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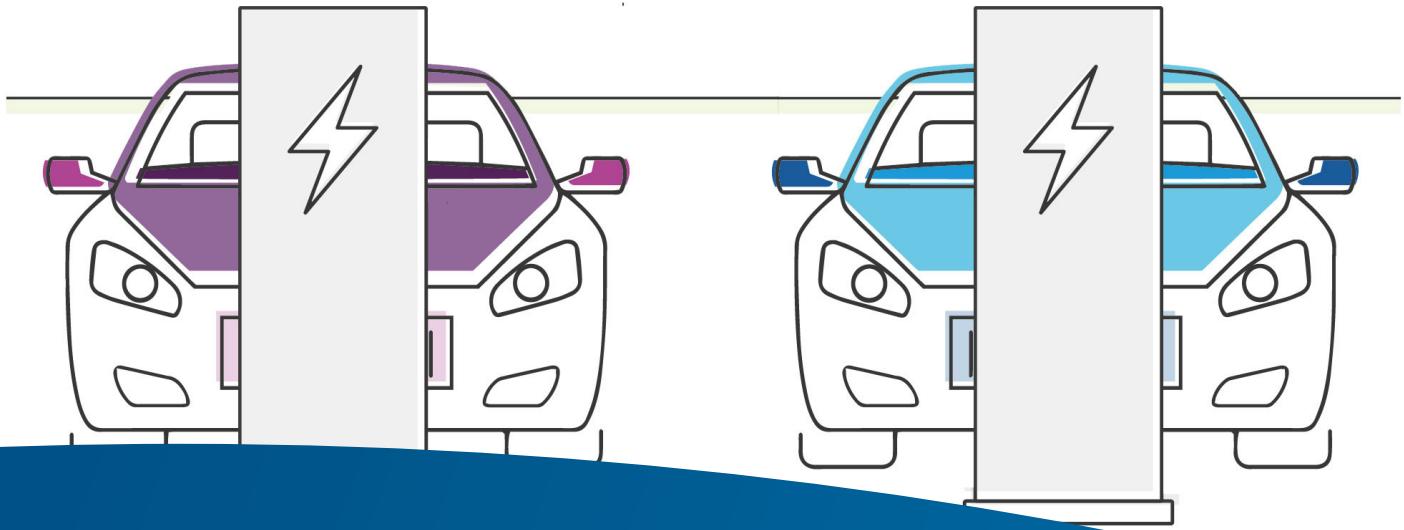


The Case to Standardise Mounting Systems for Electric Vehicle Chargepoints

Cenex Insight - July 2022

Is it time to standardise mounting systems for EV charging?

Introduction

There are currently more than 190,000 domestic and 30,000 workplace sockets, and almost 29,000 public EV charging devices in the UK.

Opinions vary and debate continues as to whether this overall charging network is leading or lagging the “necessary” rate for the UK’s current levels of EV adoption. However, it can be agreed that with the UK government recently announcing a target of 300,000 public chargepoints by 2030 , a great deal more EV charging will be required for a fully net zero transport system.

While there are many barriers that must be overcome to enable this (network upgrade connection costs, land availability, leasehold businesses and public sector leadership to name a few), one rather unglamorous barrier that is often overlooked is the physical interface between the chargepoint and its “foundations”.

Cenex has researched the potential benefits that could be achieved by standardisation of this physical interface, by consulting with a range of industry stakeholders, including:

- Four Local Authorities (Nottingham City Council, Coventry City Council, Devon County Council, Bromsgrove District Council/Redditch Borough Council) and one regional authority initiative (Midlands Energy Hub). Each of these organisations have experience and/or are very active in deploying EV charging infrastructure, and many have experience of using standardised mounting systems.
- Six chargepoint manufacturers, operators and installers; Elmtronics, EO Charging, Mr Charger, PlugNGo, The Phoenix Works (now rebranded as Egg), and Siemens.

The results of this research, and our proposed next steps for industry decision makers, are set out here.

Current Options

There are four chargepoint mounting options for installers:

1. Mount the chargepoint on an existing structure

Typically an exterior wall of a building or internal wall of an indoor carpark, an interior wall of a garage, or even a guardrail or metal framework for more creative installers. Chargepoint manufacturers have innovated by providing devices that integrate into other street furniture, such as streetlights.

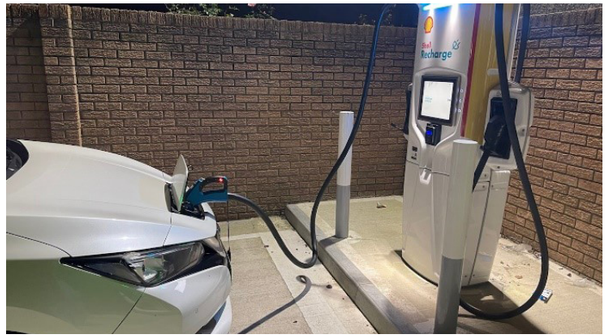
2. Mount the chargepoint on a supporting post

Using a post mount allows for chargepoints to be installed free-standing where there is no suitable existing structure available at the install location. For these devices, chargepoint manufacturers either supply bespoke posts, or pedestals, or have designed their equipment to be compatible with posts or pedestals from a third party.

Current Options

3. Install a freestanding chargepoint

Many chargepoints designed specifically for public use are free-standing ground-mounted structures such that they can be located anywhere without the need for a post. Rapid DC chargepoints, which include the rectifier to convert AC to DC, are larger in form factor and therefore are almost always floor-mounted (with the exception being some semi-rapid DC devices).



4. Choose a chargepoint with novel architecture

There are an increasing number of providers offering solutions designed for on-street charging to minimise the impact of the charging infrastructure on the streetscape. The example shown below is “hidden” when not in use.

For options 2 and 3, there is an interface between the charging infrastructure and the ground. This interface is not currently standardised, but there are arguments as to why it should be.

Options for Foundations

Requirements

For those chargepoint installs where there is an interface between the new infrastructure and the ground, the interface design needs to meet three core requirements:

> A level, consistent mounting surface to ensure that the chargepoint is vertical and can be attached to the foundation securely.
> There is a mechanism to robustly attach the chargepoint to the foundation. This is typically an arrangement of bolts, with the pattern varying depending on the chargepoint design.
> Cable routes for power and communications.

Solutions

There are two solutions for achieving these three requirements:

> Option 1

The traditional solution is to use a poured concrete base pad around a pre-installed ducting to provide the necessary cable route. Holes are then drilled to match the chargepoint to be installed once the concrete has set and various types of anchor bolts used to secure the chargepoint to the foundation.

> Option 2

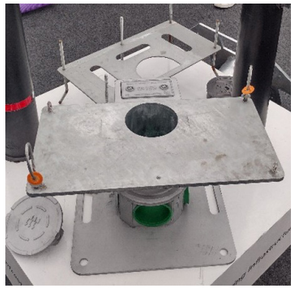
New solutions designed and manufactured specifically to provide a more standardised (albeit proprietary) mounting system for EV chargepoints. Cenex is aware of three such solutions:

a. Retention Sockets – Retention sockets are commonly used in the highways industry as mounting systems for bollards, signs and streetlights, are provided by a number of suppliers, and controlled by standards. NAL Ltd is an established provider of retention socket systems that has diversified their product line for use with post-mounted EV chargepoints. They now also offer a system design specifically to integrate their socket products with rapid EV chargepoints via a universal adapter plate.

Options for Foundations

b. EVBlocks – A range of sizes of pre-fabricated concrete blocks that are specifically designed for EV charging mounting. The blocks have four entry points for ducts and pre-drilled threaded holes with which a universal adaptor plate is used to mount the charger pole.

c. Unimi Solutions – Swedish company Unimi offer three universal chargepoint mounting systems. Two of these – concrete and recycled plastic versions – are designed for smaller post-mounted AC chargepoints whilst a larger concrete version is offered for DC chargepoints. The system has been deployed in 16 countries although it is not clear whether it counts the UK as one of these.



Option 2a - NAL Ltd's EV Retention Socket and Adapter Plate

Option 2b - EVBlocks Product

Option 2c - Unimi's universal mounting systems

The Advantages

The benefits of standardised mounting systems, cited by interviewed stakeholders, can be categorised into two different groups:

> Benefits from improved standardisation
> Ease of installation, maintenance and repairs

Standardisation

All 11 of the interviewed stakeholders cited the importance of being able to fit different charging hardware from different manufacturers to a single more standardised mounting. For the Local Authorities the key benefit from standardisation was the flexibility and reduced level of risk involved with long-term EV charging contracts.

Coventry City Council shared lessons learnt from very early EV charging deployments where suppliers were changed and obsolete or broken chargepoints replaced frequently, and this process was made difficult as the original poured concrete foundations were not compatible with different hardware. More recently, Devon City Council has included NAL sockets within its specification for its DELETTI programme, to ensure that end of contract interoperability is built into the project from the start. PlugNGo, Siemens and The Phoenix Works also recognised the benefits of this flexibility for the provider to standardise installations for different chargepoint models or even update hardware at certain sites as and when required.

In addition passive provision – a technique whereby civil works and even electrical supply and distribution is configured on day 1 for chargepoints that are to be installed at a later date – is made much more achievable when standard mountings are used. The UK and its devolved nations currently legislating to make active and passive provision of EV charging mandatory in residential and non-residential car parking. Therefore, the ability to be able to specify a standardised interface for the installation of EV charging at a later date is likely to become even more powerful and important for parking landowners and developers in the very near future.

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The Advantages

Ease of installation, maintenance and repairs

Whilst poured concrete foundations require curing time, standard mounting systems can be ready for the chargepoint to be mounted as soon as they are installed. Moreover, their use decouples the civils and electrical parts of the installation neatly. This is a benefit acknowledged by The Phoenix Works and Bromsgrove District Council/Redditch Borough Council, as well as Nottingham City Council who stated the importance for concession contracts where the local authority is responsible for the civil works and the appointed EV charging supplier responsible for completing the chargepoint installation.

In addition to this, standardised systems are designed to make maintenance and repairs quick and easy. Coventry City Council had experience of damaged public chargepoints that needed to be replaced, but no civil works were required as a result of using a standard mounting system. This minimised downtime, which is important for the installation's business case, and is also operationally critical in a fleet charging scenario. Additionally, avoiding disruption can be key for maintaining user confidence in the charging infrastructure which may benefit the longer-term business case.

The Phoenix Works shared, how in some previous projects where they have not been responsible for the civil works, the poured concrete foundations were of poor quality. Standardised quality-controlled solutions also reduce the risk of delays during installations due to issues with the mounting system.

Whilst likely to incur greater up-front cost than traditional methods, as a result of the benefits during installation, operation and end-of-life, standardised mounting systems can result in lower total lifecycle costs. This indirect benefit was remarked by Nottingham City Council, Coventry City Council, PlugNGo and Mr Charger.

The Disadvantages

Unfortunately, the currently available solutions are not without their drawbacks. The disadvantages listed by suppliers were as follows:

Compatibility

Ironically, whilst each of the solutions from NAL, EV Blocks and Unimi are designed to offer standardisation, as they are all proprietary solutions, they are not truly standardised. This creates an uncertainty for both suppliers and customers whether the solution they are using will in fact be fully interoperable with all chargepoint hardware.

Supply chain

With so few suppliers, there is a distinct lack of competition. This raises risks over increased costs in and security of supply when deployments are dependent on a particular supplier remaining in business and being able to meet the required demand.

Tendering

For Local Authorities to procure a specific solution from a private supplier without falling foul of competitive tendering rules can be a procurement minefield. Both Coventry City Council and Nottingham City Council identified this as an important problem to address.

Up-front costs

As previously mentioned, the standardised solutions are more costly than a traditional mounting. This means that suppliers are often forced to not specify them when bidding into tenders where costs are heavily weighted to remain competitive.

Security

There was concern (although no evidence) from suppliers that whilst standardised mounts make installations, maintenance and repairs more easy, the undesirable effect of this is that they make chargepoints more vulnerable to theft.

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The Disadvantages

Technical

Each of the products available have their own disadvantages. For NAL sockets, different solutions are required for AC and DC charging and for the EV Blocks system there can be logistics challenges with transporting heavy pre-cast concrete blocks. With all systems there may be limitations on the maximum duct sizes that can be used which could become problematic for large scale deployments.

Other Civils

The use of standard mounting systems for the chargepoints does not negate the need for civil works for other infrastructure, such as foundations for new feeder pillars.

A NAL socket awaiting a chargepoint in an on-street location

Creation of a True Open Standard

Cenex believes that a standard for EV charging infrastructure mounting systems could yield all of the potential benefits already being realised by in-use proprietary standard solutions, whilst avoiding many or all of their pitfalls.

What's more is the scope could be expanded to include multiple types of chargepoints or even electrical distribution equipment. The challenge would be designing the standard with engagement from the sector to ensure that any additional development costs for manufacturers does not outweigh the benefits, and that it is well-used when implemented via inclusion within industry-standard minimum technical specifications.

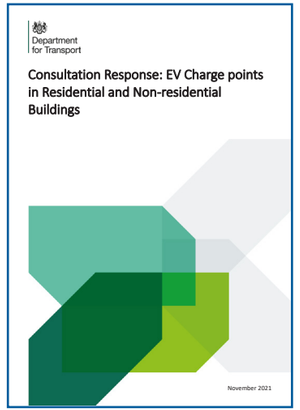
Cenex has engaged the British Standards Institution (BSI) about the standards creation process, who were supportive of the concept to create a standard for EV chargepoint mounting systems.

Our recommendation is that there is sufficient benefit for the UK Government to sponsor an open standard to help facilitate EV charging infrastructure rollout.

Of course, for any standard to be most useful, given that many of the manufacturers of chargepoints used here in the UK are based overseas, it would also need to be recognised internationally.

The BSI, as the UK's national member of the international standards organizations ISO and IEC, would be able to offer support on this as part of the standard creation process.

Further Reading



Consultation Response: EV Charge points in Residential and Non-residential Buildings
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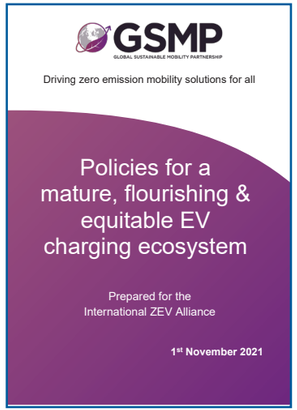
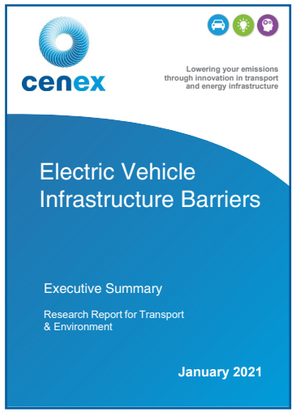
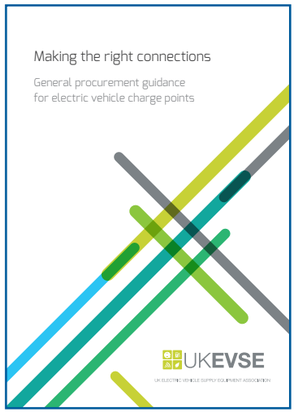


Policies for a mature, flourishing & equitable EV charging ecosystem
gsmp.world/wp-content/uploads/2021/11/211101-ZEV-Alliance-Policy-Advice_branded_Final.pdf



Electric Vehicle Infrastructure Barriers
https://www.cenex.co.uk/app/uploads/2021/05/EV-Infrastructure-Barriers-Executive-Summary.pdf



UK EVSE General procurement guidance for electric vehicle charge points
www.r-e-a.net/wp-content/uploads/2020/03/Updated-UK-EVSE-Procurement-Guide.pdf

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