

## Short Introduction

This document outlines recommendations for specific technical requirements for purchasing and operating Smart and Bidirectional Charging Infrastructure. With this list of requirements a minimal and harmonized set of technical Smart and Bidirectional Charging requirements is presented, which aims to create clarity for all stakeholders involved, including drivers, contractors, clients, mobility stakeholders and energy stakeholders.

In European legislation smart (re)charging is becoming a legal requirement, especially for new infrastructure. Bidirectional charging is promoted, particularly for its grid-balancing potential. Also requirements as interoperability, data exchange, and integration with renewables and buildings are stated. However at time of publication of this document, a concrete translation of above into technical requirements is missing. This document presents recommendations for these technical requirements.

The document mainly consists of a bundle of existing standards and protocols, where the current state of technology is used as a starting point. As the technology for charging infrastructure is still maturing also requirements regarding regularly updates is included. This to safeguard that newly installed charging infrastructure remains up-to-date in the coming decade. The technical requirements finally also ensure that consumers can be given a concrete perspective to actively participate in the energy market.

The technical requirements listed in this document can be anchored in and used for:

- Drafting (inter) national legislation and regulations.
- Forming (inter) national and local policy, which is implemented in the purchase and operating of charging infrastructure.
- The development of products and propositions by market parties, as a checklist for manufacturers who develop and operate Smart and Bidirectional Charging infrastructure.

The requirements in this document are a supplement or addition to the general (charging) criteria for charging infrastructure. It has been developed based on:

- Results from the SCALE project demonstrations. SCALE has received funding from the European Union's Horizon 2020 research and innovation program under grant agreement No 101056874.
- Tender experiences from the Netherlands in deploying public charging infrastructure.
- Results from European Testlab for Emobility at ElaadNL
- Feedback received from a broad range of European stakeholders including Charge Point Manufacturers, Charge Point Operators, Mobility Service Providers, Distribution System Operators, Energy Suppliers, Flexibility Service Providers, EV Manufacturers, Software companies, City Authorities, Research and Knowledge institutions and Consulting companies.

The final version of this document is made available on the ElaadNL website, see (<https://elaad.nl/en/requirements-smart-and-bidirectional-charging-infrastructure/>). When using this document, always check this website for updated versions.

This document will be shared with the EU Smart Energy Expert Group as input to assist the European Commission with the preparation of delegated - and implementing acts.

For the context of the Netherlands, this document is the successor of the smart charging requirements from the NAL published in 2021. This document is offered as input to NKL as part of updating the "Basisset AC charging infrastructure", which is scheduled by the beginning of 2025.

## Generic requirements - all charge points

The following generic requirements are applicable to all charge points (public, semi-public and private, AC as well as DC) and both for Smart Charging and Bidirectional Charging.

ID	Requirement	Explanation
1	The requirements listed below are <b>applicable for all new and to be refurbished charging points</b> .	
2	<b>Compliance</b> to all mentioned standards, protocols and requirements <b>needs to be proven via an independent conformity certificate</b> . In case this is not available, compliance needs to be proven via a certification program or test cases made available by the applicable standardization organization.	<p>Conformity assessment must be in line with ISO/IEC 17065:2012.</p> <p>For IEC standards, Accredited National Certification Bodies (NCBs) can be found at: <a href="https://www.iecee.org/members/national-certification-bodies">https://www.iecee.org/members/national-certification-bodies</a>.</p> <p>Disclaimer, a reference for possible independent test labs are provided for information purposes only. It is up to the contractor to identify current independent test labs for each standard, protocol and requirement mentioned.</p>
3	<p><b>New official published versions</b> of all mentioned standards, protocols and requirements <b>need to be implemented free of charge and complied to, within the following period:</b></p> <ul style="list-style-type: none"> <li>• <b>Larger structural changes</b> (normally indicated by a shift in the first number of a version, for example from v1.0 to v2.0 or a newer edition) will be implemented <b>within 18 months</b> after availability of independent test certification in at least the first 5 years after the purchase of hardware.</li> <li>• <b>Smaller incremental changes</b> (normally indicated by a shift in the second number of a version, for example from v1.0 to v1.1 or a correction or amendments document) will be implemented <b>within 6 months</b> after availability of independent test certification in the total technical lifetime of the hardware.</li> </ul>	<p>To secure charging points are up to date within acceptable timeframe and acceptable budget for all stakeholders.</p> <p>Both larger structural changes and smaller incremental changes need to be proven via an independent conformity updated conformity certificate.</p> <p>If hardware refurbishment is necessary for updates, implementation should occur after the hardware has reached the end of its technical lifetime.</p>
4	All components of the operational charging infrastructure must demonstrably meet all requirements under real operating conditions, to be proven by a <b>periodic (sample) field audit process</b> .	The detailing of the periodic field (sample) audit process is up to negotiation between client and contractor.

## Smart Charging requirements - all charge points

Requirements are applicable to all charge points (Public, Semi-public and Private) and both Smart Charging and Bidirectional Charging. Most requirements in this section are relevant for AC and DC chargers. It is mentioned if a recommendation is only applicable to AC or DC charging.

ID	Requirement	Explanation
4	All charging points, regardless of power, must be <b>remotely controllable in near realtime</b> .	<p>European regulations in the field of the European internal energy market state that an end customer must be enabled to become "active" in the energy market. There is an essential role for the end customer in realizing more flexibility in the electricity system, for example through its EV.</p> <p>For a private charger, remotely controlled also refers a connection to a Customer Energy Management System.</p> <p>The method to prove compliance to this requirement is up to negotiation between client and contractor.</p>
5	All Charging Stations, Charging Points must have access to a telecommunication module and be <b>connected</b> with the Backend of the Charge Point Operator or an Energy Management System <b>at least 98%</b> of the time / month.	<p>This is essential to send and receive Smart Charging signals.</p> <p>The method to prove compliance to this requirement is up to negotiation between client and contractor.</p>
6	All Charging Stations, Charging Points must operate in compliance with at least ENCS <b>EV-311 Security requirements from IEC 62443 for procuring EV charging stations - 2025 v1.0</b> . <sup>1</sup>	<p>The requirements in this document are based on "IEC 62443-4-1 - Secure product development lifecycle" and "IEC 62443-4-2 - Technical security requirements for IACS components".</p> <p>The requirements can be found on <a href="https://elaad.nl/publicaties/">https://elaad.nl/publicaties/</a> and <a href="https://encs.eu/resources/security-requirements/">https://encs.eu/resources/security-requirements/</a></p> <p>To prove compliance, the manufacturer can show two IEC 62443 certificates: one for 62443-4-1 and one for 62443-4-2 compliance related to the requirements (and guidance for implementation) mentioned in "EV-311 Security requirements from IEC 62443 for procuring EV charging stations - 2025 v1.0".</p>
7	All Charging Stations & Charging Points must operate in compliance with at least <b>IEC 61851-1:2017</b> .	<p>Basic standard for Charging points.</p> <p>At least support modes:</p> <ul style="list-style-type: none"> <li>- Mode 3 (AC)</li> <li>- Mode 4 (DC)</li> </ul>

<sup>1</sup> In the feedback received, a limited number of stakeholders have expressed concerns about the requirements regarding cybersecurity. However, a large group of stakeholders have expressed concerns about an inadequate level of cybersecurity in relation to Charging Infrastructure in general and Smart – and Bidirectional Charging in particular. Given the fact that Charging infrastructure is marked as a sector of High Criticality in the NIS2 Directive, in this document is chosen to include strict requirements for cybersecurity.

ID	Requirement	Explanation
8	<p><b>For DC only:</b></p> <p>All Charging Stations &amp; Charging Points must operate in compliance with at least <b>IEC 61851-23:2014, ISO 15118-2:2014 and DIN SPEC 70121.</b></p>	<p>This requirement is applicable for DC only.</p> <p>These standards specify the communication between the electric vehicle (EV) and the Charging Station or Charging Point.</p> <p>List of conformance test labs can be found on CharIN website, see <a href="https://www.charin.global/technology/charin-conformance-testing/">https://www.charin.global/technology/charin-conformance-testing/</a></p>
9	<p>All Charging Stations, Charging Points, and the backend of the Charge Point Operator must operate in compliance with at least <b>IEC 63584:2024 (OCPP 2.0.1).</b><sup>2</sup></p>	<p>The communication between charge point and backend is in conformity of the Open Charge Point Protocol. Mandatory use of the highest security profile.</p> <p>At least support modules: Core, Advanced security, Smart charging, ISO15118 support</p> <p>List of Independent test labs can be found on Open Charge Alliance website, see <a href="https://openchargealliance.org/testing-laboratories/">https://openchargealliance.org/testing-laboratories/</a>.</p>
10	<p>The backend of the Charge Point Operator must operate in compliance with at least <b>OCPI 2.2.1.</b><sup>3</sup></p>	<p>To enable data sharing with other market parties and -roles.</p> <p>At least support modules: ChargingProfiles module</p> <p>List of Independent test labs can be found on EVRoaming Foundation website, see <a href="https://evroaming.org/evroaming-test-tool/">https://evroaming.org/evroaming-test-tool/</a>.</p>
11	<p>The backend of the Charge Point Operator must operate in compliance with at least <b>IEC 62746-10:2018 (OpenADR 2.0) or IEC 61850.</b></p> <p>Alternatively the Charging Stations, Charging Points may also be connected to a DSO device which is able to receive remote signals and control the charging power.</p>	<p>These standards are a recommendation for communication between DSO and CPO to enable Smart Charging based on actual grid load. It is up to each DSO to decide whether to follow this recommendation. A contractor must contact the applicable DSO to agree on required protocol for communication with DSO.</p> <p>For public charge points in Member State the Netherlands a subset of OpenADR 3.0 is agreed. Documentation and compliance information is available via ElaadNL.</p> <p>List of Independent test labs can be found on OpenADR website, see <a href="https://www.openadr.org/certification-process#testhouses">https://www.openadr.org/certification-process#testhouses</a>.</p>

<sup>2</sup> In the feedback received, a limited number of stakeholders have expressed concerns about the required version for OCPP. After careful consideration in this document is chosen for version OCPP 2.0.1 as this version has been published already in 2020 and is the first and only formal IEC standard for OCPP.

<sup>3</sup> In the feedback received, a limited number of stakeholders have expressed concerns about the required version for OCPI. After careful consideration in this document is chosen for OCPI 2.2.1 as this version has been published already in 2021 and older versions of OCPI are not supported anymore. Furthermore the choice of OCPI 2.2.1. is in line with CEN Workshop Agreement (CWA) 18090 published in April 2024.

## Smart Charging requirements – private charge points only

Requirements are applicable to Private charge points only. The requirements in this section are relevant for both AC and DC chargers.

ID	Requirement	Explanation
12	All Charging Stations & Charging Points can communicate with the <b>meter in the Grid Connection</b> if this meter supports local connection possibilities.	For communication between EVSE and Power Grid Management System.  On European and Member State level there is no harmonization yet for one standard or protocol.
13	All Charging Stations & Charging Points can communicate with an <b>Energy Management System (EMS)</b> via an open protocol.	For communication between EVSE and Energy Management System.  On European and Member State level there is no harmonization yet for one standard or protocol.  Energy Management System (EMS) means a set of interrelated or interacting elements of a plan which sets an energy efficiency objective and a strategy to achieve that objective (Energy Efficiency Directive (EED) – Directive 2012/27/EU)
14	All Charging Stations, Charging Points, and the backend of the Charge Point Operator must additionally comply with <b>additional applicable national technical standards</b> and grid-integration protocols regarding smart charging, dynamic load management, cybersecurity, and interoperability with grid operators.	For member state <b>the Netherlands</b> specifically, this refers to compliance with <b>NTA 8043:2024</b> , addressing national requirements on grid integration, smart charging functionality, data exchange, and cybersecurity.  Note: The requirement of IEC 63584:2024 (OCPP 2.0.1) in this document prevails above the requirement of OCPP 1.6 as mentioned in NTA 8043:2024.
15	When maximum charge speed information is received via <b>multiple sources</b> , the lowest value prevails.	Making sure all limitations are taken into account and for safety reasons.

# Bidirectional Charging

Requirements are applicable to all charge points Public, Semi-public and Private. The requirements in this section are relevant for both AC and DC chargers. The requirements below are in anticipation of upcoming regulation and can be used by clients who want to lead the way to bidirectional charging.

ID	Requirement	Explanation
16	All requirements for Smart Charging are also applicable for Bidirectional Charging.	In this section only the additional requirements for bidirectional charging are mentioned. All requirements for Smart Charging are also required for Bidirectional Charging.
17	At/on charge point it is <b>clearly visible</b> that the charge point is suitable for <b>bidirectional charging</b> .	So that the driver knows whether bidirectional charging is possible at the charge point
18	The <b>status indicator</b> of the charge point provides an indication when the vehicle (via the charge point) supplies <b>energy to the grid</b> . This indication can be clearly distinguished from the regular indicators.	So that the charge points' status is visible for safety reasons.
19	All Charging Stations & Charging Points must operate in compliance with at least <b>NEN-EN-ISO 15118-20:2022</b> .  <i>Note: In the EC proposed Delegated Acts for AFIR is stated that From January 1, 2027 all new and refurbished public charging points and new private charging points must support ISO 15118-20.</i>	This standard specifies the communication between the electric vehicle (EV) and the electric vehicle supply equipment (EVSE).  Comply to the complete standard and also amendment 1 (when released) in particular AC DER service and improved security concept.  List of conformance test labs can be found on CharIN website, see <a href="https://www.charin.global/technology/charin-conformance-testing/">https://www.charin.global/technology/charin-conformance-testing/</a>
20	All Charging Stations, Charging Points and the backend of the Charge Point Operator must operate in compliance with at least <b>OCPP 2.1</b> .	The communication between charge point and backend is in conformity of the Open Charge Point Protocol. Mandatory use of the highest security profile.  At least support modules: core, advanced security, smart charging, ISO15118 support, Bidirectional power transfer, DER control (grid code support)  List of Independent test labs can be found on Open Charge Alliance website, see <a href="https://openchargealliance.org/testing-laboratories/">https://openchargealliance.org/testing-laboratories/</a> .
21	All Charging Stations & Charging Points must operate in compliance with at least <b>NEN-EN 50549-1</b> (including anti-islanding and interface protection).	The system is equipped with a mechanism that automatically disconnects the charge point from the grid in case of power failure (anti-islanding). It is allowed to use the relay for this disconnection.  Additionally, the system shall include interface protection (under- and overvoltage, under- and overfrequency protection) as part of the broader grid code handling requirements.
22	All Charging Stations, Charging Points and the backend of the Charge Point Operator must operate in compliance with <b>national Grid Codes</b> .	For UK see Engineering Recommendation G98 and Engineering Recommendation G99

## Annex: Legislation for Smart and Bidirectional Charging

The information below is added for information purposes only. The contractor needs to comply to all applicable EU regulations. Once new regulations are in place, charge points must comply to these new regulation within the timeframe stated by the EC.

All Charging Stations & Charging Points must operate in compliance with Directive 2022/2555, also known as **NIS2**.

The NIS2 Directive establishes a unified legal framework to uphold cybersecurity in 18 critical sectors across the EU. Charging infrastructure is marked as a sector of High Criticality. The directive mandates that each Member State adopt a national cybersecurity strategy, which includes policies for supply chain security, vulnerability management, and cybersecurity education and awareness. In Member State the Netherlands, the "Cybersecurity Act", the national translation of the NIS2, will enter into force in Q3 2025.

For more information see [NIS2 Directive: new rules on cybersecurity of network and information systems | Shaping Europe's digital future](#).

At the time of publication of this document, a procedure for amending regulations for **Network Code regarding requirements for demand connection** (recommendations made by ACER) is in progress at the EC.

At the time of publication of this document, the commission adoption procedure for amending regulations for **Measuring instruments (MID)** including EVSE (COM(2024)561 - Amendment of Directive 2014/32/EU) is in progress at the EC.

At the time of publication of this document, a procedure for amending regulations for **Network Code regarding Requirements for Generators (RfG)** is underway at the EC.