
Refined Superhomes2030 Standards



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ABBREVIATIONS

SuperHomes 2030: Up scaling integrated Home Deep renovation services for Ireland

PARTNERS

EHPA: European Heat Pump Association

ESB: Electricity Support Board

LIT: Limerick Institute of Technology

TEA: Tipperary Energy Agency

SW: Sustainable Works

Introduction

Following on from D3.1 SuperHomes Standards Recommendations report, this report aims to show the methodology of proceeding with the refinement of the SuperHomes Standards and provides an example of one. SuperHomes envisage that this document will be an ongoing process as the industry develops to adopt new technology and practices. So therefore, what is presented is a snapshot of what the initial refined SuperHomes standards document will feature.

As discussed in the SuperHomes Standards Recommendation Report, it would be an effective process to condense down the larger set of standards followed by SuperHomes employees into one concise inhouse document (collection of standards) with key standards and processes included. This would reference the source standards so that further knowledge can easily be attained by the user as required.

Methodology

The methodology for preparing such a document will primarily be through; -

- the review of current practices,
- identification of key parts of the current reference standards
- and discussion within the engineering team at SuperHomes to identify a suitable format and refined content.
- Identification and development of easy to use 'quick reference' tools and tables (where applicable)

The key information that will inform the user to the correct standards to follow can best be derived from the experienced engineers within the team. This is because the senior engineers have between them extensive years' experience of following these standards daily and so are best prepared to identify the key information required for each standard. As mentioned before, this will be an ongoing process and so if a standard emerges with new technology or new methodologies, these can be added, or if a standard becomes more prevalent in the work of the engineers, then it can be added.

Current Reference Standards

Per Deliverable D3.1 'Superhomes Standards Recommendations Report' See Appendix 1 for a list of many of the reference documents currently used by Superhomes.

This is a comprehensive but non-exhaustive list of technical standards that are currently in use by the Superhomes Engineering Team.

These form the starting point of the review and refinement of the Superhomes Standards.

Process of Refinement

In line with the recommendations of Deliverable D3.1 'Superhomes Standards Recommendations Report' the following outlines the key steps and requirements for the process of refinement of the Superhomes Standards.

1. Identify & define an appropriate format for the New Refined Superhomes standards.
2. Divide & organize the Technical Standards on a 'Measure by Measure' basis.
3. Identify & consolidate the key information to suit / match the Superhomes methodologies.
4. Be cognisant of the need to be develop the standards such that they are Clear, Concise & Can be used as Efficiently as possible.
5. Ensure that the New Refined Standards clearly reference the specific relevant parts of the Primary Reference Documents.
6. Define concisely, in the Main Clauses of the Refined Standards, the key information required by the Superhomes Engineers in fulfilling their activities.
7. Identify training needs where applicable for Superhomes Retrofit Engineers, Approved Contractors and Clients / Homeowners.
8. Create Documentation Checklists to define what supporting documentation & certifications are required on each project on a Measure-by-Measure Basis.
9. Create Inspection Checklists to define what specific Measure by Measure inspection points need to be checked on each project.
10. Ensure that the New Standards inherently contain a suitable and effective continual review process.

For more information on the recommendations and the reasoning behind them refer to Deliverable D3.1 'Superhomes Standards Recommendations Report'.

Format of Refined Superhomes Standards

Following some thought and discussions it was decided that important features of the format should; -

- Be based on an established commonly used template format.
- Be compatible with recognised Quality Management Systems (e.g., ISO 9000 etc.) which may become a requirement for Superhomes in the future.
- Have a standardised Document Reference Numbering System
- Have a Document History / Revision Tracking System
- Incorporate a document review process

The format identified contains the following as Main Headings;-

1. Scope
2. Primary (Normative) References
3. Terms & Definitions
4. Standards Clauses (Specific to the measure in question)
5. Reference to Installation Standards
6. Reference to Commissioning Standards (Where applicable)
7. Skills & Knowledge
8. Appendix 1: Documentation Checklist
9. Appendix 2: Inspection Checklist (Referencing inspection checklists for Quality Control)
10. Appendix 3: Quick Reference Tools / Tables (where applicable)

Using this format allows for the user to quickly access the key information necessary to go about their daily tasks without delving deep into several different reference documents. However; It also 'signposts' the user to the most specific and relevant sections of the reference material for the occasion when a greater level of detail is required or when a 'non-standard' approach may be required.

Measure-by-Measure Standards

The following is the initial list of the Standards that are to be prioritized for development as these cover the energy upgrade measures most commonly implemented in Superhomes Energy Upgrade Projects.

This list has been further categorized as Priority A to C (with A being highest Priority for immediate development).

SHS #	SH Standard Title	Priority
Roofs		
SHS_R01	Roof Insulation (on Ceiling)	A
SHS_R02	Roof Insulation (on Rafter / Sloped Ceilings)	B
SHS_R03	Roof Insulation (Sloped Warm Roof)	C
SHS_R04	Flat Roof Insulation (Warm Roof)	C
SHS_R03	Flat Roof Insulation (Cold Roof)	C
Walls		
SHS_W01	[CWI] Cavity Wall Insulation	A
SHS_W02	[IWI] Internal Wall Insulation	A
SHS_W03	[EWI] External Wall Insulation	A
SHS_W04	[IWI] Internal Wall Insulation - Breathable	B
SHS_W05	[EWI] External Wall Insulation - Breathable	C
SHS_W06	Nee Wall Insulation	C
Floors		
SHS_F01	Floor Insulation - Suspended	C
SHS_F02	Floor Insulation - Solid	A
Windows & Doors		
SHS_D01	Windows	A
SHS_D02	Doors	A
Air Tightness		
SHS_A01	Air Tightness	A
Mechanical Ventilation		
SHS_V01	Mechanical Ventilation - DCV	A
SHS_V02	Mechanical Ventilation - MVHR	C
Primary Heating System		
SHS_H01	Heat Pump	A
SHS_H02	Heat Distribution System	B
SHS_H03	Heat Emitters	B
SHS_H04	Heating Controls	B
SHS_H05	Heating System Ballancing	C
SHS_H06	Heating System Monitoring	C
Other Heating		
SHS_S01	Stoves	C
Solar Energy Systems		
SHS_P01	Solar Photovoltaic	B
SHS_P02	Battery Storage	C

Sample Standards

The newly refined Superhomes Standards will constitute protected intellectual property and therefore will not be published in full as part of this report or the Superhomes 2030 project. However, for the purposes of this report we have attached a sample standard for one of these newly refined standards, to demonstrate the format, purpose and content that will typically be contained in each of the newly Refined Superhomes Standards.

See Appendix 2; [EXAMPLE REFINED STANDARD] "SHS_Wo2 [CWI] Cavity Wall Insulation"

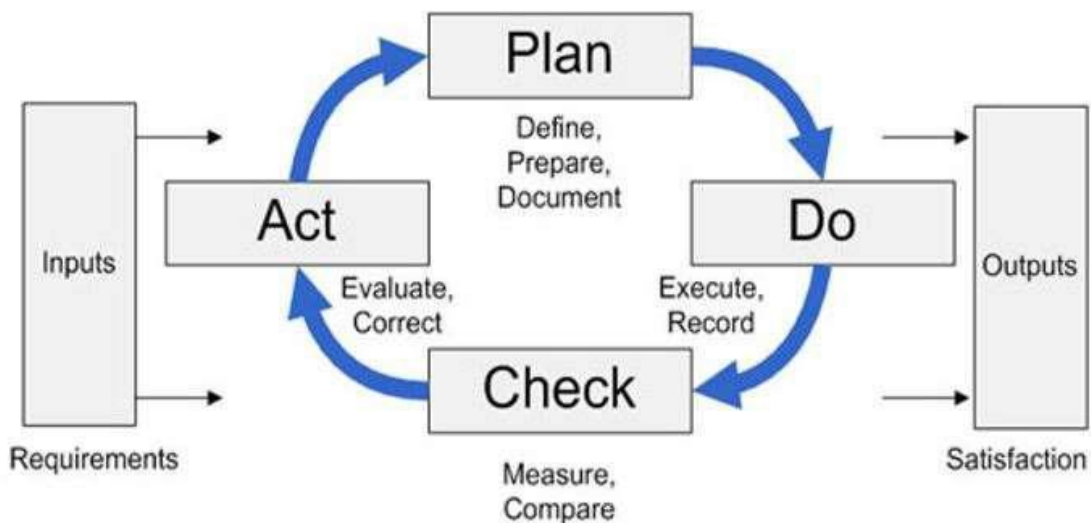
Continual Review

All SuperHomes Standards will be subject to a process of 'Continual Review' to ensure that they remain current, relevant, efficient in their use and contribute to the continual improvement of the quality & performance of SuperHomes.

In order to ensure this all SuperHomes standards will; -

- Be listed on a Document Tracking Register of Standards, each with;
 - o Implementation Date
 - o Latest Revision Date
 - o Planned Review Date
 - o An allocated Document Owner (Responsible Person)
- Be subject to effectiveness auditing (as part of the Internal Quality Control Procedures)
- Be Reviewed at Regular Intervals (as least annually); or
- Whenever any other changes arise which make review necessary such as;
 - o Technical Advances
 - o Regulator Changes
 - o Change in Grant Support Scheme Rules
 - o Change in inspection regimes
 - o Learned Experiences (from past successes or failures) gleaned from the effectiveness auditing.

Below is a basic map demonstrating this continual improvement loop process; -



SuperHomes Processes

Though not part of the scope of this report, another element of the improvements & refinements being introduced in SuperHomes is the formal documentation of SuperHomes operational processes. Below is a reference document with a brief overview of the SOP's (Standard Operation Procedures) that will be refined and documented as part of these improvements & refinements.

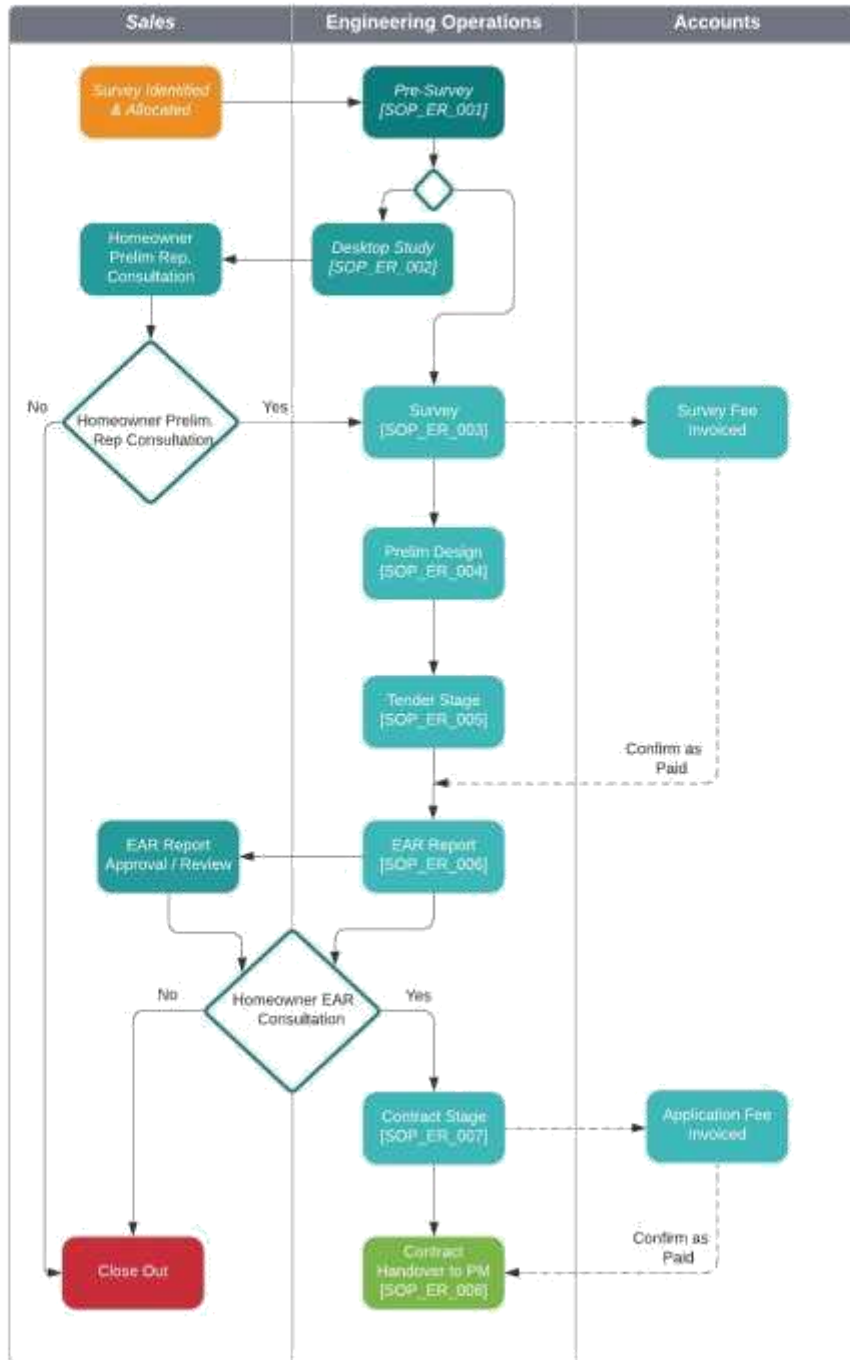
	SOP #	SOP Title	Rev #	Rev Date	Drafted By	Reviewed By	Implimentation Date	Review Due
SUPERHOMES ADVISOR STAGE	SA_001	insert sop title here	0.00		CC	DF		
	SA_002							
	SA_003							
	SA_004							
	SA_005							
	SA_006							
	SALES TO ENGINEERING HANDOVER							
ENERGY REPORT STAGE	ER_001	Pre Survey	0.00	06/03/2021	MOR			06/03/2022
	ER_002	Desk Top Study						
	ER_003	Survey			SOC			
	ER_004	Prelim Design			SOC			
	ER_005	Tender Stage						
	ER_006	Energy Report						
	ER_007	Contract Stage						
	ER_008	Contract Handover to PM						
	ENGINEERING TO PROJECT MANAGEMENT HANDOVER							
PROJECT MANAGEMENT STAGE	PM_001	Final Design						
	PM_002	Project Planning & Start						
	PM_003	Project Management						
	PM_004	Interim Inspections						
	PM_005	Project Completion & Final Inspection						
	PM_006	Grant Claim						
	PM_007	SEAI / KSN Inspection						
	PM_008	Project Snagging & Close out						

In line with SuperHomes goals of 'Continual Improvement' these SOP's will be subject to the same Continual Review process as the newly Refined SuperHomes Standards which are the subject of this report.

The SOP's will be accompanied by infographics that make them easier for users to follow, below is an example of the infographic describing the process from 'survey to contract';

Survey to Contract Processes

MOR_10/03/2021



Appendix 1

Superhomes Technical Standard Reference Docs
[Current]

Appendix 1: Superhomes Technical Standard Reference Docs (Current)

Ref.	Reference (Click for link where available)	Rev:	Type:	Marketing			Sales				Engineering Process										Other						
				[1] Website	[2] Marketing / Advertising	[3] Openhouses	[4] Applications	[5] EAR Discussion and Signing up HO	[6] Pre Survey	[7] Survey	[8]	[9]	[10]	[11]	[12]	[13]	[14]	[15]	[16]	[17]	[18]						
1	Superhomes Website		InHouse	✓	✓	✓	✓																				
2	Superhomes Application		InHouse	✓	✓	✓	✓																				
3	Superhomes FAQ and note on fees		InHouse						✓	✓																	
4	Heat Pump Survey Info Sheet		InHouse						✓	✓																	
5	DRPP Domestic Technical Standards and Specifications (Latest V 1.2 Version) 2019 S.R.54: 2014 & A1: 2019 (code of practice for energy efficient 2019 Retrofit of Dwellings)		National								✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
6	Building Regs 2014 TGD J Heat producing Appliances		National								✓	✓									✓	✓				✓	
7	Building Regs 2019 TGD F Ventilation	2019	National									✓	✓								✓	✓				✓	
8	I.S. EN 1856-2:2009 Chimneys. Requirements for metal chimneys. Metal flue liners and connecting flue pipes		EU																								

Appendix 1: Superhomes Technical Standard Reference Docs (Current)

Ref.	Reference (Click for link where available)	Rev:	Type:	Marketing		Sales		Engineering Process										Other																				
				Website/Marketing / Advertising	OpenHouses	Client Service - Initial Screening	Technical Review	EAR Discussion and Signing up HO	Pre Survey	Survey	Site Visit	Design & Specification	Construction Management	Handover	Final Inspection	Completion	Payment/Claim	Other Quality Assurance & Management																				
10	MCS - Guide to the Installation of Photovoltaic Systems		EU																																			
11	ESB Networks - Conditions Governing the Connection and Operation of Micro-generation		National																																			
12	BS EN 215 'Thermostatic Radiator Valves. Requirements & Test Methods'.		-																																			
13	Building Regs 2019 TGD L Conservation of Fuel & Energy (Dwellings)		National																																			
14	Irish Agreement Board approved/certified product installed to IAB approved methods and standards.		National																																			
15	Building Regulations TGD G - Hygiene		National																																			
16	BS EN 60598-1 Luminaires . General requirements and tests		EU																																			
17	TGD L 2011_Limiting Thermal Bridging and Air Infiltration - Acceptable Construction Details		National																																			

Appendix 1: Superhomes Technical Standard Reference Docs (Current)

Ref.	Reference (Click for link where available)	Rev:	Type:	Marketing			Sales			Engineering Process							Other		
				[1] Website / [2] Marketing / Advertising [3] Open Houses	[1] Operations [2] Data and Service - Initial Screening [3] Technical Review	[5] EAR Discussion and Signing up HO	[1] Pre Survey	[2] Survey	[1] Design / Create / Build [2] Design / Review / Amend [3] Construct / Manage	[1] Project Completion [2] Payment Claim / Some Quality Assurance & Management	Finance								
18	Energy Efficiency Best Practice in Housing		EU								✓	✓	✓	✓	✓	✓	✓	✓	✓
19	MCS Domestic RHI Metering Guidance v1.1		EU									✓	✓	✓	✓	✓	✓		
20	Building Regs 2014 TGD K Stairways, Ladders, Ramps & Guards		National																✓
21	SR50-1 - Code of practice for building services – Part 1: Domestic plumbing & heating		National									✓	✓	✓	✓	✓	✓	✓	✓
DRAFT	SR50-4 - Building Services – Part 4: Heat Pump Systems in Dwellings [DRAFT ONLY]		National									✓	✓	✓	✓	✓	✓	✓	✓
NEW	Heating and Domestic Hot Water Systems for Dwellings – Achieving compliance with Part L & Energy Performance of Buildings Regulations 2019		National									✓							
22	SEAI DOMESTIC SOLAR PHOTOVOLTAIC- CODE OF PRACTICE FOR INSTALLERS (latest version)		National									✓	✓	✓	✓	✓	✓	✓	✓
23	DPR Data Monitoring Guidelines		National									✓	✓	✓	✓	✓	✓	✓	
24	Local Authority Planning Search Planning Search		National							✓									

Appendix 1: Superhomes Technical Standard Reference Docs (Current)

			Marketing			Sales			Engineering Process						Other		
Ref.	Reference (Click for link where available)	Rev:	Type:	[1] Website/2]Marketing / Advertising3]OpenHouses	[1] Operations/2]Customer Service - Initial Screening/3]HomeVisit or Call/4]Energy Efficiency/5]Energy Performance	[5] EAR Discussion and Signing up HO	[1] Pre Survey	[2] Survey	[1] Design/2]Construction/3]Handover/4]Post-Handover/5]Warranty & Defects Management	[1] Design/2]Construction/3]Handover/4]Post-Handover/5]Warranty & Defects Management	[1] Design/2]Construction/3]Handover/4]Post-Handover/5]Warranty & Defects Management	[1] Design/2]Construction/3]Handover/4]Post-Handover/5]Warranty & Defects Management	[1] Design/2]Construction/3]Handover/4]Post-Handover/5]Warranty & Defects Management	[1] Design/2]Construction/3]Handover/4]Post-Handover/5]Warranty & Defects Management	[1] Design/2]Construction/3]Handover/4]Post-Handover/5]Warranty & Defects Management	[1] Design/2]Construction/3]Handover/4]Post-Handover/5]Warranty & Defects Management	[1] Design/2]Construction/3]Handover/4]Post-Handover/5]Warranty & Defects Management
25	SEAI National BER Register		National				✓	✓	✓								
26	Google Maps Ireland or Google Earth		Other				✓	✓									
27	DEAP Survey Form		National					✓									
28	TEA Window Schedule		InHouse					✓	✓								
29	TEA Radiator Schedule		InHouse					✓	✓								
30	Preliminary Health & Safety Checklist	V1.1	InHouse					✓									
31	Use of AutoCAD to re-draw site sketches		Other					✓	✓	✓							
32	Use of Sketchup to Redraw site sketches / 3D model.		Other					✓	✓	✓							
33	BRE U-value Calculator		EU						✓	✓					✓		
34	DEAP Manual	V4.2.2	National														
35	Carol DEAP calculation / record sheet		Other						✓								
36	DEAP Software Version 4.2.0		National						✓						✓		
37	Measures Table [Master] (EAR Detailed Measures)	REV 2.2	InHouse						✓		✓						
38	Measures Table [Master] (EAR Optional Measures)	REV 2.2	InHouse						✓		✓						

Appendix 2

[EXAMPLE REFINED STANDARD]

“SHS_W02 [CWI] Cavity Wall Insulation”

Department	Engineering / Operations	SH Standard #	SHS_W01
Standard Title	CWI – Cavity Wall Insulation	Revision #	v0.1
		Implementation Date	06/01/2022
Page #	1 of 18	Last Reviewed Date	06/01/2022
SHS Owner	Sarah O’Connell	Approval	MO’R

Document History

Date	Version	Name	Changes
10/03/2021	V0.0	Sarah O’Connell	Initial draft.
15/12/2021	V0.1	Fintan Wallace	Updated / Developed further
15/01/2022	V0.2	Mike O’Rourke	Review and Update

Summary of Changes since Previous Version

1. Change xxx
2. Change xxx
3. Change xxx
4. Change xxx

1. Scope

This standard sets out the minimum requirements for the Specification, Selection, Installation, Documentation & Inspection of Cavity Wall Insulation on SuperHomes Projects.

This standard is mainly related to cavity wall insulation.

Further information on cavity wall insulation is available in S.R. 54:2014 / A1:2019.

Note: Internal wall insulation and external wall insulation are dealt with in a separate SH Standards. Refer to main schedule of Electric Ireland Superhomes Technical Standards.

2. Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

2.1 DEAP Manual – Latest Version

The DEAP Manual sets out the General Principals of the information required and the means through which wall types and any insulation added to them should be input into DEAP software

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Standard Title	CWI – Cavity Wall Insulation	Revision #	v0.1
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SHS Owner	Sarah O’Connell	Approval	MO’R

for the calculation of Building Energy Ratings (BER). Many dwellings may have one or more extensions of a different construction makeup or insulation type and/or thickness. The dimensions of each wall type less the area of windows and doors should be entered separately into DEAP. Default values may be used when assessing existing dwellings subject to the guidance in Appendix S of the DEAP Manual. Non default values must only be used when sufficient substantiating evidence is available.

[\(Note: At last review of SHS W01 the latest version published was V 4.2.2 July 2020\) Click Here](#)

Applicable Sections

- 1 Dwelling Dimension
- 3.1 U-values of opaque elements
- 3.3 U-Values of elements adjacent to an unheated space
- Appendix S: DEAP for existing dwellings: survey methodology and default data
 - Table S3: Exposed Wall U-Values
- Table 12a: Thermal conductivity of some common building materials

2.2 SEAI Domestic Technical Standard & Specification, (Latest Version)

This document sets out the general competence, standards, and specifications that Contractors should possess, and adhere to, in carrying out works supported by various SEAI Programmes.

[\(Note: At last review of SHS W01 the latest version published was V 1.3 2020\) Click Here](#)

Applicable Sections

- 2.5 Provision of Evidence for BER Assessors
- 2.6 U-Value Calculations: Further Information
- 6.1 Cavity Wall Insulation

2.3 NSAI. S.R. 54:2014 / A1:2019 - Code of practice for the energy efficient retrofit of dwellings.

The scope of this Standard Recommendation addresses the energy retrofit of the building fabric and services of detached, semi-detached, and terraced dwellings of not more than three stories.

[\(Note: At last review of SHS W01 the latest version published was 17-07-2019\) Click Here](#)

Applicable Sections:

- Section 7.2.2 Wall types- Cavity Wall
- Section 7.3.4 Wall insulation methods Cavity Wall Insulation

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2.4 BRE 443, 2019, U-value calculator

Calculations methods for determining the heat transfer through building elements between internal and external environments are based on standards that were developed in the European Committee of Standardisation (CEN) and the International Organisation of Standardization (ISO) and published as British Standards. (2019 version in Consultation)

(Note: At last review of SHS_W01 the latest version published update was 2020 Version) [Click Here](#)

Applicable Sections:

- Section 7 U-Values for walls

2.5 Technical Guidance Document L, Conservation of Fuel and Energy, DECLG

In general, Building Regulations apply to the construction of new buildings, major renovations and to extensions and material alterations to existing buildings. In addition, certain Parts of the Regulations, including Part L, apply to existing buildings where a material change of use takes place.

(Note: At last review of SHS_W01 the latest version published update was 2021 Version) [Click Here](#)

Applicable Sections:

- Section 2.1- Building Fabric
 - This section gives guidance on acceptable levels of provision to ensure that heat loss through fabric elements provided by way of extension, material alteration, material change of use to an existing dwelling is limited insofar as is reasonably practicable. Guidance is given on three main issues:
 - insulation levels to be achieved by the plane fabric elements (sub-section 2.1.2);
 - thermal bridging (sub-section 2.1.3); and
 - limitation of air permeability (sub-section 2.1.4).
- Appendix A – Calculation of U-values
 - This section provides examples of the application of the u-value calculation method specified in I.S. EN 6946: 2017.
 - This section provides default thermal conductivities of common building materials.

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SHS Owner	Sarah O’Connell	Approval	MO’R

2.6 Better Energy Homes Contractor’s Code of Practice

This document is a reference for Contractors wishing to carry out dwelling energy upgrade works supported by SEAI’s Better Energy Homes (BEH) Programme. It sets out the programme-specific requirements of Contractor’s practices in carrying out works supported by the Programme.

[*\(Note: At last review of SHS W01 the latest version published update was 2020 Version 1.1\) Click Here*](#)

Applicable Sections:

- Section 5.1- Building Fabric
 - This section outlines the requirements applicable to wall insulation for the Better Energy Homes Programme.

2.7 Better Energy Homes QADP for Contractors

This document outlines the key elements and processes of the Quality Assurance and Disciplinary Procedures (QADP) for Better Energy Homes Registered Contractors.

[*\(Note: At last review of SHS W01 the latest version published update was 2019 Version 5.5\) Click Here*](#)

Applicable Sections:

- Appendix 2.2- Checklists for Cavity wall Insulation Energy Efficient Upgrade works
 - This section outlines the requirements applicable to wall insulation for the Better Energy Homes Programme.

2.8 NSAI Irish Agréments Board Certificate (specific to make / product of cavity wall insulation proposed)

NSAI Agrément Certificates establish proof that the certified products are ‘proper materials’ suitable for their intended use under Irish site conditions and in accordance with the Building Regulations 1997 to 2017.

[Search for an Agréments Certificate | NSAI](#)

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2.9 Guidance on Providing Photographic Evidence for Desktop Audits

Where desktop audits are deemed necessary in lieu of site inspections by SEAI/KSN this document provides guidance on the requirements for photographic evidence to be provided.

(Note: At last review of SHS W01 the latest version published update was 2020 Version 1.0) [Click Here](#)

Applicable Sections:

- Page 16 – Cavity Wall Insulation

3. Terms & Definitions

For the purposes of this document, the following terms and definitions apply.

3.1 Cavity Wall Insulation (CWI)

A cavity wall consists of two rows of brick or concrete block with a cavity or space between them. Injection of insulating product from the outside is the best method for insulating this type of wall.

3.2 U-value

Thermal transmittance, also known as **U-value**, is the rate of transfer of heat through a structure (which can be a single material or a composite), divided by the difference in temperature across that structure. The units of measurement are W/m²K. The better-insulated a structure is, the lower the **U-value** will be.

Calculation of the correct U-value is essential in determining if U-value targets specified have been met. Prior to commencing insulation work, consult with the insulation product manufacturer or supplier to establish the best product to use for the given construction type to achieve the required U-value.

Detailed examples of U-value calculations can be found in Appendix A of the Building Regulations TGD to Part L. TGD L and Annexes A, B and C of S.R. 54 also give indicative values that can help determine the likely depth and type of required insulation. These indicative values are not considered acceptable proof of U-value in an actual retrofitted dwelling.

3.3 Thermal Conductivity

Thermal conductivity (λ -value) relates to a material or substance and is a measure of the rate at which heat passes through a uniform slab of unit thickness of that material or substance, when unit temperature difference is maintained between its faces. It is expressed in units of Watts per metre per degree Kelvin (W/mK).

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3.4 Thermal bridging

Thermal bridging will occur whenever there is a break in the continuity of the insulation. This often occurs at the junctions of solid external walls with internal walls, where concrete floor edges are exposed on the external face of the building, and at window/ door openings. Thermal bridging results in a loss of heat and the risk of condensation and mould growth.

3.5 Cavity Width

Distance between the internal cavity faces of the masonry leaves of a cavity wall, measured perpendicular to the plane of the wall.

3.6 Cavity Wall Tie

Device for connecting a masonry leaf across a cavity to another masonry leaf or to a structural frame to resist tension and compression forces while allowing limited differential movements in the plane of the wall.

4. Cavity Wall Types

To Be considered suitable for pumping with cavity bead insulation all cavities should have a minimum residual (unfilled) depth of 50mm Min.

4.1 Unfilled cavity

The cavity has no existing insulation between the exterior leaf and the interior leaf. As long as the cavity is a minimum of 50mm thick then cavity wall insulation can be injected with a suitable bonded bead insulation.

4.2 Full filled cavity- injected post construction

The cavity between the exterior leaf and interior leaf was empty at the time of construction but has since had insulation pumped/injected into the cavity thus fully filling the cavity.

4.3 Full filled cavity- slabs or cavity bead insulation during construction

The cavity has had insulation installed at the time of construction and there is no residual cavity.

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4.4 Partial filled cavity

The cavity had some insulation installed at the time of construction (usually rigid board of some type) but still has some residual cavity. If the remaining residual cavity is a minimum of 50mm thick then cavity wall insulation can be injected with appropriate bonded bead insulation.

4.5 Poor / Unacceptable existing filled cavity insulation

Various other cavity insulation systems have emerged and been used down through the years which can be ineffective, unsafe or can result in damp and / or other problems. Examples of such insulation types can included;

- glass or mineral fibre type insulation (usually installed at construction stage)
- spray foams of various types (installed at or after construction stage)

Advice should be sought where these type of insulation are encountered. It may be advisable or necessary to extract such insulation before a better and more suitable insulation is injected into the walls.

5. Insulation Methods

5.1 Cavity Walls with Non-Porous Exterior Leaf

Table 1 provides information on Appropriate retrofit methods for Type 1 to 3 Cavity walls:

- Type 1: Cavity that cannot be filled: a cavity where no insulation is present, but which cannot be filled, as it is too narrow, or there is a risk of driven rain causing moisture ingress, e.g., un-rendered brick work in a severe exposure area.
- Type 2: Clear cavity: originally a 50 mm, 75 mm or 110 mm wide cavity which has the potential to be full-filled or has been full-filled because of previous energy efficiency improvements.
- Type 3: Partial fill cavity: a partial filled cavity wall which retains a residual cavity of approximately 50 mm width, or a width as specified by the product certification. These can be further separated into:
 - type 3a cavities which cannot be filled and;
 - type 3b cavities which can be filled using a certified system.

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	Baseline U-value (W/m ² .K)	Cavity wall insulation	External wall insulation	Internal wall insulation
Type 1	1,55	N	N	Y
Type 2	1,55	Y ^a	Y ^b	Y
Type 3a	0,70	N	N	Y
Type 3b		Y	Y ^b	Y
a Where cavity not filled previously.				
b Provided cavity has been filled.				

5.2 Cavity Wall with Porous Exterior Leaf

If a wall in question is of a particularly porous or open jointed construction (e.g. brick / stone) and / or is in an exposed location, there may be an increased risk of moisture creep across the cavity if filled with insulation, resulting in moisture ingress through the inner leaf of the wall and appearing on the inside as damp spots which can lead to damage and mould growth. This risk should be carefully considered before using cavity fill insulation in such instances.

For guidance on when full cavity fill should or should not be used refer to SR54:2014 & A1:2019; Section 7.3.4.2.1 & Annex D.

NSAI certificates for cavity wall insulation will also include maps of driving rain potential in Ireland. All proposed cavity wall insulations must follow guidance outlined within the certificate regarding geographical exposure.

Where there is a significant risk and no other suitable insulation option is available, it is recommended that the homeowner be made aware of the risk/possibility of moisture ingress. The homeowner may consider one of the options below:

Option	Risk	Additional cost	Additional disruption
Accept the risk and address it if issues arise	High	None	None
Dry line internally and avoid pumping the cavity	Low	Moderate	High
Apply hygroscopic treatment to the exterior leaf	Moderate	Moderate	None
Apply external wall insulation to the exterior leaf	Low	High	Moderate

6. Insulation Types

SuperHome's standard insulation specification is Agreement Certified EPS (Expanded Polystyrene) Bonded Bead. Typical Thermal conductivity of 0.035W/mK.

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7. Standards and Specifications

Retrofit Cavity Wall Insulation must be installed in accordance with the guidelines as described in S.R. 54 Clause 7.2.2 – Cavity Walls and in accordance with the relevant Agreement Certification.

Materials used must be installed in accordance with specifications laid out by the system supplier’s guidance and must be certified by an NSAI Agrément.

Cavity Wall Insulation must be installed to fill the full depth of the cavity. In as much as is physically and economically feasible, this must achieve a Maximum U-value of 0.37 W/m²K or better for external walls. Minimum cavity depths apply depending on the product as per NSAI Agrément, and as outlined in SR 54 7.3.4.2.5

Additional care should be taken where the walls exterior leaf is a porous material and located in an area of high exposure or driving rain. See SR 54 7.3.4.2.1

7.1 Cavity Wall Suitability

It is vital that the suitability of the wall for Cavity Fill insulation is assessed and considered before specifying cavity wall insulation on a project.

The SuperHomes Engineer must assess each wall type, as far as is reasonably practical using non-destructive / non-invasive survey methods, including;-

- Measure Overall Wall Thickness (at window or door ope)
- Check cavity in such places as; Meter Box, Through-wall vents or other existing opens through walls, in order to establish;
 - Type (if any) of existing wall insulation
 - Overall Cavity Depth
 - Remaining (unfilled) Cavity Depth
- Where suitable opes to view / measure cavity are not available;
 - Drill & Use Borescope camera to establish the above.

7.2 Maximum U-value

The U-value achievable with cavity insulation will be subject to the width of the existing cavity. A maximum U-value of 0.37W/m²K should be achieved to meet SEAI grant scheme requirements in addition to satisfying the HLI requirements. The Backstop U-Value for walls in homes where the HLI is between 2.0 and 2.3 is also 0.37W/m²K .

Where Cavity Wall insulation alone is not sufficient, it may be necessary to use a combination of measures either insulating internally or externally along with the cavity fill.

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7.3 Calculation of improved U-value

Where a wall U-value is improved with the addition of cavity wall insulation, the resultant u-Value must be substantiated in accordance with the requirements set out in the DEAP Manual. More often than not the starting point for this calculation will be the Default U-Value for the wall as set out in the DEAP Manual.

The resultant improved U-Value can be calculated case by case based on the project specifics and in accordance with the DEAP manual. *See Appendix S, Table S3 & S3a.*

In the interest of speed and efficiency a quick reference table is included in **Appendix 3** of this Standard to give indicative improved U-Values based on The Default U-Value of the existing Wall with the addition of different thickness of Cavity Bead insulation.

7.4 Cavity wall insulation installation

Although responsibility for the correct installation procedure lies with the Contractor, Superhomes Engineers should be able to identify and check that the pattern of injection holes complies with the recommended pattern given in the associated insulation's NSAI certification for either partially filled or unfilled cavities.

7.4.1 Gable wall installation

In dwelling with an unheated attic space, it is not necessary to fill to gable peaks as long as the height of the cavity wall insulation is not less than 200 mm above the top of the loft insulation. Where the gable forms part of a heated living space or the edge of the thermal envelope the drilling and filling process should be extended to the apex of the gable walls.

7.5 Service penetrations

Electrical Cables: In cavities where electric cables can come into contact with expanded polystyrene, all PVC sheathed electric cables shall be run through ducting or be sleeved. Cavity filling should not be carried out unless electrical cables are placed in suitable conduits or removed from the cavities.

Flues: Where a flue pipe from a heating system passes horizontally through a cavity wall which is to be insulated with a combustible Cavity Wall Insulation, the flue pipe shall be separated from the cavity insulation by non-combustible material in accordance with TGD Part J to the Irish Building Regulations.

Ventilation Ducts & Natural Vents through Walls: Location of existing and proposed wall ventilation ducting should be identified early on and any necessary protective measures

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highlighted to the contractor. Natural Vents through walls (e.g. DCV Fresh Air Vents) should always be sleeved / ducted through the full thickness of the wall inclusive of insulation.

Gas Pipes: All gas pipes through external walls should be appropriately sleeved through the wall, to protect the gas pipe and also to ensure that any potential gas leak on that stretch of pipe does not bleed into the wall structure or Cavity.

This applies equally to Natural / Mains Gas and to Gas pipes from LPG. Propane cylinders etc (such as cookers, hobs, gas fires etc.).

Air Tightness: Care should always be taken, with service penetrations, to minimize any negative impact on the overall Air Tightness of the house.

8. Supporting Documentation

8.1 All Projects

A checklist of required supporting documentation is provided in;

- Appendix 1: Documentation Checklist

8.2 Existing Cavity Wall Insulation

In instances where suitable cavity wall insulation has been previously pumped into existing partial fill/ unfilled cavities the following additional supporting documentation will be required to substantiate the inclusion of the existing insulation in the calculation of wall U-Values to be used in the DEAP analysis for the Post works BER certification:

- A Signed & Dated Declaration form the Original Installation insulation Installer confirming the following:-
 - Brand & Type on Insulation installed
 - Depth/thickness of Insulation installed
 - Agreement cert No. of the Product installed
 - Thermal Conductivity of the Product Installed
 - Above Required for Each different wall type / area (if applicable)

OR

- If above is not available, but the existing insulation was grant supported under an SEAI grant scheme, the following will be acceptable:-
 - Copy of the 'Declaration of Works' associated with the SEAI grant claim in question.
 - This Declaration of Work can be requested by the Homeowner from SEAI, upon providing acceptable evidence that they are the legal owner of the property.

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If neither of the above can be provided, then default U-Value for the wall type & age band must be used for the base / starting point calculation of the wall for the Post Works BER. Brand

9. Pre-Installation Inspection

All contractors must be familiar with and follow the pre installation inspection requirements outlined in the relevant NSAI certificate.

For further Details refer to:-

- S.R 54;2014 & A1:2019; Section 7.3.4.3
- S.R 54;2014 & A1:2019; Section 7.3.4.2.5 Table 20

Cavities should be checked for the presence of electrical wiring. Where present, the wiring should be relocated or sleeved before filling the wall cavity.

Other defects, e.g. missing wall ties, debris or mortar blocking the cavity, should be identified and, if they cannot be remedied, the cavity may be unsuitable for filling. These items should be covered in the assessment of the wall for filling.

To ensure that cavity wall insulation is only installed where it is appropriate, the assessment and installation procedure should include the following:

- determining that the wall is a masonry wall with unfilled cavities.
- inspecting the general condition of the external wall.
- Identifying any constructional defects that first need to be remedied, e.g. failed pointing.
- checking on the inside of external walls to see if there are any existing dampness problems
 - which need to be remedied prior to carrying out cavity wall insulation. Existing leaks of water into the cavity might only become evident after the cavity fill is installed.
- External leaf of the wall should be in good condition and any necessary repairs should be undertaken. Cracks in masonry or render and any defective masonry should be identified and rectified.
- Mortar joints should be inspected for excessive cracking of mortar and defective pointing. Any
 - necessary repairs should be made.
- checking any penetrations of the external wall, e.g. for flues and air ventilators.
- checking if the cavity of a directly adjacent house has already been filled, e.g. in a terraced
 - or semi-detached dwelling.
- checking the exposure of the wall for the type of insulation system to be used.

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- where a semi-detached or terraced dwelling is to be insulated, the insulation is contained by
 - inserting a cavity barrier at the line dividing the dwellings. After filling, the cavity barrier is
 - retained in the cavity and the drill holes filled;
- Holes in the inner and outer leaf at wall heads may need sealing to prevent loss of cavity fill material.

10. Post Installation Inspection

All cavity wall insulation installations are subject to inspection by SuperHomes & by SEAI appointed inspectors (KSN) as part of SuperHomes Quality Control & SEAI Quality control and grant scheme terms and conditions. Inspection consists of checks to verify that both Documentation and Installation are in order:

Whilst the following are non-exhaustive, the following referenced checklists outline the main inspection requirements;

- Appendix 1: Documentation Checklist
- Appendix 2: Inspection Checklist

11. Skills & Knowledge

Describe the Skills & Knowledge that will be required in relation to this standard, for:-

11.1 Superhomes Engineers

Superhomes Engineers / Surveyors must be competent to; -

- Identify different wall types using non-destructive survey methods
- Carry out a Borescope investigation of walls.
- Identify existing wall types & measure critical parameters.
- Identify the different common insulation types found in walls.
- Complete u-value calculations.
- Calculate what thickness of insulation is needed to reach required backstop u-values.
- Use the Quick Reference Tables contained in this standard.
- Describe the benefits/disadvantages to homeowners.
- Assess the general condition of the existing wall to identify risk of condensation forming.
- Be able to establish the most appropriate insulation solutions for different wall types.

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11.2 Contractors

- Must be competent to complete the installation and must complete the work in accordance with S.R. 54 & SEAI Domestic Technical Standards and Specification.
- Cavity wall insulation Contractors must be approved by the NSAI Agrément scheme. Contractors carrying out Cavity wall insulation works must be on the directory “NSAI Agrément Registered Blown Cavity Wall Installation Companies” and must carry out the installation to the standards required by this approval and certification.
- Must be aware of the various certification and documentation requirements for the various insulation types & methods.
- SEAI requires documentary and *photographic evidence of the installation of insulation to be available for inspection and for the purpose of BER assessments. Contractors need to be aware of the requirements and how to comply.

*For detailed information on photographic evidence required, refer to SEAI’s Document ‘Guidance on Providing Photographic Evidence for Desktop Audits’ (latest version).

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Appendix 1 Documentation Checklist

List (in table) all substantiating documentation required indicating where & what they are required for;-

Document Title / Description	BER	Grant Support	SEAI / KSN Insp.	HO Manual
Irish Agreement Certificate (NSAI Agreement Certificate - Product)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
NSAI Agrément Installer Certificate	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
SEAI (Cavity Wall) Registration Number	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Contractor Sign off / Declaration*	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Product Datasheet	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Declaration of Conformity	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Borescope test (By SEAI / KSN Inspector)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

*For Each different Wall Type the Contractor Sign Off / Declaration MUST Include:

- The Name of the Installation Contractor / Print on Company Headed Paper
- The address of the property,
- Brand and type of the cavity wall insulation used
- The Agreement Certificate Number of the Product Used
- The Depth / Thickness of the Wall insulation injected.
- Thermal conductivity of the cavity wall insulation used
- Signature and Date (by Installation Company)

NOTE: A 'Template' Format is available for use from Electric Ireland Superhomes

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Appendix 2 Inspection Checklist

List (in table) of key inspection points that will typically be examined as part of a Post Works Snagging inspection and / or SEAI/KSN inspection.

- The walls may also be subject to a borescope test (by the inspector on the day of the inspection).

TABLE OF INSPECTION POINTS TO BE INSERTED HERE

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Appendix 3

Cavity Wall Insulation – Improved U-Values Quick Reference Table

In the interest of speed and efficiency a quick reference table is included here to give indicative improved U-Values based on The Default U-Value of the existing Wall with the addition of different thickness of Cavity Bead insulation.

Table W01-A.1 v 1.0

'Y' Added Insulation Depth (mm)	'X' DEAP Default U-Value (Walls) from SEAP Appendix S, Table S3							
	2.4	2.2	2.1	1.78	1.64	1.1	0.6	0.55
50	0.55	0.54	0.53	0.51	0.5	0.44	0.33	0.32
60	0.48	0.47	0.47	0.45	0.44	0.39	0.31	0.29
70	0.42	0.4	0.41	0.4	0.39	0.35	0.28	0.27
80	0.38	0.37	0.37	0.36	0.36	0.32	0.26	0.25
90	0.34	0.32	0.32	0.33	0.32	0.3	0.24	0.24
100	0.32	0.3	0.31	0.3	0.3	0.28	0.23	0.22
110	0.29	0.28	0.29	0.28	0.28	0.26	0.22	0.21
120	0.27	0.26	0.27	0.26	0.26	0.24	0.21	0.2

Cost optimal U-Value showing corresponding insulation thickness which complies with SEAI Grant Support Requirements & HLI Backstop U-Value Rules.

U-Values Outside of SEAI Grant Support Requirements & HLI Backstop Rules

* U-Values in this table are calculated on the basis of EPS Bonded Bead Insulation with a Thermal conductivity $\lambda = 0.035$

How to Use this table:

1. Identify the Default U-Value for the wall in question (X Axis of the table)
2. Confirm (from Survey) the depth of the remaining cavity to be filled with added insulation.
Tip: Be conservative and under estimate rather than over estimate . (Y Axis of the table)
3. Find the cell where these two figures intersect. This is your Estimated resultant improved U-Value for that Wall.

Example: 'X' Default U-Value = 0.6; 'Y' Depth of Insulation Added = 60mm; Resultant U-Value = 0.31

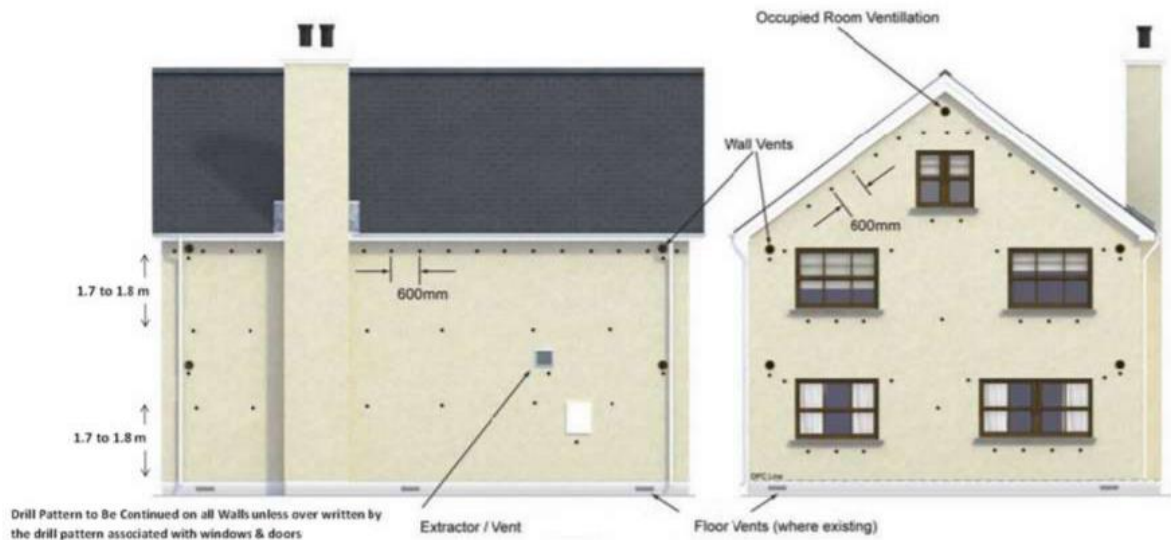
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Appendix 4

'Typical' Drill Pattern for Cavity Wall Insulation (Indicative for information purposes only)

Below is an example of a 'typical' drill pattern for demonstration purposes only.

The Drill pattern to be used on each installation should be per the Drill Pattern contained in the specific NSAI Agreement Certificate for the product used.



Example NSAI layout drilling pattern for cavity wall insulation