

New Approved Documents



Volume 1: Dwellings
Requirement F1: Means of ventilation
Regulations: 35, 42 and 44

2021 edition – for use in England



Volume 2: Buildings other than dwellings
Requirement F1: Means of ventilation
Regulations: 39 and 44

2021 edition – for use in England



Volume 1: Dwellings
Requirement L1: Conservation of fuel and power
Requirement L2: On site generation of electricity
Regulations: 6, 32, 33, 34, 35, 35A, 25B, 36, 36A, 36C,
37, 37A, 37C, 38, 40, 40A, 41, 44 and 44ZA

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Volume 2: Buildings other than dwellings
Requirement L1: Conservation of fuel and power
Requirement L2: On site generation of electricity
Regulations: 6, 32, 33, 34, 35, 35A, 25B, 36, 36C, 37, 37C,
38, 40, 40A, 41, 44 and 44ZA

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Requirement O1: Overheating mitigation
Regulations: 40B

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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

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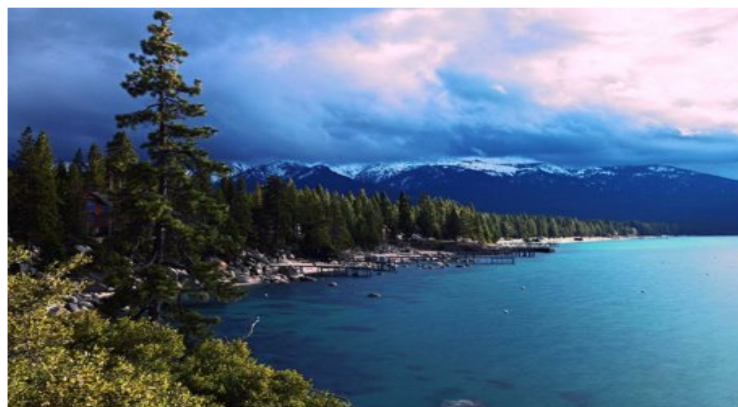
<https://www.gov.uk/government/collections/approved-documents>



Department for Levelling Up,
Housing & Communities

Tackling climate change: what are we working towards?

- **2015:** UNFCCC Paris Agreement temperature goal to limit global warming to well below 2°C and pursue efforts towards 1.5°C
- **2019:** the UK Government and the devolved administrations committed to the Net Zero by 2050 target as recommended by the Climate Change Committee

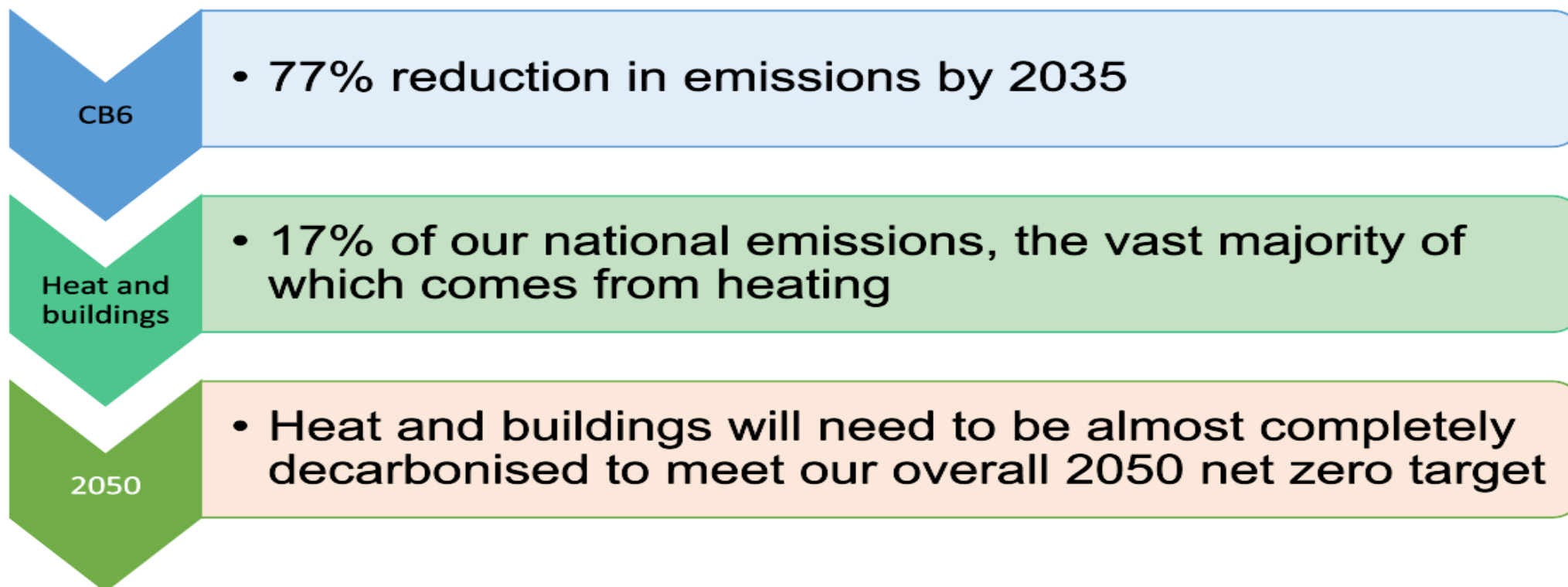


What is Net Zero?

When the amount of carbon emissions produced are cancelled out by the amount removed, the UK will be a net-zero emitter.



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Housing & Communities

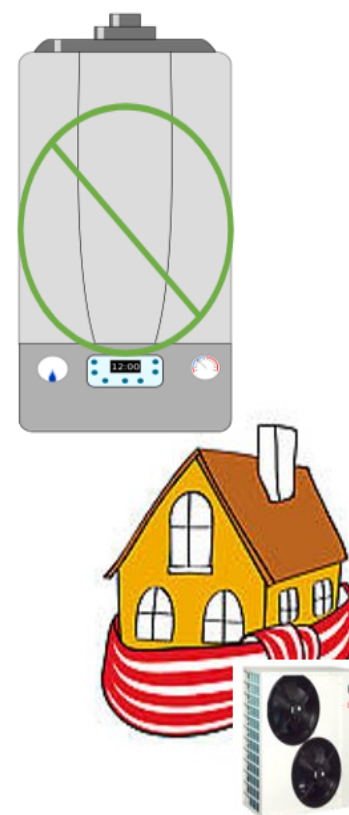
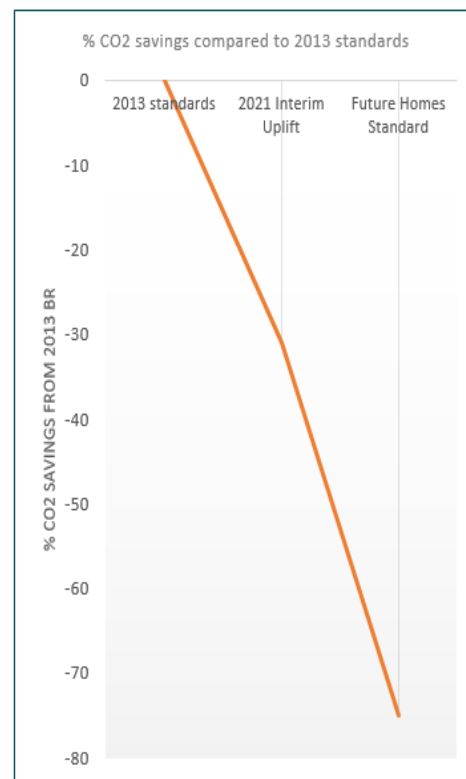




Department for Levelling Up,
Housing & Communities

Ensuring all new buildings in England are ready for Net Zero by 2025 – the Future Homes and Buildings Standards

- **75% lower CO₂ emissions** for new homes built from 2025
- **Highly efficient non-domestic buildings** which use low-carbon heat and have the best fabric standards possible
- Very high fabric standards, technology neutral - Compliance simplest and lowest cost with **heat pumps**
- **Zero Carbon Ready standard**, no further retrofit work needed as grid decarbonised
- **Part L 2021 Uplift** is an interim standard, which will help to build up skills and supply chains



Implementation timeline

Phase 1: Introduce the interim uplift

- **Dec 2021** – Interim Part L, F and Overheating regulations made for domestic and non-domestic buildings
- **June 2022** – Interim Part L, Part F and Overheating regulations come into effect

Phase 2: Technical work and engagement

- **Autumn 2021 – Summer 2022** – research and analysis to develop proposed technical specification
- **Summer 2022 – 2024** – develop sector specific guidance and embed understanding of the FHS

Phase 3: Consultation and Policy Development

- **Spring 2023** – Technical consultation on the proposed specification of the Future Homes Standard

Phase 4: Full FHS Implementation

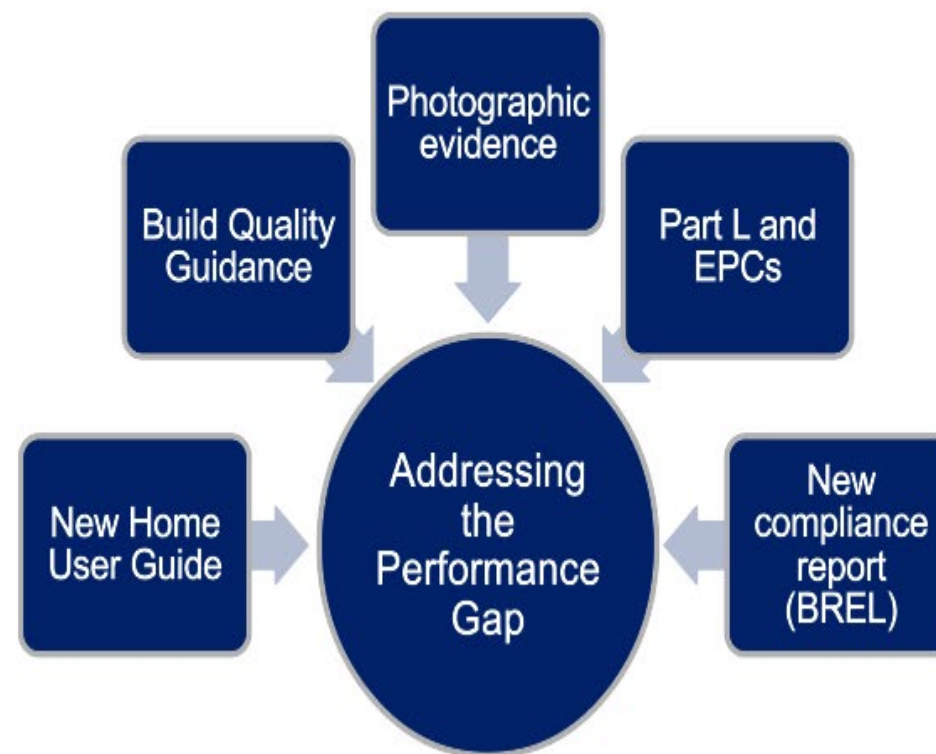
- **2024** – Part L FHS Regulations made
- **2025** – Part L FHS regulations come into effect





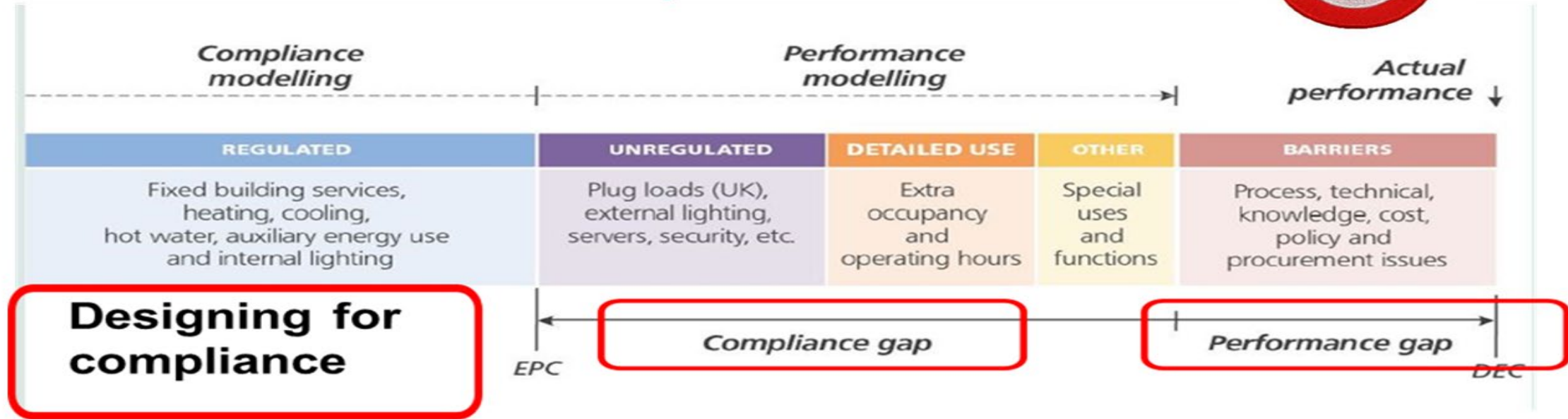
	Current 2013 Part L standard	2021 Part L Standard	Indicative FHS specification
Floor U-value (W/m ² .K)	0.13	0.13	0.11
External wall U-value (W/m ² .K)	0.18	0.18	0.15
Roof U-value (W/m ² .K)	0.13	0.11	0.11
<u>Window U-value (W/m².K)</u>	1.4	1.2	0.8
Door <u>U-value (W/m².K)</u>	1.0 - opaque 1.2 – semi-glazed	1.0	1.0
Air permeability at 50 Pa	5.0 m ³ /(h.m ²)	5.0 m ³ /(h.m ²)	5.0 m ³ /(h.m ²)
Heating appliance	Gas boiler	Gas boiler	Low-carbon heating (e.g. Heat pump)
Heat Emitter type	Regular radiators	Low temperature heating	Low temperature heating
Ventilation System type	Natural (with extract fans)	Natural (with extract fans)	Natural (with extract fans)
PV	No	40% floor area	None
Wastewater heat recovery	No	Yes	No







The Unintended Consequences: The Performance Gap



- Actual energy use in homes varies 200+% & 'Performance Gap' can vary 400%
- Product substitution can be a major problem, alongside build quality?



Appendix B: Reporting evidence of compliance



BREL report

- B1** The Buildings Regulations England Part L (BREL) report and photographic evidence should be provided to the building control body and to the building owner to show that building work complies with energy efficiency requirements.
- B2** SAP 10 will produce the BREL report for the building as a standard output option.
- B3** Two versions of the BREL report should be produced, using the approved software.
 - a. The first, the design stage BREL report, before works begin, to include all of the following.
 - i. The target primary energy rate and dwelling primary energy rate.
 - ii. The target emission rate and dwelling emission rate.
 - iii. The target fabric energy efficiency rate and dwelling fabric energy efficiency rate.
 - iv. A supporting list of specifications.
 - b. The second, the as-built BREL report, to include all of the following.
 - i. The target primary energy rate and as-built dwelling primary energy rate.
 - ii. The target emission rate and as-built dwelling emission rate.
 - iii. The target fabric energy efficiency rate and as-built dwelling fabric energy efficiency rate.
 - iv. A supporting list of specifications and any changes to the list of specifications that was provided at design stage.

The building control body can then use these reports to help check that what was designed has been built. The software includes a facility to compare the design stage and as-built data input files and automatically produce a schedule of changes.



Photographic evidence

- B6** Photographs should be taken for each dwelling on a development as a record during the construction of a property. The photographs should be made available to the energy assessor and the building control body. Anyone may take the photographs.
- B7** Photographs should be taken of typical details as listed below and should be unique to each property. One photograph per detail should be recorded. Additional images, such as a close-up detail, should be provided only when necessary (see below). Photographs should be taken at appropriate construction stages for each detail when completed, but prior to closing-up works.

Photos should be for **each home, geolocated and timestamped**.

To show **thermal continuity and quality of insulation**, and **airtightness** details:

1. Foundations/substructure and ground floor.
2. External walls.
3. Roof
4. Openings

Details of **Building Services**:

1. Plant/equipment identification label(s).
2. Primary pipework continuity of insulation.
3. Mechanical ventilation ductwork continuity of insulation (for duct sections outside the thermal envelope).

Detailed guidance is provided in the draft Approved Document L1 (Appendix B).



Airtightness

Airtightness in new dwellings

4.20 The minimum standard for **air permeability** of a new **dwelling** is given in Table 4.1. When carrying out work in new **dwellings**, care should be taken to reduce unwanted heat loss through air infiltration.

4.21 To ensure **airtightness** in new **dwellings**, all of the following apply.

- a. **Drawings:** all relevant drawings should be provided to clearly identify the position, continuity and extent of the **air barrier**. Drawings should be reviewed by the designer and installer and should include specifications for key materials.
- b. **Incoming services:** ducts, and cables wherever possible, should be grouped to minimise how often the **air barrier** is penetrated, while ensuring sufficient space to allow adequate screed flow between ducts. (Use temporary supports for services during floor works.) **Grommets or flexible collars** should be used around incoming services and sealed to the **air barrier** with **air-sealing tape or sealant**.
- c. **Internal building services:** where services penetrate the **air barrier**, holes should be as small as possible and should be core drilled to limit damage. The penetrating services should be sealed to the **air barrier** using proprietary grommets or collars with air-sealing tape or sealant. Where membranes are penetrated, careful detailing should be used to achieve a robust and durable seal at these penetrations.
- d. **Structural penetrations** need to be effectively sealed for **airtightness**. **Timber joist hangers** should be considered as an alternative to penetrating through the inner leaf.



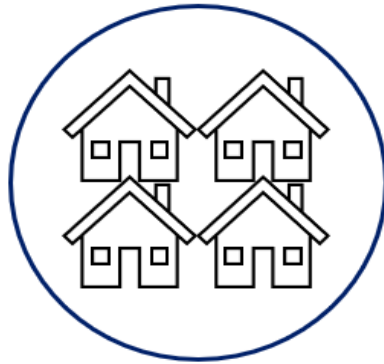
- e. **Cavity walls:** the inner block leaf mortar joint should be fully filled and pointed within the cavity. Where dense aggregate blocks have been used, plaster, parge coat or liquid membranes should be applied internally to reduce air permeability. Internal plasterboard linings are not appropriate for use as an air barrier solution.
- f. **Timber frame:** the vapour control layer should overlap at seams and junctions and be taped where it forms the airtightness barrier. Any damage, such as tears, should be repaired before boarding. Where sheathing board forms the air barrier, air-sealing tape should be applied at junctions and edges.
- g. **Fixings:** care should be taken to ensure that fixings do not damage the airtightness barrier.
- h. **Windows and doors:** to ensure continuity of the air barrier, window and door units should connect to the primary air barrier and window and door frames should be taped to surrounding structural openings using air sealing tape. Compressible seals or gun sealant may be used to supplement taping.
- i. **Loft hatches:** where the roof is insulated at ceiling level, hatches should be suitably designed and installed to ensure optimum airtightness.





All dwellings tested

Air leakage $AP_{50} \leq 8 \text{ m}^3/\text{h} \cdot \text{m}^2$ – Door fan
or
Air leakage $AP_4 \leq 1.57 \text{ m}^3/\text{h} \cdot \text{m}^2$ – Pulse



- All new dwellings must be airtightness tested – no more sample testing.
- New method for airtightness testing – TM23
- Pulse testing for airtightness available





Minimum standards for new and replacement thermal elements, windows and doors in existing homes:

- Aim of consolidating standards between new builds and existing homes as far as possible.
- 2021 standards are the highest standard for each element which is still cost-effective

	Current standard's U-values (W/m ² .K)	2021 standard's U-values (W/m ² .K)
Pitched roof – insulation at ceiling level	0.16	0.15
Pitched roof – insulation at rafter level	0.18	0.15
Flat roof or roof with integral insulation	0.18	0.15
Wall	0.28	0.18
Floors	0.22	0.18
Window, roof window	1.6 or Window Energy Rating Band C	1.4 or Window Energy Rating Band B
Rooflight ¹	1.6 or Window Energy Rating Band C	2.2
Doors with >60% of internal face glazed	1.8 or <u>Doorset</u> Energy Rating Band E	1.4 Or <u>Doorset</u> Energy Rating Band C
Other doors	1.8 or <u>Doorset</u> Energy Rating Band E	1.4 or <u>Doorset</u> Energy Rating Band B





Minimum standards for the renovation of thermal elements in existing homes:

Element	Current standard's U-values (W/m ² .K)		2021 standard's U-values (W/m ² .K)	
	Threshold	Improved	Threshold	Improved
Pitched roof – insulation between rafters	0.35	0.18	0.35	0.16
Flat roof or roof with integral insulation	0.35	0.18	0.35	0.16

We have uplifted the improved U-value for:

- Pitched roof – insulation between rafters
- Flat roof or roof with integral insulation

We have **not** uplifted the threshold values or the improved U-values for:

- Pitched roofs - ceiling level insulation
- Cavity walls
- Solid walls
- Floors

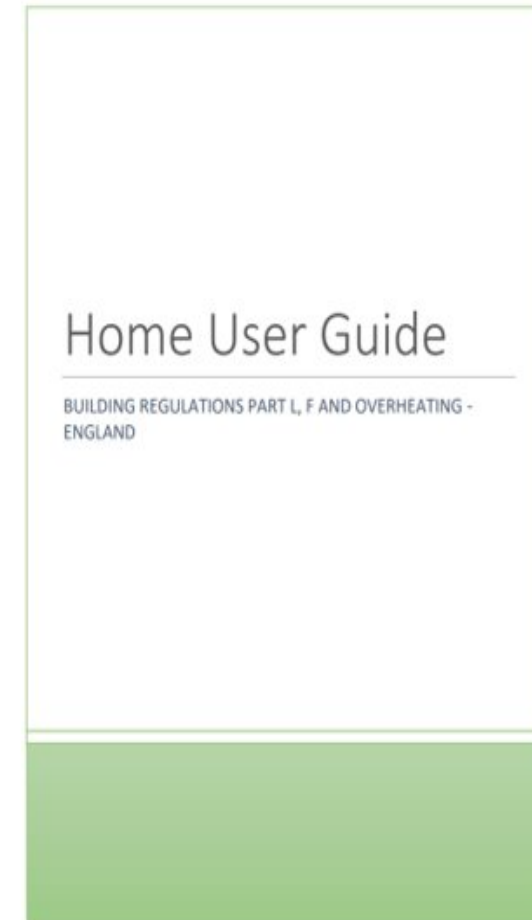


- Ventilation standards simplified to make easier to follow.
- Renamed systems:

System 1	Background ventilators and intermittent extract fans
System 2	Passive Stack Ventilation (PSV)
System 3	Continuous Mechanical Extract Ventilation (MEV)
System 4	Continuous mechanical supply and extract with heat recovery (MVHR)



Natural ventilation
Continuous mechanical extract ventilation
Mechanical ventilation with heat recovery





Replacing windows



If not mechanical supply and extract ventilated, replacing windows likely to reduce useful ventilation



Install background ventilation



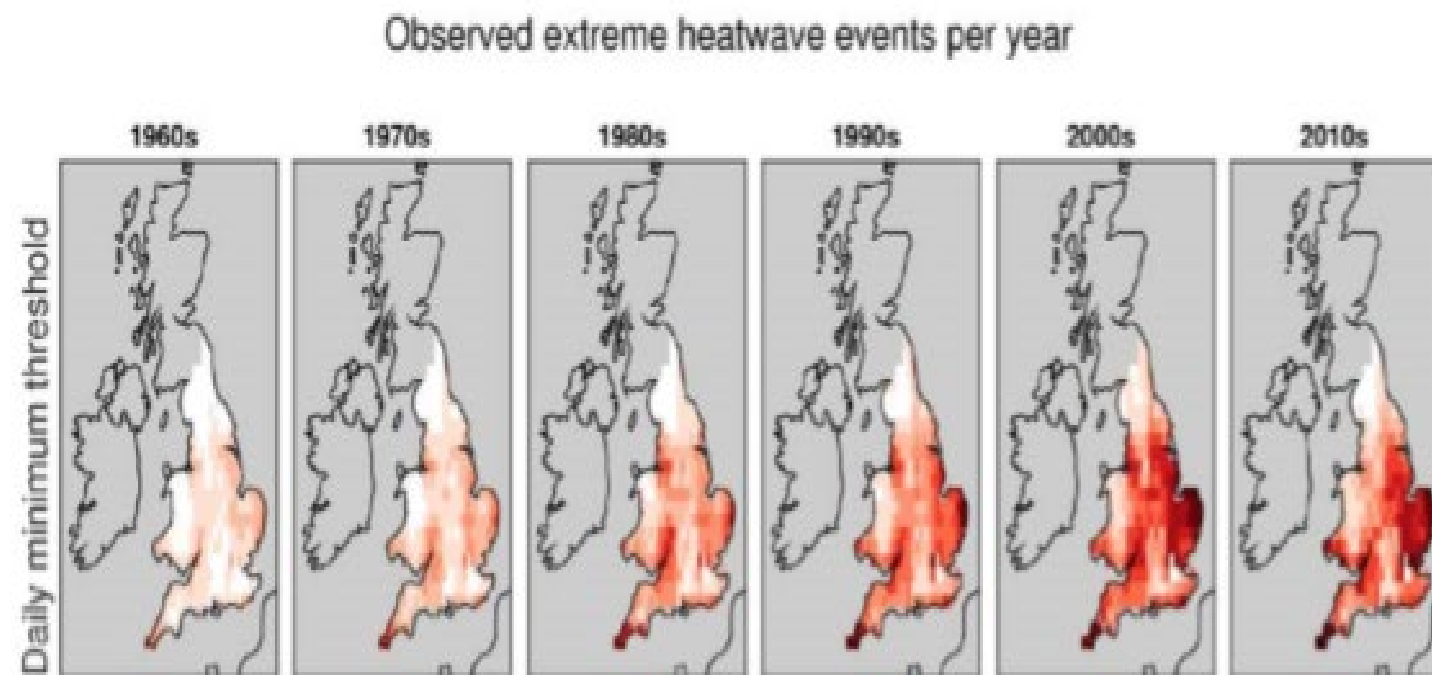
	Minimum equivalent area for dwellings with multiple floors	Minimum equivalent area for single-storey dwellings
Habitable rooms	8,000 mm ²	10,000 mm ²
Kitchen	8,000 mm ²	10,000 mm ²
Bathroom	4,000 mm ²	4,000 mm ²
MEV	background ventilators for any replacement windows which are not in wet rooms, with a minimum equivalent area of 4,000 mm ² in each habitable room	

Or demonstrate that dwelling ventilation provision is not worse overall





Fig. 1: Average number of days above the minimum and maximum heat thresholds per year.
Source: National Centre for Atmospheric Science at the University of Reading



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HM Government

The Building Regulations 2010

Overheating

APPROVED DOCUMENT

Requirement O1 Overheating mitigation
Regulations 408

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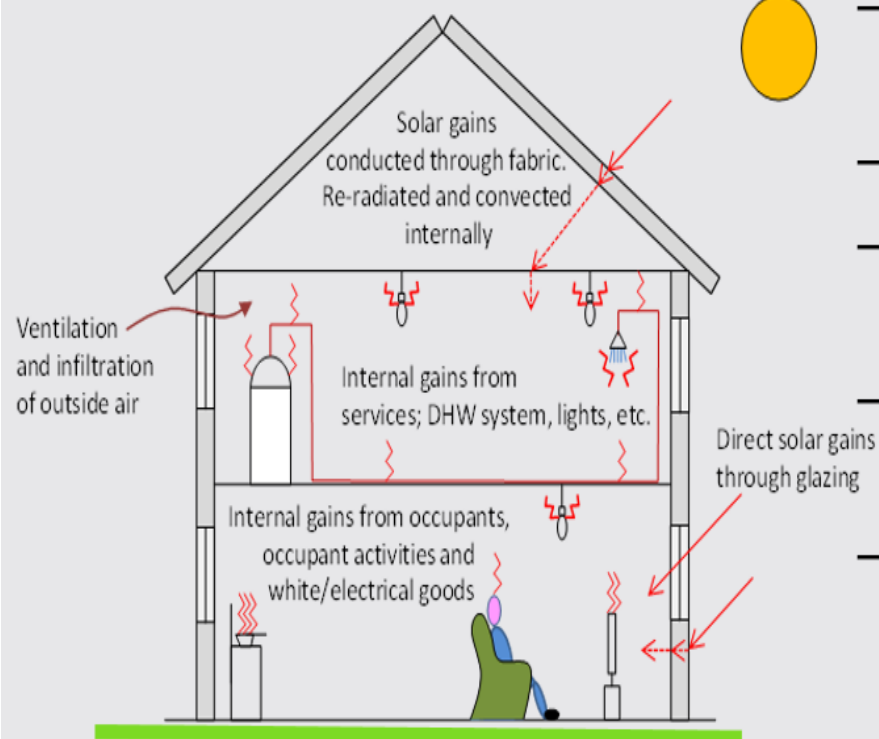
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Current design practice is making problem cases more common through:



- Fabric insulation – well insulated and getting better
- Airtightness – good and getting better
- Glazing and shading – balance of daylight and gains
- Internal gains / usage patterns – defined by building user
- Heat losses from distribution pipes in communal heating



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HM Government

The Building Regulations 2010

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Two methods to demonstrate compliance:

Simplified Method

- Dependent on a combination of cross-ventilation and geographical location:
 - Buildings in London are more likely to overheat
 - Single aspect flats are more likely to overheat
- Includes shading and ventilation

Dynamic Method

- Uses CIBSE TM59
- Uses the following to calculate overheating risk:
 - Location
 - Materials' properties
 - Orientation
 - Air change rates
 - Occupancy scenario
- A more flexible method





Limiting solar gains

Solar gains can be limited through:

- Fixed shading devices
- Glazing design
- Building design
- Shade of adjacent permanent buildings, structures or landscape

Not included:

- Internal curtains and blinds
- Tree cover

Removing excess heat

Excess heat can be removed through:

- Opening windows
- Ventilation louvres in external walls
- A mechanical ventilation system

Mechanical cooling can be included once other methods have been exhausted.





How many electric vehicles have been sold in the UK?

Number of new electric cars sold in the UK by year

Year	Number of new electric car registrations (source: SMMT)
2021	190,727
2020	108,205
2019	37,850
2018	15,510

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The Building Regulations 2010

Infrastructure for
the charging of
electric vehicles

APPROVED DOCUMENT

S

Requirement S1: The erection of new residential buildings
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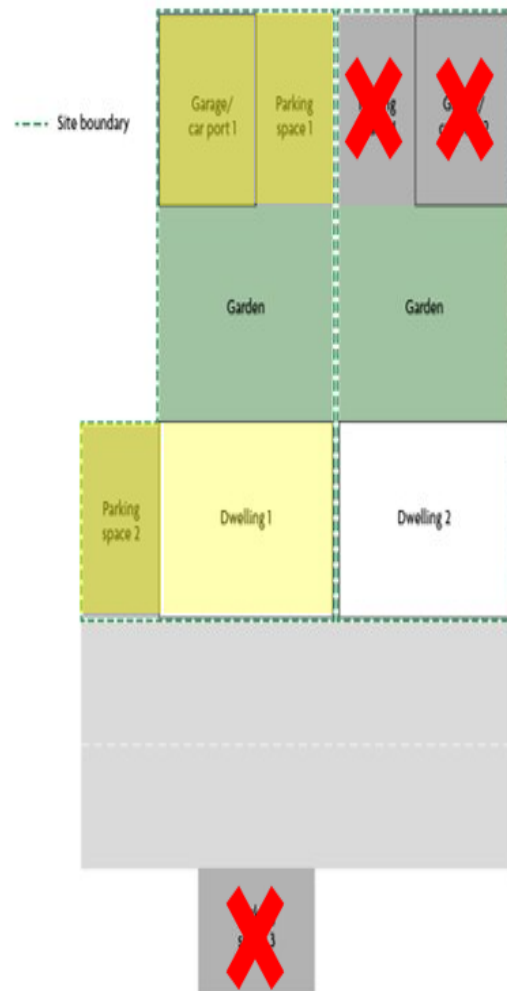
Summary

- 0.1 This approved document is Approved Document S. It gives guidance on how to comply with Part S of Schedule 1 to the Building Regulations.
- 0.2 This approved document contains the following sections:

Approved document section	Related Building Regulations requirements
Section 0: Introduction	n/a
Section 1: New residential buildings	Requirement S1 of Schedule 1 and regulation 44D
Section 2: Material change of use and major renovations for residential buildings	Requirements S2 and S3 of Schedule 1 and regulations 44E and 44F
Section 3: New buildings other than residential or mixed-use buildings	Requirement S4 of Schedule 1 and regulation 44G
Section 4: Major renovations of buildings which are not residential or mixed-use buildings	Requirement S5 of Schedule 1 and regulation 44H
Section 5: Mixed-use buildings	Requirement S6 of Schedule 1 and regulation 44I
Section 6: Standards for electric vehicle charge points and cable routes	Regulation 44J
Appendix A: Key terms	n/a
Appendix B: Standards referred to	n/a
Appendix C: Documents referred to	n/a

- Introduction
- 1. New Residential Buildings
- 2.Dwellings from MCOU/Residential undergoing major renovation
- 3.New build (not resi/mixed use).
- 4. Buildings undergoing major renovation (not resi/mixed use).
- 5.New mixed use/mixed use major renovation.
- 6.Standard for EVCP





Individual Dwelling Example

Associated parking space (or car parking space) means:

Within the boundaries of the property,
it serves



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The Building Regulations 2010

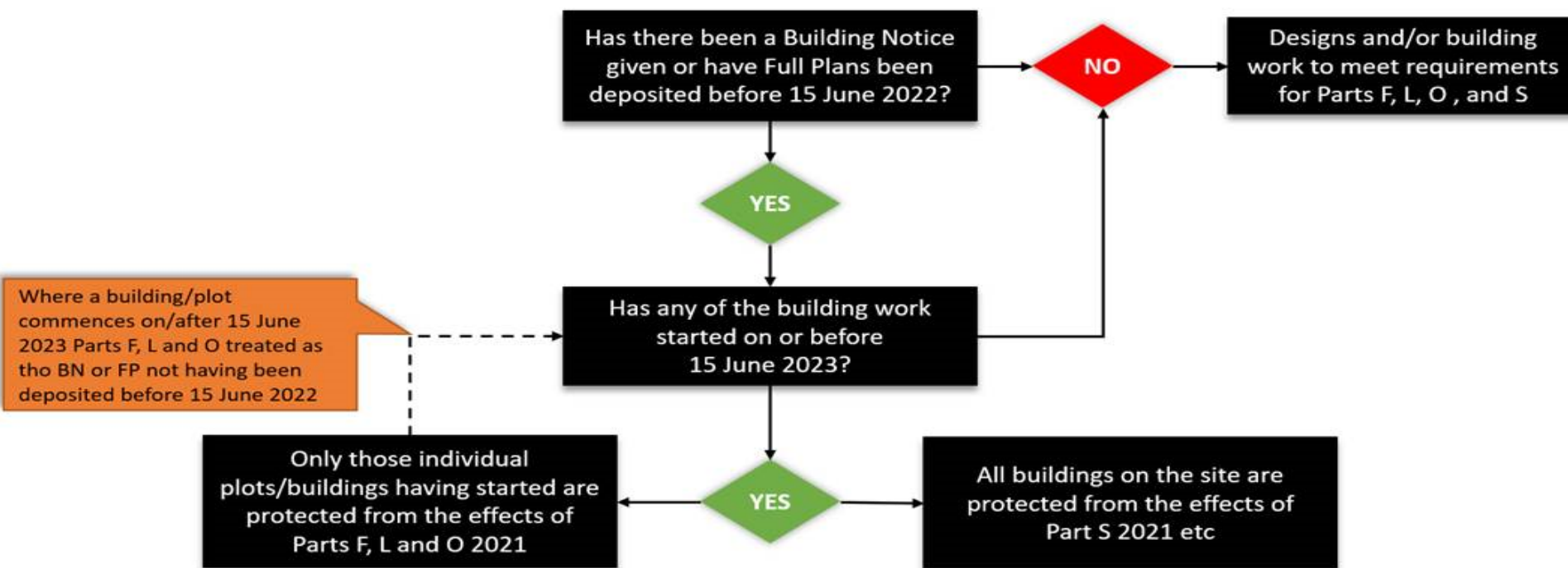
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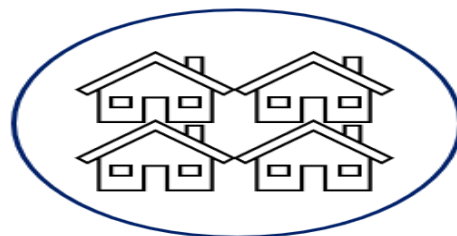
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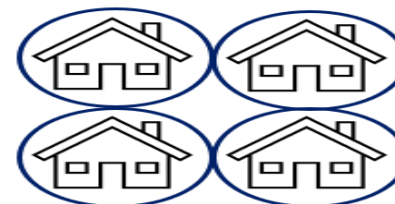


Before (F & L) ...



Transitional arrangements applied site-wide

Now...



Transitional arrangements apply to individual homes

With a reasonable period of **12 months** to commence work



Any questions please contact

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