage Type 2.
   • Obligatory in self-service and charging points located in Boards or EVSE.

EVSE Characteristics
CP: Control Pilot Function.
PP: Proximity Pilot Function.
CMS: EVSE allows manage load.
- Obligatory in buildings.

CPS: EVSE allows to operate with a cabling protection system.
- Obligatory in buildings

OCCP 1.6: Communication protocol
- Obligatory in self-services and charging points.

REM: Differential protection that counts with a remote disconnection system.
- Obligatory in self-services and charging points.

ISO 15118: Compatible with ISO15118.
- Obligatory for connectors FF.

Connectors with configuration AA, BB. EE o FF.
- Obligatory for connectors FF and AA in charging points.

Figure 15.4.1. Possible protective configurations

ANNEX 15.5

Prevision of EVSE in private buildings

$P_{building} = (P_1 + P_2 + P_3 + P_4) \times Fs + P_5$

$P_{building}$ = Power to consider for feeder designs in new buildings.

P_1= Building consumption power

P_2= General services power

P_3= Commercial premises and offices

P_4= Car parks

P_5= Electric charge infrastructure EV

(P_5= N° Car parks X 7kW x 0.3)

Fs= Simultaneity factor

Figure 15.5.1: Power to consider for the dimensioning of the feeder.

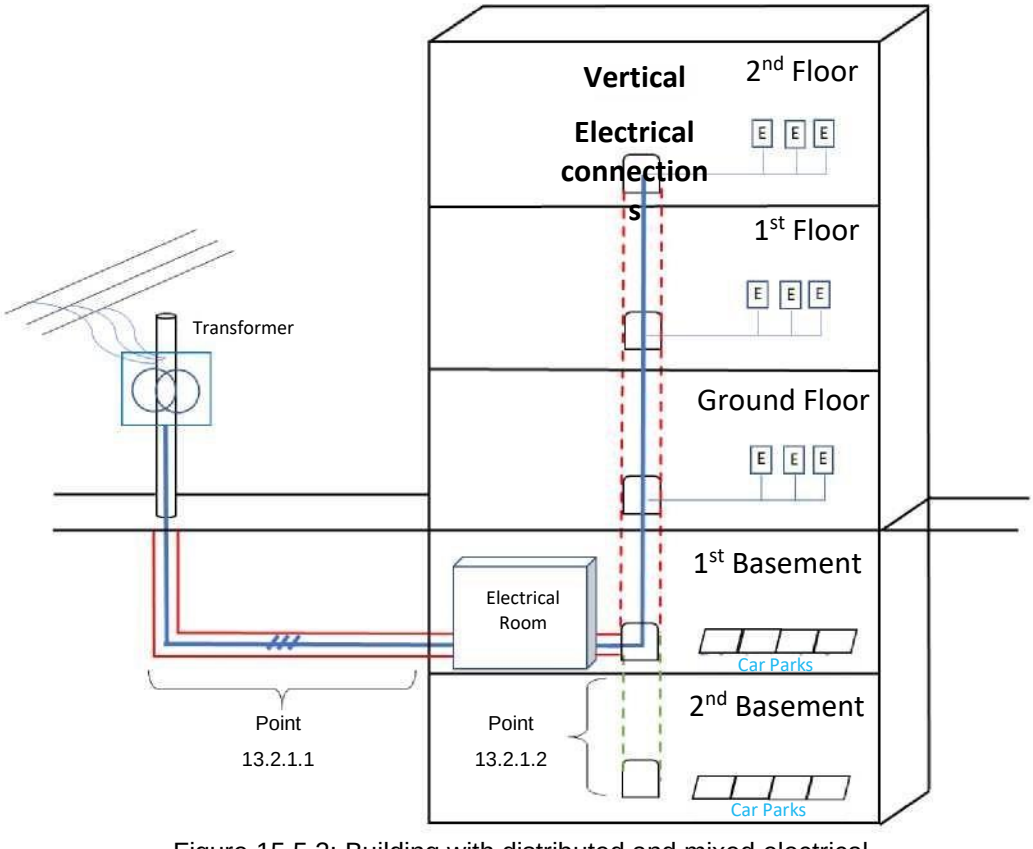


Figure 15.5.2: Building with distributed and mixed electrical connections.

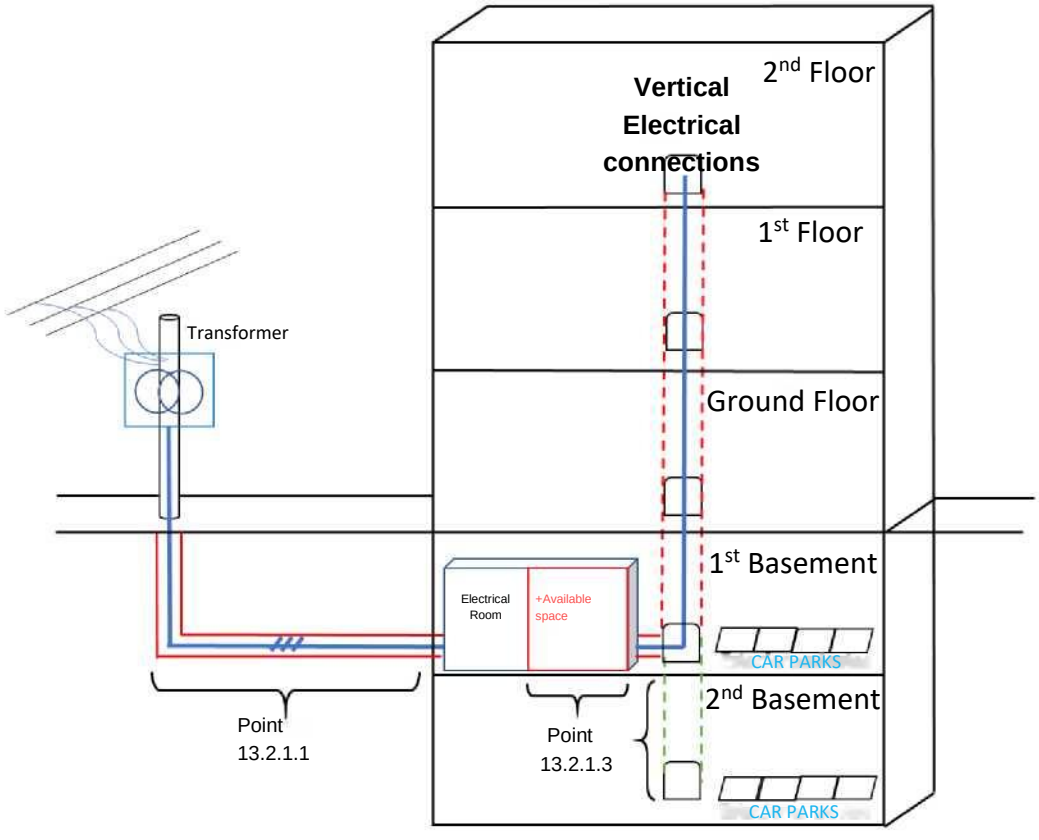


Figure 15.5.3: Building with multiple electrical connections.

ANNEX 15.6.
Facilities signage

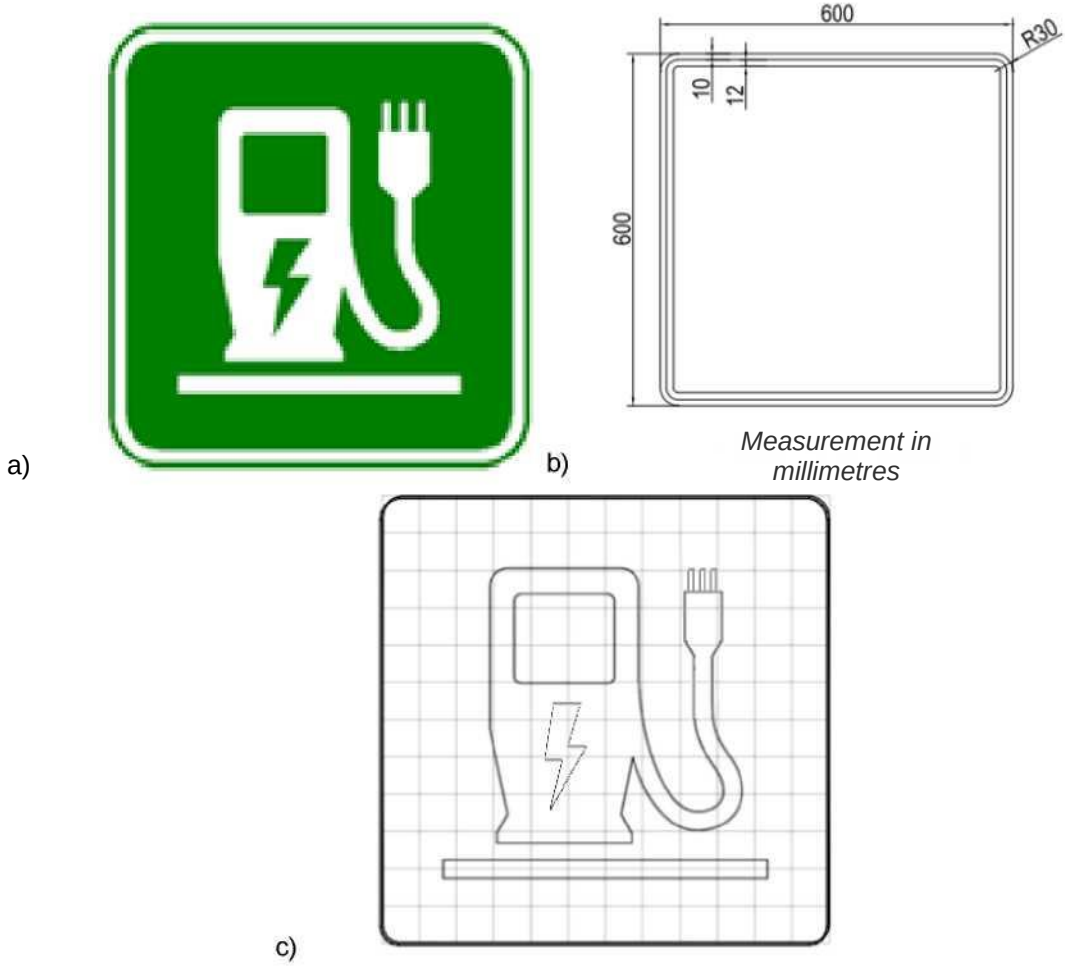


Figure 15.6.1. Signage of facilities a) Model of signage b) Dimensioning c) Model template

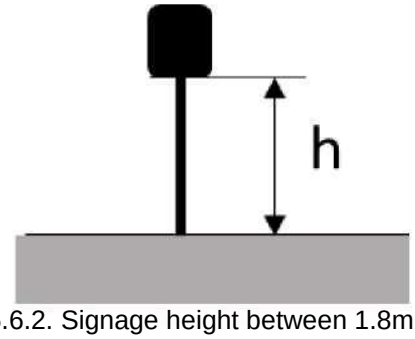
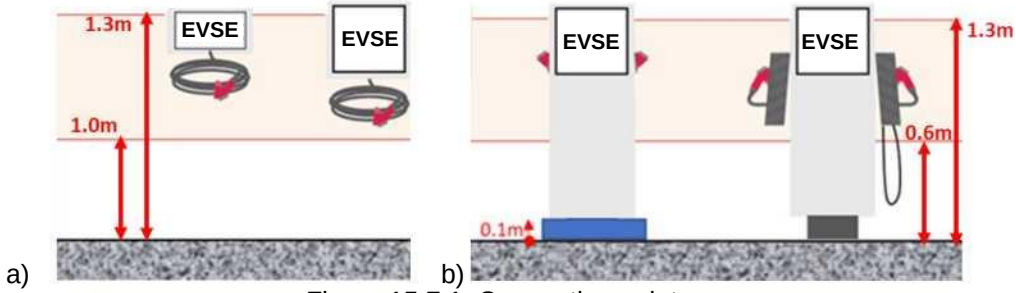


Figure 15.6.2. Signage height between 1.8m and 2.0m

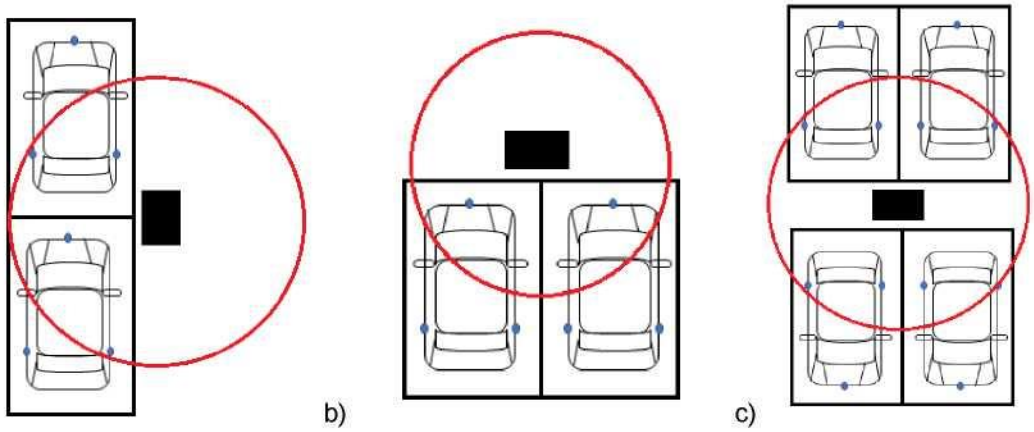
ANNEX 15.7.

Mounting and provision of equipment



a) b)

Figure 15.7.1. Connection point.
a) EVSE installed in the wall
b) Totem or station EVSE



a) b) c)

Figure 15.7.2. Parking configurations for charging plugs

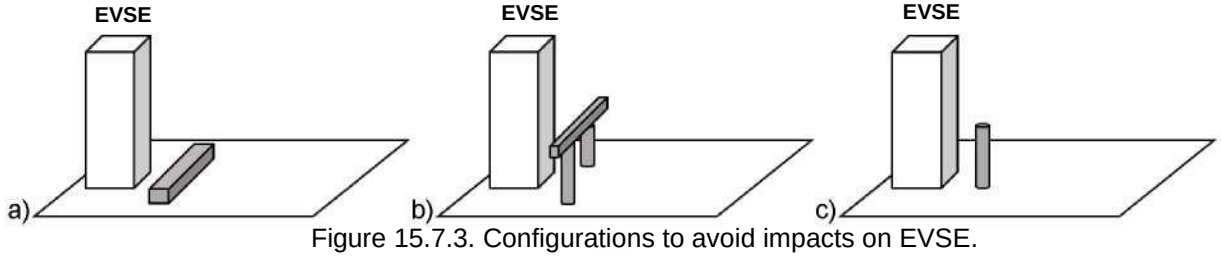


Figure 15.7.3. Configurations to avoid impacts on EVSE.
a) Wheel stops b) Stationary structure c) Static anti-impact pole