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Design Guidance

Accessible EV charging

November 2022

Foreword

As Chief Executive of Designability, I am delighted to share this design guidance for accessible public EV charging with you.

As a UK charity, Designability has been creating solutions to increase independence for disabled people for over 50 years, and we are proud to have worked in partnership with Motability, the national disability charity, and hundreds of Motability Scheme customers on this project.

We hope that this design guidance will help you to understand the practical steps you can take to achieve a positive, real-world impact for disabled people across the UK. The future of electric vehicle charging should be accessible to everyone. We hope that you will use this guidance to review, shape and inform public EV charging infrastructure so that no one is left behind.

Catharine Brown

Chief Executive, Designability

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Background

We believe that no one should be left behind in the transition to electric vehicles.

One in five people in the UK live with a disability. By 2035 there will be 2.7 million disabled drivers and up to 50% are expected to be partially or fully reliant on public charging. With the UK government announcing that sales of new petrol and diesel vehicles will end in 2030, there is now an urgent need for accessible public charging infrastructure.

Motability, the national disability charity, identified that there is a lack of accessibility across the UK's electric vehicle (EV) charging infrastructure.

Designability is a national charity that enables disabled people to live with greater independence. We use human-centred design to create solutions with and for disabled people to give them greater choice every day.

At Designability we worked in partnership with Motability and engaged with over 200 Motability Scheme customers to inform this freely available design guidance for manufacturers, installers, providers and site owners of public electric vehicle (EV) charge point infrastructure, to ensure accessibility for all users.

The design and engineering team at Designability were active members of the steering group for PAS 1899:2022 – a new standard from the British Standards Institution (BSI) for accessible EV charging, co-sponsored by Motability, the Charity and the Office for Zero Emissions Vehicles (OZEV).

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About this design guidance

Purpose

This design guidance draws together detailed evidence about inaccessible aspects of current public Electric Vehicle (EV) charging, to inspire you to make public charging more accessible for disabled people in the future.

The guidance in this document is taken from our Accessible EV charging website, which also covers:

- Descriptions of the charging unit prototypes we built to test and illustrate some of the design guidance.
- Detailed case studies drawn together from real first-hand insights, to illustrate the impact of good and bad design on real people.
- Basic information about adapted vehicles for disabled people, mobility aids, electric vehicles and charging speeds and connectors, for those new to this sector.
- Suggested additional resources and further reading.

The guidance is aimed at anyone involved in, or responsible for, planning, procuring, designing, manufacturing, or installing public EV charging points.

How does the guidance relate to the new standard?

An accessibility standard for public EV charging points, PAS 1899:2022 Electric vehicles – Accessible charging – Specification**,** has been developed by the British Standards Institution (BSI) in its role as the national standards body (NSB) and was launched on 11 October 2022.

The standard provides detailed requirements and recommendations for the design of public EV charging infrastructure, and was co-sponsored by Motability, the Charity, and the UK Government's Office for Zero Emissions Vehicles (OZEV).

Members of Designability's design and engineering team sat on the steering group for PAS 1899:2022.

Designability's design guidance does not refer to every part of the standard, but it provides a wealth of evidence-based insights and real-life challenges to help you to understand the importance of applying it and makes some suggestions about how to approach the requirements contained within it.

Scope of this guidance

The design guidance covers signage and information, the built environment, and the process of charging an electric vehicle, including a range of:

- Charging point locations including kerbside, car parks and service stations
- Charging types – primarily fast and rapid
- Access needs including mobility, strength, stamina, and dexterity; and mobility aids including walking sticks, crutches, walking frames and wheelchairs
- Journeys including local and long distance

The guidance does **not** cover:

- The ultimate "accessible" charging point design
- Every part of the new standard (PAS 1899:2022)
- Specific dimensions for parking spaces and charging units (which can be found in the standard)
- Allocation of accessible charging spaces, which falls under OZEV's remit
- Home charging, although some guidance may apply in that setting
- Wireless charging, which has the potential to be accessible but is not yet widely available
- The design of electric vehicles, whose sockets and other features affect accessibility
- The design of charging apps, which can help with planning ahead

How to use the guidance

We hope you will use the guidance to shape and inform public electric vehicle (EV) charging infrastructure, develop your own designs, and check the accessibility of existing charging points. It's never too early or too late to learn about how to make EV charging more accessible.

Consider referring to the guidance during site visits as well as in the office. Looking at the guidance on a particular topic can really make sense once you are looking at a charging unit in its real-world context.

How we developed the design guidance

Everything in this design guidance has been directly influenced by what disabled drivers and passengers, and those close to them, have told us first-hand.

> *"It's really important to be involved in this process as a disabled person, because we are getting our views heard"*

We are grateful for the feedback from over 200 Motability Scheme customers who shared their views with us throughout the work.

This enabled us to create prototype charging units and to develop this design guidance so that their voices could directly influence industry.

Information about charging points

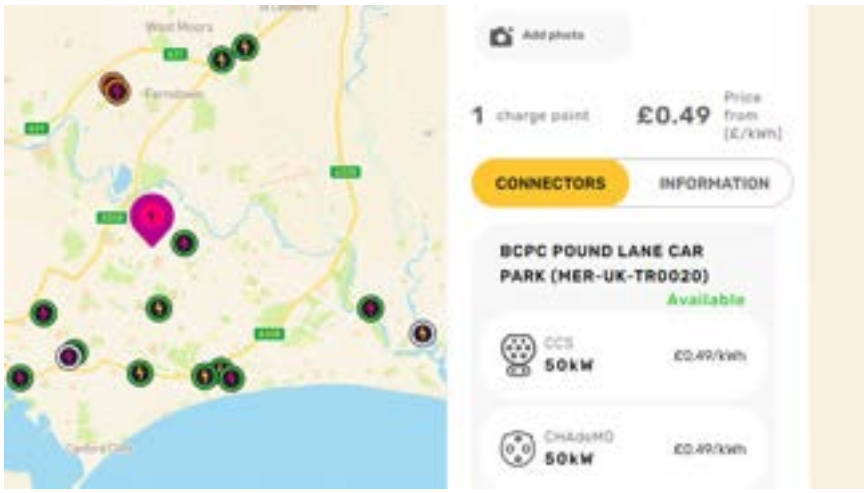
Before someone arrives at a charging point, they may want to find out what is available and choose one that suits their needs.

Why does information matter?

Information about charging points is important to help people choose a suitable one before they set off. This can be essential for disabled people who may have accessibility needs around parking, charging and nearby amenities, on top of the usual considerations such as charger type and speed, and eligibility to use a particular brand of charger.

Without easy access to this information, disabled people and those who travel with them can spend unnecessary time and effort looking for suitable charging points.

> *"It's so frustrating when I can't tell if the chargepoint will be accessible when I get there – it makes me anxious about my journey"*



Types of information

Information about accessibility

Once a user has chosen a suitable geographical location to search for a charging point, they may want more detailed information about accessibility, for example:

- The size of the parking space
- Space beside and at the ends of the vehicle
- The position and location of the charging unit and its features
- Kerbs or other obstructions around the space or the charging unit
- Level access to and from any nearby amenities

General information

They may also want to know more general information about a charging point, such as:

> *"What if I have a low battery and then arrive at a chargepoint and it doesn't work?"*

- Where exactly is it (for example on a particular floor of a multi-storey car park, or next to a store entrance)?
- Is the charger working?
- Is it available or is someone else using it – and can it be booked?
- What type and speed of charging is available?
- Are there any time limits to charging?
- How much will charging cost and what payment methods are available?
- Who can use it – only existing customers of that charging brand or anyone?
- Will I have to pay for parking?

Having this information can help disabled people and others to have confidence that they will be able to use a particular charging point. This can also help reduce concerns about having enough battery to reach their destination (known as "range anxiety").

Signage

It is important to help people to find a charging point easily, and to tell them useful information about the charging point once they have found it.

Navigation signage

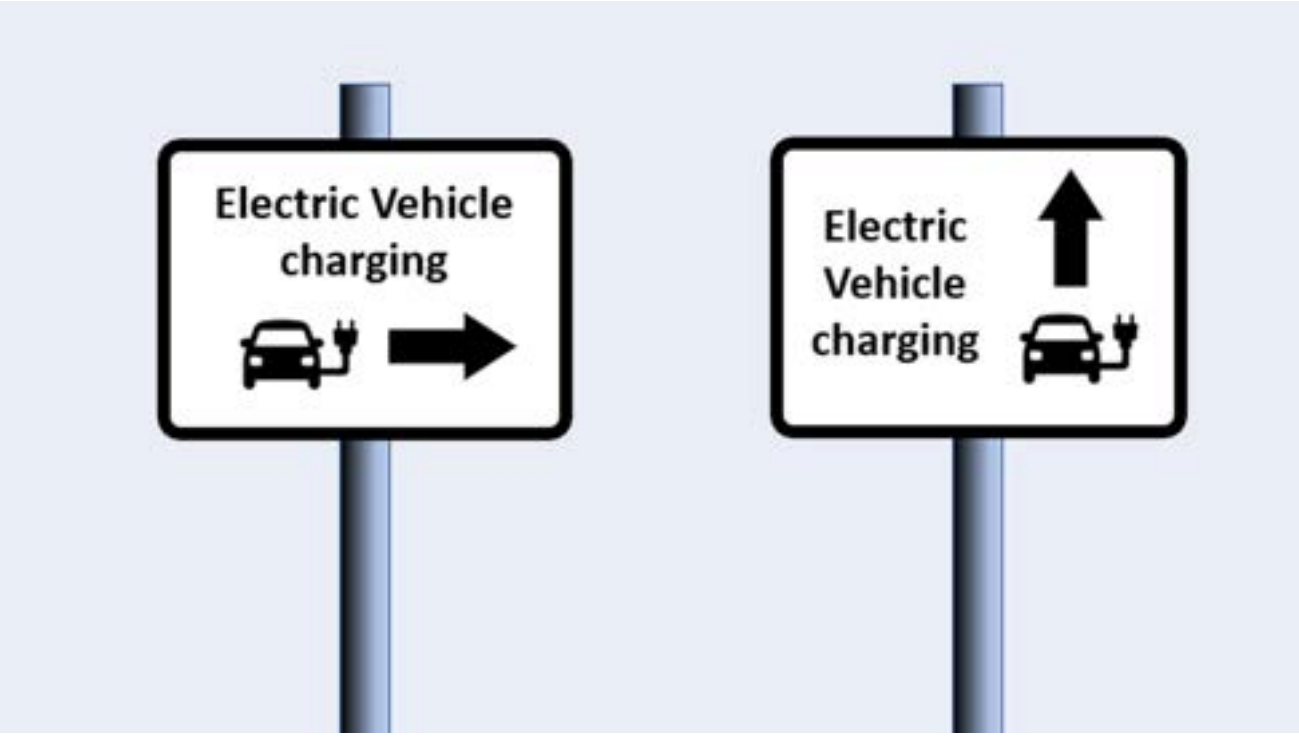
Helping a user to find a charging point can make charging a more straightforward experience.

Ideally provide clear, consistent navigation signage from a site entrance to the charging points, particularly where there are several different areas or storeys within a car park.

If dedicated accessible charging points are available, be clear about this on the navigation signage too.

> *"I hate it when I get to a car park entrance and it takes me ages to find the chargepoints"*

Good, clear navigation signage can save people time and frustration and can prevent congestion as any users can hesitate while looking for charging points.



Signage at the charging point

Signage at the charging point should tell the user some key information about the charging point in a suitable format.

Information on signage

Make clear the most important information for users, such as:

- who can use this charging point (one brand's customers only, or blue badge holders only?)
- whether parking charges apply (and whether this also applies to blue badge holders)
- any time limits for parking or charging
- what type of charging is available (connector type, charging speed)
- how to use the charging point, if this is not clear elsewhere
- what penalty applies if a vehicle is parked in the space when it should not be

Make it clear to legitimately parked charging customers, as well as those who should not be there, how to avoid getting a fine or a parking ticket.

The signage at the charging point can also be used to tell the user how to use the charging unit, even if this is already available somewhere else, such as in a smartphone app.

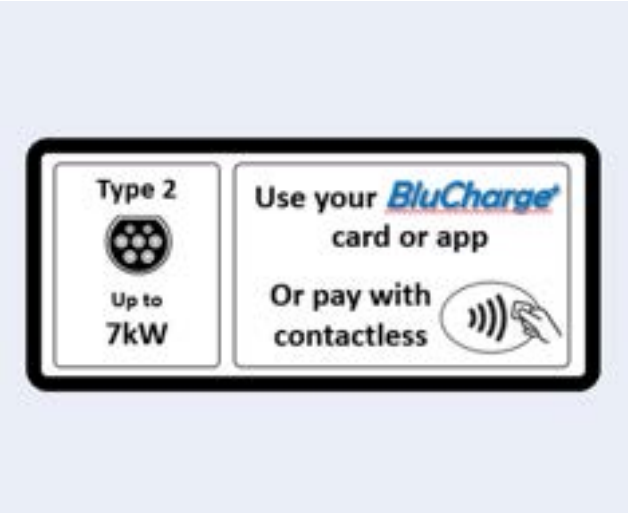
> *"I hate it when the signs aren't clear – I've had several parking tickets when charging my EV, even though I have a blue badge"*

Format and visibility

Prioritise showing this essential information to the user in a clear, consistent way, and display other required information separately (e.g. car park liability and other legal notices and "small print").

For more about formatting visual information, see the section called "Start, stop and pay for charging" on page 28.

Make sure the signage can be easily read from a realistic distance, from a seated or standing position, and ideally from inside the vehicle to save the user from getting out of the vehicle to check what they need to know.



> *"So-called 'accessible' signage only at low level is not accessible for me, as I cannot bend down to read it when standing or walking"*

Positioning

Finally, remember that poorly placed signs can make the area around a charging point less accessible, so take care not to position them where they can cause an obstruction or risk of injury to the user or to people passing by (for example at head height on a footpath).

See "Charging unit position and location" on page 18 for more information about obstructions, and see PAS 1899:2022 for more about required gaps between street furniture.

Space around the vehicle

The space around a vehicle can enable or limit access to a charging unit. While you should refer to PAS 1899:2022 for specific dimensions, here we tell you what space people need and why.

Space at the sides of a vehicle

Make sure users have space to open their driver and passenger doors fully.

This will allow drivers and passengers with reduced mobility to straighten their legs when getting in and out, to have enough space to help passengers (adults or children) in and out, and to have enough space to move along the sides of the vehicle.

> *"I look for a wide enough space so I can get my door fully open, as I have a bit of trouble getting in and out of the car"*

Some adapted vehicles need space along the side so that the user can get in and out using ramps or lifts.

Some users will need to open doors on both sides of the vehicle on the same occasion. For example, a disabled driver may need to get out of the driver's door, and then have enough space to manoeuvre around to help a child out of a passenger door on the other side of the vehicle.

> *"All of the chargers near me are in single parking spaces and on the driver's side there is a kerb and a verge, so I always have to have someone with me as I can't fit my wheelchair (or even crutches, if I'm having a good day) past the car"*

Parking next to a kerb can create an extra barrier for those who cannot easily step or transfer from their vehicle onto the pavement.

> *"I have to park my car away from the kerb so I can stand between the car and the pavement – then my passenger is right in the traffic flow"*

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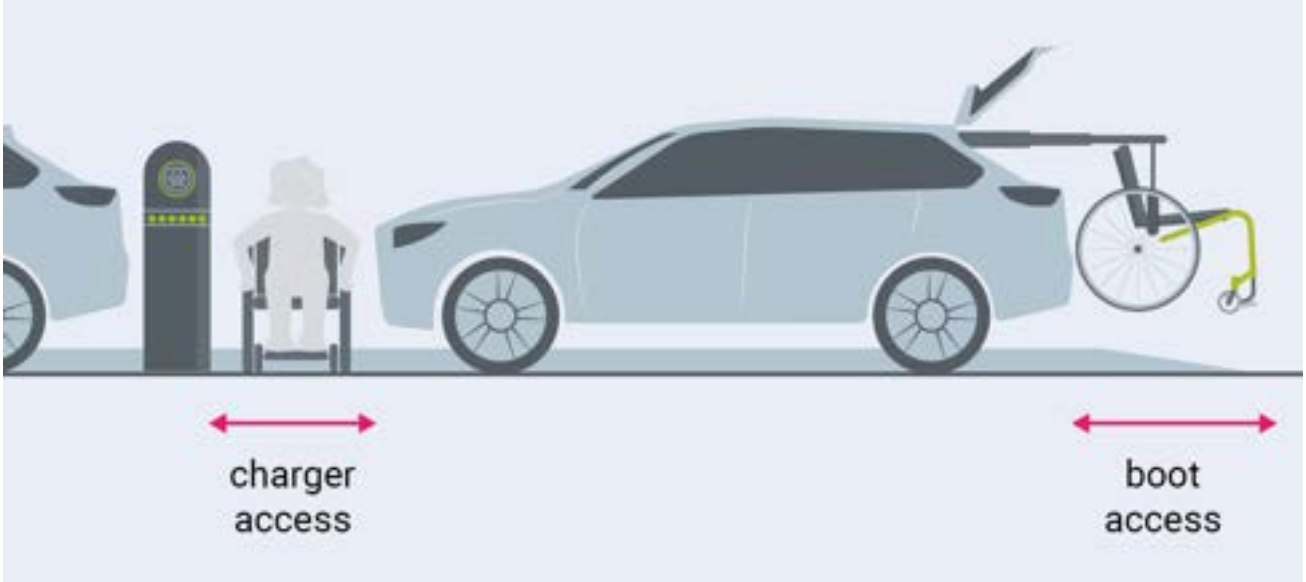
Space at the front and back of a vehicle

Ideally provide protected space at the front and back of the vehicle at the same time.

For example, a user may need to park their vehicle with the front charging socket close to a charging point leaving enough space to access the charging unit, and still have enough space to get their wheelchair out of the boot while being protected from moving vehicles.

> *"People park close to my boot when I am out shopping, then I can't get my scooter back in the boot"*

It is important that protected space around the vehicle is clearly marked so that drivers do not park in it.



Wheelchair Accessible Vehicles

Larger Wheelchair Accessible Vehicles (WAVs) may require extra space around them for ramps and lifts.

Some people may need specific charging point provision for larger vehicles, which could include making use of void space on the end of a row of spaces. Refer to PAS 1899:2022 for detailed space requirements.

Charging unit position and location

The way a charging unit is positioned, and the location of a charge point in relation to its surroundings, can affect the user's charging experience.

Kerbs and level changes

People should be able to exit their vehicle and walk or wheel easily onto pedestrian walkways from the charging point, so make sure level access or nearby dropped kerbs are available.

> *"I can't transfer from car into wheelchair when there is a high kerb; I look for level access onto the rest of the site (so no steps, kerbs, gravel, cobbles etc) – I don't want to be landlocked at the charger!"*

All parts of the unit should be reachable from the ground level that the person is standing or sitting on, once the unit is in its installed position. The accessibility of a well-designed charging unit can be undermined by placing it in a higher position than it was designed for, inadvertently putting some of the features out of reach of some users. See page 23 ("See reach and use parts of the charging unit") for more about making charging units accessible.

> *"The machines on kerbs are too high up to reach from my wheelchair"*

Setting a unit too high up or too far back on a step can restrict who can use it, particularly as the raised surface can require the user to move onto a raised surface consisting of gravel, mud or bark chippings.

Bear in mind some features on the side of a unit may be harder to see and reach than those on the front, so consider the whole setting when positioning the charging unit.

> *"The raised kerb doesn't give much space to stand around the charger, but I need to step up to reach the cable – then I worry about stepping backwards off the kerb without noticing the level change, and falling"*

Obstructions at the charge point

Measures that are put in place to protect the charging unit, such as bollards and raised concrete plinths, can reduce access, so consider the positions of these carefully so that they do not prevent someone reaching or using parts of the charging unit, or look at alternative solutions.

Remember that some wheelchairs and scooters have large footplates or front or rear parts that may limit a person's reach.

Ensure that there is space for people using different mobility aids to approach the charging unit and position themselves so they can see reach and use all parts of it. See page 23 ("See reach and use parts of the charging unit") for more about making charging units accessible.

Other obstructions such as poorly positioned bins and signs can also prevent access to otherwise accessible charging units.

> *"I don't approach it straight on, I position myself diagonally in my wheelchair so I can get closer to it with my right hand"*

Shelter and lighting

Consider providing shelter over the charging unit to protect people from hot or wet weather.

This can be more important for disabled people because they may take longer than average to get in and out of the vehicle or to wait for electric powered doors to open and close, as well as to manoeuvre around the vehicle and manage the charging process.

Lighting that illuminates the usable parts of the charging unit means that the user can see what they are doing, and situating the charging unit in a well-lit area can help people to feel safe in the dark.

> *"There is no light in my car's charging socket, so in the dark I use my 30-seconds of headlights that stay on after I get out of the car to rush to plug in the cable"*

Nearby amenities

People may need or want to be close to shops, toilets, cafes or other amenities while they charge their vehicle. This can be particularly important for disabled users with toileting or other needs, and convenient for anyone to save time moving from the charging point to the amenities.

> *"The chargepoints at my nearest motorway services are near the shops and toilets, which is what I need – I'll always choose those, even if I have to drive further to find them"*

Ground conditions

Think about the ground surface around the charging unit. Level, smooth ground is important because people with mobility issues, whether walking or wheeling, may find sloping ground and uneven ground such as gravel, potholes or mud difficult or impossible to move around on, and they may be more likely than other people to trip or fall.

> *"Lots of car parks are on a gradient. I park with the bonnet pointing downhill so that my wheelchair is trapped by the open car door as I assemble it and cannot roll away"*

Once a person has arrived at a charging unit, make sure they do not need to move onto muddy, grassy, or uneven ground to reach the parts of the charging unit.

> *"I hate it when I have to stand on wet grass to charge"*

Trees and shrubs

Finally, remember that although foliage is often used to make car parks more green and pleasant, untrimmed shrubs and bushes can make charging unpleasant or impossible for some people, particularly in wet weather.

> *"I get wet where there are bushes close to the charge point and it has been raining"*

See, reach and use parts of the charging unit

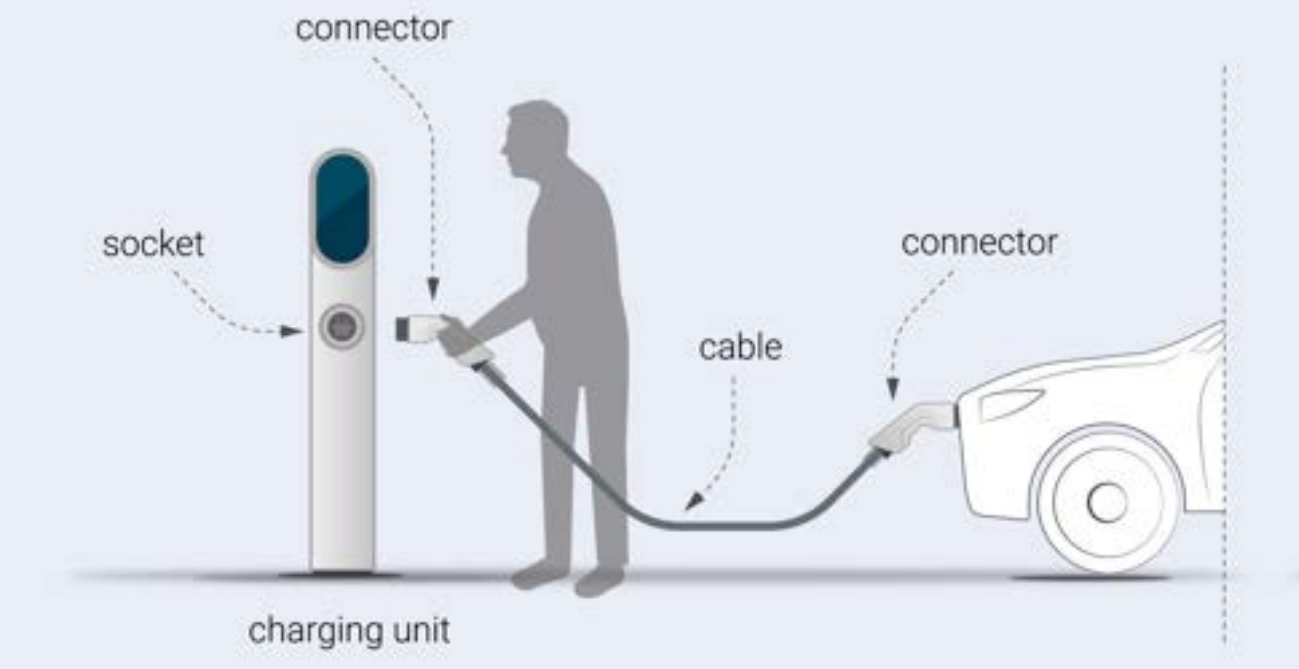
Once the charging unit has been installed in a suitable setting, people need to be able to see, reach and use every part of it.

Parts of the charging unit

Charging units vary, but can include features such as:

- Cables
- Connectors and their holders
- Sockets
- Screens
- Lights and illuminated signs or labels
- Buttons
- Contactless payment pads

All of these features need to be seen, reached and used by both seated and standing users. See our pages on connectors (page 38), cables (page 40), and sockets (page 44) for more information about these features.



See the features

People should be able to see and recognise each feature easily.

Make sure each part of the charging unit is recognisable or well-described so that the user knows what it is.

For example, a contactless payment pad is often a black box with a raised black symbol on it which can be difficult to see. Where contactless pads are used, consider making them easy to see and recognise by using good contrast and labelling.

Remember that someone using the charging point may not be the driver, so do not assume that the user will have good enough vision to drive. Equally, drivers who need reading glasses that are not required for driving may not have these with them.

> *"I like not needing my reading glasses to see the screen"*

Well-designed labelling can help to make the parts of the unit easily recognisable. Make sure that labels are easy to read by using high contrast and large text and symbols.

Put the labels close to their features so that it is clear what they are referring to. If there are similar features on the unit (such as different types of similar connector), describe each one clearly to help the user to choose the right one.

Where screens are used, make sure that they can be seen from seated and standing positions and are visible even in bright conditions. This may require measures such as positioning the charging unit away from bright sunlight, ensuring adequate screen brightness, shielding the screen, and using screens that do not degrade in strong sunlight.

Combining screen tilt with the right screen height can make the screen accessible to more people – see PAS 1899:2022 for more about screen height and tilt.

Other illuminated parts, such as lights and illuminated signs or labels should also be visible in bright conditions.

Reach the features

All parts of the unit must be reachable by standing and seated users. Some people cannot extend their arms fully when reaching because of reduced strength, pain or fatigue, or their use of walking aids.

For example, a wheelchair user with a shoulder injury may not be able to reach as far forward as a standing person with no physical disability, and someone using crutches or a walking frame may have limited reach.

The elements of the charging units must be reachable horizontally (reaching forwards or sideways) and vertically (up or down from the person's current position).

One easy mistake to make is to design all the elements of the unit to be at the correct heights and then to install the charging unit up on a kerb or concrete plinth so that the features are then too high to reach, so bear in mind that each person must be able to reach all of the elements from their ground level once the unit is in place.

Units that are set too far back on a kerb can cause similar problems.

> *"I don't like it when chargers are up on a kerb and the socket is on the side of the unit – it's almost impossible to reach from my wheelchair"*

When considering a person reaching, think about their possible position. For example, a person using a manual wheelchair may choose a diagonal chair position to reach across with their preferred arm, and someone using a mobility scooter may reach sideways, rather than forwards, to access a charging unit.

Use the features

It is important to remember that the strength and dexterity needed to actively use a feature (for example a connector or cable) may well be more than the person needs to simply reach it. Simply being able to reach a part does not mean that someone can actually use it in a meaningful way.

Actively using parts of the charging unit can involve holding a position (to touch a screen in a controlled way or use a fine grip to hold a contactless payment card against a payment pad) or supporting a weight for a short time (when holding a connector).

This can be difficult for some people, so some proposed maximum forces needed to use some parts of public charging points are provided in PAS 1899:2022.

Other people may choose to let go of a walking aid such as a walking stick or crutch when using the charging unit, so consider providing somewhere to support those.

Make sure that all the features require minimal effort to use, and where possible give feedback to show that they have been used correctly. See the section on “Start, stop and pay for charging” (page 28) for more on this.

Start, stop and pay for charging

Make the charging process as simple as possible. Consider removing any unnecessary steps, and make sure that people can easily understand what is happening and what they need to do.

Start charging

Make the set up and start of charging as simple as possible.

Remove unnecessary steps or automate them to save the user time and effort. For example, if members and non-members can use a charging unit, do not ask whether they are a member, if they can instead indicate this automatically by holding their membership card against a contactless pad.

Remove payment steps to shorten the process. For example, if there is a way to automatically identify the vehicle or the user, this can save them time and effort.

Accessing the set up process

Ideally do not make the system app-only, since smartphones can be inaccessible for some people despite the widely available range of accessibility features. Smartphones also require enough memory to store specific apps, and a mobile phone signal is not always available at every charging point (although some charging points provide local mobile hotspots for this purpose).

"Accessible" can mean different things to different people, so ideally a range of options for accessing the charging unit. For example, a smartphone app, buttons or touchscreens on the charging unit should be available.

> *"I'd like to just tap a payment card onto the charger and go! I don't want the faff of using an app and an interface"*

Conversely, holding and handling a contactless card (for payment or membership of a charging scheme) can be difficult for those with poor dexterity or feeling in their hands.

> *"Payment cards can be hard to handle, because you need fine finger actions"*

Give the person enough time to set up and start charging. Some systems "time out" after a while if the user does not continue to set up the charging process. However, if this time limit is too short, a disabled person who needs to take longer to move around the vehicle or to manage an app may be prevented from charging.

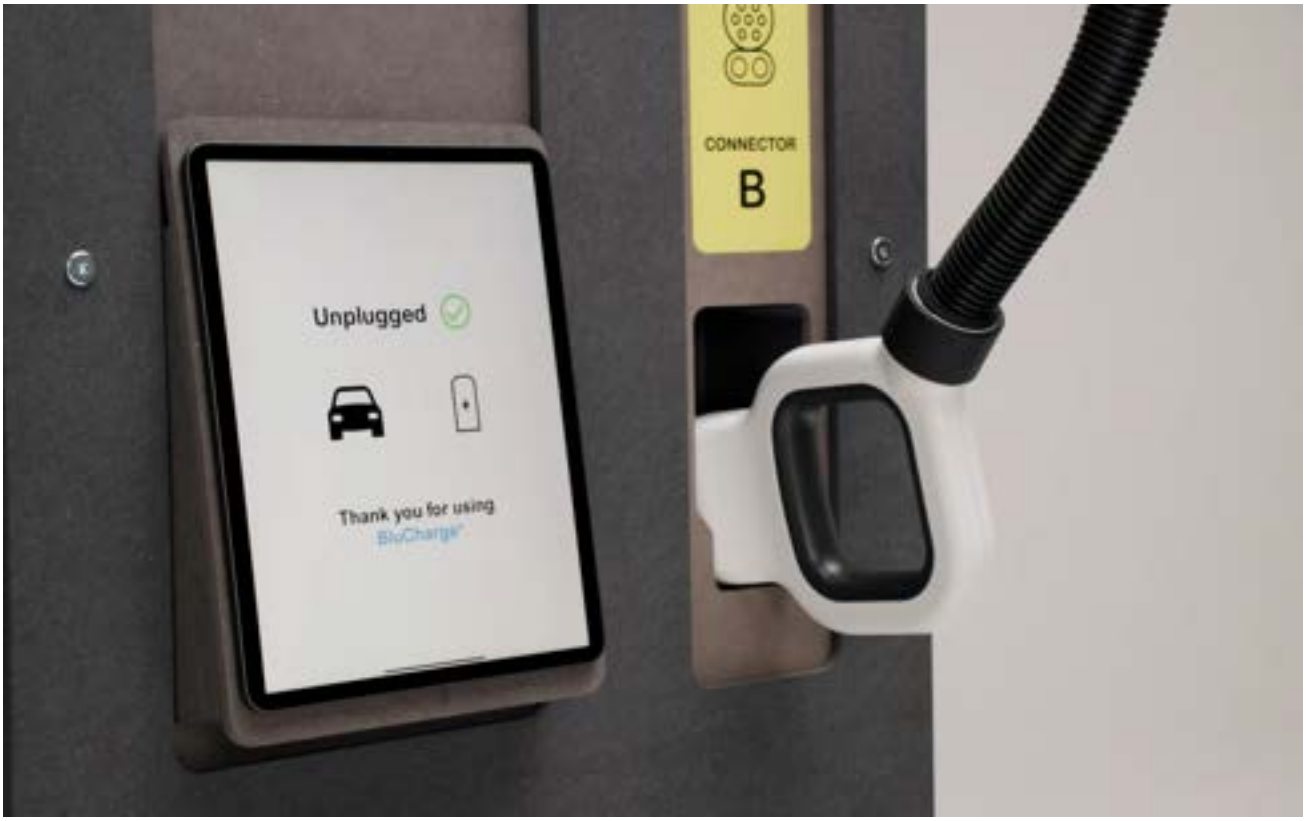
> *"The app can time out while you are setting it up if you are not quick enough, and you have to start the app process again"*

Stop charging

Finishing charging should be another simple step. One common issue raised in our research is that charging connectors can be locked into a vehicle's socket during charging, and need to be released by the charging unit before the connector can be pulled out.

Make sure it is clear to the user when the connector is ready to pull out. This is particularly important for people with limited strength or reduced balance, as they could overbalance if a connector suddenly releases while they are pulling on it.

> *"Sometimes I can't tell if the connector is too stiff to pull out, or if it is still locked into the vehicle"*



Pay for charging

The payment process should be simple and, ideally, automated.

If it is necessary to take a minimum or holding payment, make sure this is as low in value as possible and communicated clearly to the user. High holding payments that sometimes take several days to refund can cause problems for some disabled people on fixed or limited incomes.

In some situations where a person tries to use a charging unit that then stops working, and they then have to try another unit, they may be liable for more than one holding payment on a single day.

> *"It is frustrating if you go to a new charging point, download a new app, pay £5 just to access the charger, then find out the charger isn't working"*

The use of contactless payment cards can be a simple approach that allows both charging scheme members (who have signed up to use certain brands of charging points), and contactless bank card holders, to pay for charging in a single action without the need to log in.

However, bear in mind that cards can be hard to handle and position against a contactless pad for some people with reduced dexterity, particularly in cold weather or when wearing gloves, so having alternative options can be helpful.

> *"If I have to pay using card, and I am using a walking stick that day, I have to use my walking stick in my "good" hand, and manage a card or wallet in my other hand, all while off-balance"*

The use of other contactless payment methods such as virtual wallets on smartphones or smart watches can also be accessible for some people.

> *"Contactless payment on my smartwatch is good, because I can keep my hands free to use my walking stick for balance – I just briefly lift my wrist [while still holding the walking stick in that hand] to pay and I can usually steady myself to do that"*

Information and instructions

Once you have made sure that your charging process is as simple and short as possible, make sure you give clear information and instructions to the user. Consider where, when and how you provide these.

> *"Think about providing the right information, in the right place, at the right time, in the right format"*

Consider putting a visual summary of the steps involved on the charging point's signage to provide reassurance as people arrive. Find out what else to include on signage on pages 12 to 14.

Make sure that visual instructions are noticeable and readable when the person needs to see them. For example, do not put the instructions only on the side of a unit if the person is likely to approach the unit from the front and vice versa. The person may be seated or standing, and not everyone who is standing can easily bend down to read information.

Visual instructions, including in a smartphone app, should have clear layout, good contrast and large enough information to be read from the appropriate distance, following best practice in information design.

When writing text instructions, consider that not everyone will have English as a first language, or be literate, so use symbols alongside text as an additional format. Be consistent and group information together to make it easier to take in.

Step-by step instructions

Step-by-step instructions before, during and after charging can make the charging experience simple and reassuring for new and returning users. It can also be a valuable way to reduce the mental effort required during the process, which can be important for people with low energy or anyone who is distracted or tired. One participant who tried our prototypes with simple instructions said:

> *"No understanding needed, it just tells you what to do. It's better just to have one piece of information at a time"*

For step-by-step instructions, additional spoken instructions can be valuable. These can support those who are not confident readers, as well as reducing the need for the user to turn towards the charging unit's screen for information at every step. However, making spoken instructions optional is a good idea, since some people prefer a more discreet or quieter experience. One participant who tried our prototype with the voice instructions option said:

> *"It's very simple, very easy to use – you don't have to look at the screen"*

CONNECTOR
B
Which connector will you use?
A
B

CONNECTOR
B
Plug in your chosen connector

Feedback to the user

Provide clear feedback throughout the charging process, so that the user can be sure of what is currently happening and whether their actions have had the intended effect. Avoid the need for someone to say “Did that work?” or “What am I meant to do now?”, at any point in the charging process.

For example, make it clear to the user that charging has started or stopped successfully, payment has been accepted, or that the connector is ready to unplug.

Feedback to reinforce physical actions

Physical actions can be reinforced by a click or a sound and a visual (written or symbol) confirmation that the action was successful; however, vibration is not recommended in this context because some disabled people, particularly those with neurological conditions, can experience unpleasant sensations or pain in their hands when touching a vibrating object.

> *“The idea of vibration is not so good, as it can leave an unwelcome sensation in the hands and arms”*

For example, a click or a beep together with a written and spoken confirmation can give confidence that a connector has been successfully plugged into a fast charging unit or into a vehicle.

One common area where feedback is important is when the person comes to unplug the cable at the end of charging, when the connector has been locked into the vehicle during charging. See the “Stop charging” section on page 30 for more details.

Visual feedback

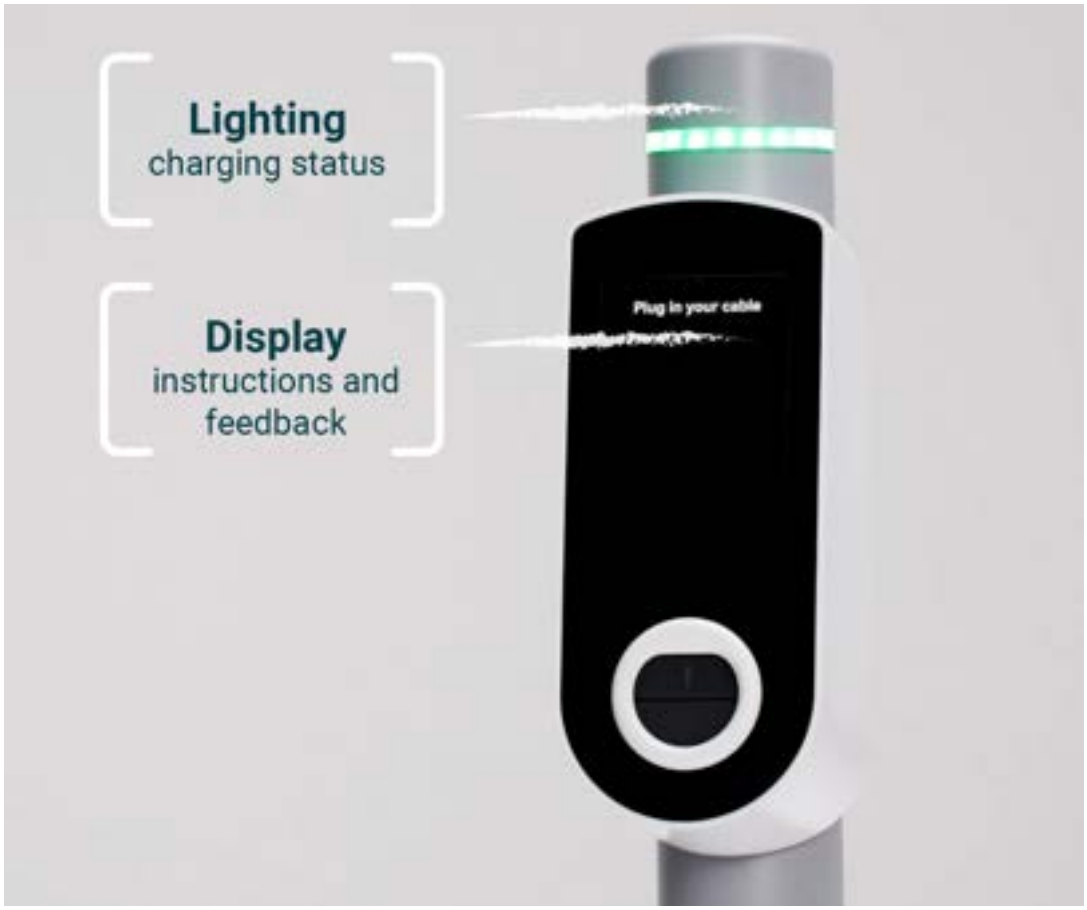
Using words and symbols together is useful for those who do not read English fluently, to accommodate a wide range of people. For more on this, see the “Information and instructions” section on pages 32 and 33.

If there are steps in the process which involve the user waiting for something to happen (e.g. a payment being processed, or a charging unit doing some internal checks before starting to charge), make this clear.

Coloured lights can be useful indicators of the status of the charging unit (e.g. available, charging, out of order) from a distance, as well as up close when the user makes the unit change from one state to another. An informal convention for chargers in the UK is to use green lights to denote “available”, red for “out of order” and blue for “charging” or “in use”.

When the user is close to the unit, the colour should also be reinforced in other ways, so that anyone with colour blindness can also be sure of the current state of the charging unit. These may include moving light patterns, illuminated words or other approaches.

Ideally enable someone to see whether the unit is available from a distance as they approach it before parking, and when they have left the vehicle while it is charging. It can save a person time and energy if they do not need to approach the unit from a particular direction to see or check its current status.



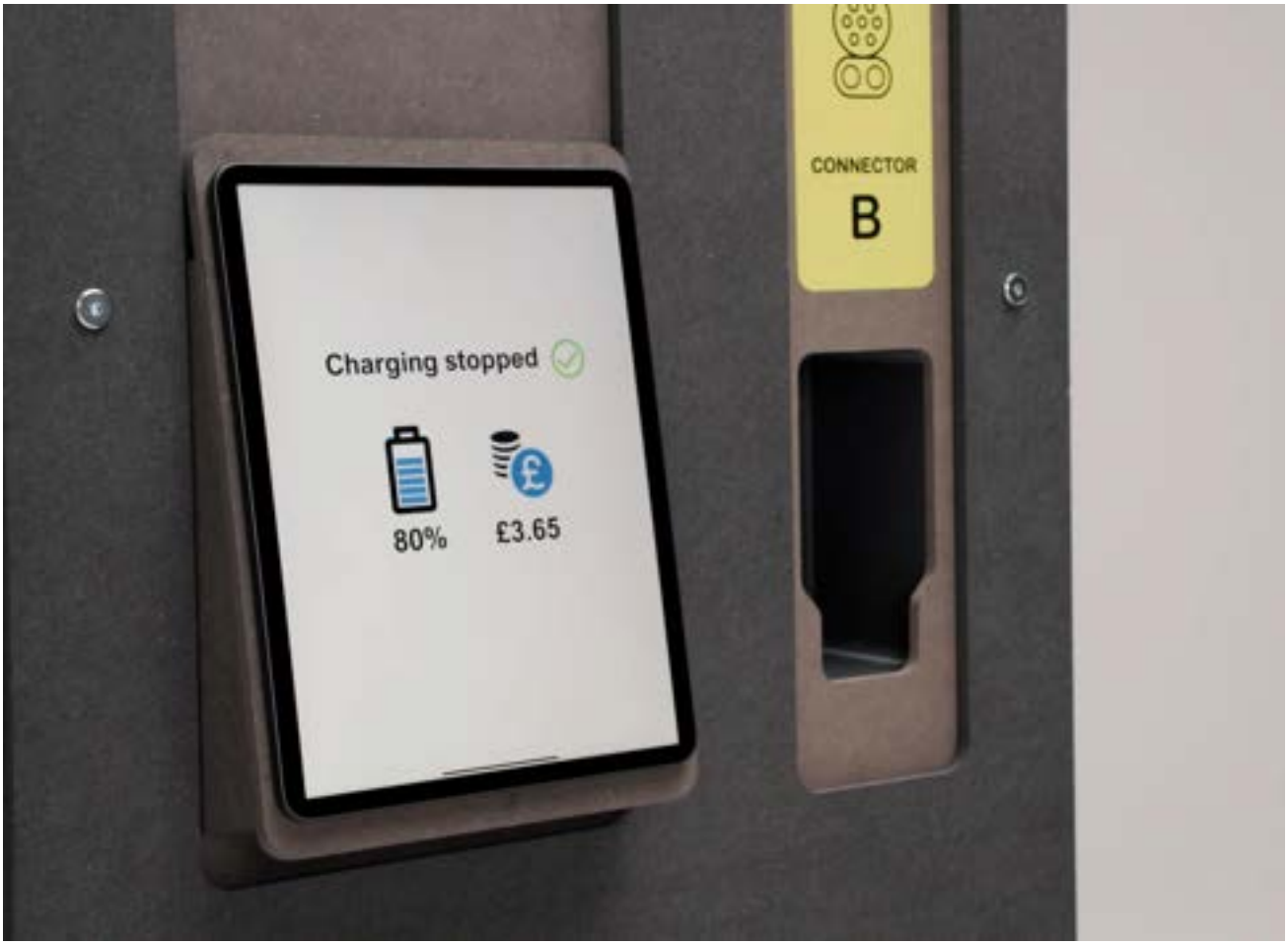
Feedback during charging

Provide information during charging, so that the person can stay informed about things like cost and charging speed, as well as whether charging is successfully happening. Providing a speech option can also be a useful way to tell users information (see the Information and instructions section of on page 32 for more about spoken information).

Most people are interested in their vehicle's current battery level, so consider displaying this clearly on the charging unit during charging, even though it is usually provided on the vehicle's dashboard and on a smartphone app.

Displaying the battery level overhead on a rapid charging unit can help people to know their battery level at a glance and to feel less under pressure from other motorists to move their vehicle while it is charging.

> *"Showing the battery level clearly would be good for avoiding pressure from people who want to use the charging unit next, who say 'Are you going soon?'"*



Providing customer support

Sometimes the charging process does not go as expected: perhaps the charging unit is faulty, or there is an issue with payment. If charging cannot be carried out successfully, the user will need a way to seek help.

When providing a way for someone to ask for assistance, consider whether on-site staff may be able to help if the charging point is near some amenities. If so, make sure that they can be easily and reliably contacted and have the necessary training.

The standard approach of a telephone helpline is useful but can be frustrating if there is no reliable phone signal or if a call centre takes a long time to answer, and is not suitable for someone who does not have the ability to make a voice call because of speech or hearing issues.

> *"The charging machine near me is often not working, and then you have to wait on the phone, only to be told they know it's broken"*

Consider how you can provide reliable and responsive support for disabled people if things do not go to plan, which does not rely solely on a telephone support line.

Connectors

Connectors are at the centre of any charging process that requires a cable.

Connectors on tethered cables

Tethered cables attached to rapid charging units can be heavy and hard to manage, but good connector design can help.

Provide a handle that can be held in different ways, using one or two hands without relying on strength or dexterity.

The connector needs to be removed from and returned to the charging unit easily, without the need for precise hand actions, and also inserted into and pulled out of the charging socket on the vehicle.

The user may also need to move the connector some distance between the charging unit and the vehicle, so make this easy to hold.

Connectors on untethered cables

Where a user needs to provide their own cable, the connectors at both ends of the charging cable should be easy to use.

Consider providing a handle on each connector to help hold, carry, insert and remove the connector. Make sure the handle can he held in different ways, using one or two hands, and can be inserted or removed without relying on strength or dexterity.

If the connectors on the ends of the cable look similar, think about labelling them clearly to save the user time.

Consider giving feedback to the user so they can be sure that the connector is fully pushed into the charging unit.

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Cables

Handling charging cables can be one of the most inaccessible aspects of charging for disabled people.

Cables attached to charging units

These “tethered” cables for high power rapid charging are typically thick, heavy and stiff, and can be hard to handle.

> *“I’m not very strong and it’s hard to drag the long cable and plug it in”*

The effect of the cable weight on the user should be limited, so that people with reduced strength can use it. This can be done by supporting the cable in different ways, making it retractable, or reducing the length of the cable.

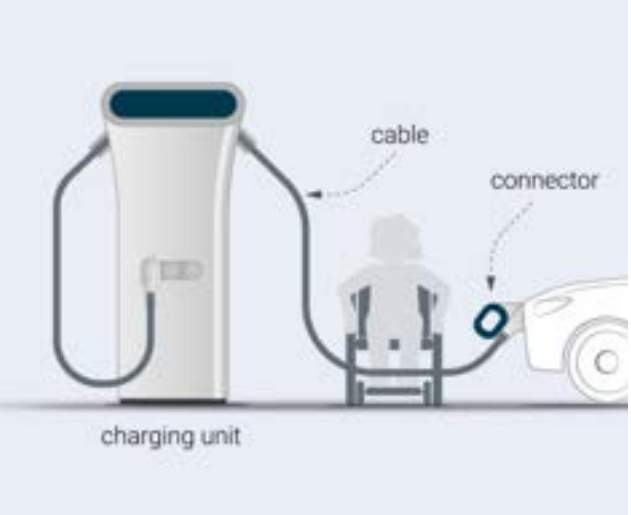
See PAS 1899:2022 for more information about cable weight.

Managing the space around the charging unit may enable the use of shorter cables, since more flexible spaces can increase the chance of a disabled person being able to park with their vehicle’s socket close to the charging unit.

Be aware that both short and long cables can be hard to manage.

People can have difficulty with stiff cables when they are using a cable in a small space (for example between charging unit and a vehicle).

> *“In some cases I have had to move the car, to be able to bend the cable tightly enough to plug it into the car.”*



Stiffness can also cause problems when turning the connector towards the vehicle's socket when the cable is at full stretch at the far end of the vehicle.

> "When I connect to the vehicle I have to twist the cable round for the nozzle to fit into the charging socket and I find this very difficult due to the weight of the cable"

Avoid the tendency for cables to twist as this can make them hard to handle.

> "It's hard if the cable is twisted, as that means you're fighting the rotation of the cable as you handle the cable and as you try to plug it in."

Cables should be flexible enough to enable the user to move and position the connector where they need it, including plugging it into sockets that are at different heights and locations on vehicles. See pages 44 to 46 about sockets for more details.

Consider changing the outer material of the cable to make it more flexible, or designing the fixed end of the cable so that the cable can move or swivel more freely. Building in greater flexibility where the cable meets the connector could also be helpful.

Avoid the need for cables to trail on the ground, as this can cause trips and falls or block access to people who cannot step over or wheel over them.

> *"When I am using walking sticks, it's possible to fall over the cable"*

Portable cables

These “untethered” cables (owned by the user) can be hard to manage. While this project did not focus on users’ own cables, people shared some useful insights about the challenges that these can bring.

Reducing the weight of the cable could be useful for anyone with limited strength or stamina, as cables are often stored in a car boot and carried to the charging unit.

Cables can trail on the ground and get wet and dirty in some conditions, so it is desirable to help people to hold and carry the cables without getting their hands or clothing dirty. This can be a challenge for people who use both hands to propel a wheelchair or need to hold a walking stick.

Possible solutions could include adding handles to help manage the cable, reducing the cable length needed by rearranging the space at the charging unit, or providing ways of supporting the cable.

Untethered cables need to have usable connectors on each end. See page 38 on connectors for more information about this.

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Sockets

Sockets on charging units can be hard to use for many disabled people, and for some, completely inaccessible.

Socket position

All users should be able to see, reach and use sockets easily.

Make sure that each socket is easily recognisable and clearly visible from wherever the user approaches the charging unit, and ideally has good contrast with its surroundings.

The user should be able to reach the socket comfortably by reaching forwards or sideways from a standing or seated position.

The socket should not be too high or low for seated or standing users to reach and use – there are socket heights that can work for both groups, or you could consider providing sockets at different heights or ones that can easily be adjusted to different heights.

Note that simply providing lower sockets for seated users is not likely to give a universally accessible experience, since there are people who cannot easily bend down because of pain or limited balance. However there are some socket heights that may work for both standing and seated users – see PAS 1899:2022 for details.

Consider that the socket may be easier to access on the front or side of the charging unit, depending on the surroundings. Go to page 22 (“ See reach and use parts of the charging unit”) for more information on the positions of different parts of the charging unit.

Socket covers

Charging points are usually outdoors and their sockets need to be protected from water and dirt. However, the covers used to protect the sockets can make them less accessible for some people.

If a socket cover is needed, make sure the user can open it easily and insert a connector using one hand.

A stiffly sprung socket cover that needs two hands could prevent a user from using a charging unit at all.

> *"I only have the use of one hand, and it's only because I have years of experience that I can manage things like lifting up the socket flap on the vehicle"*

One-handed use could include using the connector, rather than a hand, to open the socket cover.

This small change to a common socket cover design could help users who can only use one hand, for example if they:

- Are using one hand to hold a walking aid or to lean on the charging unit for support
- Are carrying something in one hand (e.g. a payment card or smartphone)
- Only have the use of one hand
- Only have one hand

Make socket covers easy to find and obvious to use – consider having a high contrast surround to highlight the socket's location.

Also consider supporting the weight of the connector while the user is lining it up ready to push into the socket.

Make sure the user can push the connector into the socket with little force.

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Resources

1. Designability's dedicated website on Design Guidance for Accessible Public EV Charging:

   accessibleevcharging.designability.org.uk

2. The new accessibility standard for public EV charging points: PAS 1899:2022 Electric vehicles – Accessible charging – Specification:

   bsigroup.com/en-GB/standards/pas-1899

3. The website for UK charity Designability:

   designability.org.uk

4. The website for Motability, the national disability charity:

   motability.org.uk

Acknowledgements

Special thanks to all the disabled drivers and passengers, and those close to them, who shared their knowledge and experience to inform this work.

We would also like to acknowledge members of our industry stakeholder group, who supported this work by giving us feedback throughout the design process.

Thank you to the British Standards Institution (BSI) for inviting us to sit on the steering group during the development of PAS 1899:2022 Electric vehicles – Accessible charging – Specification.

Finally, thanks to Motability, the national disability charity, whose grant funding supported the Accessible EV charging project.

Design Guidance

Accessible EV charging

November 2022

Version 1.2

Scan this QR code to explore Designability's Accessible EV charging website

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