

Approved Documents O & S

Overheating mitigation & Infrastructure for the charging of electric vehicles

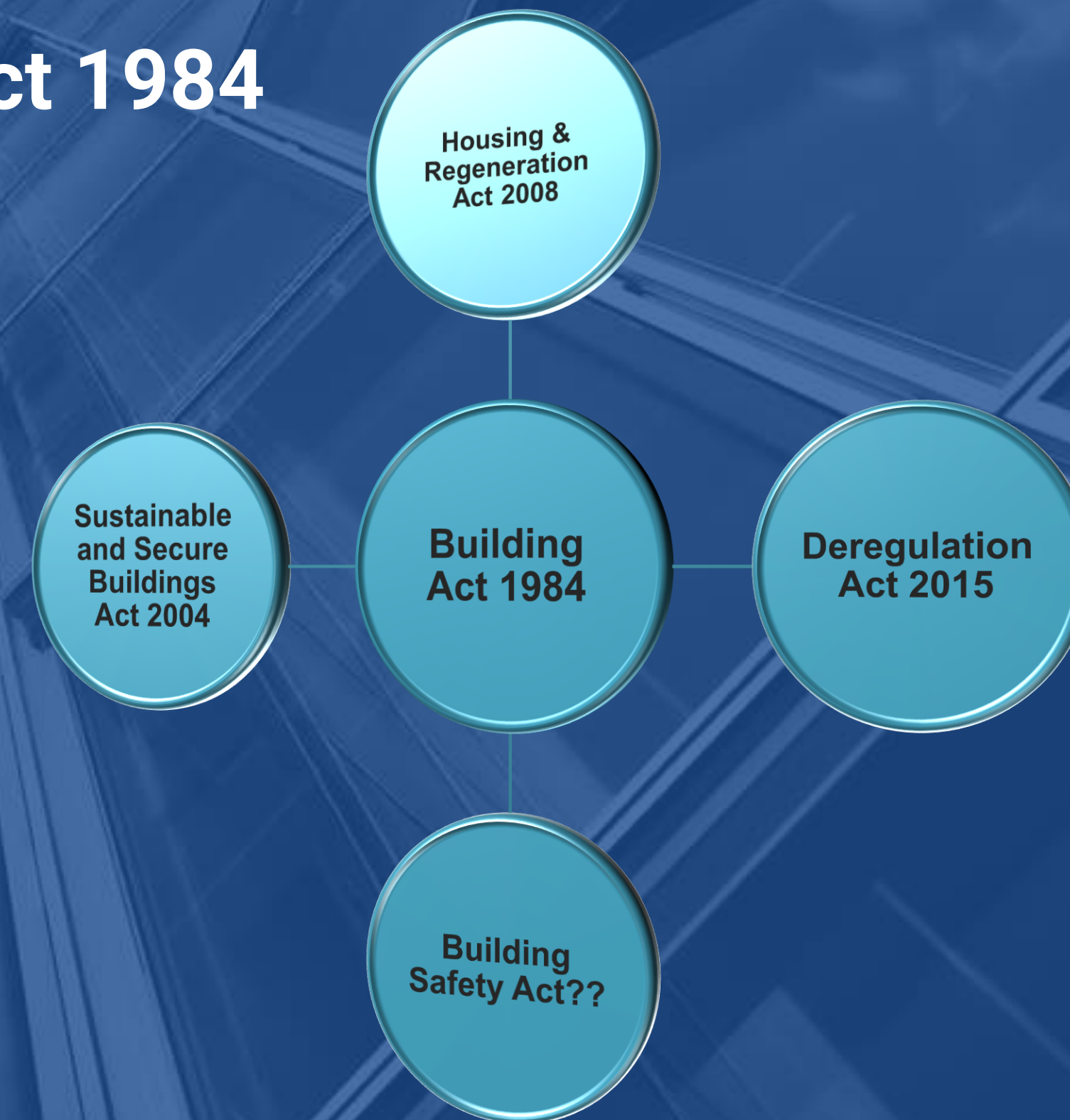
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Current Building Regulation Structure



The Building Act 1984



NZEBs?

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Built environment sustainability?



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The road to Zero Carbon

The statutory targets

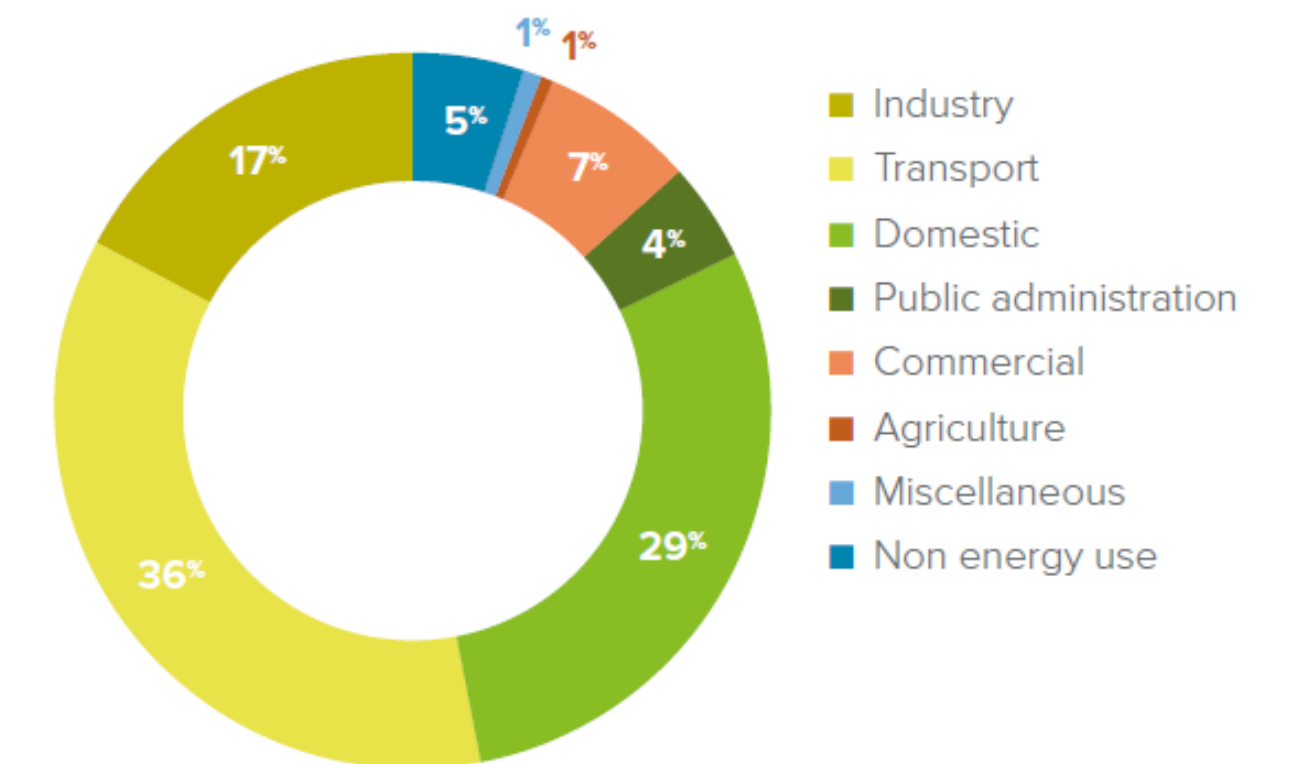
Zero carbon (original)

- All new dwellings 2016
- Public sector buildings 2018
- All other buildings 2019

Nearly zero energy (Regulation 25B)

- New public buildings 01/01/2019
- All other buildings 31/12/2020

UK Energy consumption by sector, 2012



Digest of UK Energy Statistics, 2013

= Current Regulations



Approved Document O

Overview of background

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“Heatwave deaths set to soar as UK summers become hotter”



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Approved Document 0 – background?

Dwelling death Statistics (approximate ONS):

- Fire related – 200
- Falling down stairs – 1000
- Radon related – 1100+
- Overheating – 2000

Environmental Audit Committee (EAC) held an inquiry into heatwaves and impact on the UK

The Future Buildings Standard

Public consultation from 1 October 2019 to 7 February 2020.


Department for Levelling Up,
Housing & Communities

The Future Buildings Standard: 2021
Consultation on changes to Part L
(conservation of fuel and power) and Part F
(ventilation) of the Building Regulations for
non-domestic buildings and dwellings; and
overheating in new residential buildings
Summary of responses received and Government response

December 2021
Department for Levelling Up, Housing & Communities

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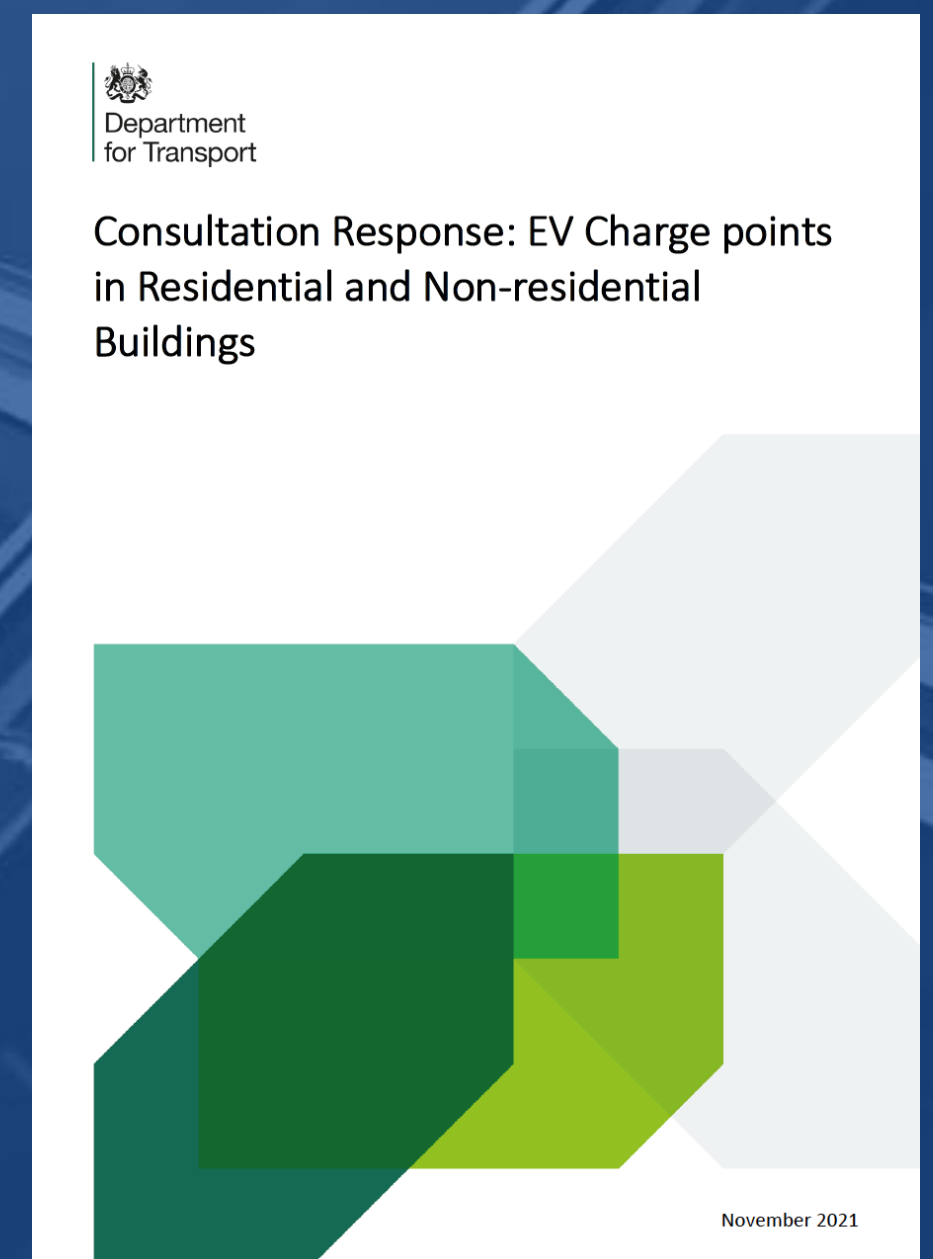
- Public/private Charging Infrastructure Investment
- Regulate to support expansion of the charging infrastructure network.
- After the Grenfell Review gov to update building regulations to mandate that all new residential developments must contain the enabling cabling for charge-points in the homes.
- Support new technologies for on-street and wireless charging.
- Strengthen UK markets for clean technologies development supply chains and create jobs.



Approved Document S – background?



- The consultation, ended 7 October 2019 with proposals to alter the regulations for new residential buildings in England, as well as new and existing non-residential buildings, to include requirements for EV charge points.
- COP26 declaration on accelerating the transition to 100% zero emission cars and vans
- Phase out petrol and diesel cars with gov working towards all sales of new cars and vans being zero emission with hybrids forming the transition
- Work towards all sales of new cars and vans being zero emission by 2040 or earlier, or by no later than 2035 in leading markets.





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Overheating mitigation

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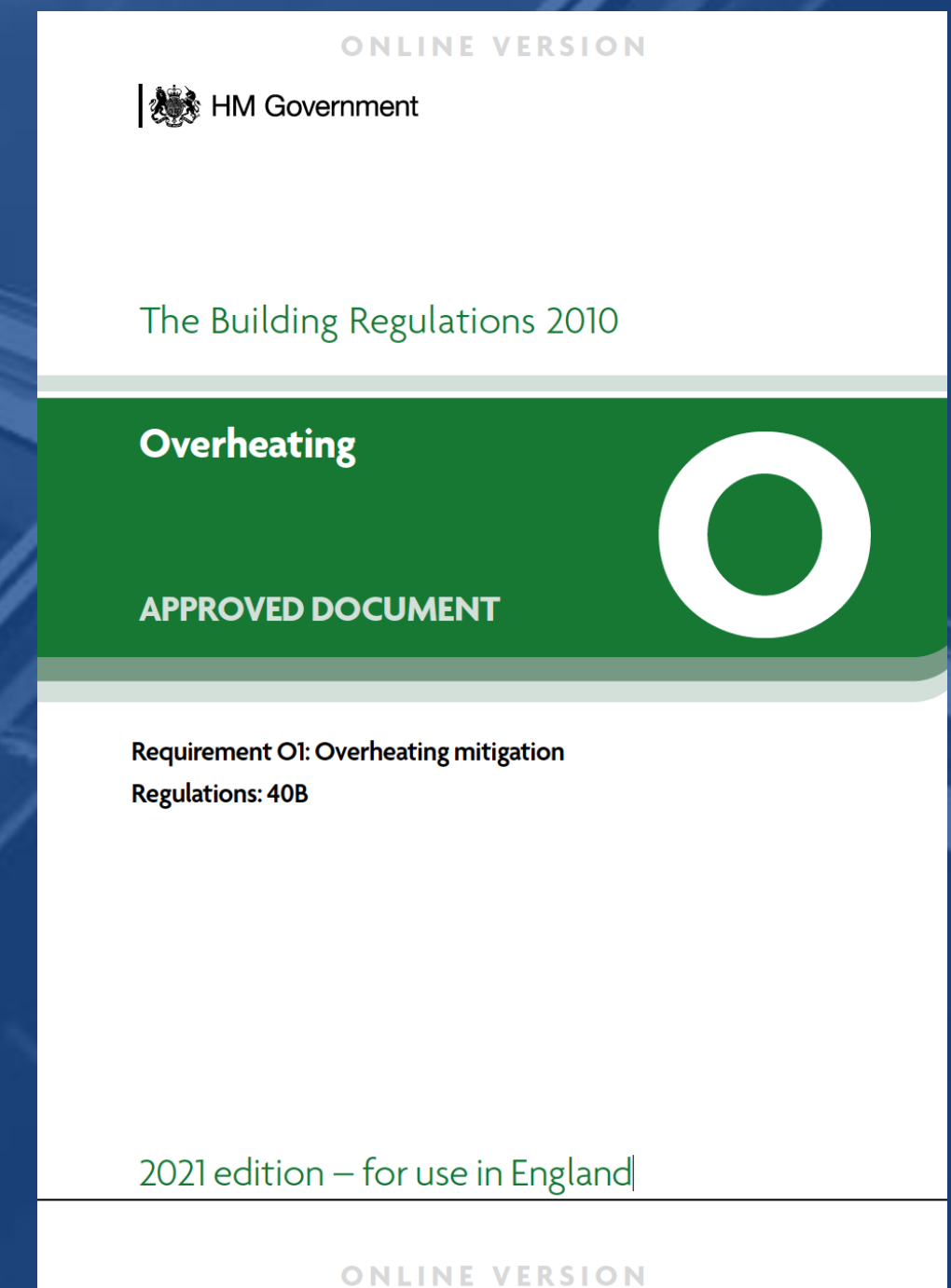
New Approved Document O

New look Approved Document

Requirement O1: Overheating mitigation

Regulations: 40B - Providing information

1. Simplified method
2. Dynamic thermal modelling



Requirement Application



Requirement

Requirement

O1 Overheating mitigation

- (1) Reasonable provision must be made in respect of a dwelling, institution or any other building containing one or more rooms for residential purposes, other than a room in a hotel (“residences”) to—
 - (a) limit unwanted solar gains in summer;
 - (b) provide an adequate means to remove heat from the indoor environment.
- (2) In meeting the obligations in paragraph (1)—
 - (a) account must be taken of the safety of any occupant, and their reasonable enjoyment of the residence; and
 - (b) mechanical cooling may only be used where insufficient heat is capable of being removed from the indoor environment without it.

Limits on application

Requirement 01 - Application

New residential buildings only

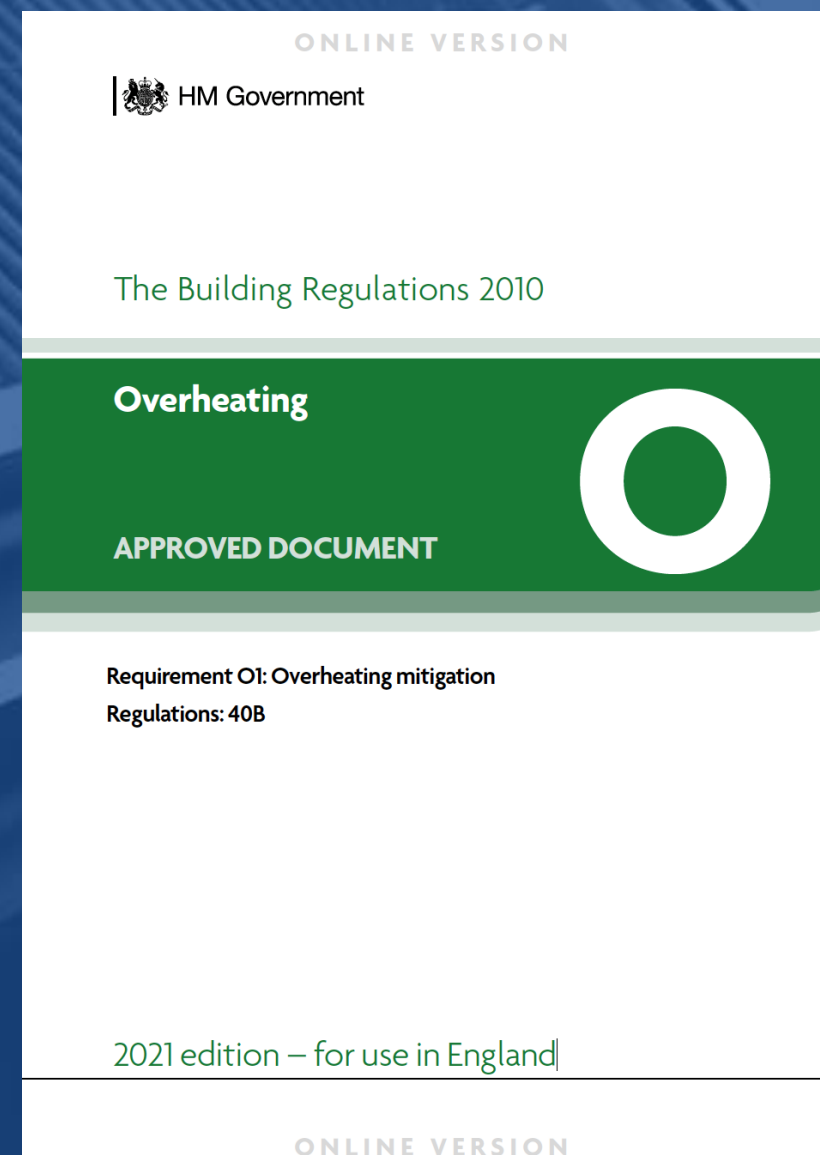
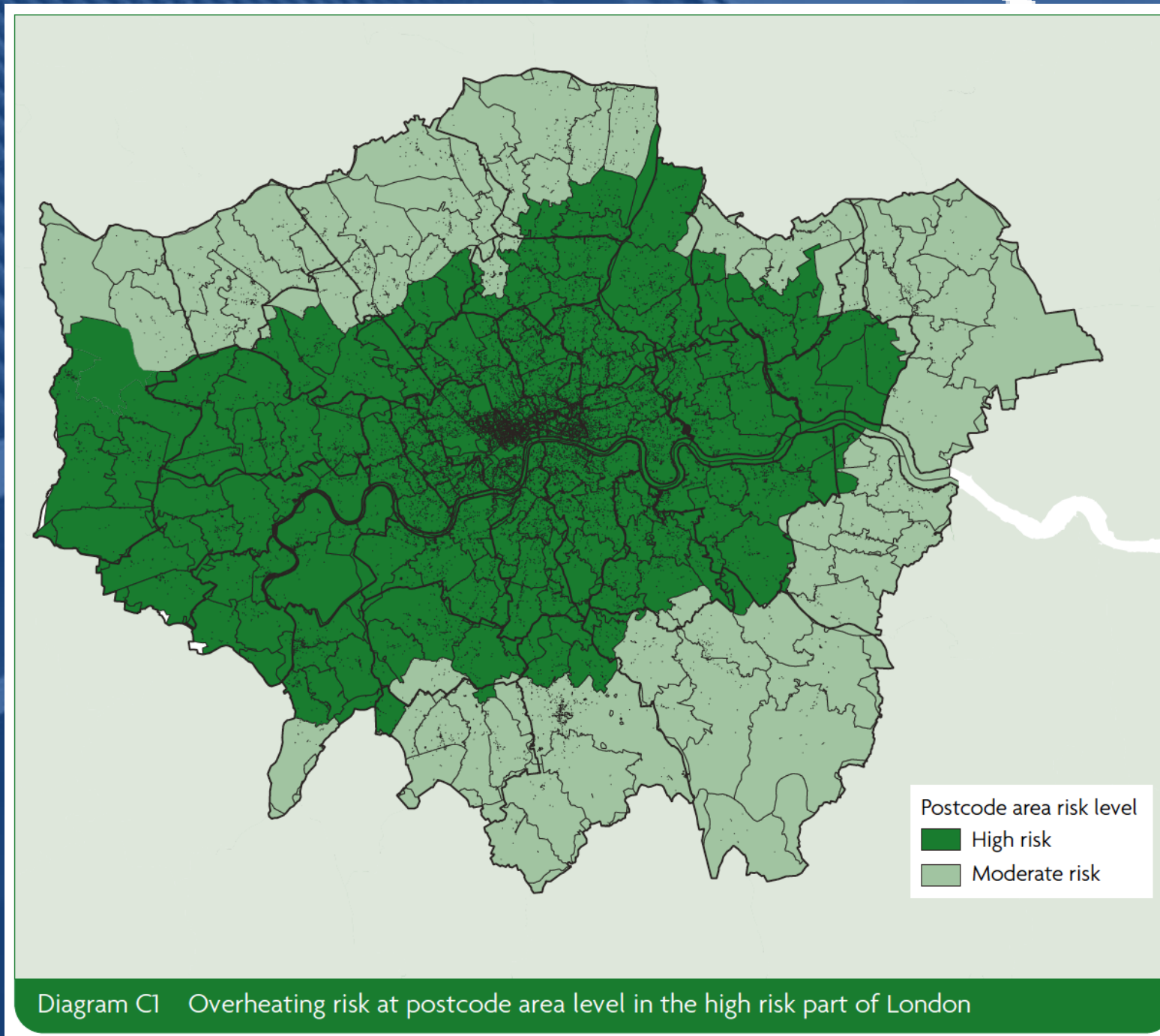


Table 0.1 Residential buildings within the scope of this approved document

Title	Purpose for which the building is intended to be used
Residential (dwellings)	Dwellings, which includes both dwellinghouses and flats.
Residential (institutional)	Home, school or other similar establishment, where people sleep on the premises. The building may be living accommodation for the care or maintenance of any of the following. <ul style="list-style-type: none"> a. Older and disabled people, due to illness or other physical or mental condition. b. People under the age of 5 years.
Residential (other)	Residential college, hall of residence and other student accommodation, and living accommodation for children aged 5 years and older.

Simplified method - Overheating risk category

1. Location of the new residential building (maps provided)
 - 'Moderate risk' location – England, excluding high risk parts of London
 - 'High risk' location – urban and some suburban parts of London detailed in Appendix C.
2. Whether it has cross-ventilation
 - Follow relevant guidance on AD O.



Cross-ventilation The ability to ventilate using openings on opposite façades of a dwelling. Having openings on façades that are not opposite is not allowing cross-ventilation, e.g. in a corner flat.

Simplified method - Limiting solar gains

Limits on maximum glazing areas of buildings or part of building using orientation of the façade that has the largest area of glazing



Table 1.1 Limiting solar gains for buildings or parts of buildings with cross-ventilation⁽¹⁾

Largest glazed façade orientation	High risk location		Moderate risk location	
	Maximum area of glazing (% floor area)	Maximum area of glazing in the most glazed room (% floor area of room)	Maximum area of glazing (% floor area)	Maximum area of glazing in the most glazed room (% floor area of room)
North	15	37	18	37
East	18	37	18	37
South	15	22	15	30
West	18	37	11	22

NOTE:

1. Floor area and floor area of room are as defined in Appendix A.

Simplified method - Limiting solar gains

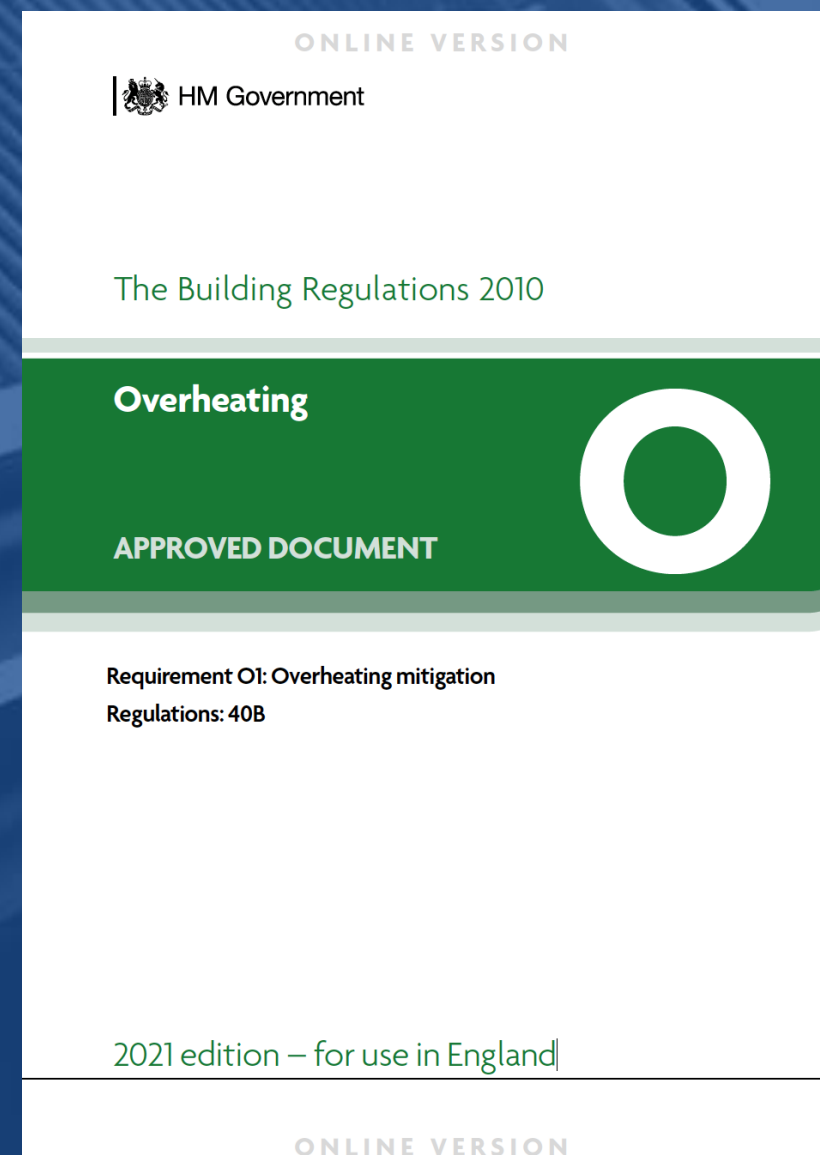


Table 1.2 Limiting solar gains for buildings or parts of buildings without cross-ventilation⁽¹⁾

	High risk location		Moderate risk location	
Largest glazed façade orientation	Maximum area of glazing (% floor area)	Maximum area of glazing in the most glazed room (% floor area of room)	Maximum area of glazing (% floor area)	Maximum area of glazing in the most glazed room (% floor area of room)
North	15	26	15	26
East	11	18	18	26
South	11	11	15	15
West	11	18	18	11

NOTE:

1. Floor area and floor area of room are as defined in Appendix A.

Residential buildings in high risk location to also be provided with shading:

- External shutters with means of ventilation.
- Glazing with a maximum g-value of 0.4 and a minimum light transmittance of 0.7.
- Overhangs with 50 degrees altitude cut-off on due south-facing façades only.

Simplified method - Removing excess heat



Table 1.3 Minimum free areas for buildings or parts of buildings with cross-ventilation

	High risk location	Moderate risk location
Total minimum free area ⁽¹⁾	The greater of the following: a. 6% of the floor area ⁽²⁾ b. 70% of the glazing area ⁽³⁾	The greater of the following: a. 9% of the floor area ⁽²⁾ b. 55% of the glazing area ⁽³⁾
Bedroom minimum free area	13% of the floor area of the room ⁽⁴⁾	4% of the floor area of the room ⁽⁴⁾

NOTES:

1. The total minimum free area is the free area for the whole dwellinghouse, residential unit, shared communal room or common space, including any bedrooms.
2. 'Floor area' is a key term. See Appendix A.
3. 'Glazing area' is a key term. See Appendix A.
4. 'Floor area of the room' is a key term. See Appendix A.

Free area – The geometric open area of a ventilation opening. This area assumes a clear sharp-edged orifice that would have a coefficient of discharge (Cd) of 0.62. Measurement to BS EN 13141-1 or Appendix D.

Simplified method - Removing excess heat



Table 1.4 Minimum free areas for buildings or parts of buildings without cross-ventilation

	High risk location	Moderate risk location
Total minimum free area ⁽¹⁾	The greater of the following: a. 10% of the floor area ⁽²⁾ b. 95% of the glazing area ⁽³⁾	The greater of the following: a. 12% of the floor area ⁽²⁾ b. 80% of the glazing area ⁽³⁾
Bedroom minimum free area	13% of the floor area of the room ⁽⁴⁾	4% of the floor area of the room ⁽⁴⁾

NOTES:

1. The total minimum free area is the free area for the whole dwellinghouse, residential unit, shared communal room or common space, including any bedrooms.
2. 'Floor area' is a key term. See Appendix A.
3. 'Glazing area' is a key term. See Appendix A.
4. 'Floor area of the room' is a key term. See Appendix A.

The simplified method is not suitable for buildings with more than one residential unit which use a communal heating or hot water system with significant amounts of horizontal heating or hot water distribution pipework. Main distribution routes should be through vertical risers to minimise heat gains into common spaces.

Dynamic thermal modelling method

Predicting overheating risk for residential buildings using dynamic thermal modelling offers the designer additional flexibility over the simplified solutions especially for:

- Residential buildings with very high levels of insulation and airtightness.
- Residential buildings with specific site conditions not well represented
- Residential buildings that are highly shaded

Set modelling parameters and balance with security.

Dynamic thermal modelling A method of building modelling that predicts the internal conditions and energy demands of a building at short time intervals using weather data and building characteristics.

Internal blinds, curtains plus external foliage not taken into account.

Easily accessible Defined as one of the following.

- A window or doorway, any part of which is within 2m vertically of an accessible level surface, such as the ground or basement level, or an access boundary.
- A window within 2m vertically of a flat or sloping roof (with a pitch of less than 30 degrees) that is within 3.5m of ground level.

Design methodology for the assessment of overheating risk in homes



TM59: 2017



Dynamic thermal modelling method

Design methodology for the
assessment of overheating
risk in homes



TM59: 2017



Removing excess heat

2.10 Excess heat should be removed from the residential building by any of the following means.

- a. Opening windows (the effectiveness of this method is improved by **cross-ventilation**).
- b. Ventilation **louvres** in external walls.
- c. A mechanical ventilation system.
- d. A mechanical cooling system

2.11 The building should be constructed to meet requirement O1 using **passive means** as far as reasonably practicable. It should be demonstrated to the **building control body** that all practicable **passive means of limiting unwanted solar gains and removing excess heat** have been used first before adopting mechanical cooling. Any mechanical cooling (air-conditioning) is expected to be used only where requirement O1 cannot be met using openings.

Requirement 01(2)(a)

‘Account must be taken of the safety of any occupant, and their reasonable enjoyment of the residence’

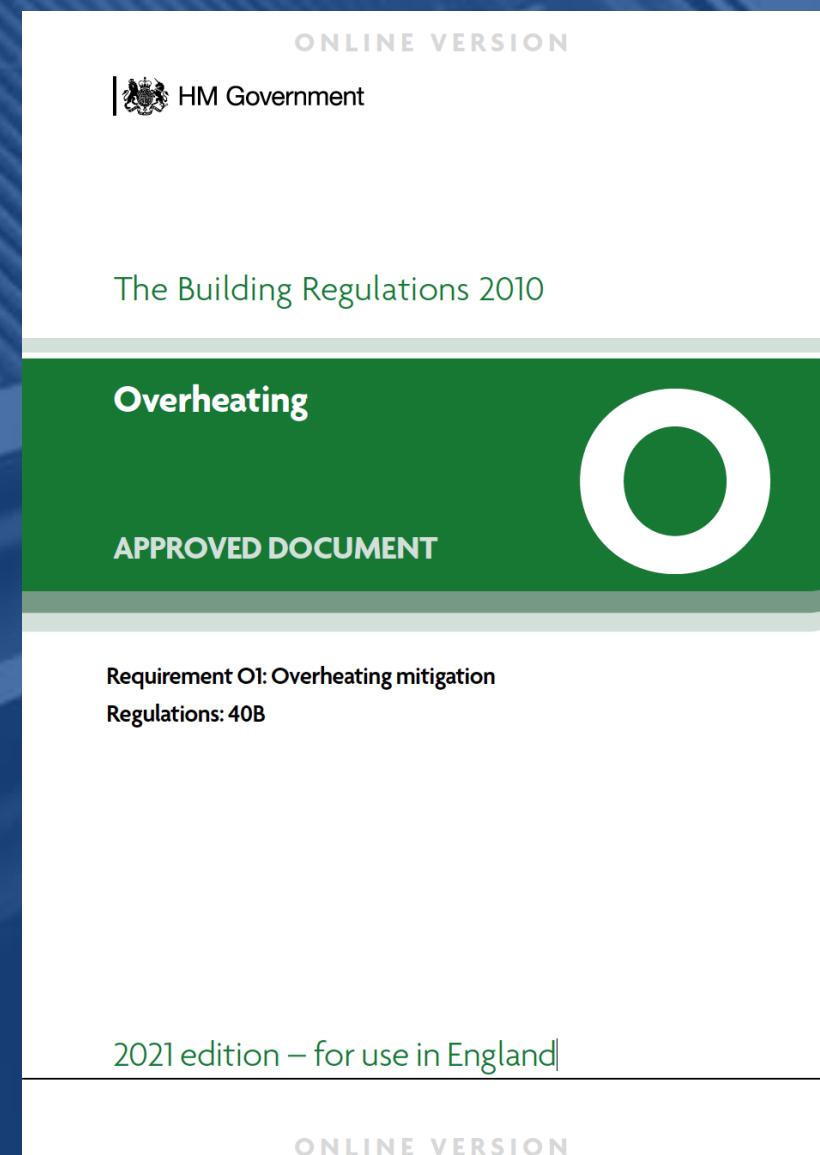
- Noise at night – National Model Design Code: Part 2 (MHCLG, 2021)
- Pollution – Section 2 of Approved Document F, Volume 1: Dwellings
- Protection from falling – Part K & BS 6180
- Protection from entrapment – Part K
- Security – Part Q



Regulation 40B: Providing information

Home User Guide should be provided for new dwellings as described in Section 9 of Approved Document L + section on ‘**Staying cool in hot weather**’

Appendix B: Compliance checklist



2a.1 Site details	
Site location, assigned using paragraph 1.3 ⁽¹⁾	
Building category, assigned using paragraph 1.4	
2a.2 Designed overheating mitigation strategy	
Details of standards selected:	
a. Maximum area of glazing	
b. Maximum area of glazing in the most glazed room	
c. Shading strategy	
d. Total minimum free area	
e. Bedroom minimum free area	
2a.3 Designer's declaration	
Designer's name	
Designer's organisation	
Designer's signature	
Registration number (if applicable)	
Date of design	

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Approved Document S

Infrastructure for the charging of
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Approved Document S – Regulatory Requirements

- Requirement S1: The erection of new residential buildings
- Requirement S2: Dwellings resulting from a material change of use
- Requirement S3: Residential buildings undergoing major renovation
- Requirement S4: Erection of new buildings which are not residential buildings or mixed-use buildings
- Requirement S5: Buildings undergoing major renovation work which are not residential buildings or mixed-use buildings
- Requirement S6: The erection of new mixed-use buildings and mixed use buildings undergoing major renovation
- Application of S requirements

Regulations: 44D, 44E, 44F, 44G, 44H, 44I, 44J




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STATUTORY INSTRUMENTS	
2021 No. 1392	
BUILDING AND BUILDINGS, ENGLAND	
The Building Regulations etc. (Amendment) (England) (No. 2) Regulations 2021	
<i>Made</i>	13th December 2021
<i>Laid before Parliament</i>	15th December 2021
<i>Coming into force in accordance with regulation 1</i>	
<p>The Secretary of State has consulted the Building Regulations Advisory Committee for England and such other bodies as appear to be representative of the interests concerned in accordance with section 14(3) of the Building Act 1984(1).</p> <p>The Secretary of State makes the following Regulations in exercise of the powers conferred by sections 1, 1A, 3, 34 and 47(1) of, and paragraphs 7, 8 and 10 of Schedule 1 to, the Building Act 1984.</p>	
Citation, commencement, extent and application	
1.—(1) These Regulations may be cited as the Building Regulations etc. (Amendment) (England) (No. 2) Regulations 2021.	
(2) They come into force on 15th June 2022, immediately after the coming into force of the Building Regulations etc. (Amendment) (England) Regulations 2021(2).	
(3) These Regulations extend to England and Wales.	
(4) These Regulations apply in relation to buildings(3) and building work in England.	
Amendment of the Building Regulations 2010	
2.—(1) The Building Regulations 2010(4) are amended as follows.	
(2) In regulation 6(1)(a) (requirements relating to material change of use), after "P1 (electrical safety)" insert on a new line "S2 (infrastructure for the charging of electric vehicles)".	
(3) After Part 9A (physical infrastructure for high-speed electronic communications), insert—	
"PART 9B Infrastructure for the charging of electric vehicles	
Application of paragraph S1 of Schedule 1 (the erection of new residential buildings)	
44D.—(1) The requirements of paragraph S1 of Schedule 1 apply in relation to the erection of a new residential building with associated parking as follows.	
(2) The number of electric vehicle charge points that must be installed is the maximum number of electric vehicle charge points that it is possible to install at an average sum of £3600 or less for the connection cost of each electric vehicle charge point connection ("the £3600 cap").	
(3) If it is not possible to completely fulfil the requirements of paragraph S1(2) of Schedule 1 as a result of the operation of the £3600 cap, cable routes for electric vehicle charge points must be installed in the associated parking spaces that would otherwise be required to have electric vehicle charge points, but for the operation of the £3600 cap.	
(4) Where the new residential building has, or will have, associated parking that is situated within a covered car park—	
(a) if there are or will be any associated parking spaces situated in a position other than in a covered car park—	
(i) the requirements of paragraph S1 of Schedule 1 must first be applied in relation to those parking spaces; then	
(ii) if the number of associated parking spaces, which are situated in a position other than in a covered car park, is insufficient to completely fulfil the requirements of paragraph S1(2) of Schedule 1, cable routes for electric vehicle charge points must be installed in—	

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Cable route and locations for EV charge points

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 HM Government

The Building Regulations 2010

**Infrastructure for
the charging of
electric vehicles**

S

APPROVED DOCUMENT

Requirement S1: The erection of new residential buildings
Requirement S2: Dwellings resulting from a material change of use
Requirement S3: Residential buildings undergoing major renovation
Requirement S4: Erection of new buildings which are not residential buildings or mixed-use buildings
Requirement S5: Buildings undergoing major renovation work which are not residential buildings or mixed-use buildings
Requirement S6: The erection of new mixed-use buildings and mixed-use buildings undergoing major renovation
Regulations: 44D, 44E, 44F, 44G, 44H, 44I, 44J

2021 edition – for use in England

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Regulation

Minimum standards of an electric vehicle charge point

- 44J.** (1) For the purposes of this Part and Part S of Schedule 1, an electric vehicle charge point must meet the following minimum standards.
- (2) It must be capable of providing a reasonable power output for each parking space for which it is intended to be used.
- (3) It must be run on a dedicated circuit.
- (4) It must be compatible with all vehicles which may require access to it.

Interpretation of this Part and Part S of Schedule 1

“cable route” means a safe, unobstructed route from the power supply to the envisaged electric vehicle charge point location, for electrical cabling to be installed in the future.

Minimum standards of an EV charge point



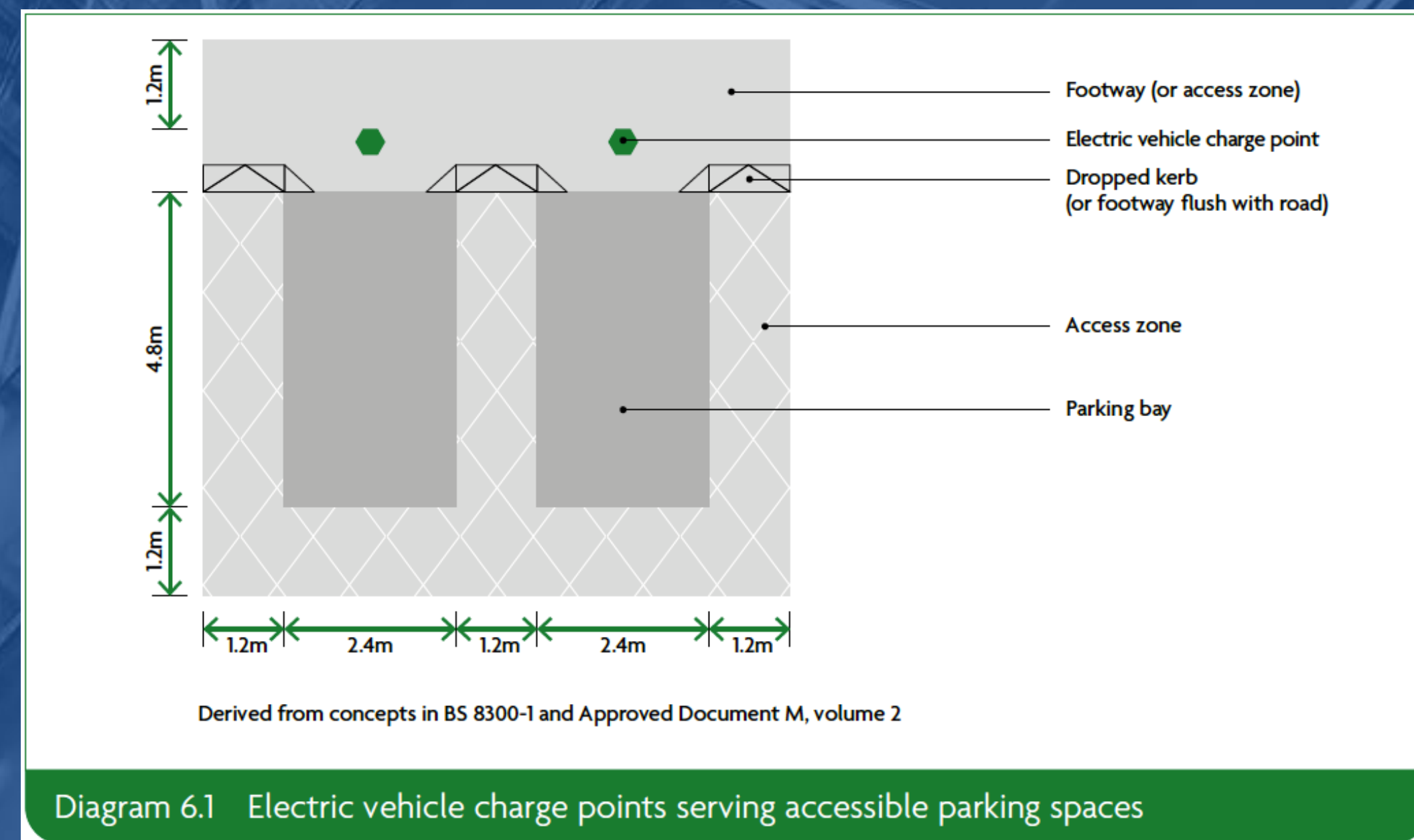
Each electric vehicle charge point should meet all the following.

- Be designed and installed as described in BS EN 61851.
- Have a minimum nominal rated output of 7kW.
- Be fitted with a universal socket (also known as an untethered electric vehicle charge point). N.B. Except self-build
- Be fitted with an indicator to show the equipment's charging status that uses lights, or a visual display.
- Minimum of a Mode 3 specialised system for EV charging running from a dedicated circuit, or equivalent, as defined in BS EN IEC 61851-1.
- Meet the requirements of BS 7671.
- Meet requirements in the IET's Code of Practice: Electric Vehicle Charging Equipment Installation.

NOTE: Other legislation may also apply – e.g. the Alternative Fuels Infrastructure Regulations 2017.

Cable route and locations for EV charge points

The location of the EV charge point or future connection locations should be suitable for use by EV's with charging inlets in different places.



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Locations for EV charge points

Often, the best position for an electric vehicle is at one corner of the parking space, as shown in Diagram 6.2.

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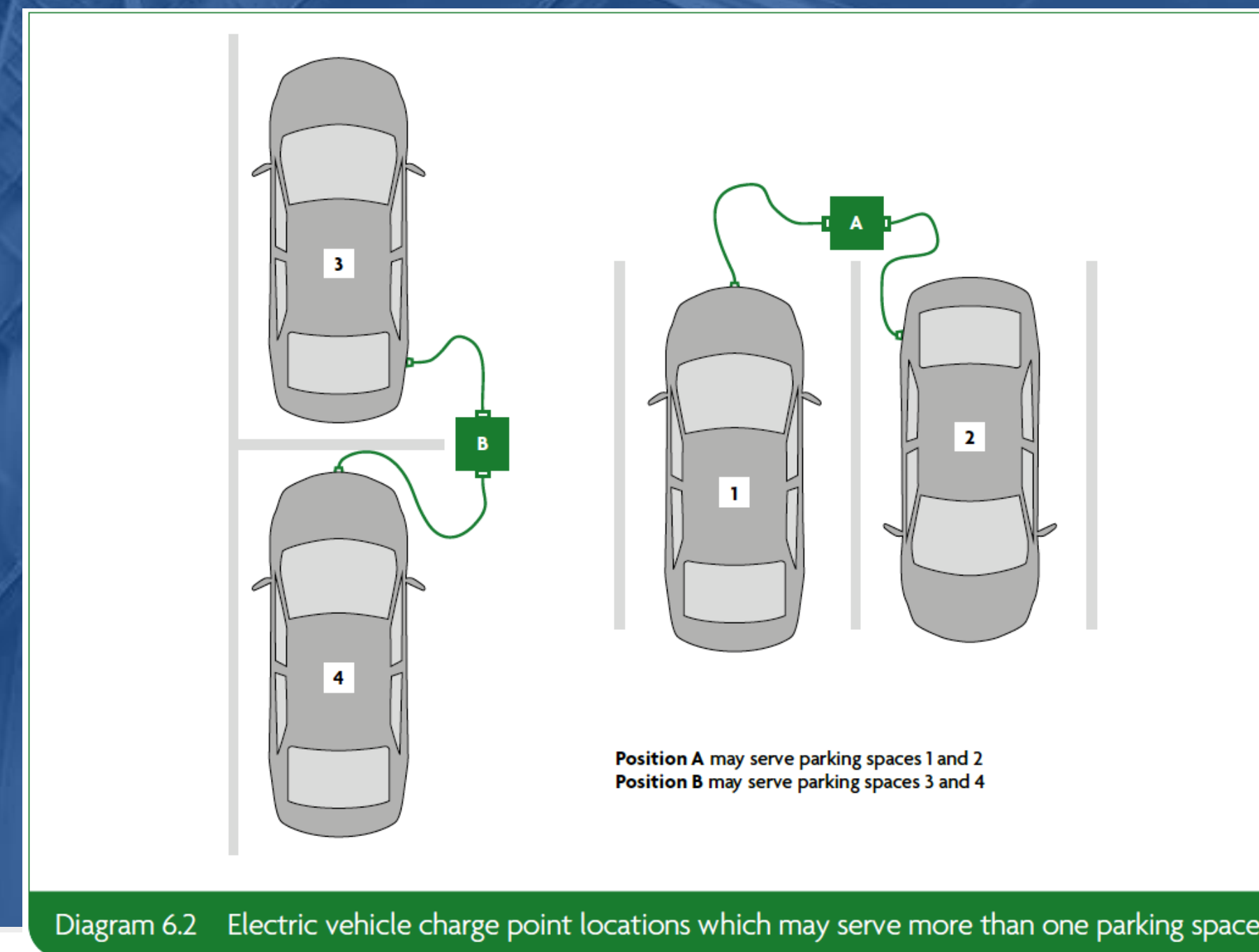
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EV charge point location and dimensions

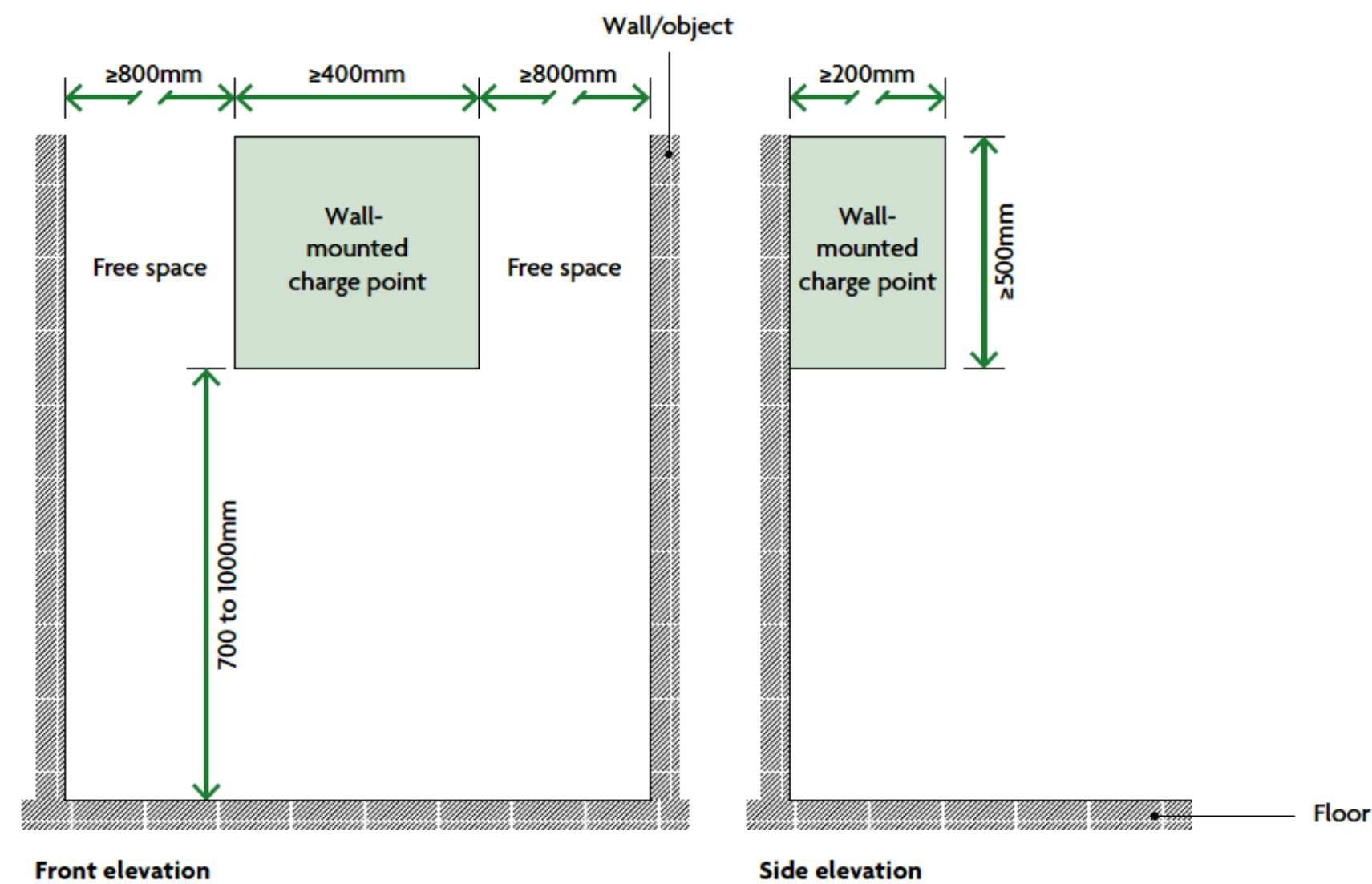


Diagram 6.5 Minimum space requirements for wall-mounted charge point location

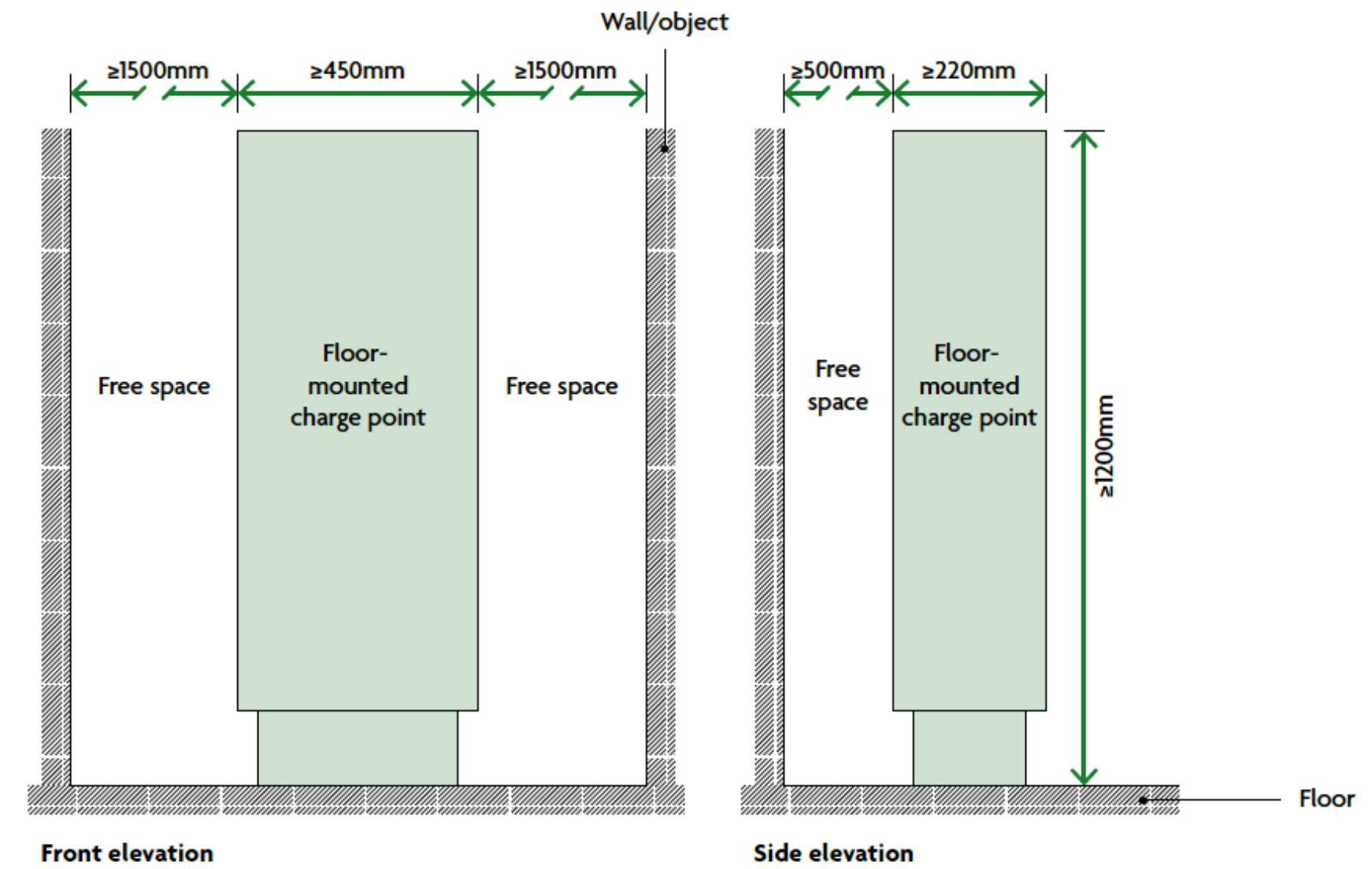


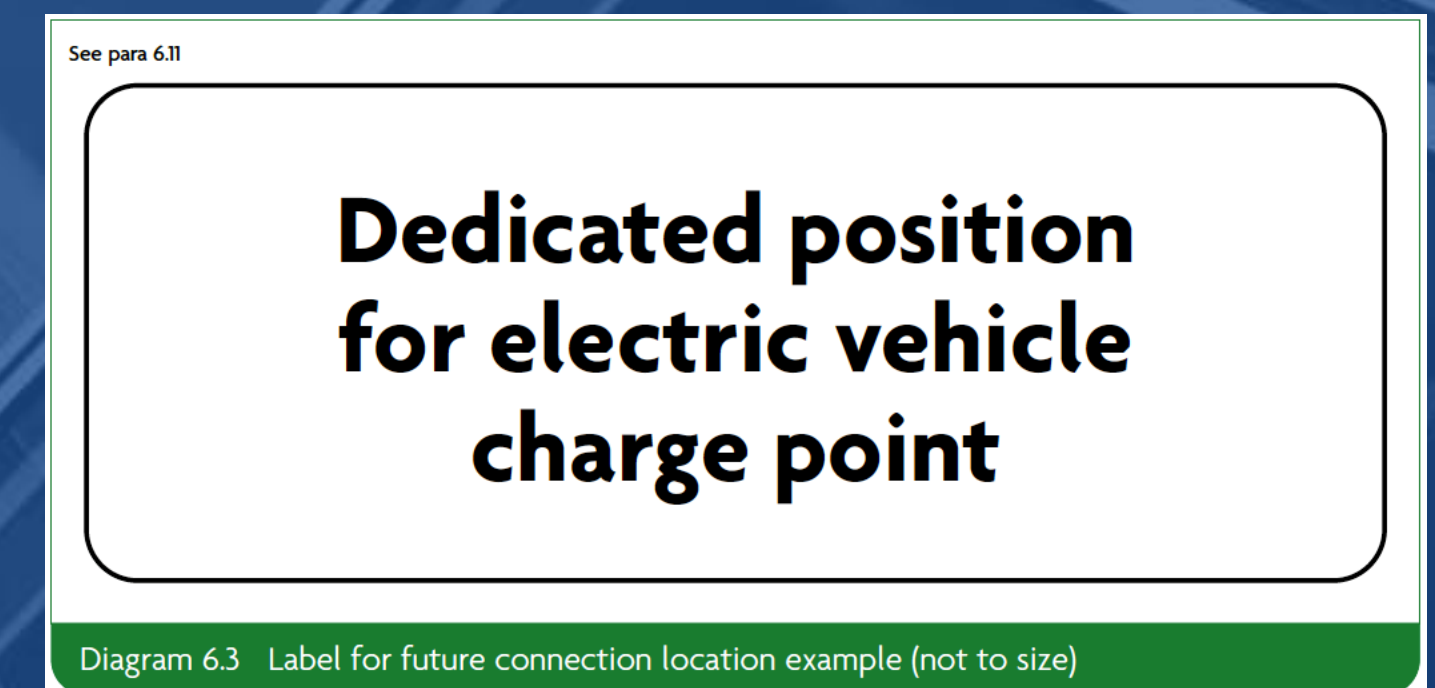
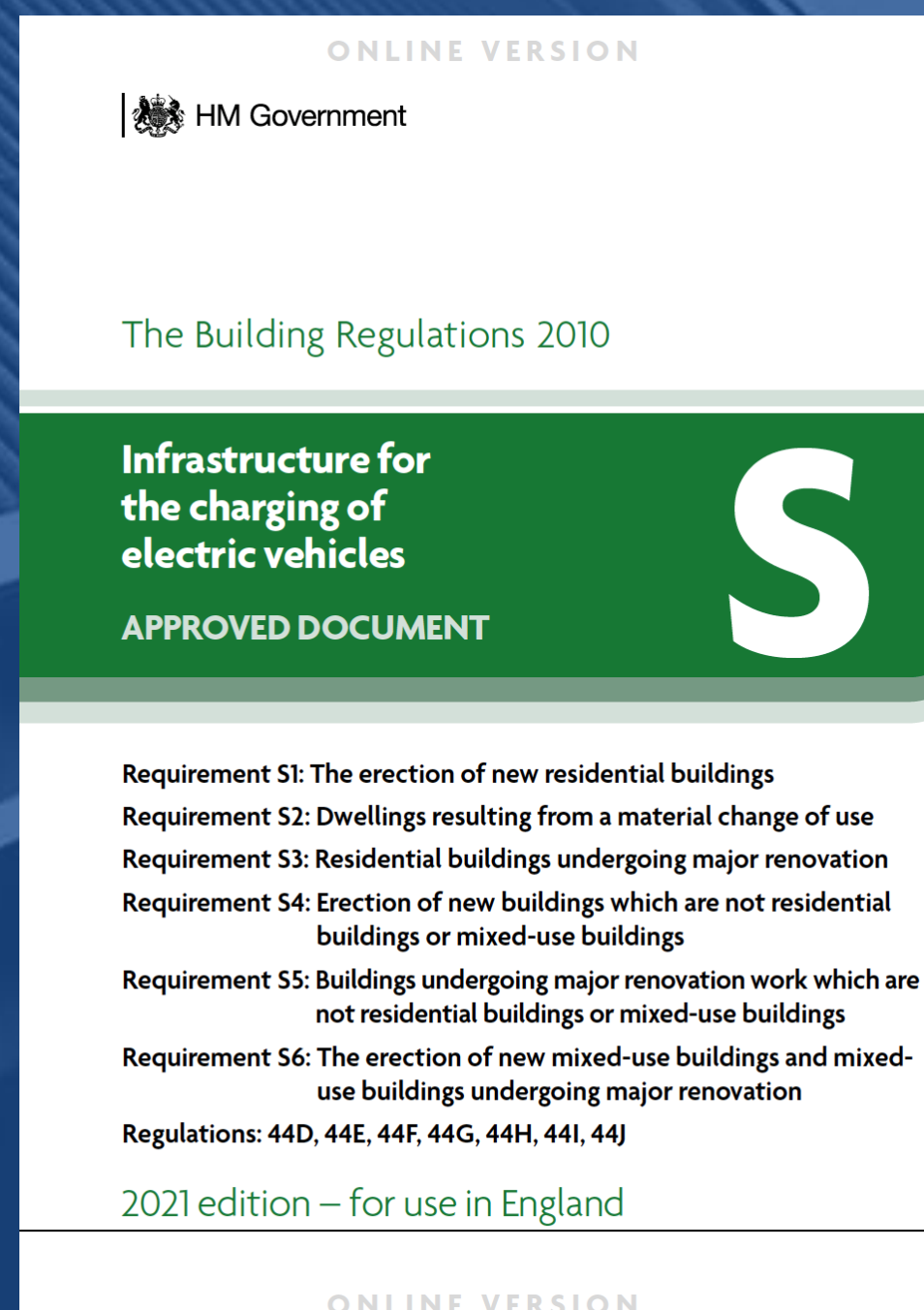
Diagram 6.4 Minimum space requirements for floor-mounted charge point location

Cable routes and locations for future charge points

Any future connection locations should be clearly identified and labelled.
The label or sign should be as follows.

- Letter text should be 25mm high.
- The text should be displayed over three lines.
- The sign should measure 506mm by 194mm.
- The sign should be suitably weatherproof for its location.
- The sign should be sited where a person installing an electric vehicle charge point in future will see it.

- Dedicated safe unobstructed route
- Electrical containment systems
- Space to connect EV charge point
- Electricity Safety, Quality and Continuity Regulations 2002






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Building Requirements and application

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Regulations: 44D, 44E, 44F, 44G, 44H, 44I, 44J

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Requirement

The erection of new residential buildings

- S1.** (1) A new residential building with associated parking must have access to electric vehicle charge points as provided for in paragraph (2).
- (2) The number of associated parking spaces which have access to electric vehicle charge points must be—
- (a) the total number of associated parking spaces, where there are fewer associated parking spaces than there are dwellings contained in the residential building; or
 - (b) the number of associated parking spaces that is equal to the total number of dwellings contained in the residential building, where there are the same number of associated parking spaces as, or more associated parking spaces than, there are dwellings.
- (3) Cable routes for electric vehicle charge points must be installed in any associated parking spaces which do not, in accordance with paragraph (2), have an electric vehicle charge point where—
- (a) a new residential building has more than 10 associated parking spaces; and
 - (b) there are more associated parking spaces than there are dwellings contained in the residential building.

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Regulation

Application of paragraph S1 of Schedule 1 (the erection of new residential buildings)

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- (4) Where the new residential building has, or will have, associated parking that is situated within a covered car park—
- (a) if there are or will be any associated parking spaces situated in a position other than in a covered car park—
- (i) the requirements of paragraph S1 of Schedule 1 must first be applied in relation to those parking spaces; then
- (ii) if the number of associated parking spaces, which are situated in a position other than in a covered car park, is insufficient to completely fulfil the requirements of paragraph S1(2) of Schedule 1, cable routes for electric vehicle charge points must be installed in—
- (aa) the number of parking spaces in the covered car park which, when added to the number of associated parking spaces which are situated in a position other than in the covered car park, corresponds to the total number of dwellings with associated parking, where the total number of associated parking spaces is 10 or less;
- (bb) all the associated parking spaces in the covered car park, where the total number of associated parking spaces is both less than the number of dwellings with associated parking and 10 or less; and
- (cc) all the associated parking spaces in the covered car park, where the total number of associated parking spaces is more than 10;
- (b) if all the associated parking spaces are situated in a covered car park, cable routes for electric vehicle charge points must be installed—
- (i) where there are 10 or fewer parking spaces—
- (aa) in the number of associated parking spaces in the covered car park which corresponds to the total number of dwellings with associated parking;
- (bb) in all the parking spaces where there are fewer parking spaces than there are dwellings;
- (ii) in all the parking spaces in the covered car park, where there are more than 10 parking spaces.

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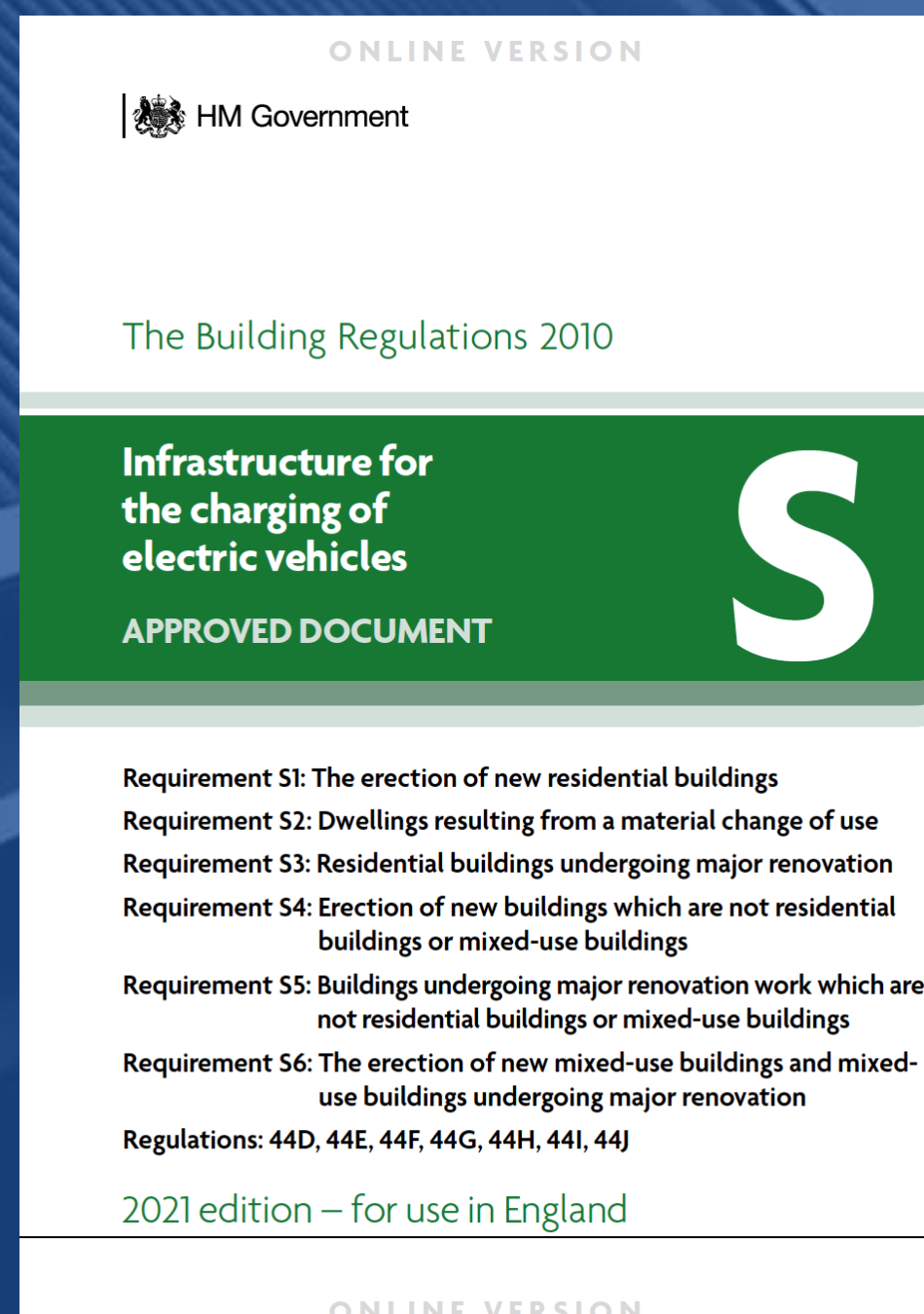
Approved Document S – S1 New dwellings

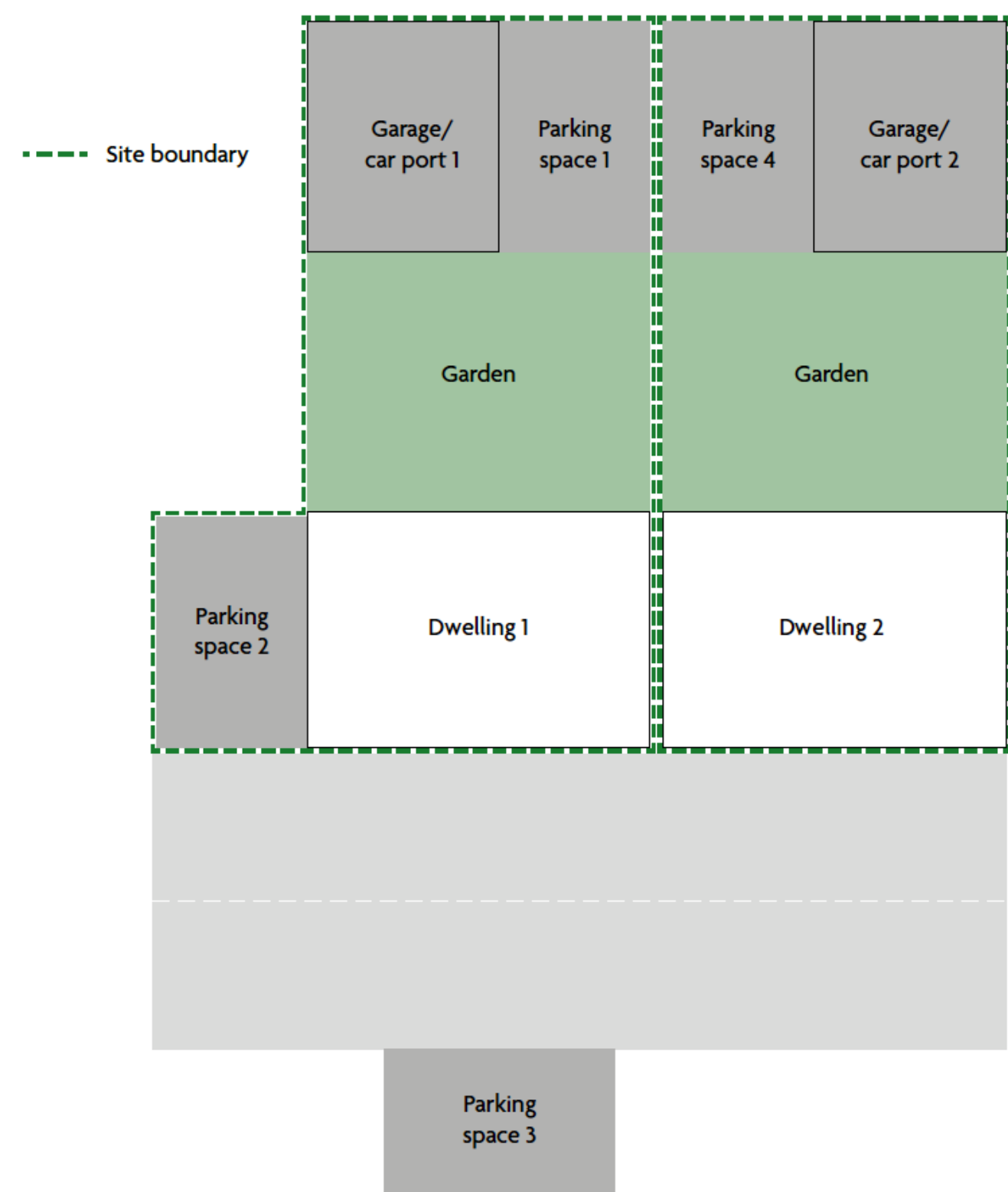
Where associated parking spaces are provided for a new residential building, the number of associated parking spaces that have access to an electric vehicle charge point must be a minimum of either of the following.

- The number of associated parking spaces.
- The number of dwellings that the car park serves.

NOTE: Where no associated parking spaces are provided, there is no requirement to install an electric vehicle charge point.

Associated parking space – Any parking space that is available within the site boundary of the building, for the use by the occupant of, or a visitor to, a dwelling in the building, including any parking space which is for the use of any occupant of, or any visitor to, any dwelling in a building containing more than one dwelling.

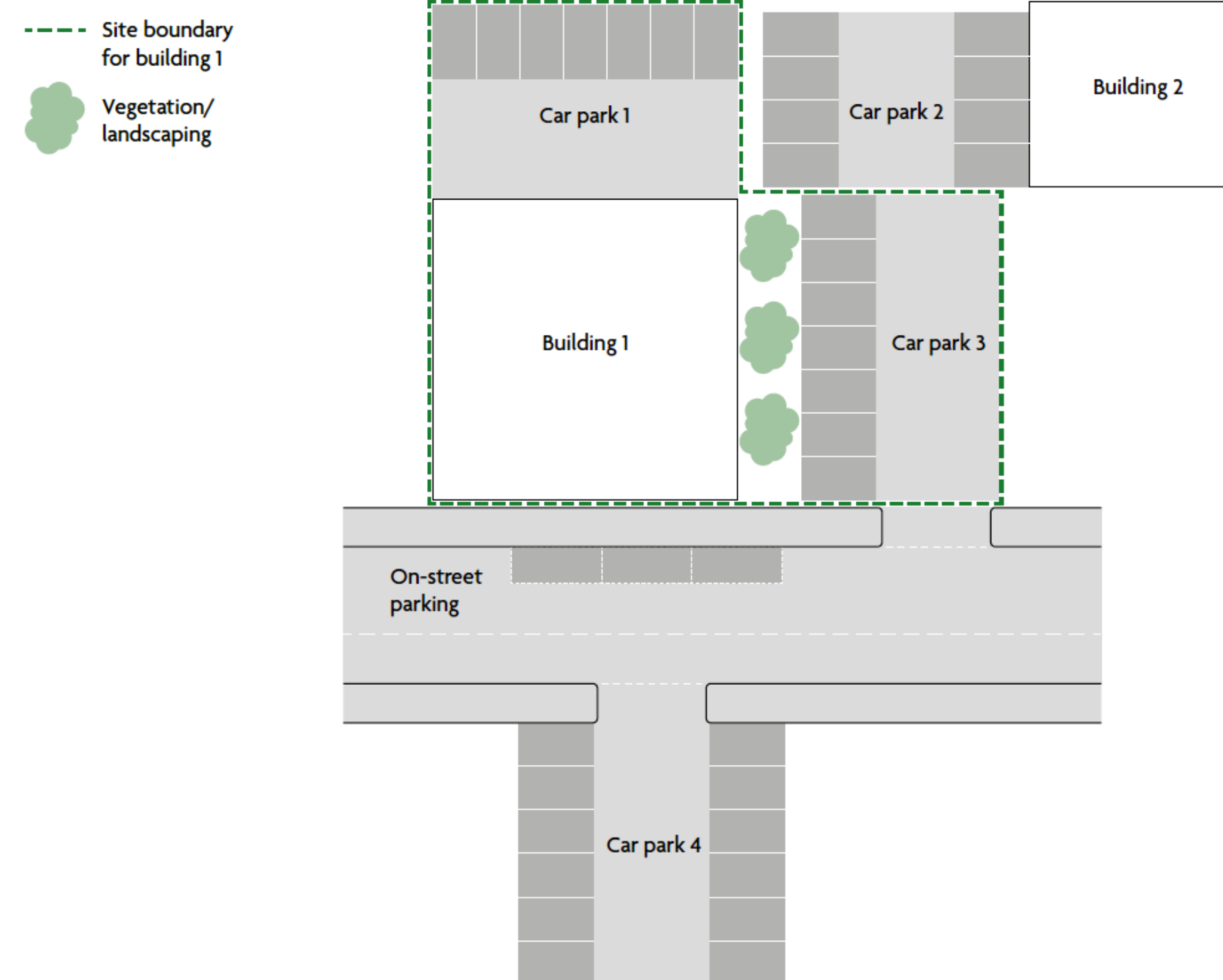




NOTES:

1. **Parking space 1**, despite being separated from dwelling 1 by a garden, is within the site boundary and contains a parking space associated with dwelling 1.
 2. **Parking space 2** is within the site boundary of dwelling 1 and contains a parking space associated with dwelling 1.
 3. **Parking space 3** is outside the site boundary of dwelling 1. In this example, parking space 3 is separated from dwelling 1 by a public highway or a road that does not belong to the owners of dwelling 1.
 4. **Garage/Car port 1** is within the site boundary of dwelling 1, despite being separated from the building by a garden; therefore, parking space within the garage/car port is associated with dwelling 1.
 5. **Parking space 4** is outside the site boundary of dwelling 1. Parking space 4 is on land that belongs to the owners of dwelling 2.
- Note that some garages do not contain parking spaces (for example, if a car cannot reasonably be expected to be parked inside the garage).

Diagram 1.1 Determining associated parking spaces and site boundaries, example 1



NOTES:

1. **Car park 1** is within the site boundary for building 1 and contains parking spaces associated with building 1.
2. **Car park 2** is outside the site boundary, and the parking spaces do not therefore need to be considered. The car park may be associated with a different building or under different ownership to building 1.
3. **Car park 3**, despite being separated from building 1 by vegetation/landscaping, is within the site boundary. If the parking spaces are for the use of the occupants/users of building 1, they are therefore associated with building 1.
4. **Car park 4** is outside the site boundary of building 1. In this example, the car park is separated from the building by a public highway or a road under different ownership to that of the building.
5. The **on-street parking** is outside the site boundary of the building. In this example, the parking spaces are on a public highway or a road that does not belong to the owners of the building.
6. **Car park 1** and **car park 3** each contain seven parking spaces. The new building therefore has 14 associated parking spaces. The requirements for buildings with a minimum of 11 associated parking spaces apply.

Diagram 1.2 Determining associated parking spaces and site boundaries, example 2

Approved Document S - New dwellings

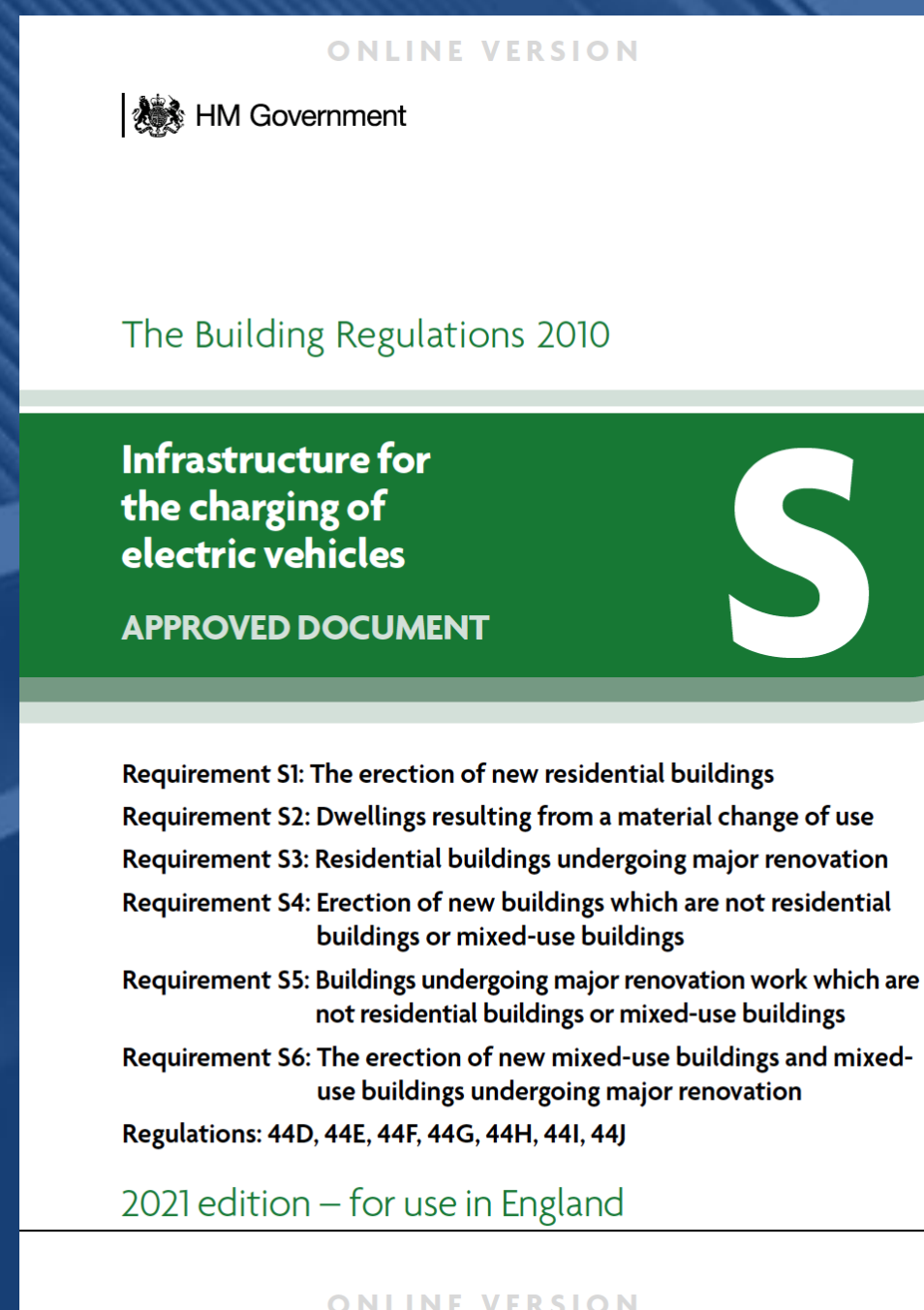
If some associated parking spaces are not required to install EV charge points then cable routes may need to be installed. If either:

- The average connection cost for an electric vehicle charge point connection is greater than £3600
- Some of the associated parking spaces associated with the new residential building are within a covered car park

The total number of associated parking spaces which have access to either an EV charge point or cable routes must be a minimum of either of the following.

- The number of associated parking spaces
- The number of dwellings that the car park serves

All associated parking should be provided with at least cable routes if >10



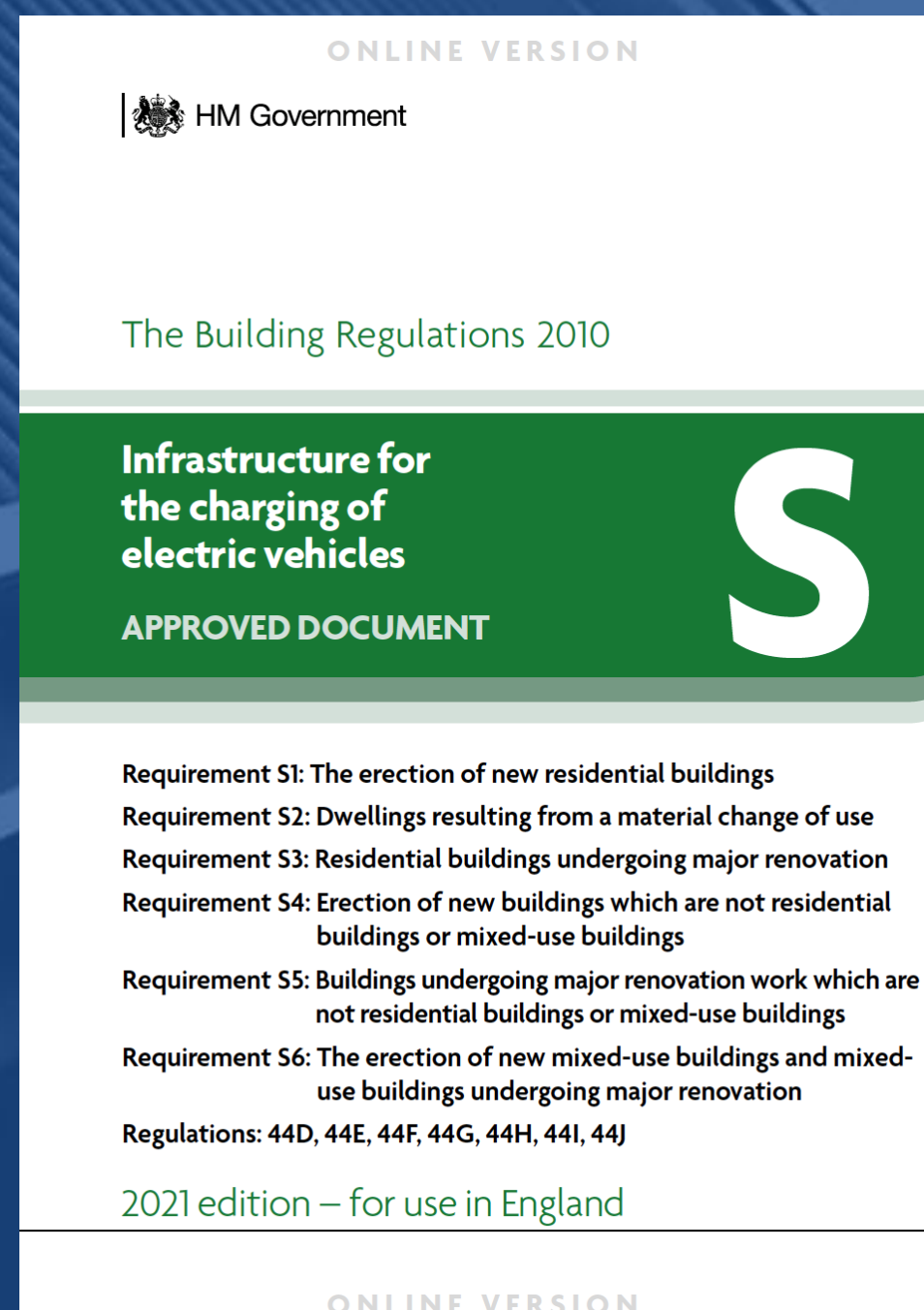
Approved Document S – Application of requirements

The requirement to install electric vehicle charge points applies for each associated parking space where both of the following apply:

- The associated parking space is not within a covered car park.
- The average connection cost for each EV charge point connection is less than £3600, determined according method in AD S.

Connection cost – the cost of upgrades needed to the electricity system in order to accommodate a charge point, excluding the cost of any building work or the cost of the charge point itself.

Max number of charge points should be installed before the extra grid connection costs exceed £3600

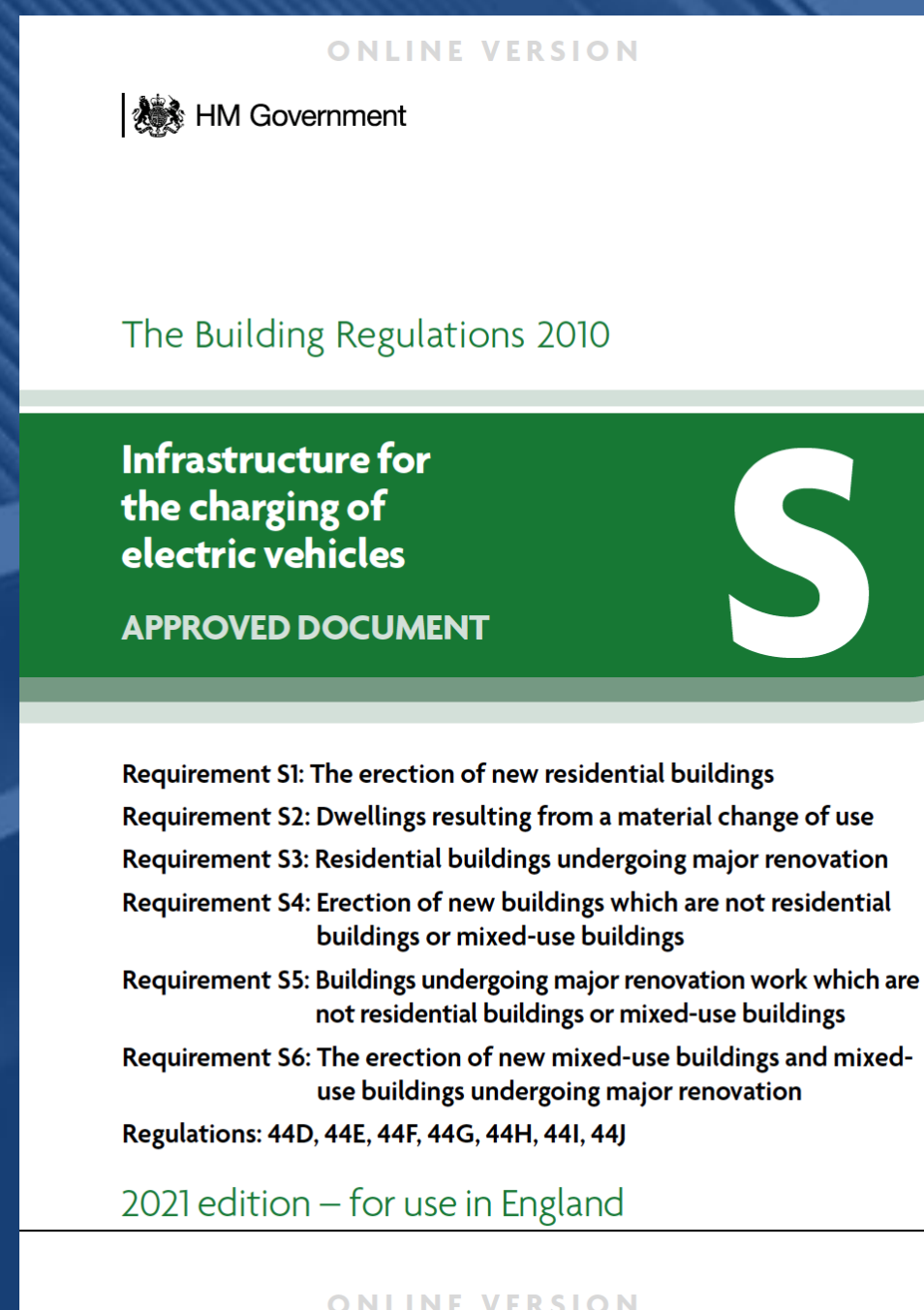


Approved Document S – Connection cost

At least two formal quotes should be given to the building control body during the notice/plans stage to show connection cost >£3600.

At least one quote should be from a distribution network operator. Quotes should clearly show all of the following.

- Total connection costs for electrical infrastructure without electric vehicle charge points for all dwellings, as an average cost per dwelling.
- Total connection costs with electric vehicle charge points for all dwellings, as an average cost per dwelling.
- The average additional connection costs per EV charge point per dwelling if charge points are installed for all dwellings with associated parking spaces.
- The maximum number of EV charge points that can be installed before the extra grid connections costs exceed £3600 per charge point per dwelling.



S2 - Dwellings from a material change of use

ONLINE VERSION

HM Government

The Building Regulations 2010

Infrastructure for the charging of electric vehicles

S

APPROVED DOCUMENT

Requirement S1: The erection of new residential buildings
Requirement S2: Dwellings resulting from a material change of use
Requirement S3: Residential buildings undergoing major renovation
Requirement S4: Erection of new buildings which are not residential buildings or mixed-use buildings
Requirement S5: Buildings undergoing major renovation work which are not residential buildings or mixed-use buildings
Requirement S6: The erection of new mixed-use buildings and mixed-use buildings undergoing major renovation
Regulations: 44D, 44E, 44F, 44G, 44H, 44I, 44J

2021 edition – for use in England

ONLINE VERSION

Requirement

Dwellings resulting from a material change of use

- S2.** Where one or more dwellings with associated parking result from a building, or a part of a building, undergoing a material change of use at least one associated parking space for the use of each such dwelling must have access to an electric vehicle charge point.

Application of requirements to work being carried out.

- Substantial work to the car park associated with or within the building, such as resurfacing or installing electrical infrastructure.
 - Electric vehicle charge points can be installed without having to upgrade the capacity of the incoming electrical supply.
 - The installation of an electric vehicle charge point will not unacceptably alter the character or appearance of a historic/traditional building
- N.B. – The associated parking space is not within a covered car park.

Material change of use – Exceptions

If the electrical power supply is not sufficient for EV charge points:

- Evidence to the BCB to demonstrate that the electrical power supply is not sufficient. Should be written confirmation obtained from either the distribution network operator or a suitable expert.
- As many electric vehicle charge points as can be accommodated within the existing power supply should be installed.
- Cable routes should be provided for additional parking spaces which would have required an EV charge point if the power supply were sufficient.

Covered Car Parks undergoing material change of use or major renovation:

- Cable routes or an EV charge point
- Number of associated parking spaces or dwellings (greater)

Historic and traditional buildings undergoing material change of use

Regulation

Application of paragraph S2 of Schedule 1 (dwellings resulting from a material change of use)

- 44E.** (1) The requirements of paragraph S2 of Schedule 1 apply to a building, or a part of a building, undergoing a material change of use to result in one or more dwellings as follows.
- (2) The requirements of paragraph S2 of Schedule 1 apply—
- (a) if—
- (i) the circumstances specified in regulation 5(a), (b) or (g) apply; and
- (ii) the material change of use involves building work being done which includes work being done to any of the following—
- (aa) to a car park that is located within the site boundary of the building, where the nature of the work is such that it would be reasonable to expect that work to include enabling the requirements of paragraph S2 of Schedule 1 to be fulfilled;
- (bb) the electrical infrastructure of a car park, where that car park is located within the site boundary of the building;
- (cc) the electrical infrastructure of the building, where a car park is located inside the building;
- (b) subject to paragraph (3), if an electric vehicle charge point for each dwelling resulting from a building, or a part of a building, undergoing a material change of use can be accommodated within the incoming electrical supply to the building without having to upgrade the capacity of the incoming electrical supply to the building; and
- (c) if the building is not one in relation to which paragraph (4) applies.

Regulation continued

- (3) If paragraph (2)(a) and (c) applies, but electric vehicle charge points for some but not all of the dwellings resulting from a building, or a part of a building, undergoing a material change of use can be accommodated within the incoming electrical supply to that building—
- (a) the requirements of paragraph S2 of Schedule 1 apply in respect of the maximum number of electric vehicle charge points that can be accommodated within the incoming electrical supply; and
- (b) cable routes for electric vehicle charge points must be installed in the associated parking spaces that would otherwise have been required under paragraph S2 of Schedule 1 to have had electric vehicle charge points installed.
- (4) The requirements of paragraph S2 of Schedule 1 do not apply if a building, or a part of a building, is—
- (a) listed in accordance with section 1 of the Planning (Listed Buildings and Conservation Areas) Act 1990;
- (b) in a conservation area designated in accordance with section 69 of that Act; or
- (c) included in the schedule of monuments maintained under section 1 of the Ancient Monuments and Archaeological Areas Act 1979,
- where compliance with the requirements of paragraph S2 of Schedule 1 would unacceptably alter the building's character or appearance.

S3 - Major renovations of residential buildings

Requirement

Residential buildings undergoing major renovation

- S3.** Where a residential building undergoing major renovation will have more than 10 associated parking spaces after the major renovation is completed—
- (a) at least one associated parking space for the use of each dwelling must have access to an electric vehicle charge point;
 - (b) cable routes for electric vehicle charge points must be installed in all additional associated parking spaces.

Regulation

Application of paragraph S3 of Schedule 1 (residential buildings undergoing major renovation)

- 44F.** (1) The requirements of paragraph S3 of Schedule 1 apply to a residential building undergoing major renovation as follows.
- (2) The requirements of paragraph S3 of Schedule 1 apply if—
- (a) the major renovation involves building work being done which includes work being done to any of the following—
 - (i) a car park that is located within the site boundary of the building, where the nature of the work is such that it would be reasonable to expect that work to include enabling the requirements of paragraph S3 of Schedule 1 to be fulfilled;
 - (ii) the electrical infrastructure of a car park, where the car park is located within the site boundary of the building;
 - (iii) the electrical infrastructure of the building, where a car park is located inside the building;
 - (b) the residential building will have more than 10 associated parking spaces upon completion of that work;
 - (c) subject to paragraph (3), all the required electric vehicle charge points can be accommodated within the incoming electrical supply to the building;
 - (d) the cost of installing all the required electric vehicle charge points and cable routes for electric vehicle charge points does not exceed 7% of the total cost of the major renovation; and
 - (e) the residential building is not one in relation to which paragraph (5) applies.

For a residential building undergoing a **Major Renovation** where all of the following apply, EV charge points should be provided:

- Purpose the work is not to improve the fire safety of the walls or roof
- When work is complete, there will be more than 10 associated parking spaces for the use of the dwellings.

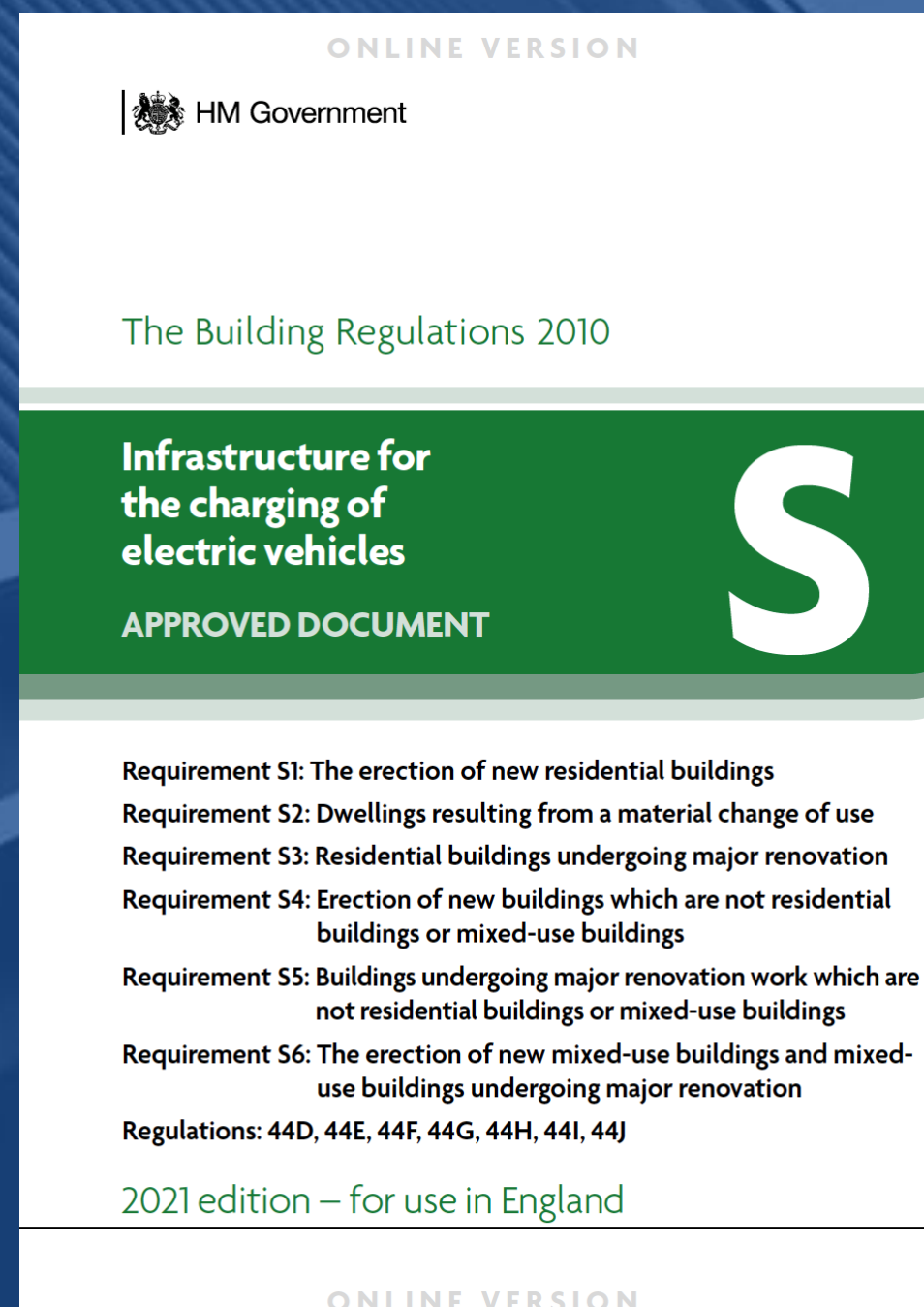
Major renovation – where more than 25% of the surface area of the building envelope undergoes renovation. Renovation work includes:

- Substantial work to the car park, such as resurfacing.
- Work to the electrical infrastructure of the car park.
- Work to the electrical infrastructure of the building, where the car park is located within the building.

Major renovations – Exceptions

- Residential buildings undergoing a major renovation, the requirement to install EV charge points only applies where all of the following apply:
- Power supply to the building or car park prior to installation is sufficient. If the electrical power supply is insufficient = Justification as before.
 - Cost of installing EV charge points and cable routes is not more than 7% of the total capital cost of the major renovation.
 - Where the cost is more than 7% requirement S3 can be met by installing cable routes only in all associated parking spaces.
 - Where the cost of installing only cable routes is more than 7% there is no requirement to install either electric vehicle charge points or cable routes.

Alternative guidance for covered car park – as before.



S4 - New non-residential building

Requirement

Erection of new buildings which are not residential buildings or mixed-use buildings

- S4.** Where a new building which is not a residential building or a mixed-use building has more than 10 parking spaces—
- (a) one of those parking spaces must have access to one electric vehicle charge point; and
 - (b) cable routes for electric vehicle charge points must be installed in a minimum of one fifth of the total number of remaining parking spaces.

Regulation

Application of paragraph S4 of Schedule 1 (erection of new buildings which are not residential buildings or mixed-use buildings)

- 44G.** (1) The requirements of paragraph S4 of Schedule 1 apply to the erection of a new building which is not a residential building or a mixed-use building ("new building") as follows.
- (2) If such a new building has, or will have, within its site boundary, more than 10 parking spaces—
- (a) if there are or will be any parking spaces situated in a position other than in a covered car park—
 - (i) the requirements of paragraph S4 of Schedule 1 must first be applied in relation to those parking spaces; then
 - (ii) if the number of parking spaces which are situated in a position other than in a covered car park is insufficient to completely fulfil the requirements of paragraph S4 of Schedule 1, cable routes for electric vehicle charge points must be installed in a sufficient number of parking spaces in the covered car park in order to ensure compliance with the requirements of paragraph S4(b) of Schedule 1;
 - (b) if all the parking spaces are situated in a covered car park, cable routes for electric vehicle charge points must be installed in a minimum of one fifth of the total number of those parking spaces.

For new buildings other than residential or mixed-use buildings with more than 10 parking spaces, both of the following apply.

- One electric vehicle charge point must be provided for the building.
- At least one in every five remaining parking spaces must be provided with cable routes.

Covered car parks:

EV charge points or Cable Routes only apply to parking spaces other than covered carpark unless there are insufficient spaces. Then cable routes should be provided. Cable routes must still be provided for a minimum of one in five parking spaces.

Parking space – A space in which occupants of or visitors to the building may reasonably expect to park a passenger car.

S5 – Non-residential buildings undergoing major renovation work

Requirement

Buildings undergoing major renovation which are not residential buildings or mixed-use buildings

- S5.** Where a building undergoing major renovation, which is not a residential building or a mixed-use building, will have more than 10 parking spaces after the major renovation is completed—
- (a) one of those parking spaces must have access to one electric vehicle charge point; and
 - (b) cable routes for electric vehicle charge points must be installed in a minimum of one fifth of the total number of remaining parking spaces.

Regulation

Application of paragraph S5 of Schedule 1 (buildings undergoing major renovation which are not residential buildings or mixed-use buildings)

- 44H.** (1) The requirements of paragraph S5 of Schedule 1 apply to a building undergoing major renovation, which is not a residential building or a mixed-use building, as follows.
- (2) The requirements of paragraph S5 of Schedule 1 apply to such a building if—
- (a) the major renovation involves building work being done which includes work being done to any of the following—
 - (i) a car park that is located within the site boundary of the building, where the nature of the work is such that it would be reasonable to expect the requirements of paragraph S5 of Schedule 1 to be fulfilled;
 - (ii) the electrical infrastructure of a car park, where the car park is located within the site boundary of the building;
 - (iii) the electrical infrastructure of the building, where a car park is located inside the building;
 - (b) upon completion of that major renovation, the building will have more than 10 parking spaces situated within the site boundary of the building;
 - (c) the cost of installing the required electric vehicle charge point and cable routes for electric vehicle charge points does not exceed 7% of the total cost of the major renovation.

For a non-residential buildings undergoing a **Major Renovation** where all of the following apply, EV charge points should be provided:

- Purpose the work is not to improve the fire safety of the walls or roof
- When work is complete, there will be more than 10 parking spaces within the site boundary for the building users.

Application:

- One electric vehicle charge point must be provided for the building.
- At least 1 in 5 remaining spaces must be provided with cable routes.

Exceptions:

- No more than 7% of the total cost of the major renovation

Requirement

The erection of new mixed-use buildings and mixed-use buildings undergoing major renovation

- S6.** (1) The requirements of paragraph S1 apply in respect of the part of the new mixed-use building that contains one or more dwellings and the associated parking spaces that are assigned to those dwellings.
- (2) The requirements of paragraph S3 apply in respect of the part of the mixed-use building that is undergoing major renovation that contains one or more dwellings and the associated parking spaces that are assigned to those dwellings.
- (3) The requirements of paragraph S4 apply in respect of the part of the new mixed-use building that contains one or more new premises that are not dwellings and the parking spaces that are assigned to those premises.
- (4) The requirements of paragraph S5 apply in respect of the part of the mixed-use building that is undergoing major renovation that contains one or more premises that are not dwellings and the parking spaces that are assigned to those premises.

Regulation

Application of paragraph S6 of Schedule 1 (the erection of new mixed-use buildings and mixed-use buildings undergoing major renovation)

- 441.** (1) The requirements of paragraph S6 of Schedule 1 apply to the erection of a new mixed-use building and a mixed-use building undergoing major renovation as follows.
- (2) The requirements of paragraph S6 of Schedule 1 apply if, upon completion, such a mixed-use building will have at least one parking space situated within the site boundary of the building.
- (3) If such a mixed-use building has, or will have, within its site boundary, a covered car park—
- (a) if there are or will be any parking spaces situated in a position other than in a covered car park—
- (i) the requirements of paragraph S6 of Schedule 1 must first be applied in relation to those parking spaces; then
- (ii) if the number of parking spaces, which are situated in a position other than in a covered car park, is insufficient to completely fulfil the requirements of paragraph S6 of Schedule 1, cable routes for electric vehicle charge points must be installed in accordance with—
- (aa) regulation 44D(4)(a), in relation to the associated parking spaces for one or more dwellings in a new mixed-use building;
- (bb) regulation 44F(6)(a), in relation to the associated parking spaces for one or more dwellings in a mixed-use building undergoing major renovation;
- (cc) regulation 44G(2)(a), in relation to the parking spaces for one or more premises that are not dwellings in a new mixed-use building;
- (dd) regulation 44H(4)(a), in relation to the parking spaces for one or more premises that are not dwellings in a mixed-use building undergoing major renovation;

S6 – Mixed-use buildings

For new mixed-use buildings.

- Requirement S1 and regulation 44D are followed relating to parts of the premises that include new dwellings.
- Requirement S4 and regulation 44G are followed relating to parts of the premises that are not dwellings.

For mixed-use buildings undergoing major renovation work:

- Requirement S3 and regulation 44F are followed relating to parts of the premises that include dwellings.
- Requirement S5 and regulation 44H are followed relating to parts of the premises that are not dwellings.



Final Thoughts!

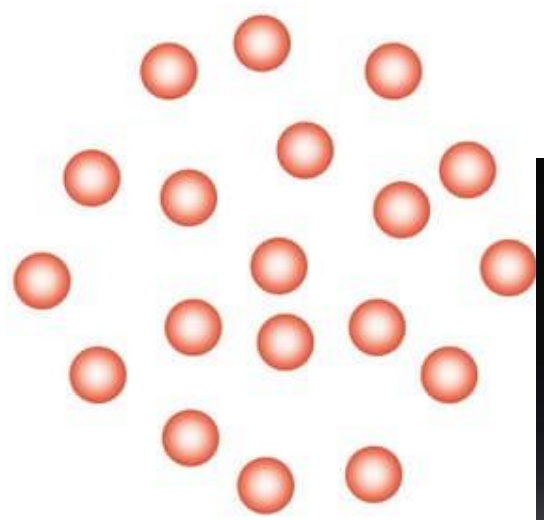
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Energy generation focus??

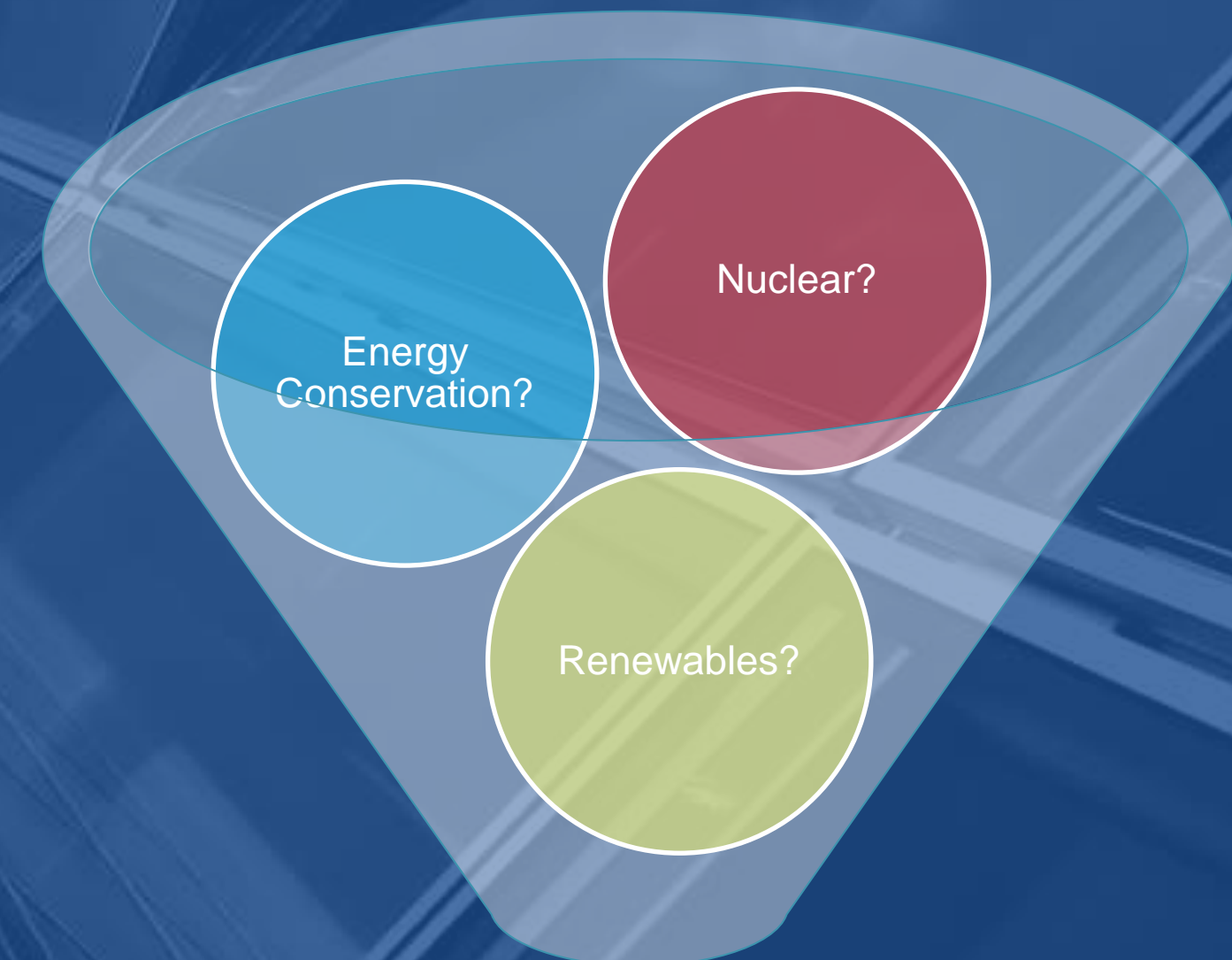
Energy, Entropy, the 2nd law of Thermodynamics



High Randomness,
High Entropy, High Disorder

**Iron man
ARC Reactor**

**1:1 Scale
LED Chest Light
USB Powered**



Energy in Buildings?



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