



LOW ENERGY HOMES: HOW TO GET THE DESIGN RIGHT!
- WITH JENNY CHANDELA



Allan Corfield
ARCHITECTS

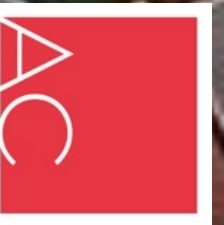


Designing your low energy home –

- 1. The Case for a “Green” Home**
- 2. The Fabric First Approach**
- 3. The Design Process**
- 4. Summary**

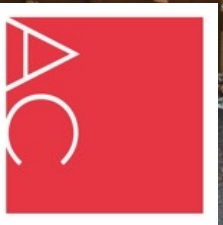



The Case for a “Green” Home



The Current Problem -

1. We have a massive shortage of housing in the UK and the current housing stock is sub-standard in design and energy performance
2. The major house builders who control the delivery of new homes are focused on volume rather than quality (EPC less than C)
3. Heating and powering homes accounts for over 20% of all greenhouse gas emissions in the UK
4. The construction industry accounts for over 10% of all greenhouse gas emissions in the UK





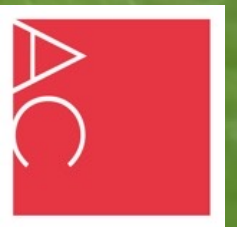
“Put simply a green or low energy home - from design, technologies and construction method - uses less energy, from any source, than a traditional or average new house.”



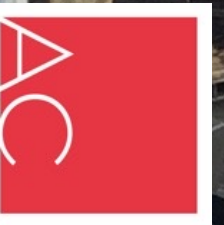
These are examples of low energy homes-



These are examples of low energy homes-



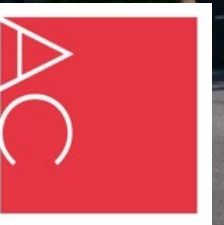
These are examples of low energy homes-



These are examples of low energy homes-



These are examples of low energy homes-



The Future Homes Standard

1. The new Future Homes Standard is aimed to ensure that all new homes built from 2025 will produce 75-80% less carbon emissions than homes delivered under 2013 regulations.
2. New homes built from 2022 produce 31% less carbon emissions compared to 2013 regulations. Amended Building Regulations came into effect June 2022.

From 2025 no new homes should be connected to the gas grid, they should instead be heated through low carbon sources, have ultra-high levels of energy efficiency alongside appropriate ventilations.
(Committee on climate change)

ONLINE VERSION

HM Government

The Building Regulations 2010

Conservation of fuel and power

APPROVED DOCUMENT

Volume 1: Dwellings

Requirement L1: Conservation of fuel and power
Requirement L2: On-site generation of electricity
Regulations: 6, 22, 23, 24, 25, 25A, 25B, 26, 26A, 26C, 27, 27A, 27C, 28, 40, 40A, 43, 44 and 44ZA

2021 edition – for use in England

Scottish Government
Riaghaidh na h-Alba
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PUBLICATION - ADVICE AND GUIDANCE

Building standards technical handbook
2020: domestic

Published: 2 Dec 2020
Directorate: [Local Government and Communities Directorate](#)
Part of: [Buildings, electricity and design](#)
ISBN: 978-1-78544-328-2

The building standards technical handbooks provide guidance on achieving the standards set in the Building (Scotland) Regulations 2004. This handbook applies to a building warrant submitted on or after 1 March 2021 and to building work which does not require a warrant commenced from that date.

Supporting documents

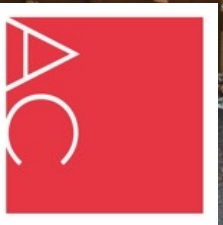
Building standards technical handbook 2020: domestic
455 page PDF
19.5 MB


Download



The Future Homes Standard -

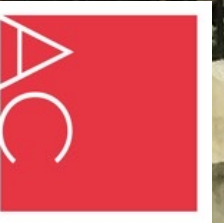
1. It is better for the environment, by reduced carbon emissions during construction
2. It is better for the environment, during operation due to the reduced energy demand
3. Typically 40-80% betterment in building standards than current housing stock
4. Reduced running costs over the life of the house
5. Potential for zero or positive energy bills
6. A more comfortable, healthy built environment





“Is a back to basics approach where you concentrate on the fabric of the building before throwing eco bling, in order to make it work.”

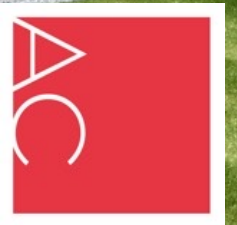
The Fabric First Approach





Fabric First, the key elements -

1. Solar Gain
2. Construction Type
3. Air Tightness
4. Limit Cold Bridging
5. Ventilation Strategy
6. Heating Systems





The Design Process



Initial design & planning stages -

1. Initial design ideas should be a response to the site and your brief (function before form)
2. Orientate habitable rooms due South to maximise solar gain, with utility/plant/service zones to the North
3. If going for Passive then large windows to South none on the North, also compact simple form
4. Larger more complex forms will cost more and have more junctions which will impact thermal bridging factor
5. Design with a construction method in mind
6. Limit overheating at design stage, ideally outwith building envelope
7. Once design is frozen complete initial PHPP and SAP calculations

Technical design (regs & production) stages-

1. You should be working with an efficient design, suitable for construction
2. Appoint a suitable kit company for the fabric of the building
3. Finalise specification of all major products and materials
4. Detail all individual construction connections, clearly showing insulation and airtightness (openings & penetrations)
5. Thermally model any bespoke details
6. Review and update PHPP and SAP calculations
7. Appoint specialist design items – MVHR, renewable heating etc
8. Make sure design & specification is both buildable & economic

Sto Rend Flex System on Ventec Carrier Board & ICF to be installed strictly in accordance with manufacturer written instructions and requirements and leaving 50mm ventilated cavity to 217mm SIPS panel - with Tyvec Reflex reflective external breather membrane or similar and approved and approved internal Tyvec Airguard or similar and approved reflective high performing vapour barrier - all junctions at SIPS panels to be securely taped before the membrane is fitted to limit air movement. Finished with 12.5mm Gyproc Wallboard Ten (10kg/m2) on 25x50mm battens.

External walls within 1m of boundary to achieve medium duration fire resistance.

10mm Engineered timber floor/vinyl or ceramic tile finish TBC over 22mm chipboard floor (15 kg/m2) on 300 JJI floor at 600mm crt. joist filled completely with high performance acoustic insulation (10-60 kg/m3). Finished with 2 no. layers of 12.5mm Gyproc Wallboard Ten (10kg/m2) to provide fire separation. Min airborne sound insulation value of 43Rw met. Fixed using InstaCoustic RB16 resilient bar acoustic ceiling system (16mm depth) at 400mm crt.

10mm Engineered timber floor/vinyl or ceramic tile finish TBC over 22mm chipboard floor (15 kg/m2) on 50x50 timber battens with plated UFH system fitted between and over min 25mm rigid insulation.

15mm laminated glass sheet as protective barrier to be 1100mm from fill, and be constructed in accordance with BS 6399-1:1996

2x12.5mm plasterboards 10kg/m² fixed using InstaCoustic RB16 resilient bar acoustic ceiling system (16mm depth) at 400mm crt. with all joints fully taped and filled.

10mm Engineered timber floor/ vinyl or ceramic tile finish TBC over 22mm chipboard floor (15 kg/m2) on 50x50 timber battens with plated UFH system fitted between and over min 25mm rigid insulation.

22mm chipboard floor (15 kg/m2) on 300 JJI floor at 600mm crt. joist filled completely with high performance acoustic insulation (10-60 kg/m3). Finished with 2 no. layers of 12.5mm Gyproc Wallboard Ten (10kg/m2) to provide fire separation. Min airborne sound insulation value of 43Rw met. Fixed using InstaCoustic RB16 resilient bar acoustic ceiling system (16mm depth) at 400mm crt.

Rigid insulation to be packed tight between 300 JJI floor joists to the full depth between flanges with Tyvec Reflex or similar and approved reflective high performing breather membrane. Min 50mm ventilated cavity to be provided to the underside of the insulation.

Soffit to be finished with Sto Rend Flex System on Ventec Carrier Board to be installed strictly in accordance with manufacturer written instructions and requirements in accordance with manufacturer written instructions and requirements in colour as specified by the client.

Sto Rend Flex System on Ventec Carrier Board to be installed strictly in accordance with manufacturer written instructions and requirements and leaving 50mm ventilated cavity to 217mm SIPS panel - with Tyvec Reflex reflective external breather membrane or similar and approved and approved internal Tyvec Airguard or similar and approved reflective high performing vapour barrier - all junctions at SIPS panels to be securely taped before the membrane is fitted to limit air movement. Finished with 12.5mm Gyproc Wallboard Ten (10kg/m2) on 25x50mm battens.

External walls within 1m of boundary to achieve medium duration fire resistance.

TENMAT FF102/50 or similar and approved Ventilated Fire Barriers to be fitted at the edges of the cavity.

STO- Ventilated Profile - sized for 50mm ventilated cavity

STO Edge Protection Profile

Illbruck Compriband TP600 impregnated sealing foam tape to form breathable external weathertight seal to be applied in accordance with manufacturer instructions.

Intermedia sealant (Illbruck FM230 window thermally insulating seal foam) to entirely fill the gap between the window frame and the wall opening/cavity. To be added prior to internal airtight tape being lapped over SIPS panel.

High performance Aluminium window.

1:10 DETAIL 23 WINDOW JAMB GENERAL

217mm SIPS panel wall with internal Tyvec Airguard or similar and approved reflective high performing vapour barrier. Internal lining as 12.5mm plasterboard 10kg/m² fixed on 25mm timber battens. All joints to be

Structural steel section as per engineers specification.

Gap between steel column and SIPS kit to be packed with mineral wool.

high performance rigid insulation board packed tight to steel section and lined over with 11mm OBS board.

Tyvec Reflex reflective external breather membrane or similar and approved folded over OBS cover board.

1:10 DETAIL 21 STRUCTURAL STEELWORK GENERAL

10mm Engineered timber floor, vinyl or ceramic tile finish TBC over 22mm chipboard floor (15 kg/m2) on 50x50 timber battens with plated UFH system fitted between and over min 25mm rigid insulation.

Steel beam supporting outer wall as per Structural Engineers specification.

Rigid insulation to be packed tight between 300 JJI floor joists to the full depth between flanges with Tyvec Reflex or similar and approved reflective high performing breather membrane. Min 50mm ventilated cavity to be provided to the underside of the insulation.

1:10 DETAIL 06

1:10 DETAIL 05

Preformed powder coated aluminium cill with RAL colour to match Alu-clad windows and doors.

TENMAT FF102/50 or similar and approved Ventilated Fire Barriers to be fitted at the edges of the cavity.

Sto Rend Flex System on Ventec Carrier Board to be installed strictly in accordance with manufacturer written instructions and requirements.

Rigid insulation packed around structural steel/timber to have resistance min 1.14 (m2K)/W to reduce cold bridging.

STO Edge Protection Profile Ventilation profile/Insect mesh

Soffits to be finished with Sto Rend Flex System on Ventec Carrier Board to be installed strictly in accordance with manufacturer written instructions and requirements in colour as specified by the client.

1:10 DETAIL 04

1:10 DETAIL 11

Waterproofing to ICF structural retaining wall to be specified by Structural Engineer

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1:10 DETAIL 02

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1:10 DETAIL 100

Amendments per building control report dated 11.05.17	SPH	16.05.17	B
Amendments per building control report dated 26.01.17	SPH	15.03.17	A
REVISION	INITIAL	DATE	SUFFIX



Allan Corfield Architects

The Self Build Experts

CLIENT
KENNETH MCLEAN

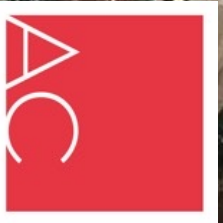
PROJECT
BELMONT DRIVE EDINBURGH

TITLE
Details Walls/General STAGE 3 DETAIL DESIGN DEVELOPMENT

SCALE @ A2	DATE	DRAWN	CHECKED
1:10	06/12/16		
No.	187 - BW 13		
REV.	B		
LEWIS HOUSE, UN HILLEND IND ES1 FIFE, KY11 9JL			
t - 01383 e - info@aca w - www.aca			

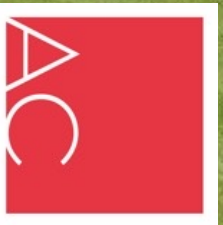
On site -

1. Before you start make sure you discharge any planning or regs conditions. Also put in place any warranty or insurance policies.
2. What procedures do you have agreed for managing quality on site.
3. Every trade that comes on site needs to know about airtightness.
4. If you are using inexperienced trades then consider Toolbox talks, at key stages –
 1. Kit sign off
 2. Window fitting
 3. Airtightness layer (VCL)
 4. Pre airtest
5. **Tape everything!**
6. Any onsite changes to be run past the design team.



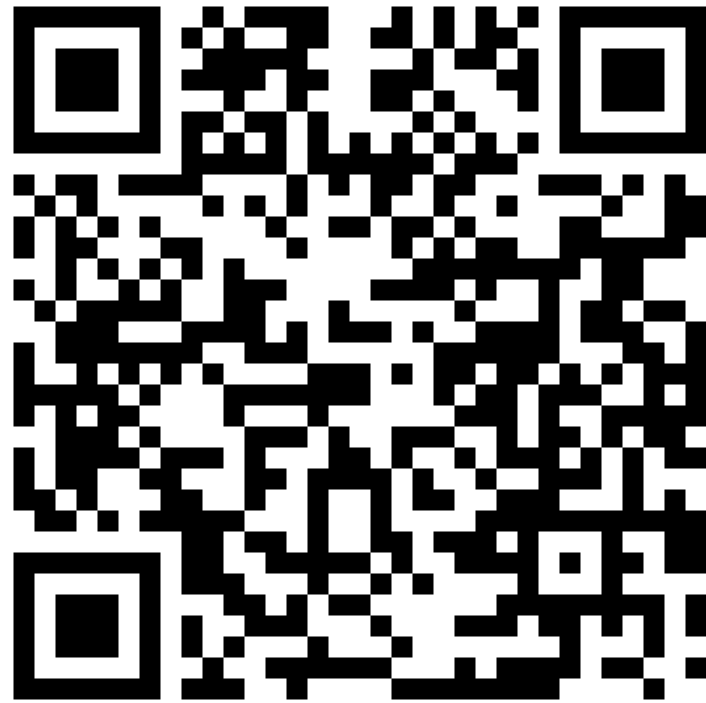
IN SUMMARY

1. The biggest impact on your low-energy home is during the initial design stages
2. Research all options, principles and construction methods for low energy homes
3. Decide how energy efficient you want your home to be; Zero / Passive or Fabric First
4. Detail out the poor traditional construction details, ie limit areas of cold bridging
5. Strive for Passive House standard Airtightness results
- 6. Remember none of this matters if your designers/ builders don't follow these principles!**



Allan Corfield Architects presents:

‘How to Self Build Successfully’ Seminar



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Key Topics:

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- Funding and protecting your project
- Your project team and the design process
- Project Management and cost control
- Future home standards and construction systems
- Renewable heating design
- MVHR design
- Virtual Reality demonstration



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