

CONNECTION REQUIREMENTS FOR 3X25A – 3X80A CHARGING STATIONS

For installing a standardised grid connection in a charging
station

RESEARCHING AND
TESTING SMART
AND SUSTAINABLE
CHARGING

These specifications have been developed
in collaboration with the grid
operators in the Netherlands.



Table of Contents

| | |
|---|----|
| 1. Introduction | 4 |
| 2. Application | 5 |
| 3. Connection method | 6 |
| 4. Change history | 7 |
| 5. General information and requirements | 8 |
| 6. Housing of the charging station requirements | 9 |
| 7. Foundation requirements | 10 |
| 8. Cable inlet, connection and protection requirements | 11 |
| 9. Smart kWh meter requirements | 14 |
| 10. Access requirements | 15 |
| 11. Optional requirements for the primary - secondary Installation | 16 |
| 12. Appendix | 17 |

CHAPTER 1

INTRODUCTION

This document describes the requirements for integrating a standardised 3x25A to 3x80A grid connection in a charging station for electric vehicles. It concerns charging stations that require a (new) grid connection, such as charging stations to be newly installed or relocated. The directive is intended for manufacturers of these charging stations.

The requirements are designed to ensure that a safe and reliable connection remains guaranteed to the grid operator's public electricity grid. ElaadNL inspects the charging station in accordance with these requirements for admission to the electricity grid. An overview of the charging stations approved by the grid operators can be found on [ELAADNL'S WEBSITE](#).

ElaadNL facilitates and coordinates the grid operator approval process in cooperation with the regional grid operators, in which ElaadNL manages the contact (e-mail: info@netbeheerderskeuringen.nl). The physical grid operator inspection takes place at ElaadNL's Testlab in Arnhem.

CHAPTER 2

APPLICATION

The requirements drawn up regard the grid operators section in a charging station with a connection value of 3x25A to 3x80A. This includes the application of a smart meter, which has been a requirement in public charging stations due to the AMvB 'Decree on the infrastructure for alternative fuels' since 24 June 2017. The grid operator is responsible for this section, using the safeguards as shown in Appendix 1. The customer is responsible for the customer section, which is beyond the transition point of the grid operator (the meter).

The following applies to the inspection of charging stations based on the connection specifications v3.1 from the 1st of June 2025 onwards:

- New types of charging stations: all new charging stations to be placed must at least comply with connection specifications v3.1.
- Objects previously approved according to connection specifications v3.0 do not need to be re-inspected against connection specifications v3.1. Version 3.2 is expected to be released in 2026, which will require a physical re-inspection based on connection specifications v3.2.
- There are no costs associated with grid operator approval.
- Refurbishment: if the (refurbished) charging station is provided with a connection via a grid operator, the charging station must comply with the current version of the connection specifications for charging stations 3x25A to 3x80A. The grid operator inspection team can provide support with regard to the refurbishment of charging stations.

CHAPTER 3

CONNECTION METHOD

Manufacturers are expected to set up the charging station in such a way that a standard compact connection module (CAM) used by the grid operator can safely be installed (see requirement 20). The compact connection module also further standardises the safeguards applied to charging stations, which are shown in Appendix 1. The grid operators also offer the possibility to use software selectivity. *

* Not permitted for RENDO's grid operator area.

CHAPTER 4

CHANGE HISTORY

This is an overview of the changes from connection specifications version 3.0 to updated version 3.1.

- Compared to the connection specifications version 3.0, a change has been made to requirement 16. This concerns a change to the foundation requirements. In version 3.1, to protect the connection cable, it has been added that the connection cable must be routed through the foundation, whereby it may not rest on the connection cable.
- A change has also been made to requirement 29, this concerns access control requirements. In version 3.1, it has been added that the lever must be placed at a minimum height of 30 cm from ground level.
- Furthermore, changes have been made to requirement 24. The object should have a selectivity sticker if software-based selectivity is used, and the object should be equipped with a sticker.
- Finally, a requirement has been added that the object must be provided with a safety sticker according to NEN3011.

All further changes applied in version 3.1 compared to version 3.0 concern textual changes to the connection specifications; specifically, the description and in some cases the inspection assessment.

CHAPTER 5

GENERAL INFORMATION AND REQUIREMENTS

| # | Description | Inspection assessment |
|---|--|---|
| 1 | The grid connection in the charging station is installed via a compact connection module. To measure consumption, the grid operator supplies and installs a smart kWh meter. This kWh meter is a smart (d)SMR kWh meter. | N/a. |
| 2 | The outer diameter of the charging stations connection cable can vary from 22 mm to 27 mm. | N/a. |
| 3 | The whole assembly complies with IEC- 61439-1 and IEC- 61439-7. | Provided test report from an accredited testing body. |
| 4 | The entire charging station should comply with the current (NEN)-IEC-61851, including all parts. | Provided test report from an accredited testing body. |
| 5 | All specifications refer to the grid operator section of the charging station, unless reference is made to the entire charging station including the customer section. | N/a. |
| 6 | These specifications apply to normal ambient conditions in accordance with IEC-61439. In specific cases, different ambient conditions may occur for which specific additional requirements may apply. | Declaration in which conditions the charging station is suitable. |

CHAPTER 6

HOUSING OF THE CHARGING STATION REQUIREMENTS

| # | Description | Inspection Assessment |
|--|--|---|
| 7 | The housing of the charging station has a protection of IP44 (in accordance with NEN-EN-IEC 61439-7 and NEN-EN-IEC 61851-1). | Test report in accordance with NEN-EN-IEC 61439-7, from an accredited test body. |
| 8 | The housing of the charging station has an impact resistance of IK10 (in accordance with NEN-EN-IEC 61439-7). | Test report in accordance with NEN-EN-IEC 61439-7, from an accredited test body. |
| 9 | The mechanical strength of the charging station complies to the requirements for installation in public spaces in accordance with section 10.2.102 of NEN-EN-IEC 61439-7. | Test report in accordance with NEN-EN-IEC 61439-7, from an accredited test body. |
| 10 | The air temperature in the charging station may not exceed 55 degrees Celsius on average, during a one-hour period at the same position as the compact connection module and the smart meter. This is based on a maximum ambient temperature (*) outside the charging station of 40 degrees Celsius (in accordance with section 10.10 of NEN-EN-IEC 61439-7). The temperature measurement is carried out at 5mm from the top of the kWh meter. | Test report in accordance with NEN-EN-IEC 61439-7, from an accredited test body. |
| <p>* Ambient temperature refers to the temperature outside the charging station at 1.5m distance. The grid connection is mounted inside the charging station, where the air temperature inside the charging station will be higher than the ambient temperature.</p> | | |
| 11 | Condensation may occur in the charging station. This should not lead to dangerous situations or equipment failure. Adequate measures should be taken to prevent this. | Visual inspection and technical documentation. |
| 12 | The housing of the charging station does not allow any UV radiation to pass through, so that the components of the grid operator are not affected by UV radiation (leading to ageing). | Visual inspection, in case of transparent housing a material declaration regarding UV absorption. |
| 13 | The charging station has a safety sticker visible at the front of the station according to NEN-3011. | Visual inspection. |

CHAPTER 7

FOUNDATION REQUIREMENTS

| # | Description | Inspection Assessment |
|----|---|---|
| 14 | The charging station is mounted to the foundation if applicable. This connection can only be fitted and removed from the inside of the charging station. | Visual inspection. |
| 15 | <p>The charging station is supplied with a round (red) impact-resistant casing pipe with a wall thickness of 3 mm, smooth inside and diameter of around 50 mm. This is only intended for passing the connection cable from the grid operator. If applicable, the earthing cable of the earthing electrode must be laid in a separate conduit.</p> <p>The protective electrical conduit has a bending radius of at least 500 mm for the grid operator connection cable. The electrical conduit should be installed at least 20 mm above the edge of the foundation so that the connection cable cannot create friction against sharp edges of the foundation. See the example in Appendix 2 for clarification. The electrical conduit should extend at least 10 cm beyond the foundation and be at a depth of 60 cm below ground level. An example is shown in Appendix 2 for clarification. The quality of the electrical conduit must comply with the specifications of NEN-EN-IEC 61386-22, classification 2-2-3-2.</p> | Visual inspection (supplier must demonstrate this; casing pipe must be provided). |
| 16 | The connection cable can be inserted on at least two sides of the foundation. The entry height of the connection cable is 60 cm below ground level. To protect the connection cable, it must be routed through the foundation, where the foundation must not rest on the connection cable. | Visual inspection. |

CHAPTER 8

CABLE INLET, CONNECTION AND PROTECTION REQUIREMENTS

| # | Description | Inspection Assessment |
|----|--|--|
| 17 | <p>A Dutch installation manual is always provided with the charging station in accordance with the format (see website ElaadNL).</p> <p>The installation manual must include the following for the realisation of a grid connection: 'Follow the instructions of the grid operator, as communicated, to realise a safe grid connection in the object.' In addition, the manual should mention that the access door of the charging station should always be accessible. The supplier should also indicate in the manual which models it applies to. It is the supplier's responsibility to keep this information up to date.</p> | Control manual as per described requirement. |
| 18 | <p>Inserting the connection cable and any earthing cable into the charging station may not lead to any damages to the connection cable.</p> | Visual inspection. |
| 19 | <p>Strain-relief is integrated in the compact connection module. To protect the connection cable, it is important that the connection cable can enter and be connected to the compact connection module in a straight line. The exact position of the cable hole must be at the centre below the mounting plate and 6 cm away from the rear wall.</p> | Visual inspection. |
| 20 | <p>Two standard CAM mounting plates (part number Connectens: CT100 403) should be fitted directly above each other, one for securing the meter board and one for securing the compact connection module.</p> <p>The back panel of the charging station, to which the mounting plates are attached, should extend at least as far as the bottom of the connection plug of the connecting cable. The compact connection module and the meter panel are installed by the grid operator, at the time of connecting the charging station to the grid, without tools (by clicking together components).</p> | |

- 21** The space required for the grid operators' section at the bottom of the charging station measures 755 mm (h) x 180 mm (w) x 150 mm (d) (the height is measured from ground level). The transit/access hatch has a minimum width of 190 mm. The access hatch/door should sit directly in front of the compact connection module, as the lid of the compact connection module must be able to be hinged straight open. Please note that the secondary wiring of the smart kWh meter must be able to be connected to the main switch.

Trial assembly and visual inspection based on drawing with dimensions.

The grid operator section consists of the compact connection module fitted with a smart meter, enough space for safe performance of work by technicians and for rising damp. Appendix 3 provides an overview of the above-mentioned layout of the grid operator section, including dimensions.

- 22** A main earthing rail is mounted at the bottom of the charging station. It must be possible to connect the following to the earthing rail:
- The earth electrode (from the customer);
 - The connection to all conductive parts, including the housing and access hatch in accordance with NEN1010;
 - An additional connection point for the grid operator;
 - If earthing is offered by the grid operator, earthing is connected to the plug of the compact connection module.

Visual inspection and measurement.

Note: This requirement relates to earthed distribution systems (class 1). If the distribution system is double-insulated set-up (class 2), refer to NEN1010 for applicable instruction and report this to the inspection team.

- 23** During maintenance, it should be possible to connect a safety earthing without having to disconnect existing wiring. This safety earthing must be installed ahead of the protection device when viewed from the grid.

Visual inspection.

- 24** There is selectivity between the protection in the customer area (and any connected secondary charging stations) and the protection in the grid connection. The applied protection in the grid connection conforms to the overview of applied protection per grid operator (see appendix 3).

Provide selectivity calculation/graphs.

The software selectivity sticker is checked visually.

Software selectivity is not accepted in RENDO area as a method to ensure selectivity between the security in the

charging station and the security in the grid connection.

Place a sticker in the object stating that software-based selectivity is applied.

-
- 25** To connect the wire to the main switch, an excess length of 150mm is provided from the top of the meter board. If more length than 150 mm is required measured from the top of the meter board, the charging station supplier must fit the wiring in advance. The manufacturer of the charging stations has thereby arranged that there is sufficient length of wiring to connect the smart meter of the grid operator to the installation. This flexible wiring (class 5), fitted with 18 mm electric wire ferrule and is factory-fitted to the customer installation. In addition, the wiring is heat-resistant up to 90 degrees Celsius (pD90). The descending wiring is 6 mm² for connections up to 3x63A and 16 mm² in the case of a 3x80A connection. The cross-section of the neutral should be at least equal to the cross-section of the phase conductors.

Visual inspection.

If the installation is supplied with up to 150 mm of descending wiring measured from the top of the meter board, the charging station supplier does not have to supply this wiring. Assembly then takes place on site when the smart meter is installed.

Note: Connectens offers a possibility to supply the descending cables pluggable, if this is desired, please contact Connectens.

CHAPTER 9

SMART KWH METER REQUIREMENTS

The grid operator uses a remotely readable (d)SMR kWh meter. For the smart meter mounted in these charging stations, the housing of charging stations forms a relatively heavy barrier to the wireless signal. The (radio) attenuation of this signal at the place where the meter is mounted is usually between 15 and 30 dB and depends in particular on the type of station and frequency.

To ensure the accessibility of the smart meter, requirements must be imposed on a charging station. The radio attenuation of the charging station must be sufficiently low:

- The manufacturer must take measures that reduce the radio attenuation of the charging station. Suitable measures have been investigated by the grid operators and can be requested.

| # | Description | Inspection Assessment |
|----|--|---|
| 26 | The (d)SMR smart meter supplied by the grid operator can be fitted and replaced in accordance with the relevant fitting instruction. | Visual inspection. |
| 27 | At the top of the smart meter, there is a free space of 20mm. At the bottom is a free space of 50mm from the terminal strip (under the terminal cover). It must be possible to calibrate the smart meter safely. The connecting wires must not obstruct the measuring terminals and wires. This excludes the risk of closure between the housing and test pen. | Physical measurement or visual check based on drawing with dimensions. |
| 28 | The attenuation of the charging station is on average lower than 8 dB for all current frequencies, namely the current 450, 800, 900, 1800 and 2100 Mhz frequencies. | Examination report (carried out according to the applicable test protocol available at HTTPS://ELAAD.NL/EN/TOPICS/CHARGING-STATION-INSPECTIONS/ ('test protocol smart meter connectivity v1.2') showing that the radio attenuation at the mounting position of the smart meter is below 8 dB for all current frequencies, carried out by an accredited testing body. |

CHAPTER 10

ACCESS REQUIREMENTS

| # | Description | Inspection Assessment |
|----|--|---|
| 29 | <p>The access hatch/door of the charging station is equipped with a lever into which two cylinders can be inserted. The lever shall be placed at a minimum height of 30 cm from ground level.</p> <ol style="list-style-type: none"> 1. The cylinder of the CPO/maintenance party of the charging station should be placed by the manufacturer before the charging station is connected by the network operator. 2. The cylinder of the grid operator shall be placed by the grid operator at the time of connection of the charging station. The manufacturer must provide an opening for the placement of the grid operator cylinder (half europrofile cylinder S2), by the grid operator. It must be possible for the network operator, without the intervention of third parties, to initially open the door by means of a (pas)-key to realise the connection of the charging station and placement of the grid operator cylinder. It must not be possible to enter the charging station with an object directly through the opening. There should therefore be a barrier in front (outside) / behind (inside) the opening to prevent this. The installation manual should clearly describe how the grid operator, without third-party intervention, can initially open the charging station using a (pas)-key and how the cylinder should be positioned. | <p>Visual inspection.</p> |
| 30 | <p>On the charging station, the CPO/customer/owner's contact number is clearly, immediately visible and permanently displayed, so that unsafe situations can be reported and communication with the grid operator can take place via the CPO.</p> | <p>Markings applied by casting, pressing, engraving or similar means, including labels with laminated plastic covers: visual check.</p> <p>In all other cases: visual check and check durability printing by rubbing the marking by hand for 15 s with a cloth soaked in water and then for 15 s with a cloth soaked in benzene. After the test, the mark should be clearly legible to the naked eye.</p> |

CHAPTER 11

OPTIONAL REQUIREMENTS FOR THE PRIMARY - SECONDARY INSTALLATION

The requirements (requirements 31 to 36) for the primary-secondary installation are described below. The requirements for the primary-secondary installation of charging stations describe the requirements for the installation, where the primary installation secures the main power supply and protection of the system and the secondary installation is responsible for the onward flow of electricity to the other charging points.

| # | Description | Inspection Assessment |
|----|---|--|
| 31 | There is sufficient space in the charging station to safely mount descending cable(s), in accordance with NEN1010. The descending cable(s) may not affect the safety, operation and accessibility of the grid operator's components. | Visual inspection. |
| 32 | The descending cable(s) must not pass through the cable glands and/or conduit of the grid operators main connection cable. | Visual inspection. |
| 33 | The descending cable(s) to the secondary charging station should be connected to a separate circuit in the customer section; looping through directly from the grid connection is not allowed. For selectivity, see requirement 24. | Visual inspection. |
| 34 | The descending cable(s) must have its own strain relief of at least 400N, in accordance with NEN1010. | This is an advice and is not assessed. |
| 35 | The descending cable(s) and conduit of the primary charging station should have a different colour in comparison to the grid operators' cable and conduit (in accordance with NEN1010), print or labelled conduit. | Visual inspection. |
| 36 | If another object is used as a distributor, such as a distribution box. Please consult the relevant grid operator for the grid operator requirements for this object. The layout of this charging station must be submitted to the relevant grid operator for approval. | N/a. |

Appendix 1

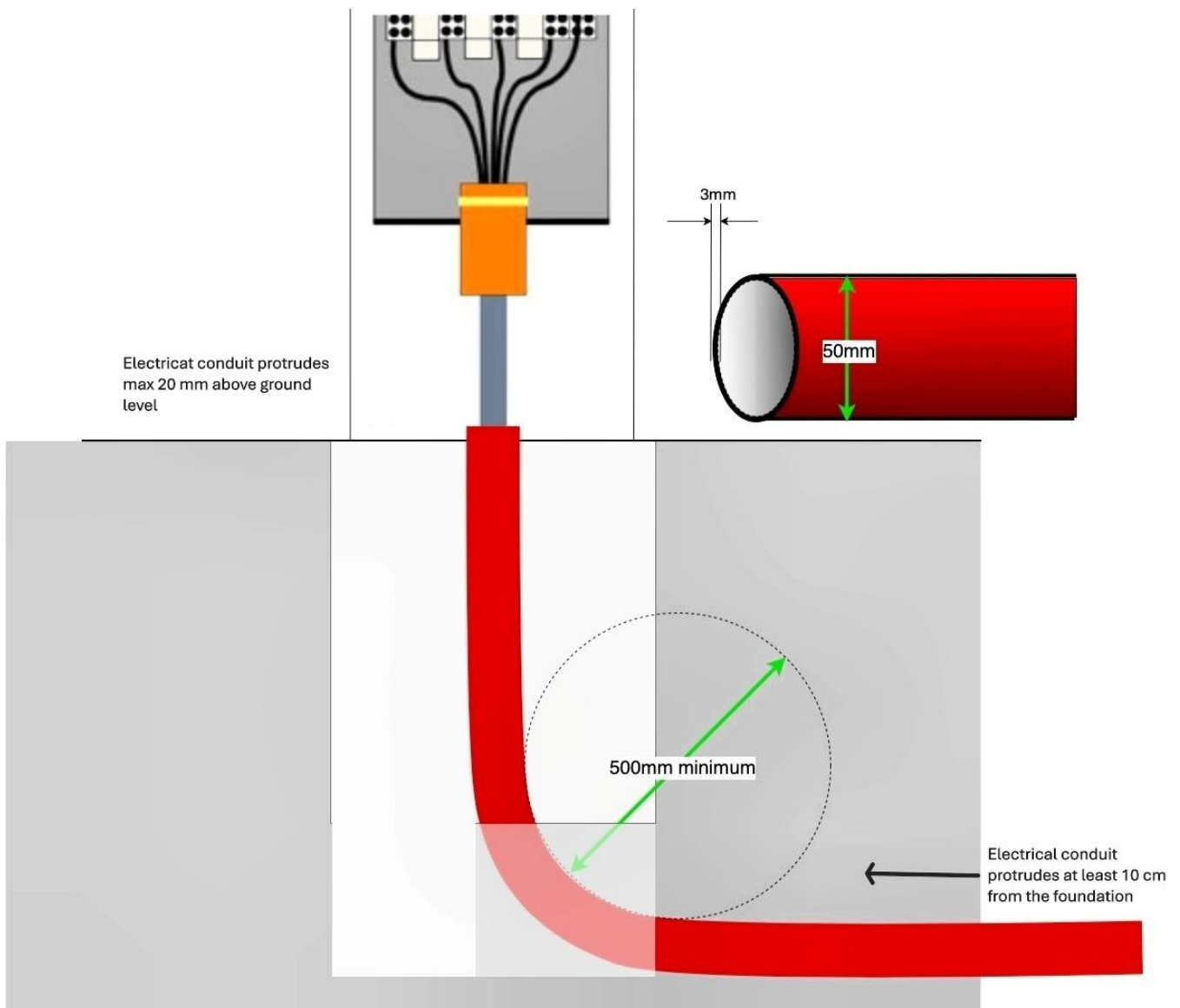
OVERVIEW OF PROTECTION DEVICES USED BY EACH GRID OPERATOR

| Protection devices charging stations | | | Grid Operator | | | | | |
|--------------------------------------|---------------------------------|----------------|---------------|---------|---------|-------|--------|----------------|
| Capacity | Protection device grid operator | Characteristic | Coteq | Enexis* | Liander | Rendo | Stedin | Westland Infra |
| 3 x 25A | Cartridge fuse 10,3 x 38 mm | gG | | x | x | | x | |
| | Centered tag fuse NH000 | gG | | x | x | | x | x |
| 3 x 35A | Centered tag fuse NH000 | gG | x | x | x | x | x | x |
| 3 x 50A | Centered tag fuse NH000 | gG | x | x | x | x | x | x |
| 3 x 63A | Centered tag fuse NH000 | gG | x | x | x | x | x | x |
| 3 x 80A | Centered tag fuse NH000 | gG | x | x | x | x | x | x |

*Enexis offers the option of applying gFF characteristic protections devices.

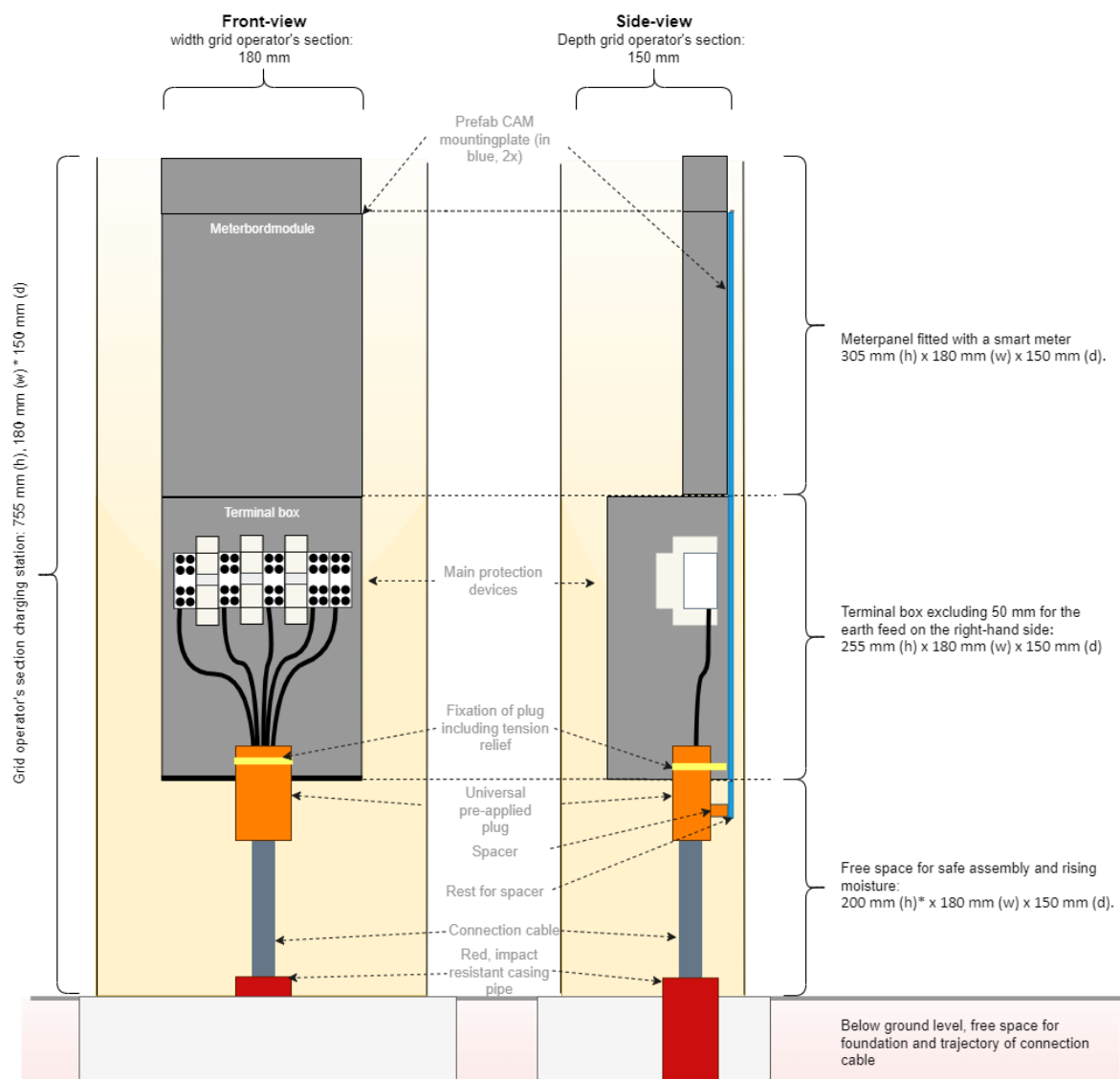
Appendix 2

REQUIREMENT 15: APPLICATION ROUND (RED) IMPACT RESISTANT ELECTRICAL CONDUIT



Appendix 3

REQUIREMENT 19, 20 & 21: INLET OF THE CONNECTION CABLE IN A STRAIGHT LINE AND LAYOUT AND DIMENSIONS OF THE GRID OPERATOR'S SECTION



* For the height from ground level to the underside of the terminal box a -5 mm deviation is handled (195-200 mm above ground level)

** The rest for the spacer should be fixated directly beneath the prefab mounting plate and should be 50 mm in height and 30 mm in width. The rest is fixated on a similar depth as the prefab mounting plates.

The logo for Elaad.nl is centered within a white circular graphic. It features the text "Elaad.nl" in a blue sans-serif font, with a yellow lightning bolt icon positioned below the "ad" portion. The background of the entire image is a green-tinted photograph showing a white electric car parked on a road, with a large wind turbine visible in the upper right and flowering plants in the foreground.

Elaad.nl