The Netherlands
Knowledge Platform
for Public Charging
Infrastructure

Public Charging of Electric Vehicles

Clear-cut guidelines

UNIFORM STANDARDS FOR CHARGING STATIONS

From Policy to Realization

NKL

WWW.NKLNEDERLAND.NL

INDEX

INTRODUCTION

Uniform Standards for Charging Stations

Based on the experiences of market parties and local authorities, a clear-cut standard set of guidelines on charging electric vehicles has been compiled. This Standard Set is available in Dutch and English.

Practical guidelines for municipal governments and market parties

- A point of departure for future public tenders and permits
- Useful in the development of policy
- A starting point for entering into agreements and signing contracts
- Valuable guidance for market parties

The Standard Set is available through NKL's online knowledge portal

The standard set of charging station agreements is a project of the Netherlands Knowledge Platform for Public Charging Infrastructure (NKL). In the context of NKL, a large number of public and private stakeholders work together on the realization of affordable and future-proof public charging infrastructure. The standard set of charging station agreements is available online at www.nklnederland.nl The knowledge portal is a collaboration between the NKL and CROW, the independent knowledge organization in the fields of infrastructure, public space, and traffic and transportation.

What does the Standard Set consist of?

Charging stations must meet standards and regulations such as safety protocols. . All guidelines, requirements and desires were categorized and assembled in thematic agreement lists. These lists were then combined to form the standard set of charging station agreements.

Why work with the Standard Set?

The agreement lists are straightforward and tie in with international standards. Municipal governments and regions that work with them are not forced to reinvent the wheel, and all information is clearly assembled together. In this manner, nothing gets overlooked in the rollout of public charging infrastructure.

How does the Standard Set work in practice?

The use of the Standard Set increases efficiency in public tenders for charging infrastructure. Drawing up tender documentation and other materials is simplified, and costs are reduced. The agreement lists are also easy to use for other parties, such as factories that manufacture charging stations . For both these parties and other market players, the demands of the Dutch market are made clear, and they know the standards that their services must comply with. An example for other markets.

How was the Standard Set established?

In practice, we understand that there are many angles involved in how public charging stations are viewed. Grid operators are primarily concerned with safety and the impact on the electrical grid. Meanwhile, governments look toward the requirements of EV drivers and organization of the space. Then there are operating companies, factories and other market players who worry about efficient implementation and management. The interest of all parties is of course that charging stations are safe and functional, with costs kept as low as possible, and that the level of service for the EV driver remains high. With this standard set, we now have a straightforward overview of all agreements concerning charging stations and their immediate environs that the various parties can conform to.

THE STANDARD SET

Guidelines per category

APPLICATION AND CONSTRUCTION
ENVIRONMENT AND LOCATION
MANAGEMENT AND MONITORING
FUNCTIONALITY
DESIGN
ENGINEERING AND SAFETY
BACK OFFICES AND INTERFACES
SMART CHARGING AND V2X
SECURITY
STANDARDS AND REQUIREMENTS

DEFINITIONS

* **Required or Desired**
Required = *based on standards, directives, laws and regulations*
Desired = *not classified as Required*

** **Priority**
Include = *Required according to Standard Set Management Team*
Recommended = *Recommended to be included in tender, can be deviated from on an incidental basis*
Consider = *suggestion in tender*
N/A = *Not Applicable*

APPLICATION AND CONSTRUCTION

Guidelines on requesting and constructing charging stations, e.g. application portal and collision protection.

Sub-category	ID	Subject description	Guideline description	Required; Desired*	Priority**	Comments
Application	AR1	Application portal	The contractor shall provide a secure application portal for applying for a charging station that is suitable for both EV driver and municipality.	Desired	Include	The parties involved, including municipalities, and the EV driver, must be able to gain insight into the status/progress including planning and delivery of the applications by logging in via the digital interface. This includes planning and delivery.
Application	AR2	Offering of a site inspection	For each new location, the contractor must offer a survey to the relevant municipality and suggest two proposed dates for a survey. The survey must take place before the request for the grid connection is submitted to the grid operator.	Desired	Recommended	Policy item for municipal authorities. Future guideline.
Application	AR3	Site inspection deviation from originally desired location	If there is a deviation from the originally desired location during the survey, this must always be agreed with the grid operator and/or its contractor (in connection with the location check). If a new location is too far from the original location, the length of the connection cable may be affected and the connection may have to be requested again.	Desired	Recommended	Policy item for municipal authorities. Future guideline.
Application	AR4	Planning	At least 10 working days before the execution, the implementation planning schedule must be visible to all relevant parties via the digital interface (application portal). Once the planning has been established, it may no longer be deviated from.	Desired	Include	
Application	AR5	Unforeseen circumstances and planning	If, due to unforeseen circumstances, it is necessary to deviate from the planning, this must be communicated to all relevant parties in good time (at least 3 working days before execution) with a well-founded and alternative planning schedule via the digital interface.	Desired	Include	

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APPLICATION AND CONSTRUCTION

Sub-category	ID	Subject description	Guideline description	Required; Desired*	Priority**	Comments
Construction	AR6	Distance from the applicant EV driver	The contractor is obliged to construct a charging station if the following conditions are met: - The EV driver is using or owns, or will use or own, an electric vehicle, or the municipality makes a request accompanied by clear reasons showing that the charging station will be used structurally; - The charging station is placed within X metres of the EV driver's address; - If another charging station is already present within a walking distance of X metres, it should be determined on the basis of consumption whether a new charging station is necessary; - The EV driver does not have a private area on which to charge the vehicle. It is possible to deviate from this with clear reasons and in consultation with the municipality.	Required	Include	Based on policy, municipal authorities indicate their own maximum walking distance at X. The recommendation here is approximately 300 m.
Construction	AR7	Construction period for charging station	The contractor may take a maximum of X weeks to submit an application (from receipt of the application to commissioning of the charging station).	Desired	Include	Municipal authorities indicate the maximum term at X on the basis of their policy.
Construction	AR8	Special circumstances	In special situations, such as, for example, contaminated land or network expansion (i.e., things that are outside the contractor's sphere of influence), the maximum term is extended by the additional terms that these special situations demand.	Desired	Include	
Construction	AR9	Permits	As far as construction work for the charging station is concerned (and any moving or removal that may be required), the contractor must be in possession of the required permits and adhere to all implementation rules and guidelines that are in effect in the relevant municipality. The term and costs associated with this must be taken into account. These costs shall be borne by the contractor.	Required	Include	
Construction	AR10	Report to the KLIC cable and pipeline information centre	A KLIC report must be requested prior to the excavation work. A KLIC report can be requested via www.klicmelding.nl.	Required	Include	Please note that in some municipalities, a KLIC report must already have been requested prior to the permit application or notification.

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APPLICATION AND CONSTRUCTION

Sub-category	ID	Subject description	Guideline description	Required; Desired*	Priority**	Comments
Construction	AR11	Parking spaces	Parking spaces shall always be clearly marked. The marking of parking spaces will use the same material as surrounding spaces not associated with the charging station.	Desired	Include	
Construction	AR12	Charging station between parking spaces	In the case of perpendicular and parallel parking, the charging station is placed between two parking bays, and in case of two rows of two bays, between four parking bays.	Desired	Include	
Construction	AR13	Road closure	The contractor is responsible for any roadblocks prior to or during the work.	Required	Include	
Construction	AR14	Comply with current conditions and standards	The charging stations must meet at least the requirements set or have been improved in such a way that they meet the conditions and/or standards applicable at that time.	Required	Include	For the most current connection specifications, please refer to the ElaadNL website.
Construction	AR15	1 operation	The grid connection and placement of the charging station(s), as well as the setting up, marking, signage and commissioning of the charging location, must be executed in one day (within 24 hours) and preferably in one working process. This should be arranged with the grid operator.	Desired	Include	
Construction	AR16	1 working process	If the setting up is not completed within 24 hours, the charging station may not yet be put into operation. In this case, a sign must be placed stating: 'Charging station not yet in use'.	Desired	Include	It is important that everything is set up in one day because of maintenance and so on. If this is not possible, a sign will have to be placed to indicate that the charging station is not yet in use.
Construction	AR17	Charge point connection	Connection of the charging station is carried out within the set time limits and as described in the expansion and construction procedure.	Desired	Include	
Construction	AR18	Parking space set-up	Set-up of the parking space (including signage and road markings) must be executed in consultation with the municipality, within the stipulated period of time and as described in the expansion and construction procedure. The contractor is responsible for any roadblocks prior to or during the work.	Desired	Include	

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APPLICATION AND CONSTRUCTION

Sub-category	ID	Subject description	Guideline description	Required; Desired*	Priority**	Comments
Construction	AR19	SAT	Before a charging station can be installed, it must successfully pass a SAT (Site Acceptance Test).	Desired	Include	The handover document shall show at least: - Organisation details including technician's data; - Applicant's details; - Location details of the charging station (incl. coordinates); - Application and cha rging station number (ID); - Make and type of charging station (including year of construction); - Construction date; - Detailed photo at a distance of approx. 3 metres from the charging station; - Earth electrode measurement data (if applied); - Road sign, collision protection and/or -ground reinforcement installed.
Construction	AR20	Accessible components	The following components of the charging station must always be accessible: a. The service hatch including cylinder lock; b. The RFID reader; c. The wall sockets.	Required	Include	
Construction	AR21	Collision protection	Depending on the location and parking situation at the charging station, collision protection must be placed. This should take place in consultation with the relevant municipality.	Required	Include	
Construction	AR22	Free passage space	If placed on a pavement, there should be at least 90 cm of free passage on the pavement.	Desired	Include	
Construction	AR23	Perpendicular parking	In the case of perpendicular parking behind the curb, the distance between the charging station and the curb must be at least 60 cm.	Desired	Include	Note: if possible, the distance should always be 90 cm.

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APPLICATION AND CONSTRUCTION

Sub-category	ID	Subject description	Guideline description	Required; Desired*	Priority**	Comments
Construction	AR24	Collision protection perpendicular parking	If the distance between charging station and curb is less than 60 cm, measures must be taken, such as collision protection.	Required	Include	
Construction	AR25	Parking behind the curb	In the case of parallel parking behind the curb, the distance between the charging station and the curb must be at least 30 cm.	Desired	Include	Note: if possible, the distance should always be 90 cm.
Construction	AR26	Collision protection parking behind the curb	If the distance between charging station and curb is less than 30 cm, measures must be taken, such as collision protection.	Required	Include	
Construction	AR27	As much parking space as possible	In the case of both longitudinal and parallel parking in front of or without a curb, the charging station must be positioned in such a way that as much space as possible remains available for the electric car to be able to park. In these situations, measures must be taken such as, for example, collision protection.	Desired	Include	
Construction	AR28	Unpaved ground	When installing on unpaved ground (for example, grass or sand), ground reinforcement must be applied around the charging station. This ground reinforcement must consist of at least two rows of concrete flags measuring 30x30 cm (or similar, in consultation with the municipality concerned), enclosed in appropriate edging strips.	Desired	Include	
Construction	AR29	Clearance and repair work	The contractor is responsible for clearing and -repairing the environment after the installation of the charging stations.	Desired	Include	
Removal/ Relocation	AR30	Relocation	In the event of removal, the aim is always to relocate the charging station to a different location within the municipality concerned.	Desired	Include	
Removal/ Relocation	AR31	Conditions	When relocating, the same conditions and requirements apply as when installing/constructing a new charging station.	Desired	Include	

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APPLICATION AND CONSTRUCTION

Sub-category	ID	Subject description	Guideline description	Required; Desired*	Priority**	Comments
Removal/ Relocation	AR32	Information via the application portal	All relevant parties must be informed (via the digital interface) about any removals and/or relocations (reason, planning, possible new location and progress).	Desired	Include	
Removal/ Relocation	AR33	Traffic sign and collision protection	In the event of removal and/or relocation, the contractor is responsible for removing or relocating the traffic sign and any collision protection, unless these have been placed by the client itself.	Desired	Include	
Removal/ Relocation	AR34	Relocation period	In the event of replacement and/or relocation, the charging station will be removed and relocated on the same day (within 24 hours), unless agreed otherwise. The contractor is responsible for this and shall submit a proposal to the client as soon as the charging station cannot be removed and relocated on the same day. If it takes more time (for whatever reason), the contractor is responsible for any storage and safekeeping of the charging station.	Desired	Include	
Removal/ Relocation	AR35	Connection service in case of disconnection and/or relocation	The switching off and/or relocation of the grid connection is requested by the contractor from the grid operator concerned, either directly or via mijnaansluiting.nl (at the option of the grid operator).	Desired	Include	
Removal/ Relocation	AR36	Storage	In the event of removal and/or relocation, the contractor is responsible for any storage and safekeeping of the charging station, unless otherwise agreed with the client.	Desired	Include	
Removal/ Relocation	AR37	Fees	If the charging station is removed, the contractor will not be eligible for compensation for any loss of income.	Desired	Include	
Removal/ Relocation	AR38	Damage in case of removal or relocation	The contractor is also responsible for any loss or damage resulting from removal or relocation.	Desired	Include	
Change	AR39	Change in connected load	The contractor shall request the relevant grid operator to change a connected load, either directly or via mijnaansluiting.nl (at the option of the the grid operator).	Desired	Include	

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ENVIRONMENT AND LOCATION

Agreements regarding the location of charging stations, e.g. signage and wiring.

Sub-category	ID	Subject description	Guideline description	Required; Desired*	Priority**	Comments
Signage	OL1	Standard sign	The signage must make use of the EV sign standards (such as E4-OB, E8-OB and sub-signs OB-304 and OB-504: 'Charging of electric vehicles' or 'Electric vehicles only'). These signs are recognised in the national Road Traffic and Traffic Signals Regulations (Reglement Verkeersregels en Verkeerstekens, RVV). In the long term, this will be replaced with a new RVV sign.	Required	Include	
Signage	OL2	Sign height	The sign is fastened to a fingerpost with a minimum clearance of 2,200 mm or on existing objects. When placing a fingerpost, service at the charging station must be taken into consideration (opening the car door and space to work).	Required	Include	
Signage	OL3	Two arrows in the case of two charge locations	When there are two charge locations, the sign or sub-sign should have two arrows.	Required	Include	
Signage	OL4	Warnings: tow warning	If applicable, the sign (or a separate sign beneath it) can include a tow warning, including text indicating when this applies.	Required	Include	OB-304 Sub-sign
Location	OL5	Sign location	The sign should be placed in a central location in relation to the parking spaces and the charging station.	Required	Include	
Location	OL6	Avoiding hindrance to other traffic	The charging station must be placed in a location that does not pose a hindrance to other traffic.	Required	Include	
Location	OL7	Distance to the main cable	The charging station must be placed within 25 meters of the main cable. The grid operator can charge more for locations with distances of more than 25 meters.	Required	Include	
Location	OL8	Location of low-voltage cable: preferred side of the road	The charging station should be placed on the side of the road where the grid operator's low-voltage cable is located.	Desired	Include	

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ENVIRONMENT AND LOCATION

Sub-category	ID	Subject description	Guideline description	Required; Desired*	Priority**	Comments
Location	OL9	Clean soil	The charging station should be placed in a location for which it is known that there is a clean soil statement (schonegrond-verklaring) (often available through the soil map).	Desired	Include	
Location	OL10	Not near trees	Because of digging, the charging station should not be placed near trees.	Required	Include	
Location	OL11	Not near other street furniture	The charging station should not be placed within X meters of other street furniture.	Desired	Include	Municipalities indicate their own minimum distance to street furniture at X based on policy.
Location	OL12	Not near areas with special traffic regulations	In particular within city limits, the charging station should not be placed in areas that have special traffic regulations. This is to ensure the accessibility of the charging station. A traffic order can offer a definite answer in such a situation.	Desired	Include	
Municipal policy	OL13	Stimulating flow when leaving charging station	The contractor will confer with the relevant municipality regarding parking policy and ensuring flow of vehicles once they are charged.	Desired	Recommended	Policy item for municipal authorities. Future guideline.
Municipal policy	OL14	Installation and modification of parking policy	Current or changed parking policy within a municipality shall not exempt the contractor from installing a charging station at the location in question.	Desired	Recommended	Policy item for municipal authorities. Future guideline.
Municipal policy	OL15	Certainty with regard to the location of the charging station	The charging station is placed on land owned or managed by the municipality in question. The municipality shall endeavour to ensure that the charging station can continue to exist until the end of the period of operation.	Desired	Recommended	Policy item for municipal authorities. Future guideline.
Municipal policy	OL16	Additional location requirements	The contractor must take into account any additional requirements and/or location requirements of the municipality concerned.	Desired	Recommended	Policy item for municipal authorities. Future guideline.

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MANAGEMENT AND MONITORING

Agreements on the maintenance and management of charging stations.
For example, the transfer of charging stations and malfunctions.

Sub-category	ID	Subject description	Guideline description	Required; Desired*	Priority**	Comments
Reporting	BM1	Management reporting	A periodic (preferably monthly) management report will be delivered in accordance with the client's format preferences.	Required	Include	The management report shall include a cumulative overview for the period of: - number of installed charging stations; - number of applications received; - applications in progress; - completion dates of the applications; - total number of transactions; - total number of kWh charged; - the uptime; - the malfunctions; - duration of the malfunctions; - a description and analysis of class and type of malfunctions; - a plan or measures to reduce the number of malfunctions; - and/or to reduce the downtime; - number of malfunctions above the set standard; - recurring malfunctions.
Service, Maintenance & Management	BM2	Maintenance	The contractor is responsible for maintaining the charging stations through preventive and corrective management.	Required	Include	
Service, Maintenance & Management	BM3	Availability rate	The availability of the charging stations shall be at least 99% per month and shall be transparent to the contractor.	Desired	Include	
Service, Maintenance & Management	BM4	Repair service	The contractor shall provide a front-line breakdown service with a free breakdown number (as well as all other customer contacts) that can be reached 24/7. If desired, this can be done in consultation with an existing IVR provider.	Desired	Include	In your own specific situation, take additional languages into account, such as English or German.

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MANAGEMENT AND MONITORING

Sub-category	ID	Subject description	Guideline description	Required; Desired*	Priority**	Comments
Service, Maintenance & Management	BM5	Urgent malfunctions	Urgent malfunctions (charging station does not function and there is no alternative charging option within a radius of X km and/or unsafe situations/serious damage) will be solved, after notification or detection, within X hours (24/7, both workdays and weekends).	Desired	Include	Based on the policy within the municipalities, the values can be filled in at the X. Proposed values are: 1 km and 2 hours.
Service, Maintenance & Management	BM6	Urgent malfunctions	In the event of a fault report by an EV driver with a fully electric vehicle (FEV), where it is not possible for the EV driver to disconnect their charging cable from the charging station, this will be resolved within X hours (24/7, both workdays and weekends) by the contractor after notification or detection.	Desired	Include	Based on the policy within the municipalities, the values can be filled in at the X. Proposed value is: 2 hours.
Service, Maintenance & Management	BM7	Malfunction and inability to disconnect charging cable (hybrid)	In the event of a fault report by an EV driver with a plug-in hybrid electric vehicle (PHEV), where it is not possible for the EV driver to disconnect their charging cable from the charging station, the contractor will ensure that the charging cable of the EV driver is returned to them within X hours at any desired address. Any additional costs, e.g. shipping costs, shall be borne entirely by the contractor.	Desired	Include	Based on the policy within the municipalities, the values can be filled in at the X. Proposed value is: 72 hours.
Service, Maintenance & Management	BM8	Urgent malfunctions	If a fault report relating to a stuck plug cannot be resolved in time (within X1 hours) and/or if the EV driver does not want to wait for the breakdown service and it is not possible to disconnect the charging cable from the charging station, the contractor will ensure that the charging cable of the driver of a fully electric vehicle is returned to them within X2 hours at any desired address. Any additional costs, e.g. shipping costs, shall be borne entirely by the contractor.	Desired	Include	Based on the policy within the municipalities, the values can be filled in at the X. Proposed values are: X1 = 2 hours and X2 = 12 hours.
Service, Maintenance & Management Management	BM9	Urgent malfunctions	In the event of unsafe situations/serious damage, the relevant grid operator must also be informed/called in immediately after the report or detection (depending on the situation).	Desired	Include	

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MANAGEMENT AND MONITORING

Sub-category	ID	Subject description	Guideline description	Required; Desired*	Priority**	Comments
Service, Maintenance & Management	BM10	Other/non-urgent malfunctions	Other/non-urgent malfunctions, such as offline, software issues and damage that does not cause dangerous situations, shall be resolved within X hours of notification 24/7 (both workdays and weekends). If it concerns a malfunction in the grid operator's part of the charging station, the contractor will call in the grid manager and ensure that the grid operator resolves the problem within a maximum of one week. As soon as the grid operator has resolved the fault, the contractor is responsible for switching on the charging station. The contractor shall ensure that the charging station is switched on within 24 hours of the grid operator remedying the fault. The grid manager costs can be charged to the client.	Desired	Include	Based on the policy within the municipalities, the values can be filled in at the X. Proposed value is 24 hours.
Service, Maintenance & Management	BM11	Cleaning	The charging station must be free of graffiti, clean and completely in accordance with 'Visual Quality Level B' (Beeldkwaliteitsniveau B) of CROW (the Dutch information and technology centre for transport and infrastructure).	Required	Include	
Service, Maintenance & Management	BM12	Cleaning	The charging station shall be cleaned within X working days of the detection or notification of graffiti or other contamination on or at the charging station.	Required	Include	Based on the policy within the municipalities, the values can be filled in at the X. Proposed value is: 5 working days.
Service, Maintenance & Management	BM13	Management	The contractor shall manage the charging location in consultation with the municipality (road markings and signage). In case of irregularities, it must return the charging location to its original state within three business days of detection or notification.	Desired	Include	
Service, Maintenance & Management	BM14	Subsidence or tilting	The charging stations must be placed correctly, and subsidence or tilting must not occur for a period of at least ten years.	Desired	Include	
Transfer	BM15	Availability of parts	Parts that are essential to the functioning of the charging stations must be available for at least three years after the end of the contract period.	Required	Include	

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MANAGEMENT AND MONITORING

Sub-category	ID	Subject description	Guideline description	Required; Desired*	Priority**	Comments
Transfer	BM16	Transfer	The contractor is required to work at no charge starting one year before the end of the contract period on everything that is required for a potential transfer of charging locations and charge data.	Required	Include	
End of Service, Maintenance & Management	BM17	Helping with the transfer	The contractor shall cooperate fully with the transfer and shall make agreements with the client/new manager at the end of the maintenance contract regarding the takeover of the charging stations (including their management and maintenance).	Desired	Include	
End of Service, Maintenance & Management	BM18	Making the charging stations available	The contractor shall make its charging stations available to the client/new manager for any tests before the final takeover takes place.	Desired	Include	
End of Service, Maintenance & Management	BM19	Damage	The charging stations must be in good physical condition (no damage and/or graffiti or other contamination) at the start of the transfer.	Desired	Include	
End of Service, Maintenance & Management	BM20	Knowledge transfer	After the operating period, the contractor will provide training to the client/new manager with regard to installation and maintenance.	Desired	Include	
End of Service, Maintenance & Management	BM21	Relevant documents	The contractor will provide the new manager with all relevant documents necessary for carrying out the transfer and the management and maintenance of the charging stations.	Desired	Include	Documents such as photographs, handover documents, drawings (digital and otherwise), quality, inspection or guarantee certificates, CE certificates, manuals, instruction manuals and any other document.
End of Service, Maintenance & Management	BM22	Making data available	The contractor shall make all data relating to use, consumption, fault/damage history, uptime, and so on available to the client/new manager.	Desired	Include	

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FUNCTIONALITY

Agreements regarding the functioning of charging stations, e.g. availability and charging sessions.

Sub-category	ID	Subject description	Guideline description	Required; Desired*	Priority**	Comments
Charging	F1	Locking of plugs	The plug must be locked in the outlet from the moment that the user logs in until the moment that they log out.	Required	Include	
Charging	F2	Representing the capacity of the charging station	Maximum charging capacity is indicated on the charging station. Additionally, the current capacity (Smart Charging) can be indicated as well. Links to third parties to share this information should also be supported.	Required	Include	
Status information	F3	Status changes	The charging station conveys active status changes to the back office system, which are critical to the safety and the continuity of providing high-quality charging services (such as tilt and temperature).	Required	Include	
Authentication	F4	Ending transaction when connection is unavailable	It must be possible to terminate the current charging transactions locally in the event that the online back office system is not available or cannot be connected to.	Required	Include	
Availability	F5	Availability of new charging session	After the user logs out, the charging point should be available for a new charging session immediately.	Required	Include	
Technology	F6	Replace/Upgrade RFID reader	The RFID reader needs to be replaced or upgraded for future changes. This will ensure that the most common payment methods are used.	Desired	Recommended	
Technology	F7	Starting up charging point after loss of power	After a power failure, no voltage is applied to the sockets until a new charging transaction is started. The ongoing transaction is terminated and the cable is unlocked.	Desired	Recommended	
Technology	F8	Cancelling a transaction	The charging station cancels the transaction if a vehicle has not been connected within a certain amount of time (e.g. 120 seconds) after authentication. This is so that other users do not accidentally plug in during a transaction in progress.	Desired	Include	

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FUNCTIONALITY

Sub-category	ID	Subject description	Guideline description	Required; Desired*	Priority**	Comments
Providing charging services	F9	Operation	The charging stations in the Netherlands deliver certified green energy from renewable energy sources such as solar, wind and biomass.	Required	Include	
Charging session	F10	EV driver must be able to determine charging session	The EV driver has the possibility at the start of their charging session to decide not to go ahead with, for example, reduced energy in connection with measures for network congestion, etc.	Desired	Include	This should also be taken into account in any pilot projects.

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DESIGN

Agreements regarding the design of charging stations, e.g. communication and use of materials.

Sub-category	ID	Subject description	Guideline description	Required; Desired*	Priority**	Comments
Communication	V1	User-friendliness	The charging station is user-friendly and can be operated without any instruction (other than the user instruction attached to the object). Any text is in the Dutch language.	Required	Include	
Communication	V2	Labelling	Labelling must only take place in consultation with the relevant client.	Desired	Include	This concerns information relating to advertising and charging information.
Communication	V3	Labelling	A QR code or Internet address can be found on the charging station where foreign users can be informed.	Desired	Include	Labelling is done in consultation with municipal authorities.
Communication	V4	Charging station data	The following information is clearly provided on the charging station: phone number for malfunctions and other services, a unique number for each charging station and a reference to terms of service.	Required	Include	The fault number must be free of charge and available 24/7.
Communication	V5	Changes to the supply of energy	If use is made of limited supply of energy at certain times or other situations (for example, in connection with a pilot project), this must be clearly indicated on the charging station.	Desired	Include	
Communication	V6	Changing charging session	If there is a possibility for the EV driver to influence the charging session (for example, by means of an app), this should be described on the charging station.	Desired	Include	
Control system	V7	Location of control system	The power cord, the outlet and the description of how to use the charging station must be at least 600 mm and at most 1,400 mm above ground level due to Health and Safety requirements.	Required	Include	
Control system	V8	Type of plug connection	The charging station must be equipped with Type 2 sockets.	Required	Include	
Space required	V9	Dimensions	The minimum height of the charging station from ground level is 800 mm and the maximum height of the charging station from ground level is 1,500 mm. Further agreements must be made about the maximum space occupied: X mm2.	Required	Include	Municipal authorities can indicate their own maximum space required at X.

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DESIGN

Sub-category	ID	Subject description	Guideline description	Required; Desired*	Priority**	Comments
Appearance	V10	Appearance and material	The charging station is a free-standing, uniform column or plinth.	Required	Include	
Appearance	V11	Appearance and material	The charging station is finished in a high-quality manner devoid of sharp edges, noticeable gaps or curvature.	Required	Include	
Appearance	V12	Appearance and material	The charging station has a sloping top so that no material can be placed on it.	Required	Include	
Appearance	V13	Appearance and material	The charging station, its casing and all parts open to air are finished in corrosion-resistant material, such as stainless steel, aluminium or high-quality impact-resistant synthetic material that is not affected by UV radiation, etc.	Required	Include	
Appearance	V14	Appearance and material	The charging station and its foundation have been developed and are suited for low-maintenance placement in the outdoors during a period of at least ten years.	Required	Include	
Technology	V15	Maximum depth of foundations	The maximum depth of the foundation is 600 mm below-ground (national requirement).	Required	Include	
Status indication	V16	Status indication	If the contractor uses status LEDs, the colours shall be in line with the policy of the client: - 'Available' status = blank (no colour, LED off); - 'Active' status = green; - 'Ready to charge' status, 'Mode 3 State B + PWM' = light blue; - 'Charging' status = blue; - 'Out of use' status = red; - 'Error message' status = red (flashing); - After transition from Mode 3 State B to State A and then back to State B = green.	Required	Include	

For * and **: definitions on page 7.

ENGINEERING AND SAFETY

Agreements regarding the technical functioning of charging stations, e.g. grounding and data connection.

Sub-category	ID	Subject description	Guideline description	Required; Desired*	Priority**	Comments
Grounding	TV1	Overcurrent and short-circuit protection	Each charging station is protected against overcurrent and short circuit. This protection is selective with that of the grid connection.	Required	Include	
Grounding	TV2	Grounding	The charging station and all accompanying components, including the door, are visibly grounded. In the event that the door needs to be removed, enough wire has been used to get the door out of the way. In consultation with the grid operator, it is possible to connect the ground of the charging station to the zero of the electricity grid; however, in all cases, the responsibility for installing the charging station lies with the contractor. The contractor shall therefore decide for itself whether an earthing electrode is required.	Required	Include	If an earthing electrode is driven, the following conditions and regulations apply: 1. The resistance of the earthing electrode must not exceed 167 ohms (in accordance with NEN 1010). 2. The earthing electrode is connected to the charging station using a ground wire. 3. Results of the earth measurement are recorded in the handover document. 4. The earthing electrode must be driven as close to the charging station as possible. 5. The KLIC report is used to determine the position of the ground connection pin. If cables or pipelines are struck when driving the earthing electrode, the contractor shall be responsible for any consequences of this; this includes handling any damages and compensating any costs. In addition, such a situation must be reported immediately to the client.
Charging	TV3	The charging station communicates active status changes	The charging station communicates active status changes of errors that occur in at least the following components (more components are allowed): - RCD (earth leakage protection); - Excess current protection; - Relay; - kWh-meter; - Plug lock; - RFID Reader.	Desired	Include	

For * and **: definitions on page 7.

ENGINEERING AND SAFETY

Sub-category	ID	Subject description	Guideline description	Required; Desired*	Priority**	Comments
Technology	TV4	Charging area possible	The charging station is prepared for any potential future inclusion in a charging area arrangement. In such an arrangement, several charging stations of the same type use one and the same grid connection. The distance between the charging stations must be at least 10 metres.	Desired	Recommended	Future guideline.
Technology	TV5	Loss of communication connection	Upon losing the communication connection, the charging station shall actively try to restore it; for example, by resetting the modem. As long as there is no connection, the charging station will continue to repeat these recovery attempts.	Desired	Recommended	Future guideline.
Technology	TV6	Communication history	In the event of a data connection failure between the charging station and the back office system, for whatever reason this may occur, all transaction-related events should be saved locally and sent to the back office system when the connection is restored, with the time stamp of when the event took place.	Desired	Recommended	Future guideline.
Technology	TV7	Offline history	Transactions that take place during the absence of a data connection between charging station and the back office system should be checked for legality as soon as the connection is restored. Should it appear that an illegal transaction is taking place (such as with a blocked debit or credit card), charging will terminate as soon as the data communication is restored. (The transaction can remain open and the cable should be locked in place until the user logs out; after this, the transaction will be closed.)	Desired	Recommended	Future guideline.
Technology	TV8	Date and time	In the event of a power failure or loss of communication, the charging point keeps track of the time and date for a minimum of seven days.	Desired	Recommended	Future guideline.
Technology	TV9	Unique charging object number	Each charging station has a unique charging station number.	Required	Include	

For * and **: definitions on page 7.

ENGINEERING AND SAFETY

Sub-category	ID	Subject description	Guideline description	Required; Desired*	Priority**	Comments
Safety	TV10	PWM coordination	The charging station never gives a PWM duty cycle that implies a higher charge current than the maximum charge current permitted by general safety, the grid connection and the charge cable being used.	Desired	Recommended	Future guideline.
Safety	TV11	NEN 1010 standard earth-leakage circuit breakers	Earth-leakage circuit breakers shall comply with the NEN 1010 standard.	Required	Include	To ensure that all types of car models can be charged, this must be taken into account when selecting the earth-leakage circuit breaker.
Safety	TV12	Earth leakage protection	Every charging station is equipped with an individual 4-pole 30 mA earth leakage protection system of at least Type A, which only turns off the live parts of the relevant charging point in the case of undesired leakage currents.	Required	Include	
Safety	TV13	Detection and deactivation of direct current feedback	Within each charging point, detection and shut-off of direct current return takes place when it is greater than 6 mA (not necessarily through an RCD Type B).	Required	Include	
Safety	TV14	Testing and certification of charging stations	Charging stations should be tested and, if available, certified before installation.	Desired	Include	Charging stations are tested by Elaad, among others. Certification is not yet available at this time.
Safety	TV15	New technological developments	If new technological developments become available, it must be possible to include this as a change in the agreements with the contractor.	Desired	Include	
Safety	TV16	Interruption of a transaction in the case of incorrect power consumption	The charging station measures/reads the current drawn by the vehicle per phase. If the power exceeds the value as indicated by the PWM signal by more than 10%, the charging station turns the power off, or tries to adjust the consumed power using PWM modulation. The charging process can also be restarted within the same transaction.	Required	Recommended	Advice: try X times (e.g. 3) to reduce power or restart charging session. Future guideline.
Property rights	TV17	Free from property rights	All charging systems and their associated systems are free from property rights as regards both hardware and software.	Desired	Include	

For * and **: definitions on page 7.

BACK OFFICES AND INTERFACES

Agreements regarding communication between charging stations and underlying systems, e.g. communication protocols and payment options.

Sub-category	ID	Subject description	Guideline description	Required; Desired*	Priority**	Comments
Authentication	BI1	Authentication of user	Charging transactions can be initiated and ended through the back office system.	Required	Include	
Authentication	BI2	Authentication back office system	User authentication through the back office system supersedes authentication through the local database.	Desired	Recommended	
Technology	BI3	Communication protocol	The firmware structure for the correct data connection between the charging station and the back office system must be structured in accordance with the Open Charge Point Protocol version 1.6 JSON, with the exception of the possibility of reservations.	Required	Include	The OCPP specification and tools can be downloaded from the website: www.openchargealliance.org. Future guideline.
Technology	BI4	Implementation and correct operation OCPP	The contractor is responsible for the implementation and correct operation of OCPP.	Desired	Include	
Technology	BI5	Update OCPP	The contractor is responsible for updating OCPP to a new version free of charge (in consultation with the client).	Desired	Include	
Technology	BI6	Mobile communication	Communication takes place through a closed communication network (APN). The contractor shall select its own telecom provider. The contractor is responsible for the establishment of a correct data communication link.	Desired	Recommended	Future guideline.
Technology	BI7	Agreements regarding the interface with regard to real-time data sharing	The client and and the contractor shall agree on the interface to be used with regard to real-time data sharing. If necessary, an interface will be developed together, in which the contractor will actively invest.	Desired	Include	The contractor shall make at least the following information available in real-time: - Unique transaction code; - The amount of kWh charged per socket, per transaction, during the transaction; - The connection and disconnection times per transaction; - The start and end time of the transaction (time of connection and disconnection, and the start time and end time of charging, including a note if there are particularities such as Smart Charging, deferred charging, temporary charging at a lower power, and so on); - Which charge profile was active and what the input was for the charge profile; - Which charging station and socket applies to the charging data.

For * and **: definitions on page 7.

BACK OFFICES AND INTERFACES

Sub-category	ID	Subject description	Guideline description	Required; Desired*	Priority**	Comments
Technology	BI8	Diagnostics	The contractor shall provide the client with the possibility of retrieving diagnostics of the charging station or a selection of stations itself (via the back office system).	Desired	Include	
Technology	BI9	Charging point as access point for configuration	The charging point supplier provides the municipality/contractor with the ability to operate all relevant functions and configurations of the charging point personally.	Required	Include	
Data	BI10	Availability of third parties	The contractor offers a solution by which insight can be gathered into current availability of all the various charging points. This occurs in a straightforward manner and in a universal format suitable for exchange of up-to-date data, such as XML, SOAP, HTTPS and TCP/IP).	Required	Include	
Data	BI11	Access to data	The contractor offers an open interface solution (such as OCPI) by which customers of other charge service providers can access the functionality of the charging station; for example, by using an app.	Required	Include	
Data	BI12	Delivery of data	Data can be transferred or exported to third parties, including all historical application and usage information.	Required	Include	The requirements to be met by the tables for static charging station data and dynamic data per charging transaction can be requested from info@elaad.nl. These data will be made available via OCPI (or a similar protocol).

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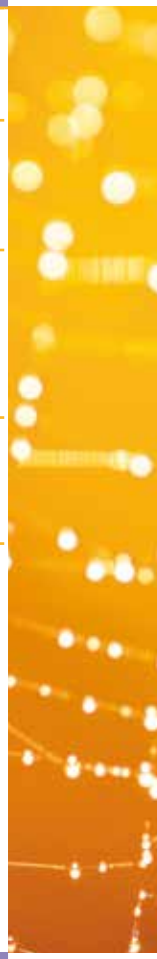

BACK OFFICES AND INTERFACES

Sub-category	ID	Subject description	Guideline description	Required; Desired*	Priority**	Comments
Data	BI13	Usage data available	The contractor shall make all usage data available for a general and independent monitoring tool for monitoring the use of the charging stations. The contractor shall make the usage data available to the client at least once a month.	Desired	Include	The contractor shall make at least the following information available: - Unique transaction code; - The number of transactions per socket; - The number of unique transactions per socket and per charging card; - The amount of kWh charged per socket, per transaction; - The connection and disconnection times per transaction; - The start and end time of the transaction (time of connection and disconnection, and the start time and end time of charging, including a note if there are particularities such as Smart Charging, deferred charging, temporary charging at a lower power, and so on); - Which charge profile was active and what the input was for the charge profile; - The uptime; - The number of malfunctions per charging station (possibly per socket) and the moments of these malfunctions.
Data	BI14	Ownership data	The client owns all available data.	Desired	Include	
Providing charging services	BI15	Price	The contractor shall settle charging transactions with charging service providers and card holders for a maximum price to be determined.	Required	Include	
Providing charging services	BI16	Price	Changes in the fee amount or fee structure for the charge services are possible in consultation with and after approval from the client.	Required	Include	

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BACK OFFICES AND INTERFACES

Sub-category	ID	Subject description	Guideline description	Required; Desired*	Priority**	Comments
Payment	BI17	Offering access through a universal card for all public charging station	The charging station accepts valid charge passes/authentication methods (app) from various providers. The contractor is expected to sign contracts with service providers, making interoperable charge infrastructure available in the process. The contractor must also make agreements with foreign providers.	Required	Include	
Payment	BI18	Alternative payment method: smartphone	To allow one-time use (for example, in the case of tourists), an alternative payment option without subscription is possible, preferably through NFC.	Desired	Recommended	Future guideline.
Payment	BI19	Paying for charging and parking	The EV driver can pay for charging and parking at the same time.	Desired	Include	Supported in OCPI. Future guideline.
Price	BI20	Choice of power supplier	It must be possible for the EV driver to make use of their own power supplier at the charging station (either or not through their card supplier/service provider), or in any case to have the choice between various providers at the charging station.	Desired	Recommended	Future guideline.
Price	BI21	Displaying actual price prior to charging	The EV driver can use an app for insight into up-to-date charging fees and the status of the charging station.	Desired	Include	Future guideline.
Charging	BI22	Messaging if the charging point is out of service	The EV driver is actively informed about the status of their charge session and the status of the charging point to which they are connected.	Required	Include	Future guideline.
Charging	BI23	Messaging for driver when the battery is fully charged	A message is sent to the EV driver once their battery is fully charged.	Desired	Include	Future guideline.
Availability	BI24	Availability and pricing information	Up-to-date information about up-to-date availability and up-to-date pricing can be viewed on an app and will also be offered to third parties.	Required	Include	Future guideline.

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SMART CHARGING AND V2X

Agreements regarding Smart Charging and advanced forms of use,
e.g. support for charge profiles and return delivery of energy to the power grid.

Sub-category	ID	Subject description	Guideline description	Required; Desired*	Priority**	Comments
Smart Charging	SC1	Collaboration on Smart Charging	The contractor actively participates in Smart Charging initiatives.	Desired	N/A	
Smart Charging	SC2	Supporting protocols	To make Smart Charging possible, at least the following protocols are supported: OCPI, OCPP v1.6 and OSCP. (The time of implementation is dependent on concrete use cases and will be determined together with the client.)	Required	N/A	Future guideline.
Smart Charging	SC3	OSCP	To work with cable forecasts from the grid operator, the back office system supports OSCP 1.0.	Required	N/A	
Smart Charging	SC4	OCPI	To support the services of third parties, the latest version of OCPI is implemented in the management system (back office system) of the charging stations.	Required	N/A	
Smart Charging	SC5	Computing power of the controller	The controller is able to receive and send messages at the same time (full duplex/multi-threading). There are no processes in the controller that permanently or temporarily prevent communication with the back office system.	Desired	N/A	
Smart Charging	SC6	Stacking charge profiles	The charging station offers support for prioritising ('stacking') at least six charge profiles of the same type using ChargePoint MaxProfile and TxDefaultProfile.	Desired	N/A	
Smart Charging	SC7	Periods	The charging station offers support for 20 periods per charge profile.	Desired	N/A	
Smart Charging	SC8	Local load balancing	The charging station divides the available energy on the basis of the connected load between the two charging points. Software will be required to execute local load balancing.	Desired	N/A	It is up to the subscriber to get the most out of the connection. The solution must always be at least smart enough to ensure the use of the maximum amount of available energy.

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SMART CHARGING AND V2X

Sub-category	ID	Subject description	Guideline description	Required; Desired*	Priority**	Comments
Smart Charging	SC9	Initiating charging regardless of charge profile	If Smart Charging is active through OCPP profiles, charging will always begin within a short amount of time (such as 30 seconds). The charge profile, if any, will then be executed. This allows the user to know that their vehicle has been correctly connected.	Desired	N/A	
Smart Charging	SC10	Flexibility of access	The contractor makes agreements with external parties to create the possibility to ensure flexibility with energy providers and PV parties. This flexibility is then translated into charge profiles. The EV driver should also profit from this flexibility. The USEF framework can be used to ensure this flexibility.	Desired	N/A	
Smart Charging	SC11	Inclusion in a charging area arrangement	The charging station is prepared for any potential future inclusion in a charging area arrangement. In such an arrangement, several charging stations of the same type use one and the same grid connection. The distance between the charging stations must be at least ten metres.	Desired	N/A	This is important in relation to keeping operational costs (including data costs) low. The protocol to be used can be chosen (RS485, Zigbee, and so on).
Smart Charging	SC12	Local load balancing	The charging station divides the available energy on the basis of the connected load between the two charging points. Software will be required to execute local load balancing.	Desired	N/A	This is important in relation to keeping operational costs (including data costs) low. The protocol to be used can be chosen (RS485, Zigbee, and so on).
Technology	SC13	OCPI version for charge profiles	In order to receive charge profiles from an external service provider and to support other services, the contractor must implement the latest version of OCPI in the management system (back office system) of the charging stations.	Required	N/A	
Technology	SC14	Sending charge profiles via OCPI and OCPP	The charge profiles that are sent by the service provider via OCPI must be sent by the back office to the charging stations via OCPP.	Required	N/A	

For * and **: definitions on page 7.

SMART CHARGING AND V2X

Sub-category	ID	Subject description	Guideline description	Required; Desired*	Priority**	Comments
Technology	SC15	Alternative protocol:	Even if another (non-OCPI) protocol becomes the standard in the Dutch market for communicating with third parties such as service providers, the contractor must implement this alternative communication protocol free of charge.	Desired	N/A	
V2x	SC16	V2x support	The charging station supports future V2x situations, in which a current runs from the car to the grid or another installation.	Desired	N/A	Future guideline.
V2x	SC17	V2x registration	The meter in the charging station is equipped to register this energy with a separate counter.	Desired	N/A	

For * and **: definitions on page 7.

SECURITY

Agreements regarding the information security of charging stations, e.g. encryption and access control.

Sub-category	ID	Subject description	Guideline description	Required; Desired*	Priority**	Comments
Security	S1	Security	In the interest of security, the requirements that were outlined in the document 'EV Charging Systems': Security Requirements' (version 1.0), as established by the European Network for Cyber Security, have been adhered to.	Desired	Include	These requirements have already been introduced by ElaadNL and have already been applied in some municipalities.

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STANDARDS AND REQUIREMENTS

Agreements regarding the standards that must be adhered to, e.g. IEC and NEN guidelines.
View the most current versions online.

Sub-category	ID	Subject description	Guideline description	Required; Desired*	Priority**	Comments
Standards	SN1	IEC 61851	IEC 61851 indicates the requirements for alternating current charging station with a conductive connection to an electric vehicle.	Required	Include	
Standards	SN2	IEC 62196	IEC 62196 indicates the requirements for plugs, sockets, vehicle plugs and vehicle sockets for charging electric vehicles using a cable with alternating current to 250 A and direct current to 400 A.	Required	Include	
Standards	SN3	NEN 1010	NEN 1010 indicates the minimum safety requirements that low voltage installations must adhere to.	Required	Include	
Standards	SN4	Security requirements	'EV Charging Systems: Security Requirements' contains the security requirements that charging systems must adhere to.	Required	Include	
Measurement and registration	SN5	Metrology Act	Measurement and registration of energy should take place in accordance with the Metrology Act.	Required	Include	
Working safely	SN6	NEN 3140	NEN 3140:2011 constitutes the Dutch implementation of the European standard EN 50110-1:2005 for low voltage devices, supplemented and adapted to the Dutch situation as prescribed by Occupational Health and Safety legislation.	Required	Include	
Protocols	SN7	OCPI	OCPI is implemented to allow receipt of charge profiles from external parties.	Required	Include	
Protocols	SN8	OCPP	The communication protocol between the charging station and the back office is OCPP.	Required	Include	
Protocols	SN9	OSCP	To work with cable forecasts from the grid operator, the back office system supports OSCP 1.0.	Required	Include	
Protocols	SN10	Standardised charge protocol	Charging of electric vehicles occurs according to the Mode 3 protocol, in accordance with IEC61851.	Required	Include	
Specifications	SN11	Grid connection specs	The grid connection in the charging station meets the requirements put forth by the grid operator. These can be found on the ElaadNL website.	Required	Include	The information can also be requested from info@elaad.nl.

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HOW WILL THE STANDARD SET REMAIN UP-TO-DATE?

The Standard Set is a living, breathing document. It is essential that steps are taken to update the guidelines in the future and ensure that they remain current. There are constant new developments in the world of electric transportation and charging infrastructure. In order to continue offering a relevant overview, we must follow these changes closely. This is why a representative group of market players will confer once a year to evaluate and update the Standard Set. Input can originate from other NKL projects, new public tenders and other market developments.

OUR PARTNERS

ABB, Alfen, Allego, Alliander, BMW, Chargepoint, CROW information and technology centre for transport and infrastructure, DOET, ElaadNL, Enexis, ENGIE, Enovates, EV-Box, EV-Consult, G40, Municipalities of Alphen aan den Rijn, Amsterdam, The Hague and Utrecht, MRAe, Nissan, Province of North Brabant, RAI Association, Renault and Stedin.

INFORMATION AND CONTACT

Information on the Standard Set and other projects of The Netherlands Knowledge Platform for Public Charging Infrastructure is available on the NKL website:
www.nklnederland.nl

The Standard Set is available in Dutch and English.

Would you like to speak with us or do you have a question or suggestion? Please send us an email:
info@nklnederland.nl


NB-916-T

The Netherlands
Knowledge Platform
for Public Charging
Infrastructure

UNIFORM STANDARDS FOR CHARGE STATIONS

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