

Design and implementation of publicly accessible charging sites for battery electric HGVs – Code of practice

January 2025 Version 2



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Department
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Foreword

This BSI Flex was sponsored by Connected Places Catapult (CPC). Its development was facilitated by BSI Standards Limited and it was released under licence from The British Standards Institution. It came into effect on 31 January 2025.

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The content in this version is part of an iterative process. It is likely to change from time to time with subsequent iterations.

Supersession

This version of BSI Flex 2071 supersedes BSI Flex 2071 v1.0:2024-06, which is withdrawn.

Relationship with other publications

This BSI Flex is part of the zero emission HGV and infrastructure demonstrator programme, alongside:

- BSI Flex 2072, *Battery electric and hydrogen-fuelled heavy-duty vehicles – Workshops and protocols for maintenance and inspection – Specification*
- BSI Flex 2073, *Design and implementation of mobile and static hydrogen refuelling sites – Code of practice*

Information about this document

This is Version 2.0 of BSI Flex 2071, which is the last planned version of the document. All comments received will be reviewed to inform the future direction of this document. Interested parties are encouraged to check the BSI website for updates regarding any future plans.

This is a partial update of the document, and introduces the following principle changes:

- the Introduction and Scope have been expanded to include reference to the RIBA Plan of Work [1];
- greater emphasis on the development of an operational plan is given in Clause 5;
- risk assessment considerations and guidance have been included in Clause 6;
- further detail has been added to address electrical safety considerations; and
- additional information has been given around charging site safety and security.

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Presentational conventions

The provisions of this BSI Flex are presented in roman (i.e. upright) type. Its recommendations are expressed in sentences in which the principal auxiliary verb is "should".

Commentary, explanation and general informative material is presented in smaller italic type, and does not constitute a normative element.

Where words have alternative spellings, the preferred spelling of the Shorter Oxford English Dictionary is used (e.g. "organization" rather than "organisation").

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0 Introduction

0.1 Background

The switch to electric light-duty vehicles in the UK is progressing well, with sales of new petrol or diesel cars set to end by 2035 and interim sales targets set via the Zero Emission Vehicle mandates. In contrast, the shift to zero emission trucks has only just commenced. The previous government announced that sales of new, non-zero emission trucks less than or equal to 26 tonnes are also set to end by 2035, while all new non-zero emission truck sales are due to end by 2040. As a result, by 2050, the vast majority of the UK HGV fleet is anticipated to be zero emission at the tailpipe and the UK is likely to be in a very strong position to achieve its net zero climate goal for the road freight sector.

The early years of this decade have seen the development and commercialization of an ever-expanding range of battery electric trucks, across all vehicle segments and in all the major developed markets, including the UK. Established truck makers are focused on bringing many more battery-powered trucks to the mass market over the next few years.

New entrants and specialist manufacturers are expected to bring innovative new concepts to the urban/short-haul, municipal and long-haul vehicle markets. Radically improved business operating models, battery chemistries and charging systems are also evolving at pace, including a transition for high power truck charging from combined charging system (CCS) to megawatt charging system (MCS) technology. While some pioneering logistics organizations are already exploiting the commercial opportunities that battery electric trucks can provide, many others are not yet able to make the switch. As well as concerns around vehicle purchase costs, driving range and payload loss, which can be significant in some use cases, there are also concerns about getting sufficient power to logistics hubs and depots, and the (lack of) availability of high power publicly accessible charging infrastructure for HGVs.

In October 2023, the UK government announced the winning projects to be funded by Innovate UK as part of the £200m Zero Emission HGVs and Infrastructure Demonstrators programme (ZEHID, previously known as the Zero Emission Road Freight Demonstrators, ZERFD). The projects funded under this programme are expected to run real-world demonstrations of battery electric and hydrogen fuel cell technologies for the largest categories of HGVs and at scale over a five-year period. This aims to provide the sector with the essential evidence needed to make strategic, long-term national infrastructure decisions to decarbonize the nation's road freight sector. The three ZEHID projects involving battery electric vehicles are expected to install and operate networks of high-power charging sites, accessible both to the vehicles directly involved in those projects but also more generally to other fleets.

The shift to zero emission HGVs is a crucial component in the transition to net zero. International harmonization and interoperability, achieved through standards and regulations, are key steps towards the viability of a wider roll-out. The drivers of eHGVs and their employers can expect the charging sites they use to be designed, built and maintained in ways that are safe, convenient and fit for purpose. Original equipment manufacturers (OEMs) are continuing to develop further generations of electric HGV models, with cross-industry stakeholder activities being led by the Charging Interface Initiative e.V. (CharIN) to standardize the future technical approach to higher power charging under the Megawatt Charging System¹⁾.

¹⁾ More information is available at <https://www.charin.global/technology/mcs/>.

BSI and Connected Places Catapult (CPC) are supporting the ZEHID programme led by the Department for Transport (DfT) and Innovate UK. The BSI/CPC contribution is articulated in two phases. Phase 1 of the project ran from April 2021 to March 2022 and produced a suite of outputs to help inform partners and build robust foundations for the demonstrations. Focus areas have included a demonstrator data strategy, export potential, safety and regulations, standards and market operations.

Building on this foundation work, BSI/CPC are now seeking to build an industry consensus around topics such as safety and security to support the ZEHID programme and the wider scale-up of zero emission HGV infrastructure.

0.2 Operational safety at charging sites

In September 2023, BSI published the *ZERFD (Zero Emission Road Freight Demonstrator) Standards Programme Prioritization Report* [2]. The report is structured around the following three activities:

- stakeholder engagement, aimed at understanding the existing barriers and constraints to the adoption of zero emission road freight vehicles;
- research and assessment of existing relevant standards at UK, European and international level; and
- prioritization of focus areas, building consensus across industry stakeholders and establishing principles to guide standards development.

This analysis and engagement work concluded that operational safety at charging sites is a priority focus area.

Numerous topics were raised in relation to the design of charging sites during the engagement activity, which are specifically linked to battery electric technology and the dwell times currently required by charging operations. Some of these were mentioned as potential areas for standardization, as follows.

- Classification of types of charging site

There might be a range of charging needs and set ups, ranging from multi-hour (e.g. overnight) charging to charging during extended breaks, and rapid top-up charging during short breaks. Charging sites can be publicly accessible (such as along motorways) or within private premises (such as distribution centres or industrial sites).

- Bay design and parking method

Stakeholders believe that the layout of sites can induce and support safe behaviour, including avoiding reverse manoeuvring where possible, which increases the risks of collisions. Herringbone parking or drive-through solutions could be explored based on space availability, charging unit design and vehicle layout.

- Separation of vehicles by category

Charging sites are likely to have to cater for a variety of vehicles. Separate charging units for electric cars and HGVs might also be necessary. HGV charging site planners might also wish to cater for vans, minibuses and small lorries and other large vehicles such as coaches and buses.

- Safety measures for pedestrians

Extended dwell times entail a likelihood that drivers and passengers might exit the vehicle while waiting, thus increasing pedestrian movements around charging units. Guidance is therefore required in relation to the design of safe walking routes and management of cables.

- Signage and wayfinding at access/egress points

Stakeholders mentioned the need for design guidance to ensure that the separation of vehicles by category/size is clear and respected by all users. Areas for HGVs, where higher voltage is in use, could potentially be gated and access provided only to those vehicles with a charging slot booked. This would reduce the number of vehicles and pedestrians in the area but would also reduce accessibility and might be challenging to implement.

- Layout harmonization

Interviewees highlighted that in the current electric car market, charging infrastructure providers have custom designs and layouts for charge points and hubs. While cars and other small vehicles can easily manoeuvre around such variable infrastructures, this is likely to be an issue with HGVs due to their size and lower manoeuvrability. Therefore, harmonization is needed to ensure consistency in design.

0.3 Objectives

This BSI Flex is intended to build upon the foundations laid by the above prioritization work and support the roll-out and expansion of a UK-wide network of high-power charging sites for eHGVs, specifically those accessible to any suitable vehicle rather than those with access restricted only to vehicles belonging to specific organizations.

The main objectives of this BSI Flex are to:

- identify and support safety and security good practice in collaboration with the demonstrations, through standards and specifications; and
- accelerate the roll-out of zero emission vehicles for road freight, towards wider commercialization, through consensus-based flexible standards.

This BSI Flex is intended to aid engineering and architectural stakeholders in the detailed design, layout and use of charging sites.

NOTE More information is available in the RIBA plan of work 2020 overview [1], specifically Stage 4: Technical design, and Stage 7: Use.

1 Scope

This BSI Flex provides recommendations on the design of publicly accessible charging sites for battery electric heavy goods vehicles (HGVs).

***NOTE** Whilst this BSI Flex is for publicly accessible sites, designers of private sites are encouraged to consider the recommendations and implement where possible.*

This BSI Flex covers:

- harmonized vocabulary and units of measurement;
- charging site layouts, including:
 - public access;
 - approach to segregation between vehicle types (HGVs, coaches, cars, vans); and
 - interaction between vehicles and pedestrians;
- safety and design implications of charging sites; and
- considerations on the coexistence of various fuel types in the same site.

This BSI Flex is applicable to publicly accessible single and multi-fuel sites in the UK.

This BSI Flex is of use to the designers and operators of charging sites.

This BSI Flex might be of interest to logistics providers, electrical grid suppliers, consumer groups and any other parties concerned with charging sites or battery electric HGVs.

This BSI Flex does not cover:

- charging technologies;
- types of charging plugs/sockets;
- driver/user training in charge point usage;
- construction safety or handover issues (RIBA Plan of Work 2020 Stages 5-6) [1];
- prior stages such as selection of suitable locations, land acquisition, grid connections or securing of planning consents (RIBA Plan of Work 2020 Stages 0-3) [1]; or
- dangerous goods vehicles.