SUSTAINABLE ENERGY AUTHORITY OF IRELAND

Better Energy Programmes

Contractors Code of Practice and Standards and Specifications Guidelines

Version 7.3 2018

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Glossary of Terms

Contractor – Member of the Registered List of Contractors maintained by The Sustainable Energy Authority of Ireland who are approved to install measures supported by this programme. The installation of these measures by unregistered Contractors will not be supported by the Programme.

Customer – An applicant for support from the Programme who has had one or more of the measures outlined herein installed by a Registered Contractor.

Agrément – the National Standards Authority of Ireland, which issues Certificates for certain products and installers. Formerly known as the Irish Agrément Board.

The Programme – The Better Energy Homes Programme administered herein and created to increase the energy efficiency of Ireland's residential building stock.

Disclaimer

This document is a reference for Registered Contractors who wish to carry out works supported by SEAI's Better Energy Homes, Better Energy Warmer Homes and Better Energy Partners programme (the "Programme"). It sets out the general competence, standards and specifications that Contractors should possess, and adhere to, in carrying out works supported by the Programme.

SEAI and its Agents do not provide any warranty or guarantee concerning the completeness, effectiveness, reliability, accuracy or otherwise of such standards or any work carried out on foot of such standards. The provision of goods and/or services by Contractors to Customers of this Programme is entirely a matter between the Contractor and the Customer. SEAI and its Agents accept no liability or responsibility, whether for breach of contract, negligence, health and safety violations or otherwise, in respect of any dispute, claim or cause of action arising out of, or in relation to, any product, equipment, work, system or installation supplied or carried out by the installer under the programme. The Contractor is entirely responsible for all such matters.

1 Introduction to the Programmes

The Sustainable Energy Authority of Ireland (SEAI) is Ireland's national energy authority with a mission to promote and assist the development of sustainable energy and was established by the Government pursuant to the Sustainable Energy Act 2002. The Better Energy Programme covers Better Energy Homes, Better Energy Warmer Homes, and Better Energy Partners.

Better Energy Homes programme

The Better Energy Homes programme is one of a range of measures and support mechanisms administered by SEAI to improve the quality of the built environment in Ireland.

This Programme provides financial support to Customers (Customers) for a defined range of upgrade technologies and materials which will improve the overall efficiency of their home. The Customer must select a Contractor or Contractors from a list of Registered Contractors, published and maintained by SEAI, to carry out the measures supported and defined by the Programme. Following completion of the works, the Customer will be able to claim fixed grants relating to these measures. In order to successfully claim the grant, the works must be carried out in accordance with the guidance set out in this document.

The Better Energy Homes programme provides grants to homeowners who invest in energy efficiency improvements in one or more of the following areas: Roof Insulation, Wall Insulation, Heat Pump Systems, Heating Control Upgrades, Solar Thermal panels and Installation of a High Efficiency (>90%) Gas or Oil fired Boiler in conjunction with heating controls. Note: applications for Oil/Gas Boilers in conjunction with heating controls were accepted up to 15 January 2018 and are due for completion by 15 July 2018).

The upgrade measures funded include:

- Attic Insulation
- Cavity Wall Insulation
- Internal Wall Insulation
- External Wall Insulation
- Heat Pump Systems from 16 March 2018
- Solar Thermal (Water Heating)
- Fully integrated Heating Controls – A minimum standard 'solution' is required to be completed before support can be applied for. This includes:
    - Installation of a Seven Day Timer and Temperature Control to an Existing Boiler
    - Installation of Zonal Control over at least two zones in the home (these minimum two zones are defined as being the space heating and domestic hot water zones)
    - Installation of a Timer and Temperature Control on the Hot Water Cylinder
    - Installation of a Boiler Interlock (which prevents the boiler from firing where the set temperature in the home has been reached.)
    - In addition to the above four items either:
        - The installation/modification to include an additional Heating Zone (which will allow the space heating to be split into two separate zones) or
        - The installation of Thermostatic Radiator Valves on at least three radiators but no less than half of all radiators
- High Efficiency Heating System which consists of "Fully integrated Heating Controls" (as above minimum standard solution) plus installation of a high efficiency boiler (in excess of 90% seasonal efficiency).

Better Energy Warmer Homes programme
The Better Energy Warmer Homes programme (BEWH), administered by the Sustainable Energy Authority of Ireland (SEAI), funds energy efficiency improvements in the homes of the elderly and vulnerable, making the homes more comfortable, healthier and more cost effective to run

The measures funded under Better Energy Warmer Homes programme include:

- Attic Insulation
- Cavity Wall Insulation
- External Wall Insulation
- Internal Dry Lining Wall Insulation
- Cavity Wall Insulation
- High Efficiency Gas or Oil fired Boiler with Fully integrated Heating Controls Upgrade
- Fully integrated Heating Controls Upgrade
- Solid Fuel Room Heater (without back boilers)
- Mechanically-assisted powered cleanse and flush (power flushing) of system
- Mechanically-assisted powered cleanse and flush (power flushing) of system and Installation of magnetic filtration system to existing heating
- Oil Boiler Service
- LPG Boiler service
- Natural Gas Boiler service
- Draught Proofing
- Insulation of pipe-work and water storage tanks
- CFLs
- Energy Advice

Better Energy Partners
The Government has committed to achieve energy efficiency savings of 20% by 2020 as set out in specific targets for energy savings in the National Energy Efficiency Action Plan. Energy Suppliers will play a key role in meeting this goal. There is a requirement for all major energy companies to deliver energy savings in proportion to their market share. This is in keeping with the EU requirements as set out in the Energy Services Directive, which has been transposed into Irish law via Regulation 16 and 17 of S.I. No. 542 of 2009, and the more recent Energy Efficiency Directive, which is currently under review.

This programme has two broad strands – the setting of energy saving targets to be achieved by energy suppliers (both network connected and non-network connected) and the creation of an energy efficiency fund, which will be made available to the energy suppliers and energy services providers. The role for SEAI in all of this will be to promote and facilitate continued development and evolution on the programme while ensuring governance, standards and quality assurance underpins all works carried out under the programme. In addition SEAI continue to develop systems and processes to support the promotion, management and reporting of programme progress towards a successful programme outcome and achievement of targets.

Measures recognised under Better Energy Partners programme include:

- Attic Insulation
- External Wall Insulation
- Internal Dry Lining Wall Insulation
- Cavity Wall Insulation
- Floor Insulation
- Full Window Replacement
- Window glazing envelope replacement
- Window glazing low e film

- External Door Replacement
- High Efficiency Gas or Oil fired Boiler with Fully integrated Heating Controls Upgrade
- High Efficiency Gas or Oil fired Boiler with Fully integrated Heating Controls Upgrade with remote access
- Heat Pump with Fully integrated Heating Controls Upgrade
- Heat Pump with Fully integrated Heating Controls Upgrade with remote access
- Biomass boiler (with/without thermal storage) with Fully integrated Heating Controls Upgrade
- Biomass boiler (with/without thermal storage) with Fully integrated Heating Controls Upgrade with remote access
- Fully integrated Heating Controls Upgrade
- Fully integrated Heating Controls Upgrade with remote access
- High Efficiency Gas or Oil fired Boiler with Entry Level Heating Controls Upgrade
- High Efficiency Gas or Oil fired Boiler with remote access Entry Level Heating Controls Upgrade
- Entry Level Heating Controls Upgrade only
- Entry Level Heating Controls Upgrade only with remote access
- Solid Fuel Room Heater (without back boilers)
- Gas Fired Room Heaters
- Solar Water Heating Installation
- Mechanically-assisted powered cleanse and flush (power flushing) of system
- Mechanically-assisted powered cleanse and flush (power flushing) of system and Installation of magnetic filtration system to existing heating
- Chimney draught limiter
- Oil Boiler Service
- LPG Boiler service
- Natural Gas Boiler service
- CFL and
- LED
- Home Energy Reporting
- Electricity Energy Monitors
- High heat retention electric storage heater

A Contractor wishing to participate in the Programme, by being entered onto the list of Registered Contractors, must have the minimum levels of competency outlined in this document and must also commit to supplying materials and equipment and performing the works to at least the standards set out herein.

Each section of the Contractors Code of Practice and Standards and Specifications Guidelines has its own label, which dictates which measure is covered under each individual programme. This information is included in the table below.

BEH	Better Energy Homes Programme
WHS	Better Energy Warmer Homes Programme
BEP	Better Energy Partners

Measure		BEH	WHS	BEP
7.1	Cavity Wall Insulation	✓	✓	✓
7.2	External Wall Insulation	✓	✓	✓
7.3	Internal Wall Insulation (Including flat roof ceilings)	✓	✓	✓
7.4	Ceiling Level Attic Insulation	✓	✓	✓
7.5	Rafter level attic insulation (warm roof)	✓		✓
7.6	Floor Insulation			✓
7.7	Fully Integrated Heating Controls	✓	✓	✓
7.8	High Efficiency Boilers	✓	✓	✓
7.9	Heat Pumps Systems	✓		
7.10	Heat Pumps (transitional arrangement)			✓
7.11	Biomass Boilers (with/without thermal storage)			✓
7.12	Solar Water Heating System	✓		✓
7.13	Draught proofing		✓	
7.14	Window Replacement			✓
7.15	External Door Replacement			✓
7.16	Window glazing envelope Replacement			✓
7.17	Window glazing low e film			✓
7.18	Entry level Heating controls			✓
7.19	Entry level Heating controls with remote access			✓
7.20	Fully Integrated Heating controls with remote access			✓
7.21	Solid Multi-Fuel Stoves (incl Biomass)		✓	✓
7.22	Gas fired room Heater			✓
7.23	Mechanically-assisted powered cleanse and flush (power flushing) of Heating system		✓	✓
7.24	Mechanically-assisted powered cleanse and flush (power flushing) of Heating system and Installation of magnetic filtration system to existing heating system		✓	✓
7.25	Chimney draught limiter			✓
7.26	Boiler Service			✓
7.27	CFL and LED domestic lighting		✓	✓
7.28	Home energy reporting		✓	✓
7.29	Electricity Energy Monitor			✓
7.30	High heat retention electric storage heater			✓

2 General Requirements

2.1 General Contractor Requirements

To successfully register to complete works under the Better Energy Homes Programme, the Contractor must meet the general requirements as shown below. The Contractor must also satisfy the specific competency requirements set out under the Competency, Product and Installation standards for each of the measures defined.

Demonstrated failure to satisfactorily comply with the terms and intent of this document may result in the immediate removal of a Contractor from the Registered Contractor list and any of the Contractors nominated personnel where they exist.

Each Contractor must:

- Fully comply with the requirements of the Contractor Registration process/form set out separately
- hold a valid Tax Clearance Certificate
- have Public, Products and Employers Liability insurance cover which meets or exceeds the requirements specified by SEAI
- be able to carry out the works in line with the guidelines set out by SEAI or its Agents
- submit to performance audits of their works and review of same with Customers by SEAI or their Agents
- have in place with their Customers a contract which meets or exceeds the terms set out in SEAI's model contract for the Programme.

The Contractor must provide a competent workforce to carry out the works. This includes all relevant training and certification as appropriate to each element of works being carried out. All nominated personnel must have relevant professional training and/or product specific manufacturer training if required to carry out the works as appropriate. Relevant training records and certificates must be maintained by the Contractor and may be subject to inspection by SEAI and/or its agents.
The specific competency standards relating to each of the measures supported by the Programme are detailed further in this document.

Contractors who wish to be registered on the Better Energy Homes programme must be computer literate, have regular access to e-mail facilities and must have IT software that is compatible with Microsoft Office software in order to ensure the effective and efficient administration of the Programme.

2.2 General Product Standards

In general, all products used must be new, fit for purpose, improve the energy efficiency of the building and have no detrimental impact on the structure, viability, quality or safety of the property.
All insulation products must meet relevant product standards and regulations. Adherence to applicable standards must be followed in relation to materials that are used, and their installation.

All aspects of this guidance document will be subject to audit, QA inspection and verification.
The specific product standards relating to each of the measures supported by the Programme are detailed further in this document.

Equivalence of Prescribed Standards and Specifications
Where this document prescribes Standards or Specifications of products / systems or Certification requirements for contractors, it may be possible for a manufacturer / supplier or contractor to participate in the programme where they can clearly demonstrate full equivalence to those requirements. Where this equivalence route is being pursued it is vitally important that the supplier or contractor make contact with the Better Energy Homes Programme Technical Team to enter a process which can establish to SEAI's satisfaction that such equivalence can be demonstrated. This must be done BEFORE any works are undertaken with the subject system or by the subject contractor. Failure to first secure confirmation from SEAI of said equivalence will likely result in a homeowner's grant approval being revoked and possible sanction of the contractor.

Manufacturers / suppliers and contractors should be aware that nothing in the above will allow SEAI to subvent legislations, regulations, procedures or institutional arrangements which would have SEAI act beyond its formal remit.

2.3 General Installation Standards

Prior to the installation of any measure the property must be assessed to ensure that:

- it is suitable for the measure proposed
- the installation of said measure will not have any detrimental effect upon the integrity and condition of the building
- the installation of the recommended measure is likely to achieve the desired effect in terms of energy efficiency.

In particular, the design and installation of the recommended works must not compromise the ventilation, air quality, humidity (and the potential for condensation) and quality of living environment in the home. Particular care must be given to the potential impact on the living environment in the home resulting from any measures installed under the Programme. It is the duty of the Contractor to prevent any detrimental changes to the living environment <u>and</u> to recommend to the Customer on any measures necessary to ensure that there is no detrimental change to the living environment as a result of the works. (See section 5)

In general, all works should be carried out in accordance with this Code of Practice, best practice and technical guidance documents outlined herein[1]:

- S.R. 54:2014 Code of practice for the energy efficient retrofit of dwellings
- Building Regulations Technical Guidance Documents (Latest updates of Part L, Part B, Part C, Part D, Part F, Part J in particular).
- The System Supplier/ Product Manufacturer Guidelines
- NSAI Agrément certificates
- NSAI Agrément recognised certificates within the EOTA network
- Irish, British or European Standards Guides

Sources of technical guidance documents and standard guides include:

- The Department of Housing, Planning and Local Government (DHPLG)
- The Sustainable Energy Authority of Ireland (SEAI)
- The National Standards Authority of Ireland (NSAI)
- The UK Energy Saving Trust
- The UK Building Research Establishment (www.bre.co.uk)

[1] As amended where applicable.

A list of the primary Best Practice Guides and where they may be obtained are referenced in Appendix 1. In each case, the Irish Standard or NSAI Agrément Certification should be considered the primary certification and preferred guidance.

Where Building Regulations are referred to within this document, and where not otherwise specified, it is the most recent amendment to and version of those Regulations which must be adhered to by the Contractor at all times.

In all instances where the manufacturer, supplier or system supplier supplies Good Practice Guides, Installation Guidance Notes or a Technical Guidance Document, the works must be installed in accordance with those guidance documents.

3 Code of Conduct

SEAI expects all Contractors to behave professionally at all times and to maintain the high standards expected of the Programme. Performance checking, carried out by SEAI or their Agents, will not only establish the quality of physical works carried out under the Programme but also the level of professionalism with which they were completed.

As a minimum level of performance SEAI expects, under the following areas, that:

Professionalism and Behaviour

- Contractors must carry a form of photographic identification (Drivers Licence, Passport or professional registration cards). This must concur with the contact name provided by the Contractor when initially arranging the works or site visit. Full contact details (business address and telephone number as a minimum) for the Contractor must be provided to the Customer prior to installation.
- Contractors must maintain a professional appearance and attitude to the Customer at all times. When communicating with Customers, Contractors should be polite, patient and informative.
- Agreed appointment dates and times must be adhered to (as far as reasonably possible) and the Customer must be informed as soon as possible in the event that an appointment will be missed. Ongoing missed appointments will be queried by SEAI or its agents.
- Contractors may be required to deal with vulnerable homes, or homes prone to being taken advantage of. Contractors in such instances must ensure that their staff are trained to deal with vulnerable homes and be able to explain the terms of an offer clearly, the full implications of the works proposed and give appropriate information.
- The Contractor is responsible for recommending to the Customer the most appropriate and optimum solution for their property in accordance with the Better Energy Homes Programme Standards and Specifications. As a competent professional registered with the Better Energy Homes Programme, it is a duty of the Contractor to provide the necessary information to a Customer for them to make an informed decision regarding their property and the practical measures best suited to same. Where applicable, this includes advising customers against implementation of measures they request, where these measures would be inappropriate or unsuitable.
- The Contractor should inform the Customer of the Cost of various solutions and the respective benefit of those solutions to the Customer, e.g. the costs of dry-lining walls with different thicknesses of materials, the respective benefits and cost comparisons of each.
- In particular, the Contractor must ensure that, in the case of insulation, an optimal whole-surface solution is provided where physically and economically feasible e.g. when dealing with walls that this comprises Internal insulation of all exposed walls; External Insulation of all exposed walls; and in the case of attic insulation that this comprises insulation of the whole surface of the ceiling / roof-space as appropriate. This economic feasibility refers only to the viability of the installation itself. Economic feasibility in this case does not refer to the ability of the Customer to fund their portion of the capital cost for a conventional installation. An example would be where, in exceptional circumstances a home may require significant additional modifications, over what would normally be expected, that would make the initial investment in the whole home insulation solution inappropriate compared to the benefit the Customer will get out of the investment. Where only part-home coverage is achieved, this must be detailed in the Declaration of Works and the Contractor should inform the Customer that this may impact on their ability to draw down support from the Programme.
- The Contractor must inform the Customer of the relative costs and performance standards of their selected products and any limitations which might be relevant.
- As appropriate to the specific measure being installed, the Contractor must be able to supply the customer with the relevant warranties and commitment of after sales service.

- In the case of heating controls and heating systems, the Contractor must ensure that the Customer has a full working knowledge of what impact the measures may have on their home and how to operate these measures in the most effective and efficient way possible. It is expected that the Contractor will demonstrate the various working conditions, controls and limitations of these systems and measures to the Customer and to provide any relevant user instructions in English.

Administration and Responsibility

- The Contractor must, in all instances, provide a detailed quotation specifying all costs of works including making good. This quotation must be laid out in a clear, concise and specific manner using language that can be readily understood by the customer and include all proposed works and associated cost and applicable VAT rates. The Contractor must also agree a procedure with the Customer on any alterations or omissions within the original quotation and the method by which the Contractor will be paid.
- The Contractor **shall not** complete an on-line Better Energy Homes Programme application for a Customer, nor let the Customer use their e-mail address in an application to the Better Energy Homes programme.
- Where specific ancillary works are required but will not be done by the contractor these should be clearly specified to the Customer and inform them as to how the completion of these works should be provided, e.g. where the installation of internal insulation requires the temporary removal and re-fitting of a fitted kitchen or where electrical switches and sockets need to be removed and repositioned and this is being provided by another party.
- The Contractor is to obtain any necessary approvals from the Customer, management company, local authority or appropriate third party where applicable for the works before installation. The Contractor must inform the Customer, to the best of their ability, of their responsibility to obtain any approvals, permits and permissions required, where applicable to the works.
- The Contractor shall indemnify and keep indemnified SEAI and their Agents from and against all costs, claims, demands, liabilities, expenses, damages or losses in accordance with the specified insurance terms for registration as a contractor (including without limitation any direct or indirect consequential losses, loss of profit and loss of reputation, and all interest, penalties and legal and other professional costs and expenses) arising out of or in connection with the Contractor's failure to obtain such consents or their failure in ensuring these consents were in place as appropriate to the works.
- Any installation works shall only be carried out by a suitably qualified and competent employee. This includes all works supported by the Programme including, but not limited to, electricity, gas, plumbing, working at heights and the operation and storage of machinery and plant.
- On completion of works a detailed invoice, including a copy of the original quotation, and subsequent receipt for payment must be provided to the Customer along with any other forms deemed necessary by SEAI.
- To ensure that they are kept informed of procedural communications, programme notices and information requests, Registered Contractors are obliged to maintain an active e-mail address. Failure to do so by a Contractor will result in penalty points and possible de-registration in accordance with the Better Energy Homes programme document Quality Assurance and Disciplinary Procedures (available on www.seai.ie).

Service Delivery

- All Contractors must make sure that their staff take every reasonable precaution to protect the property on which they are working, and leave the property clean and tidy. All excess materials, packaging, dust and debris must be removed from the Customer's premises, and any adjacent premises affected by the works, by the Contractor.
- Where works are completed over a number of days, the property must be left in an appropriate condition, minimising the impact to the Customer and surrounding properties and having regard to all Health and Safety and security Requirements.

- Contractors must make good, to the satisfaction of the Customer, any accidental damage sustained by a property where this is a direct result of their work or installation.
- All works are to be completed and finished to the Customer's satisfaction and requirements.
- In the event of a Customer not being satisfied with the works completed, Contractors must make every reasonable effort to resolve the complaint to the Customer's and SEAI's satisfaction.
- SEAI or its Agent will conduct random quality and performance checks with regard to works supported by this Programme. In the event of SEAI or its Agent not being satisfied with the service provided to the Customer, Contractors must make every reasonable effort to resolve the issue in line with the SEAI defined process.
- The requirements relating to the installation of the specific measures detailed further in this document must be adhered to by the Contractor.
- SEAI may de-register Contractors where SEAI has evidence of repeated failures on the part of Contractors or their nominated personnel to deliver quality work or give customer satisfaction. SEAI have put in place a Quality Assurance System, the key elements and processes of which are outlined in the document Quality Assurance System and Disciplinary Procedure available on www.seai.ie. A primary element of the Quality Assurance System is the penalty point procedure which is applicable to findings of administrative and / or technical non-compliance with the Better Energy Homes Programme's Terms and Conditions and this contractor's Code of Practice. SEAI may publish and make public information concerning any deregistration from the Registered Contractors List and the reasons for same.

4 Health & Safety Requirements

It is the sole responsibility of the Contractor to ensure that they comply with all relevant Health and Safety Legislation, Regulation and appropriate Guidelines and that their staff are appropriately trained to operate to these standards.

In addition to the above it is required that any Contractor performing works which are supported by the Programme:

- has a current, written Health and Safety Statement available for inspection if required.
- follows safe working practices for both employees, customers and the public at all times in accordance with current Health and Safety Legislation and relevant Health & Safety Authority guidelines.
- uses the appropriate equipment safely and in accordance with manufacturer's instructions and stores materials and equipment properly.
- Particular attention shall be given to a contractor's Health and Safety procedures when working in vulnerable households and where children, the elderly or the general public may be directly affected by the progress of works.

4.1 Special Precautions

Special precautions must be taken in relation to the following issues:

- **Radon**
  Where work is to be carried out that will compromise a radon barrier, the Contractor must bring it to the attention of the Customer and highlight appropriate preventative measures taken to address the issue. The Building Regulations *Technical Guidance Document C* and the Department of the Environment, Heritage and Local Government publication *Radon in Existing Buildings* - Corrective Options should be consulted. For further information refer to http://www.epa.ie/radon/

- **Asbestos**
  Where appropriate, the Contractor must bring to the attention of the customer that it may be necessary to undertake an asbestos management survey of the property to determine the presence of Asbestos Containing Materials (ACMs) in the building where proposed works may disturb the ACMs. All ACMs identified must be removed by a competent contractor prior to the commencement of proposed works in accordance with the Safety, Health and Welfare at Work (Construction) Regulations 2013 (S.I. No. 291 of 2013). For further information on this refer to
  http://www.hsa.ie/eng/Topics/Asbestos/

- **Carbon Monoxide**
  Carbon Monoxide alarms can be used as a backup to provide a warning to householders in the event of a dangerous build-up of CO (Carbon Monoxide). Check that the Carbon Monoxide alarm complies with the EN 50291 standard. Carbon Monoxide alarms are no substitute for regular inspection and maintenance of appliances, vents, flues and chimneys. For further information on this refer to www.carbonmonoxide.ie.

- **Wildlife**
  The Contractor shall be aware of the potential for rodent infestation within the building fabric and shall take all necessary precautions to protect himself and his employees against the risk of disease (e.g. Weils disease) when carrying out the works. If there is evidence of rodent, or any other pest infestation the Contractor shall advise the Customer accordingly. For further information related to rodent control refer to:

https://www.hse.ie/eng/services/publications/environmentalhealth/rodent-control-for-householders.pdf

If there is evidence of species of wildlife, e.g. bats or bat roosts, present in the attic space to be insulated, the contractor should consult with the National Parks & Wildlife Service (NPWS) for advice on how to proceed. For further information on this refer to https://www.npws.ie/licences/disturbance/bats-or-otters and www.npws.ie

5 Ventilation

Proper ventilation of a home is necessary in order to ensure:

- Adequacy of fresh air for a healthy and comfortable environment for the occupants
- Adequacy of the air supply for safe operation of particular types of fuel burning appliances
- Minimisation of condensation risk
- Avoidance of radon accumulation
- Avoidance of accumulation of other indoor air pollutants

Guidelines for indoor air quality and information on biological, chemical and combustion indoor air pollutants are published by the World Health Organisation.

Ventilation Types
Uncontrolled (and unintended) air infiltration – through the porosity of the building structure or through looseness in detailing or workmanship of openings such as doors and windows - which 'provides' ventilation on an arbitrary basis but is not an appropriate basis on which to rely for ensuring occupant safety, health or comfort.

Purposeful ventilation provision – which may be to varying degrees controlled e.g. MVHR, humidistat actuated extract fans, closable wall vents, trickle vents or uncontrolled e.g. permanent wall vents, in accordance with TGD F to the Building Regulations. Key is avoidance of disturbance to any such proper existing provisions, and making all reasonable effort by way of works execution.

Ventilation should be always considered at the planning and execution stages when improvements to the thermal envelope and/or windows are made. These improvements will reduce heat loss and lead to higher internal temperatures within a building. With a higher temperature, the internal air can hold a significant amount of additional water vapour. Furthermore, as improvements in energy performance of the thermal envelope result in increased air tightness, ventilation provisions must ensure that the air changes per hour are adequate. Air leakage paths should be minimised to help reduce interstitial condensation.

Each house should be upgraded such that the ventilation complies with Part F of the building regulations.

In undertaking the works, and on the basis of the findings of an initial assessment of the home, the contractor must:

1. Ensure that the works to be undertaken will not compromise the existing necessary ventilation provisions in the home to the detriment of the air quality and / or living environment therein.
2. Inform the homeowner where it is noted that the existing necessary ventilation provisions have already been adversely affected by actions of the homeowner or other parties.
3. Inform the homeowner of any aspects of ventilation considered to be inadequate or potentially unsafe (particularly with rooms containing a fuel burning appliances). Guidance on background ventilation is provided in Part F TGD and permanent ventilation for heat producing appliances in Part J TGD.
4. Inform the homeowner that levels of the radioactive gas, radon, can be increased where existing ventilation is not adequate or where work is to be undertaken that may increase the air tightness of the home. Guidance on whether the home is in a High Radon Area and how to test a home for radon is available on the Environmental Protection Agency's website: www.epa.ie or Free Phone 1800 300 600.
5. Make appropriate recommendations to the homeowner in respect of 2 and 3 above. It is then the responsibility of the homeowner to rectify these issues, with or without the involvement of the contractor, before work pertaining to the Better Energy Homes programme can commence. (Additional wall ventilators or other ventilation provisions may be supplied by contractor as part of the refurbishment works. Where this is agreed as part of the refurbishment contract works may proceed.)

These points are aimed at ensuring that the contractor takes all reasonable action to ensure that proper ventilation provisions are installed in the home and that the homeowner is made aware of the proper operation and maintenance of such provisions.

External Wall Insulation
In addition to points 1 to 4 above contractors should be alert to the fact that the installation of wall insulation will increase the air tightness of the building thereby reducing unintended ventilation in the form of uncontrolled air leakage or draughts in the home. This effect is likely to be most pronounced in the case of external wall insulation systems. However, the primary focus should remain on following points 1 to 4 above which relate to installed ventilation provisions.

Therefore in accordance with the training given by the Agrément ETICS (External Thermal Insulating Composite Systems) Certificate Holder, and where necessary in consultation with them, the contractor should consider the likely effect of the installation on the home's ventilation and to recommend appropriate options / solutions for the homeowner.

Assessment of Ventilation Provision
Provision should be made for existing wall ventilators to be maintained and/or suitable new ventilation provided as needed. If you note that there are no wall vents or sub-floor ventilation or other obvious ventilation provisions, then you should document that the homeowner has been informed of same.

Reference NSAI S.R. 54:2014: Code of practice for the energy efficient retrofit of dwellings, Section 10.2.1.1 for choice of appropriate ventilation systems.

Ventilation System Design Considerations:

- Background ventilation – allow for the provision of sleeved wall ventilator or trickle window / door ventilators. (Ref: NSAI S.R. 54:2014 clause 10.2.2.1.1 Table 30).
- Intermittent extract ventilation – all wet rooms should be fitted with mechanical extract ventilation (Ref: NSAI S.R. 54:2014 clause 10.2.2.1.1 Table 31)
  Please note: Recirculating cooker-hoods are not recognised extract ventilation under BEH spec.
- Intermittent fan control – use of timers, manual switches, occupancy & humidity sensors where applicable.
- Fans and ductwork – ducting should be insulated to prevent condensation to a minimum of 25mm of mineral wool.
- Purge ventilation is the removal of pollutants and water vapour through opening such as doors / windows and mechanical extract ventilation in wet rooms.

For all of the above reference NSAI S.R. 54:2014: Sections 10.2.2.1.1 – 10.2.2.1.3.

Table 30 from S.R. 54:2014 - Guidance for the provision of ventilation for retrofit works with air permeability levels greater than 5 $m^3/hr/m^2$

		Existing Dwelling Condition		
Retrofit Works		A. No existing background ventilation in some or all habitable rooms and no extract ventilation in wet rooms	B. Existing purpose provided background ventilation in each habitable room. No extract ventilation provided in wet rooms	C. Existing purpose provided background ventilation in each habitable room. Extract ventilation provided in wet rooms
1	Internal/External/ Cavity Insulation for Walls	Background ventilation should be provided to rooms without background ventilation in accordance with Column 2, Table 31	No requirement to upgrade background ventilation	No requirement to provide further ventilation
2.	Replacement of Windows	It is advised to provide extract ventilation in wet rooms in accordance with Column 3, Table 31	It is advised to provide extract ventilation in wet rooms in accordance with Column 3, Table 31	
3.	Sealing/insulating of timber suspended floors	Where evidence of inadequate ventilation exists (e.g. mould, condensation) - extract ventilation should be provided to all wet rooms in accordance with Column 3, Table 31	Where evidence of inadequate ventilation exists (e.g. mould, condensation) - extract ventilation should be provided to all wet rooms in accordance with Column 3, Table 31	
4	Two or more of the above measures done in combination or separately	Background and extract ventilation should be provided in accordance with Table 31	No requirement to upgrade background ventilation Extract ventilation should be provided to all wet rooms in accordance with Table 31	No requirement to provide further ventilation
NOTE Covered/Damaged covers on ventilators should be replaced with equivalent or better. Deficiencies or faults in ventilator grills or fans should be rectified and returned to intended working condition.				
NOTE Where ventilation exists and severe conditions of condensation or mould growth have developed, specialist advise should be sought.				

Background ventilators should be located to avoid draughts and at a height of approximately 2.1m to 2.2m above floor level. All background ventilators should be tested to EN 13141-1 and installed to manufacturer's instructions.

Table 31 from S.R. 54:2014 - Minimum levels of background and extract ventilation as specified by Table 30

Room usage	Minimum background ventilation (mm^2)[d]	Intermittent extract fan rating (l/s)
Habitable room	6 500	Not required
Kitchen[a]	6 500	60 (reduced to 30 for suitably sited extracting cooker hood)
Utility room[a]	6 500	30
Bath or shower room[b]	Not required	15
WC (only)[c]	Not required	6

a) Where the room has no external wall, a floor area of less than 6,5 m^2 and background ventilation cannot be provided then extraction fan to operate with a 15 minute overrun etc.

b) Where the room has no external wall and background and purge ventilation cannot be provided then the extraction fan should operate with a 15 minute overrun etc.

c) Where a window opening for purge ventilation exists then the window alone may be relied upon to provide extract ventilation.

d) Ventilation area as stated above is free area. Equivalent area is measured in accordance with the method specified in I.S. EN 13141-1: 2004. The above values should be multiplied by 0,8 to obtain equivalent areas.

Utility room: A room used for laundry purposes, which contains a sink, washing machine, tumble drier or similar equipment and which is not entered solely from outside the building.

Ventilation of air tight dwelling (achieve an air permeability below $5m^3/hr/m^2$)

Reference NSAI S.R. 54:2014: Clause 10.2.1.2 for checklist to achieve air permeability below $5m^3/hr/m^2$. The ventilation requirements are detailed in Table 32 for air tight dwellings

Table 32 from S.R. 54:2014 - Minimum levels of background and intermittent extract ventilation when the air permeability is expected to be below 5 $m^3/hr/m^2$

Room usage	Minimum background ventilation (mm^2)[c,d]	Intermittent extract fan rating (l/s)
Habitable room	7 000	Not required
Kitchen[a]	3 500	60 (reduced to 30 for suitably sited extracting cooker hood)
Utility room[a]	3 500	30
Bath or shower room[a]	3 500	15
WC (only)[b]	3 500	6

a) Where the room has no external wall, then extraction fan to operate with a 15 minute overrun etc.

b) Where a window opening for purge ventilation exists, then the window alone can be relied upon to provide extract ventilation.

c) Ventilation area as stated above is free area. Equivalent area is measured in accordance with the method specified in I.S. EN 13141-1: 2004. The above values should be multiplied by 0,8 to obtain equivalent areas.

d) The minimum total equilavent area of background ventilators providing general ventilation should be 42 000 mm^2 with an additional 7 000 mm^2 for each additional 10 m^2 floor area above the first 70 m^2 of floor area measured. For single storey dwellings situated at ground level or on any storey up to four storeys, an additional 7 000 mm^2 per dwelling should be provided. The minimum level of background ventilation recommended for each room is unlikely to provide the total background ventilation required for the dwelling as a whole.

Permanent Ventilation is any means of permanent or controllable vents, which open directly to the external air. Vents for heat producing appliances such as gas appliances are considered permanent as they are in a fixed position and not closable. Ref: NSAI S.R. 54:2014 table 35: Guidance for the provision of adequate supply of air for combustion products.

	Retrofit Works	A. No existing supply of air in room containing a fixed open flued appliance.	B. Adequate supply of air provided in each room containing a fixed open flued appliance.
1	Wall insulation, window replacement or sealing/ insulation of suspended floors carried out BUT NO new open flued appliance fitted.	Permanent ventilation should be provided in the room containing the appliance, (see note).	No requirement to upgrade permanent ventilation. Recommended to ensure ventilation is unblocked, in good condition and permanently open.
2.	New open flued or flueless appliance fitted.	This work falls within the Building Regulations Part J- Heat Producing Appliances. See TGD J for further guidance.	This work falls within the Building Regulations Part J - Heat Producing Appliances. See TGD J for further guidance.
3	Provision of new balanced flue appliance.	This work falls within the Building Regulations Part J- Heat Producing Appliances. See TGD J for further guidance.	This work falls within the Building Regulations Part J - Heat Producing Appliances. See TGD J for further guidance.
NOTE	This permanent ventilation will also suffice for Background ventilation, see clause 10.		

Introducing mechanical extraction may cause spillage of combustion products where an open-flued (non-room sealed) heat producing appliance exists. Spillage occurs when the extraction rate of the fan causes a depressurisation in the room containing the heat producing appliance, which in turn may reverse the flow of air containing the combustion gases through the appliance's flue. The ventilation system should be designed to ensure the likelihood of spillage occurring is reduced to an absolute minimum. This may be achieved by:

- Ensuring that sufficient fresh air is continuously and permanently available in the room where the heat producing appliance is located.
- The relevant installation Standards for the fuel/product type should be followed.

All new permanent ventilators should be tested to EN 13141-1 and installed to manufacturer's instructions.

6 Planning and Protected Structures

In some cases, the building in which the Contractor is proposing to install measures may be subject to specific planning controls, as in the case of Protected Structures. This is where the property is on the Local Authority Record of Protected Structures (RPS), or is proposed to be added to this or is in an Architectural Conservation Area (ACA).

The Customer must consult with the Local Authority prior to commencement of the works if the property may be on the RPS list or is in an ACA, or the installation of any measures supported by this programme may require approval from the Local Authority and or may require specialist knowledge on the part of the contractor because of a potential effect on the character of the building and the architectural heritage value of the element to be changed.

Similarly, there are certain works that may change the external character of a conventional property, not on the RPS, to such an extent that approval may need to be sought from the Local Authority e.g. the installation of external insulation and alteration of the front profile of a property in certain cases. Any alterations that affect glazing and doors could similarly require permission from the relevant Local Authorities.

Where a property may be on the RPS or is in an ACA, or the installation of any measures supported by the Better Energy Homes Programme may require approval from the Local Authority the Contractor shall satisfy himself that all necessary approvals from the relevant planning authority have been obtained by the customer prior to commencing the works. For further information related to planning and Architectural Conservation refer to:
http://www.housing.gov.ie/sites/default/files/migrated-files/en/Publications/DevelopmentandHousing/Planning/FileDownLoad%2C1595%2Cen.pdf

7 Specific Measures – Competency and Standards

The following details the competency and standards expected by SEAI for each of the specific measures to be supported under this Programme. A summary list of guides and standards referred to are detailed in Appendix 1.

Where this document prescribes Standards or Specifications of products / systems or Certification requirements for contractors, it may be possible for a manufacturer / supplier or contractor to participate in the programme where they can clearly demonstrate full equivalence to those requirements. Where this equivalence route is being pursued it is vitally important that the supplier or contractor make contact with the Better Energy Homes Programme Technical Team to enter a process which can establish to SEAI's satisfaction that such equivalence can be demonstrated. This must be done BEFORE any works are undertaken with the subject system or by the subject contractor. Failure to first secure confirmation from SEAI of said equivalence will likely result in a homeowner's grant approval being revoked, and possible sanction of the contractor.

Manufacturers / suppliers and contractors should be aware that nothing above will allow SEAI to subvent legislations, regulations, procedures or institutional arrangements which would have SEAI act beyond its formal remit.

BEH WHS BEP

7.1 Cavity Wall Insulation

Contractor Competency
Contractors of cavity wall insulation must be approved by the NSAI Agrément and must agree to carry out the installation to the standards required by this approval and certification.

Product Standards & Specification
Materials to be used in the insulation of a cavity wall must be certified by the NSAI Agrément.
The objective of this Programme is to put in place materials that will achieve a level of performance in the home, equivalent to the standard required in the most recent update of Part L of the Building Regulations. Thus, the objective for Cavity Wall Insulation is to, in as much as is physically and economically feasible, achieve a U-value of 0.27 W/m^2K for external walls.

This economic feasibility refers only to the economic performance of the installation itself. For example, where in exceptional circumstances a home may require significant additional modifications when compared to a normal case, making the initial investment in the insulation solution inappropriate compared to the benefit the Customer will get out of the investment. Economic feasibility in this case does not refer to the ability of the Customer to fund their portion of the capital cost for a conventional installation.

Building Regulations
- Building Regulations (Part B): The insulation must be suitable for use in masonry cavity walls so that it does not compromise the property's ability to resist internal fire spread within the structure.
- Building Regulations (Part C): When installed as per the system supplier and manufacturer guidelines, the product will not affect the property's ability to resist weather and ground moisture.
- Building Regulations (Part D): When installed as per the system supplier's guidelines, the system should meet the Building Regulations requirements for materials and workmanship.
- Building Regulations (Part F): The insulation should also be suitable for use on a property and meet the ventilation requirements.
- Building Regulations (Part J): Correct installation should also satisfy the Building Regulations such that the installation does not increase the risk of the property catching fire through the use of a heat producing appliance.
- Building Regulations (Part L): The insulation system shall conserve energy in keeping with the Building Regulations.

The installation of foam or bead insulation systems into the voids of Hollow Block Walls will not be supported by the programme. SEAI are specifically excluding this practice from support through this programme.

The design and installation of the recommended works must not compromise the ventilation, air quality, humidity (and the potential for condensation) and quality of living environment in the home. Particular care must be given to the potential impact on the living environment in the home resulting from any measures installed under the Programme. It is the duty of the Contractor to prevent any detrimental changes to the living environment and to recommend to the Customer on any measures necessary to ensure that there is no detrimental change to the living environment as a result of the works. (See section 5)

Installation Standards & Specifications

- **a.** All cavity wall insulation must be installed in accordance with the specifications laid out by the system supplier and in accordance with the relevant system's NSAI Agrément certificate and clause 7.3.4 of S.R. 54:2014
- **b.** The insulation material must be suitable as per clause 7.3.4.2.5 and 7.3.4.2.6 of S.R. 54:2014
- **c.** The suitability of insulation depends mainly on the local exposure to driving rain and the condition of the existing construction. Cavity wall insulation is certified for use in masonry walls up to 12m in height subject to the conditions in the product certificate. The exposure of the walls to wind-driven rain should be assessed and related to any restriction on the particular type of cavity fill being considered. The map in S.R. 54:2014 ('Code of practice for the energy efficient retrofit of dwellings') Annex D illustrates the levels of wind driven rain. Any area higher than $5m^2$/sec/year should not have the cavities filled where the external face is open jointed. In these cases internal insulation, or full fill cavity with external insulation which provides protection, should be used.
  NOTE System certificates provide maps which identify exposure zones and specify conditions where full fill cavity insulation can be used.
- **d.** A survey of the walls must be carried out prior to the installation by a trained surveyor on behalf of the approved Contractor. A complete survey, including a boroscope survey, report is required and must be provided to the Customer. This is to ascertain the suitability of the property for the recommended insulation system. Existing buildings should be assessed in accordance with BS 8208: Part 1: 1985. Additional guidance on installation considerations is detailed in clause 7.3.4.3 of S.R. 54:2014
- **e.** Any defects recorded in the survey, which may affect the performance of the insulation system when installed, should be notified to, and rectified by, the Customer with or without the involvement of the Contractor before installation work commences.
- **f.** Installation must be carried out by the system supplier or manufacturer or a Contractor approved by the system supplier/manufacturer. Approved Contractors are required to carry out a full survey of the property, comply with the system installation procedure specified by the system supplier/manufacturer and at least one member of an installation team must carry an identity card issued by the system supplier/manufacturer.
- **g.** Cavity filling with expanded polystyrene should not be carried out where PVC-sheathed electrical cables are passing through the cavity but are not protected within electrical conduits.
- **h.** If the cavity is uncapped, it must be closed at the top of the wall and at the top of any opening in order to comply with the Building Regulations Technical Guidance Document (Part B, 2007). There are a number of different methods for capping of existing walls, which should be discussed with the Customer prior to completion.
- **i.** Particular attention should be paid to ensuring that gas, oil and solid fuel appliances are correctly ventilated as per section 5 of the Better Energy Homes specification, the system supplier's specifications and the Building Regulations (Part J).
- **j.** Ventilation openings must be checked to ensure there are no obstructions due to the insulant. All flues must also be checked for obstructions using an appropriate test (e.g. smoke test). See section 5
- **k.** An NSAI Agrément Certificate or supplier guarantee must be issued to the customer where applicable. Certification is valid once the conditions outlined in the certificate are met.
- **l.** The Contractor should indicate to the Customer the methods he intends to use to ensure the successful insulation of the full extent of the cavity wall.

7.2 External Wall Insulation

BEH WHS BEP

Contractor Requirements & Competency

Contractors installing external wall insulation are required to be Approved Installers by the manufacturers of the particular product being installed. Contractors wishing to register on the Better Energy Homes Programme for external wall insulation must be approved by the NSAI Agrément and must agree to carry out the installation to the standards required by this approval and certification. This must be demonstrated to the Customer prior to completion of the works. Only contractors who have been NSAI audited and are fully registered with ETICS as a certified external wall insulation installer will be listed with the Better Energy Homes programme for this measure.

Product Standards & Specification

The external wall insulation system must be certified by the NSAI Agrément or equivalent. Only contractors who have been NSAI audited and are fully registered with ETICS as a certified external wall insulation installer will be accepted on the Better Energy Homes Programme registered contractor list for external wall insulation. Only contractors installing NSAI Agrément certified external wall systems will appear on the Better Energy Homes Programme Registered List of Contractors for external wall insulation.

The objective of this Programme is to put in place materials that will achieve a level of performance in the Home, equivalent to the standard required in Part L of the Building Regulations. Thus, the objective for External Wall Insulation is to, in as much as is physically and economically feasible, achieve a U-value of 0.27 W/m^2K or better for external walls.

This economic feasibility refers only to the economic performance of the installation itself. For example, where in exceptional circumstances a home may require significant additional modifications when compared to a normal case, making the initial investment in the insulation solution inappropriate compared to the benefit the Customer will get out of the investment. Economic feasibility in this case does not refer to the ability of the Customer to fund their portion of the capital cost for a conventional installation.

Building Regulations

- Building Regulations (Part A): The insulation system must be incorporated into the property's structure so that it complies with the loading and ground movement requirements.
- Building Regulations (Part B): The system must be suitable for incorporation onto structures so that it does not compromise the property's ability to resist internal fire spread within the structure and external fire spread.
- Building Regulations (Part C): When installed as per the system supplier's guidelines, the system should not affect the property's ability to resist weather and ground moisture.
- Building Regulations (Part D): When installed as per the system supplier's guidelines, the system should meet the Building Regulations requirements for materials and workmanship.
- Building Regulations (Part F): The insulation should also be suitable for use on a property and meet the ventilation requirements.
- Building Regulations (Part J): Correct installation of the system should also satisfy the Building Regulations such that the installation does not increase the risk of the property catching fire through the use of a heat producing appliance.
- Building Regulations (Part L): The insulation system shall conserve energy in keeping with the Building Regulations.

The design and installation of the recommended works must not compromise the ventilation, air quality, humidity (and the potential for condensation) and quality of living environment in the home. Particular care must be given to the potential impact on the living environment in the home resulting from any measures installed under the Programme. It is the duty of the Contractor to

prevent any detrimental changes to the living environment and to recommend to the Customer on any measures necessary to ensure that there is no detrimental change to the living environment as a result of the works. (See section 5)

Installation Standards & Specifications

a. All external wall insulation installation and associated works should be carried out in accordance with the manufacturer's specifications and the National Standards Authority of Ireland Standard Recommendation S.R. 54:2014 - Code of practice for the energy efficient retrofit of dwellings.

a. Where the system supplier/manufacturer operates an Approved Contractor programme, the Contractor must carry appropriate identification stating they are an Approved Contractor. The Contractor shall be NSAI ETICs registered before carrying out work.

b. The Contractor must at all times comply with the requirements of the system suppliers specifications.

c. The insulation panels should be stored on a firm, clean, dry and level base, which is off the ground and protected from prolonged exposure to sunlight either by storing opened packs under cover in dry conditions or by re-covering with opaque polythene sheeting.

d. When handling the insulation boards, care must be taken to avoid damage and contact with solvents or bitumen products. The boards must not be exposed to open flame or other ignition sources.

e. Any metal lathes, renders, paints, texture synthetic finish coatings and sealants should be stored in accordance with the manufacturer's instructions in a dry environment at the required temperatures.

f. A pre-installation survey of the property should be carried out to determine suitability for treatment and any repairs or modifications necessary to the building structure before application of the insulation system.

g. External wall insulation may be restricted where the dwelling faces onto public footpaths. Relevant Local Authorities should be consulted where the installation affects the width of the public footpath. Owners of neighbouring properties should be consulted where the installation of external wall insulation encroaches on their property.

h. The survey should also include tests conducted on the walls of the property to determine the pull-out resistance of the proposed mechanical fixings for the appropriate substrate. An assessment and recommendation is made on the type and number of fixings required

i. A specification is prepared for each elevation of the building indicating:

- Where required, additional corner mesh and reinforcement;
- Detailing around windows, doors and at eaves;
- Exact position of the damp-proof course (DPC);
- Exact position of expansion joints;
- Any required alterations to plumbing including rainwater downpipes and gulley traps.
- Areas where flexible sealants must be used;
- Where required, the position of fire barriers.

j. Modifications of down pipes, soil and vent pipes, pipe extensions, meter locations and other services should be as detailed in design specification. All pipe work should be relocated as required to accommodate the insulation.

k. Fixings to the external fabric will need reinforcement to resist movement that may affect joints on soil, rainwater, gas and water pipes. Satellite dishes are subject to wind load that may cause indenting into the insulation with the potential for failure of the waterproof render. A treated timber ground to the depth specified by the system certificate should be installed.

l. Any causes of dampness such as leaking gutters or down pipes should be repaired. Where there is evidence of rising damp, remediation measures should be carried out.

m. The condition of the exterior of the wall should be assessed. Surfaces should be sound, clean and free from any loose material. Render finishes should be in good condition. Pebble dash (wet and dry dash) does not provide an even surface for the adhesive to bond to and should

be adequately prepared or removed. All necessary repairs to the property's structure must be completed and dry before the installation of the insulation.

n. The flatness of surfaces must be checked. This may be achieved using a straight edge spanning the storey height. Local areas may be assessed using a straight edge spanning 1 metre. Any excessive irregularities must be made good before installation.

o. If the existing wall surface is covered with a render, the bond between the background and render should be adequate. Otherwise it must be removed and reinstated with a sufficient bond.

p. Where appropriate, external plumbing, including rainwater downpipes and gulley traps, must be removed and alterations made to underground drainage before installation of the system, to accommodate repositioning on the finished face of the system.

q. Application of the external insulation system is carried out in accordance with the current installation instructions of the system supplier/manufacturer.

r. As per S.R. 54, external insulation should not be used with unfilled cavities. The cavity should be fully filled either as part of the original construction or as part of the retrofit measures where external insulation is used. This has been included by NSAI in the ETICS scheme since 9th January 2017.

s. Starter track and base beads, typically at DPC level, should be accurately aligned to provide a horizontal base profile and should be secured to the external wall. The first row of insulation boards is positioned on the base profile.

t. The insulation boards must be firmly pressed to the wall and mechanically fixed in place with a fixing arrangement as per the relevant approval documentation. Care must be taken to ensure that the boards are butted tightly together and surface alignment should be checked as work proceeds. Any gaps at joints should be sealed, e.g. using basecoat material. Gaps of larger than 3 mm should be filled with slivers of insulation or spray foam. Surface irregularities must be removed by planing with a rasp over the whole surface.

u. The key thermal bridge junctions for external wall insulation may be addressed as follows:

- where ground floor thermal bridges are being eliminated this may require placement of suitable external insulation to footpath level. Further thermal improvements may be achieved by bringing insulation below ground level and may require removal of footpaths;
- sills may require specific detailing to avoid thermal bridging;
- External insulation should abut the roof insulation to form a continuous layer; otherwise a thermal bridge may occur. To eliminate the cold bridge at the wall roof junction removal of the soffit may be required.

v. The insulation should be returned into reveals, sills and jambs in accordance with the approval documentation. To fit around doors and windows, insulation boards may be cut with a sharp knife or a fine-toothed saw only. All junctions between external wall insulation and existing window frames should be adequately sealed to prevent the ingress of moisture. The insulation should overlap at the corners, and fit without gaps. Where clearance is limited, strips of approved insulation should be installed to suit available margins. If required, purpose-made window sills may be installed at this point. They should prevent water ingress as per NSAI Agrément or equivalent certificate. For additional guidance, see *Acceptable Construction Details* on the Department of Housing, Planning and Local Government website.

w. Prior to application of base and finish coats, all necessary protective measures such as taping off of existing window frames and covering of glass should be in place.

x. In sunny weather, work should commence on the shady side of the building and be continued following the sun to prevent the rendering drying out too rapidly.

y. When the basecoat has been applied to the insulation boards, the reinforcing mesh is embedded into the basecoat before it dries. The mesh should be fully embedded in the basecoat and be free of any creases. Additional mesh may be required at corners and openings.

z. Installation continues until the whole wall is completely covered including, where appropriate, the building soffits.

aa. Application of the undercoat and finishes should be carried out within the permitted temperature range and should be protected from rapid drying. Drying should take 24 hours in favourable conditions.

bb. All rendering shall be carried out in accordance with IS EN 13914-1:2005 and BS 8000-10:1995.

cc. Movement joints should be provided in accordance with the system supplier's technical specifications.

dd. Where there is a risk of insulant exposure, e.g. window reveals, eaves, etc., the system must be protected by an adequate overhang or by an adequately sealed, purpose-made flashing.

ee. Where windows and doors are being replaced they may be relocated towards the external face of the existing structure to reduce thermal bridging but at all times should be supported by the structure. Details should be in accordance with approved certification.

ff. On completion of the insulation, all external fittings shall be fixed as per applicable per NSAI Agrément cert or equivalent.

gg. A system supplier guarantee must be issued to the customer.

hh. Timber frame homes cannot be insulated externally.

External Wall Insulation and Electrical Installations

For Health and Safety reasons external wall insulation must not be installed over electricity wires / cables or other electrical fixtures.

Where installers encounter the following situations they must ensure that ESB Networks are contacted well in advance of any proposed works in order to arrange for the necessary alterations:

(a) ESB Networks service cable clipped directly to the surface of a wall or roof soffit
DO NOT REMOVE OR TOUCH THE CABLES. ESB Networks service crew will unclip the service safely allowing the contractor to install the external insulation and various renderings as required. The contractor should supply and fit uPVC electrical trunking suitable for external use. In most cases 50mm X 50mm will be the size required. Adequate fixings must be applied to cater for this trunking and its contents i.e. the service cable. Where expanded polystyrene is used it must not come in direct contact with the PVC insulated cables at any point in the service cables route, due to a chemical reaction that occurs between PVC and expanded polystyrene. Note uPVC used for the trunking is unaffected by direct contact.

(b) ESB Networks overhead service 'aerial wires' anchored to wall (e.g. gable end wall)
DO NOT REMOVE OR TOUCH THE AERIAL WIRES / CABLES. ESB service crew will fit a modified bracket and replace the aerial wires with covered wires where required. This standard bracket must be mounted on the original wall to cater for the mechanical stress levels.

Please also refer to Appendix 3 for the following ESB Networks documents which give additional and more comprehensive guidance:

ESB – External Wall Insulation Guidance Bulletin and Drawings in Appendix 3 of this document

To contact ESB Networks Call 1850 372 757

ESB Networks External Meter Cabinet

DO NOT REMOVE OR TOUCH THE CABLES. The meter cabinet cannot be moved without disturbing the cables already connected. In most situations the cabinet should remain in its original location and will be modified by the contractor in order to seal the recess created by the fitting of the insulation and to allow for the fitting of a new door. ESB Networks will not normally be involved. An acceptable solution is to fit an extension to the existing cabinet by removing the door and cutting away the back from a new cabinet. The new cabinet is then placed in the recess with the sidewalls of the new and old cabinets overlapping. Accurate fitting is essential to "seal off" the wall insulation from the inner cabinet. Please note that these meter cabinets are manufactured to a specific standard to give protection in the event of fire. Do not use alternative materials to modify the meter cabinet.
Please also refer to **Appendix 3** for the following ESB Networks documents, which give additional and more comprehensive guidance:
ESB – **External Wall Insulation Guidance Bulletin and Drawings in Appendix 3** of this document
To contact ESB Networks Call **1850 372 757**

External Wall Insulation and Natural Gas Supply
Bord Gáis Networks have issued a technical bulletin, which outlines the options open to contractors applying external wall insulation to domestic homes, which have Natural Gas installations as well as guidance on ventilation and fluing.

The technical bulletin can be viewed here:
https://www.seai.ie/resources/publications/Bord_Gais_External_Wall_Insulation_Guidelines_July2017.pdf

Where contractors have specific queries in relation to gas installations then they should contact Bord Gáis Networks directly on **1850 200694**

7.3 Internal Wall Insulation (Including flat roof ceilings) BEH WHS BEP

Contractor Competency

Contractors of internal wall insulation must be competent to install same and must agree to complete the work to the standard set out in Internal Wall Insulation in existing housing – a guide for specifiers and contractors (CE17/GPG138) published by the Energy Saving Trust. Where the manufacturer operates an Approved Installer list, the Contractor must demonstrate their inclusion on the list or certification by the manufacturer. Where a product is covered by an NSAI Agrément Certificate it must be installed in accordance with this certificate and by such qualified people as specified. Prior to internal dry-lining works commencing the Customer must be made aware of the effect on room sizes, services and decoration.

Material Standards

Materials to be used in the internal insulation of a wall must be certified by the NSAI Agrément or equivalent.

The objective of this Programme is to put in place materials that will achieve a level of performance in the Home, equivalent to the standard required in Part L of the Building Regulations. Thus, the objective for Internal Wall Insulation is to, in as much as is physically and economically feasible, achieve a U-value of 0.27 W/m2K for external walls.

This economic feasibility refers only to the economic performance of the installation itself. For example, where in exceptional circumstances a home may require significant additional modifications when compared to a normal case, making the initial investment in the insulation solution inappropriate compared to the benefit the Customer will get out of the investment. Economic feasibility in this case does not refer to the ability of the Customer to fund their portion of the capital cost for a conventional installation.

Where a U-value of **0.27 W/m^{2}K** is not achievable the internal insulation systems should have a maximum u-value that is less than 0.7 W/m^{2}K in order to prevent surface condensation being an issue. In particular, the installation of internal wall insulation must not compromise the ventilation (see section 5), air quality, humidity (and the potential for condensation) and quality of living environment in the home. Particular care must be given to the potential impact on the living environment in the home resulting from internal wall insulation installed under the programme. It is the duty of the Contractor to prevent any detrimental changes to the living environment and to recommend to the Customer any measures necessary to ensure that there is no detrimental change to the living environment as a result of the works.

Building Regulations

- Building Regulations (Part B): The insulation must be suitable for use in structures so that it does not compromise the property's ability to resist internal fire spread within the structure and external fire spread.
- Building Regulations (Part C): When installed as per the system supplier's guidelines, the insulation should not affect the property's ability to resist weather and ground moisture.
- Building Regulations (Part D): When installed as per the system supplier's guidelines, the insulation should meet the Building Regulations requirements for materials and workmanship.
- Building Regulations (Part F): The insulation should also be suitable for use on a property and meet the ventilation requirements.
- Building Regulations (Part J): Correct installation of the system should also satisfy the Building Regulations such that the installation does not increase the risk of the property catching fire through the use of a heat producing appliance.

- Building Regulations (Part L): The insulation system shall conserve energy in keeping with the Building Regulations.

The design and installation of the recommended works must not compromise the ventilation, air quality, humidity (and the potential for condensation) and quality of living environment in the home. Particular care must be given to the potential impact on the living environment in the home resulting from any measures installed under the Programme. It is the duty of the Contractor to prevent any detrimental changes to the living environment and to recommend to the Customer on any measures necessary to ensure that there is no detrimental change to the living environment as a result of the works. (See section 5)

Installation Standards & Specifications

a. All internal wall insulation installation and associated works should be carried out in accordance with the manufacturer's specifications and the National Standards Authority of Ireland Standard Recommendation S.R. 54:2014 - Code of practice for the energy efficient retrofit of dwellings.

b. Measures used to achieve the internal insulation of walls can include composite insulated dry-lining boards or any other approved system where insulation achieves a full coverage of insulation across the wall.

c. Internal wall insulation solutions typically include:
- Applying composite insulated dry-lining boards directly to the wall using mechanical fixings or plaster dabs.
- Applying battens to the wall, insulating between the battens with composite insulated dry-lining boards

d. The wall/ceiling must be surveyed to assess its flatness and suitability for the system.

e. The internal wall insulation fixing method depends on the existing internal wall construction:
- Where the masonry wall is plastered directly, any of the internal wall insulation solutions described may be used. Any wallpaper, skirting, picture rails, gloss paint and projecting window boards should be removed. The wall surface should be clean and dust free. Where the existing wall is painted the manufacturers do not recommend the use of plaster dabs
- For existing plasterboard on dabs, it is not possible to assess whether the dabs are able to support the additional weight of the composite insulated dry-lining boards, therefore the plasterboard and dabs should be removed to provide a smooth substrate. Where the block wall finish is unplastered and therefore potentially porous resulting in poor airtightness, a parging coat of plaster should be applied, to improve the airtightness of the final works.
- For existing plasterboard on battens, the condition of battens should be investigated and where they are found to be in a serviceable condition the battens may be retained and the new internal wall insulation fixed directly to them through the existing plasterboard. Where the battens are not in a serviceable condition, the plasterboard and battens should be removed entirely. Where insulation exists, it should be removed and replaced with insulation to an appropriate U-value.

f. Where existing plaster is being removed, the exposed surface of the wall should be pointed/cement washed to seal any holes/cracks;

g. Where existing plaster is to remain, all cracks should be filled, and any loose sections should be removed and made good. Where plaster is to be removed, the exposed surface of wall should be pointed/cement washed to seal any holes/cracks. Where the existing wall surface is level and smooth, the thermal laminate board may also be fixed directly to the wall surface

h. The interior wall surface should be structurally sound and free from dampness. Any repairs should be carried out ahead of the installation, and walls should be allowed to dry out prior to the works commencing. Any existing structural or dampness problems should be resolved before applying any insulation.

i. Provision should be made for the fixing of heavy items such as kitchen cupboards, or items that will have a level of force applied, such as banisters and grab rails.

j. The width of the staircase or corridor should not be reduced to less than the minimum requirements of the Building Regulations by the application of internal wall insulation. It may be necessary to install a reduced depth of insulation in these areas and increase the level elsewhere to compensate for this reduced performance.

k. Composite insulated dry-lining boards should be installed in accordance with good dry-lining practice and the manufacturer's instructions.

l. A vapour control barrier must be included in the insulation system. This can be achieved by using, for example, a polythene sheet applied to the warm side of the insulation. Where the vapour control barrier is an integral part of the insulated dry-lining board, careful attention must be given to the sealing of joints.

m. Where any services such as pipes or cables are present in the wall, or mounted on the wall, these should be extended or replaced. They should extend through the full depth of the proposed insulation layer and finish with sufficient excess for fixing or working. Where radiators cannot be re-positioned to an internal wall or be floor mounted, a ply or OSB timber plate should be fixed to the wall surface and secured through the thermal laminate into the existing masonry or timber battens.

n. The location of potential service penetrations in the insulation should be determined by offering up the composite insulated dry-lining board. Slots should not be formed in insulated dry-lining board to accommodate service penetrations. A hole should be drilled through the insulated dry-lining board, slightly larger than the diameter of the service pipe or cable and the service should be slotted through the hole.

o. Where insulated dry-lining boards are being mechanically fixed to the wall using battens, the metal fixings through the battens should penetrate at least 35mm into the masonry. Fixings through boards must penetrate at least 25mm into the batten.

p. The procedure for fitting internal wall insulation to the internal face of the wall, mechanically or using plaster dabs, should be followed from clause 7.3.3 in SR 54:2014.

q. Window and door reveals can be sources of condensation and mould if not insulated correctly, but where the amount of visible window frame is too small the full thickness of the insulated dry-lining cannot be applied. Where this is the case an insulated window lining board (e.g. expanded PVC) can be used. The lining should not restrict ventilators or opening mechanisms. It may be necessary to remove the existing plaster to accommodate an adequate thickness of insulation within the limited space available.

r. Where there is no other option but to run electrical cables within the insulation component of the insulation board, the cables must be enclosed in an appropriate conduit, e.g. rigid PVC, as per the National Rules of the Electro-Technical Council of Ireland (ET101: 2008).

s. Avoid contact between PVC-insulated wiring and polystyrene insulation, e.g. run wires through flexible cable protection tubes.

t. All gaps in an internal wall insulation solution should be sealed as any air passing through joints or junctions with floors and ceilings will flow behind the insulation and may diminish the thermal efficiency of the insulation and lead to interstitial condensation. The insulation system should be sealed around all doors, windows and other openings. Any penetrations of the insulated dry-lining board must also be sealed e.g. light switches, sockets etc. Where the manufacturer supplies or advises the use of a plasterboard primer this must be applied.

u. Where a radiator cannot be re-positioned to an internal wall or be floor mounted, a ply or OSB timber plate should be secured to the wall surface through the thermal laminate into the existing masonry;

v. A system supplier or contractor guarantee must be issued to the customer where applicable.

7.4 Ceiling Level Attic Insulation

BEH WHS BEP

Contractor Requirements & Competency

Contractors of ceiling level attic insulation must be competent to complete the installation and must agree to complete the work as set out in the guidance document entitled Energy-efficient Refurbishment of existing houses (CE83/GPG155) published by the Energy Savings Trust and installed in accordance with Best Practice Guides/ Technical Guides supplied by the material manufacturer. It is recommended that contractors of ceiling level attic insulation should complete a FETAC level 5 or equivalent in attic insulation installation. Where a product is covered by an NSAI Agrément Certificate it must be installed in accordance with this certificate and by such qualified people as specified.

Product Standards & Specification

Materials to be used in the insulation of an attic at ceiling level must be manufactured to a relevant Irish, British or European Standard. Where novel insulating materials (e.g. Sheep's wool, Hemp, Cellulosic Fibre) are being used, proof of quality control in product manufacture must be demonstrated in the Declaration of Works.

The target U-value for the programme for attics insulated at ceiling level is, in as much as is physically and economically feasible, 0.16 W/m^2K.

This economic feasibility refers only to the economic performance of the installation itself. For example, where in exceptional circumstances a home may require significant additional modifications when compared to a normal case, making the initial investment in the insulation solution inappropriate compared to the benefit the Customer will get out of the investment. Economic feasibility in this case does not refer to the ability of the Customer to fund their portion of the capital cost for a conventional installation.

Other NSAI Agrément-certified products may also be used. It is the responsibility of the Contractor to ensure that the optimum solution for each Customer is achieved, within the cost constraints and preference of each Customer.

Building Regulations

- Building Regulations (Part B): The insulation must be suitable for use so that it does not compromise the property's ability to resist internal fire spread within the internal linings and internal fire spread within the structure and external fire spread.
- Building Regulations (Part C): When installed as per the system supplier's guidelines, the insulation should not affect the property's ability to resist weather and ground moisture.
- Building Regulations (Part D): When installed as per the system supplier's guidelines, the insulation should meet the Building Regulations requirements for materials and workmanship.
- Building Regulations (Part F): The insulation should also be suitable for use on a property and meet the ventilation requirements.
- Building Regulations (Part J): Correct installation of the system should also satisfy the Building Regulations such that the installation does not increase the risk of the property catching fire through the use of a heat producing appliance.
- Building Regulations (Part L): The insulation system shall conserve energy in keeping with the Building Regulations.

The design and installation of the recommended works must not compromise the ventilation, air quality, humidity (and the potential for condensation) and quality of living environment in the home. Particular care must be given to the potential impact on the living environment in the home resulting from any measures installed under the Programme. It is the duty of the Contractor to prevent any detrimental changes to the living environment and to recommend to the Customer on

any measures necessary to ensure that there is no detrimental change to the living environment as a result of the works. (See section 5)

Installation Standards & Specifications

a. Attic Insulation should be carried out using materials that are approved by an Irish, British or European Standard for attic insulation and installed in accordance with the relevant Irish, British or European Standards, where available.

b. If there is evidence of bats or bat roosts present in the attic space to be insulated, the Contractor should consult with the Bat Conservation Ireland at www.Batconservationireland.org for advice on how to proceed. All bat and bat roosts are protected under EU and Irish legislation. For further information on this refer to www.npws.ie .

c. Where practicable, all areas of the ceiling are to be insulated to the same depth.

d. Mineral wool and other compactable insulation materials should not be compressed as this decreases its effectiveness considerably.

e. Contractor must maintain a gap at eaves at least equal to a continuous strip 10mm wide to ensure adequate ventilation via appropriate ventilation openings (see section 5). Where appropriate ventilation openings are not already present in the home a soffit vent and eaves ventilation tray or similar appropriate measure will need to be installed. In the case where a breathable sarking membrane is used, and provides appropriate levels of ventilation, the ventilation openings may be covered.

f. Unless a breathable sarking membrane is present, the insulation should be retained at least 50mm from the membrane.

g. Long term exposure to interstitial condensation within a roof space can lead to structural roof timbers rotting. It is essential that a cold roof space is adequately ventilated and the transfer of moisture from below can be limited by:

- Installing an airtight membrane at ceiling level to reduce moisture transfer is recommended where reasonably possible.
- Prevent moisture from entering the roof space by ensuring that loft hatches are properly draught proofed and sealed.
- Fitting wet rooms with a suitable ventilation system to extract moisture at source. This is in addition to window/wall vents were applicable.
- Provide roof ventilation through side eaves or through ventilation tiles located in the slope of the roof.

h. Insulation at ceiling level should be installed in such a way to avoid gaps. This can be done by;

- The insulation laid between the ceilings joists should be no more than 25mm either above or below the ceiling joists.
- The next layer of insulation should be placed across the joists and tucked into the eaves ensuring access to eaves ventilation

i. High performance insulation should be placed between or above the timber joists where a storage platform or access walkway is proposed. To maintain a high level of insulation under any flooring or storage space, where flooring is required or is being retained by the Customer there are two choices:

- Floor joists are installed on the existing joists at right angles to allow the required thickness of insulation to be laid, with the floor installed above this.
- Use a solid, closed-cell insulation with a much lower thermal conductivity and install a floor covering on top of this. This results in a lower height of the final floor surface.

j. It is essential that any heavy-duty cables (e.g. for cookers and showers) are not covered by the insulation material and should instead be left on top of the new insulation, provided there is sufficient slack to do so. Where this is not possible, a gap of at least 75mm should be left either side of the (heavy duty) cables for their entire length within the attic area.

k. The insulation material shall be retained at a minimum of 75mm from all electrical apparatus penetrating the ceiling, for example recessed lighting fittings. Where necessary a permanent physical restraint shall be used.

l. Recessed down-lights should be protected in such a way that the insulation does not cover them and that they are adequately ventilated. It is recommended that a purpose-made recessed lighting housing is used. The Contractor must advise the Customer of the need to keep the recessed lights clear of insulation.

m. The Contractor is requested to give special consideration to the elderly and disabled who may not be able to remove stored items in the attic space themselves and the Contractor should, where considered appropriate, provide the customer with a quotation for the removal and replacement of the stored items to facilitate installation of the insulation material.

n. The Contractor should identify any form of water penetration in the attic and attic insulation should not be installed if the roof or pipe-work is leaking.

o. All pipe-work and water storage vessels should be insulated see section 7.4.3 Insulation of pipe-work and water storage tanks for further details.

p. The contractor is to insulate the roof access hatch. The insulation is to be fitted to the same thermal value as the main attic and securely fixed to the attic hatch. Where attic access ladders are fixed to the hatch it is recommended to use insulating hoods or a lightweight insulating box where possible.

q. The Contractor is to draught proof attic hatches. See section 7.13 Draught proofing for further details.

r. In every roof space where cold water tanks or other fitted appliances occur, the Contractor must construct a permanent boarded walkway from the roof access point to the tank ball valve position and / or the appliance location. The boarded access walkway shall be constructed of minimum dimensions of 50x50mm soft wood battens laid across rafters, notched over pipes and cable crossings, said battens to be securely screw fixed in place to rafters. 19mm thickness by 450mm wide flooring grade chipboard to be fixed to battens base with screws. This walkway should be supported above the first layer of insulation to prevent any compaction of insulation below the walkway.

7.4.1 Attic Hatch

- Draught strip shall be fitted to all sides of the attic hatch.
- Non-hinged attic hatch covers shall be fitted with a securing catch at each side (i.e. minimum of two catches), to achieve the required compression.
- All hinged attic hatch covers shall have at least one securing latch fitted to the attic hatch framework on the opposite side to the hinges, to achieve the compression required.
- Attic access covers not located within a surrounding framework and simply covering a ceiling aperture from above shall be fitted with a rebate seal and a minimum of two catches shall be fitted. Where the aperture is covered from below the perimeter of the access, this will be fitted with a rebate seal and a semi-permanent means of holding the cover against the seal shall be provided.
- Some attic hatches (e.g. with an attached attic access ladder) may be difficult to draught proof. Particular care should be taken where spring-loaded “push-push” catches are present. Where draught proofing can be applied without problem this should be carried out as detailed below:

7.4.2 Non-Wooden Attic Hatches

- Where these are found, they must be fitted with suitable securing catches, unless the method adopted would cause damage to the attic hatch or frame.

7.4.3 Insulation of pipe-work and water storage tanks

Contractor Requirements & Competency

Contractors insulating pipework and water storage tanks must be competent to complete the installation and must agree to complete the work as set out in the guidance document entitled BS 5970 Code of practice for thermal insulation of pipework and equipment in the temperature range of -100°C to +870°C and BS 5422 Method for specifying thermal insulating materials for pipes, tanks, vessels, ductwork and equipment operating within the temperature range -40°C to +700°C.

Insulation of pipework and water storage tanks shall be installed in accordance with Best Practice Guides/ Technical Guides supplied by the material manufacturer. Where a product is covered by an NSAI Agrément Certificate it must be installed in accordance with this certificate and by such qualified people as specified.

Where attic insulation is being installed, all water pipework and water storage tanks should be insulated in unheated areas of the roof space. If pipe-work and/or water storage tanks are not sufficiently robust to withstand the installation of insulation, the pipework and/or water storage tanks should be replaced.

Product Standards & Specification

Materials to be used for Insulation of pipework and water storage tanks must be manufactured to a relevant Irish, British or European Standard.

Insulation of pipework and water storage tanks shall be installed as per manufacturer's instruction. Other NSAI Agrément-certified products may also be used. It is the responsibility of the Contractor to ensure that the optimum solution for each Customer is achieved, within the cost constraints and preference of each Customer.

Building Regulations

- Building Regulations (Part B): The Insulation of pipework and water storage tanks must be suitable for use so that it does not compromise the property's ability to resist internal fire spread within the internal linings and internal fire spread within the structure and external fire spread.
- Building Regulations (Part C): When installed Insulation of pipework and water storage tanks as per the system supplier's guidelines, the insulation should not affect the property's ability to resist weather and ground moisture.
- Building Regulations (Part D): When installed insulation of pipework and water storage tanks as per the system supplier's guidelines, the insulation shall meet the Building Regulations requirements for materials and workmanship.
- Building Regulations (Part J): Correct installation of the Insulation of pipework and water storage tanks shall also satisfy the Building Regulations such that the installation does not increase the risk of the property catching fire through the use of a heat producing appliance.
- Building Regulations (Part L): The insulation of pipework and water storage tanks shall conserve energy in keeping with the Building Regulations.
- Building Regulations (Part G): The insulation of pipework and water storage tanks shall protect water services in keeping with the Building Regulations.

The design and installation of the recommended works must not compromise the ventilation, air quality, humidity (and the potential for condensation) and quality of living environment in the home. Particular care must be given to the potential impact on the living environment in the home resulting from any measures installed under the Programme. It is the duty of the Contractor to prevent any detrimental changes to the living environment and to recommend to the Customer on any measures necessary to ensure that there is no detrimental change to the living environment as a result of the works. (See section 5)

Installation Standards & Specifications

a. The cold water storage tank, service pipe and fittings and any associated cold water pipes should be adequately protected against damage by frost.
b. Insulation of pipework and water storage tanks should be carried out using materials that are approved by an Irish, British or European Standard for insulation of pipework and water storage tanks and installed in accordance with the relevant Irish, British or European Standards, where available.
c. Insulation of pipework and water storage tanks should be carried out in accordance with BS 5970 Code of practice for thermal insulation of pipework and equipment in the temperature range of -100°C to +870°C and BS 5422 Method for specifying thermal insulating materials for

pipes, tanks, vessels, ductwork and equipment operating within the temperature range -40°C to +700°C

d. Manufacturer's instructions should be followed. The following are intended to be helpful guidelines.

e. Insulation of pipework outside of heated envelope of the building to protect against freezing for domestic cold water services shall be as per 'Appendix Table 1' for TGD Part G of the Building regulations:

Amd. No.	Text affected
G(xi)	**Appendix** **Table 1**

Minimum insulation thickness (mm) to protect against freezing for domestic cold water systems (12 hour period)

Outside diameter (mm)	Inside diameter bore (mm)	Extreme installation Inside the building but outside the envelope of the insulation				
		λ = 0.020	λ = 0.025	λ = 0.030	λ = 0.035	λ = 0.040
15	13.6	23	35	53	78	113
22	20.2	10	14	18	23	28
28	26.2	7	9	11	13	16
35	32.6	5	7	8	10	11

Initial water temperature: +2°C
Minimum ambient temperature: -6°C
Permitted ice formation: 50%
Evaluation period: 12 hours.

Note 1: Thicknesses given are calculated specifically against the criteria noted in the table. These thicknesses may not satisfy other design requirements

Note 2: Some of the insulation thicknesses given are too large to be applied in practice. The purpose of including very high thicknesses is to demonstrate that the application of a material of the given thermal conductivity (λ) is not able to provide the degree of frost protection on the pipe size indicated under the design conditions. Therefore in order to increase the degree of frost protection it is necessary to increase the pipe size, select an insulation with a lower thermal conductivity or use some means of putting heat back into the system.

f. Further advice is available in the 'TIMSA guidance for achieving compliance with Part L of the Building Regulations', Table 7.1.1, and, 'Good Building Guide 40 - Protecting Pipes from Freezing'.

g. Insulation of cold water storage tanks outside of heated envelope of the building to protect against freezing shall be as per BS 5970 Code of practice for thermal insulation of pipework and equipment in the temperature range of -100°C to +870°C.

h. Insulation of cold water storage tanks should be securely fixed to sides and top of water storage tanks. The lid of the cold water storage tank shall be ridged. No gaps should be left between the insulation surrounding the cold water storage tank. The cold water storage tank access cover should be removable to allow minimum disturbance to insulation.

i. Insulation should not be laid below water storage tanks in the roof space where the underside of the storage vessel is less than 300mm above the finished level of roof insulation. The insulation around the water storage vessel should continue down to the finished level of attic insulation to form a skirt around the water storage vessel. If the water storage vessel is greater than 300mm above the finished level of insulation the insulation should be installed below the vessel and the underside of the vessel should also be insulated. Further detail is given in the diagram below and TGD Part G of the Building Regulations.

Diagram 3 **Insulated pipes and cisterns in roof space**
(Par. 1.9)

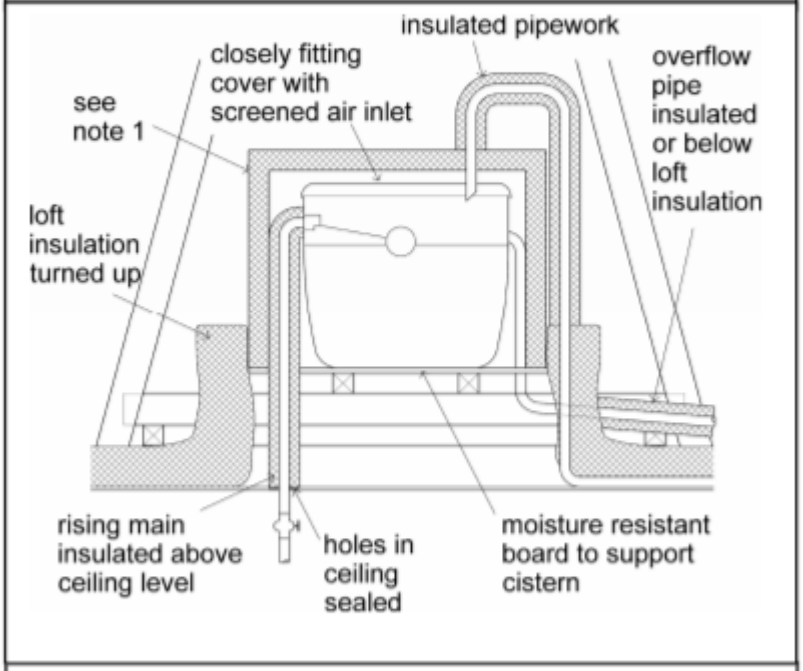

Diagram for clarification only.
Note 1: Insulation U-value to be not less than 0.3 W/m^2K as per TGD L Table 1.

j. All pipework bend and joints should be fully insulated.
k. Unless a breathable sarking membrane is present, the insulation should be retained at least 50mm from the membrane.

7.5 Rafter level attic insulation (warm roof)

BEH BEP

Contractor Requirements & Competency

Contractors of rafter level attic insulation must be competent to complete the installation and must agree to complete the work to the standard set out in *Energy-efficient Refurbishment of existing houses* (CE83/GPG155) and in accordance with Best Practice Guides/ Technical Guides supplied by the material manufacturer. Where the manufacturer operates an Approved Installer list, the Contractor must demonstrate their inclusion on the list or certification by the manufacturer. Where a product is covered by an NSAI Agrément Certificate it must be installed in accordance with this certificate and by such qualified people as specified.

Product Standards & Specification

Materials to be used in the insulation of an attic at rafter level must be certified by the NSAI Agrément or equivalent.

The objective of this Programme is to put in place materials that will achieve a level of performance in the Home, equivalent to the standard required in Part L of the Building Regulations. Thus, the target U-value for the programme for attics insulated at rafter level is, in as much as is physically and economically feasible, 0.20 W/m^2K.

This economic feasibility refers only to the economic performance of the installation itself. For example, where in exceptional circumstances a home may require significant additional modifications when compared to a normal case, making the initial investment in the insulation solution inappropriate compared to the benefit the Customer will get out of the investment. Economic feasibility in this case does not refer to the ability of the Customer to fund their portion of the capital cost for a conventional installation.

The required thickness depends on the material used. It is the responsibility of the Contractor to ensure that the optimum solution for each Customer is achieved, within the cost constraints and preference of each Customer.

Building Regulations

- Building Regulations (Part B): The insulation must be suitable for use so that it does not compromise the property's ability to resist internal fire spread within the internal linings and internal fire spread within the structure and external fire spread.
- Building Regulations (Part C): When installed as per the system supplier's guidelines, the insulation should not affect the property's ability to resist weather and ground moisture.
- Building Regulations (Part D): When installed as per the system supplier's guidelines, the insulation should meet the Building Regulations requirements for materials and workmanship.
- Building Regulations (Part F): The insulation should also be suitable for use on a property and meet the ventilation requirements.
- Building Regulations (Part J): Correct installation of the system should also satisfy the Building Regulations such that the installation does not increase the risk of the property catching fire through the use of a heat producing appliance.
- Building Regulations (Part L): The insulation system shall conserve energy in keeping with the Building Regulations.

The design and installation of the recommended works must not compromise the ventilation, air quality, humidity (and the potential for condensation) and quality of living environment in the

home. Particular care must be given to the potential impact on the living environment in the home resulting from any measures installed under the Programme. It is the duty of the Contractor to prevent any detrimental changes to the living environment and to recommend to the Customer on any measures necessary to ensure that there is no detrimental change to the living environment as a result of the works. (See section 5)

Installation Standards & Specifications

- **a.** All attic insulation installation and associated works should be carried out in accordance with the manufacturer's specifications and the National Standards Authority of Ireland Standard Recommendation S.R. 54:2014 - Code of practice for the energy efficient retrofit of dwellings.
- **b.** Attic Insulation should be carried out using materials that are approved by an Irish, British or European standard for loft insulation.
- **c.** If there is evidence of bats or bat roosts present in the attic space to be insulated, the contractor should consult with the Bat Conservation Ireland at www.Batconservationireland.org for advice on how to proceed. All bat and bat roosts are protected under EU and Irish legislation. For further information on this refer to www.npws.ie
- **d.** Particular attention should be given to ventilation and condensation requirements of the attic in relation to the materials used (see section 5).
- **e.** The installed insulation must not impede cross flow ventilation.
- **f.** Unless a breathable sarking membrane is present, the insulation should be retained at least 50mm from the membrane.
- **g.** When installing rigid insulation between the rafters, the sheets should be cut accurately so as to leave no gaps around the edges. Where gaps occur these should be filled with either insulation or insulation foam. Similarly, any service penetrations, such as a soil stack, should be sealed adequately.
- **h.** A constant coverage should be attained to avoid the risk of cold bridging. Cold bridging occurs where there is not a continuous covering across the inside (attic side) of the rafters. Where the coverage is not continuous it allows the rafter itself to conduct heat out to the external or 'cold' environment, thus providing a 'cold bridge' through which heat can escape.
- **i.** Unless the product has a built in vapour control layer, a separate vapour control layer should be fitted between the insulation and any plasterboard, i.e. on the warm side of the insulation.
- **j.** Insulation/vapour control layer joints should be fully sealed by appropriate tape. Where foiled backed insulation is used, foil taping all joints between the insulation slabs in each layer will fulfil the requirement for a vapour control layer;
- **k.** The insulation material shall be retained at a minimum of 75mm from all electrical apparatus penetrating the insulation, for example recessed lighting fittings. Where necessary a permanent physical restraint shall be used;
- **l.** Downlighters should be provided with sufficient space to dissipate heat so as to prevent the lights themselves from overheating. Where the light fitting itself is airtight (to the roof) but the hood of the fitting is open to the room, then the hole for the recessed fitting should be cut into the ceiling accurately to prevent air movement from the room into the roof space. A void should be formed around the light fitting in the lowest insulation layer. Where the light fitting itself is not airtight (to the roof), or where it is not possible to make the ceiling airtight where the fitting is provided, then an airtight enclosure should be formed or a service void provided on the warm side of the vapour control layer. Forming these spaces at regular intervals in the insulation layer reduces the overall effectiveness of the roof insulation. Where they are fitted, a layer of high performance insulation should be installed above the recessed lights to compensate for the voids formed in the lowest layer to accommodate the recessed fittings. For sloped roofs where voids cannot be provided then recessed light fittings should not be installed in the sloping roof section unless a suitably deep service void is provided.
- **m.** Whilst the Contractor is in the roof space he should identify any form of water penetration and attic insulation should not be installed if the roof is leaking.

n. Where rafter level insulation is used on a partial attic conversion, the vertical walls of the room should have insulation placed between the stud timbers (where not already existing) and across the face of the stud walls. Where there is unused attic space outside of the conversion, insulation should be applied at ceiling level to the standard detailed in 'Ceiling Level Insulation' above.

o. Careful detailing is required to avoid thermal loss due to thermal bridging and to maintain roof ventilation at the roof-wall junction particularly where the dwelling is also provided with wall insulation.

p. Services, such as cables/pipework, can be accommodated within a battened airspace, on the inside of the finished insulation, with the depth determined by what services are provided.

7.6 Floor Insulation

BEP

Contractor Requirements & Competency

Contractors installing floor insulation must be competent to complete the installation and must agree to complete the work in accordance with the following Best Practice Guides:

- *Domestic floors: construction, insulation and damp-proofing* (GBG 28 Part 1) published by the BRE
- *Insulating ground floors* (GBG 45), published by the BRE
- *Energy-efficient Refurbishment of existing houses* (CE83/GPG155) published by the Energy Saving Trust
- *Sustainable Refurbishment* (CE309) published by the Energy Saving Trust

They must also be installed in accordance with Technical Guides supplied by the material manufacturer. Where a product is covered by an NSAI Agrément Certificate it must be installed in accordance with this certificate and by such qualified people as specified.

All electrical associated works should be carried out by a suitably qualified person in accordance with the *ETCI National Wiring Rules for Electrical Installations, Fourth Edition* (ET101:2008).
Where the removal of a concrete floor slab is required, the Contractor must advise the Customer to engage the services of a suitably qualified Chartered Structural Engineer to design and oversee the work as it must comply with the Building Regulations.

In general, it is the responsibility of the Contractor to clearly outline to the Customer the full implications of the scope of works proposed, including:

- The potential impacts to services,
- Skirting,
- Doors and door heights,
- Room height (floor to ceiling), and
- The general environment during, and as a consequence of, the installation.

Product Standards & Specification

Materials to be used in the insulation of a suspended timber floor (e.g. glass fibre, rockwool, sheep's wool, expanded polystyrene, high-density foam, etc.) must be manufactured to a relevant Irish, British or European Standard. Materials to be used in the insulation of a concrete ground floor slab must be rigid insulation materials certified by the NSAI Agrément or equivalent.
Insulation to be used with a concrete floor slab must have sufficient load-bearing capacity to support the floor and its loading.

The target U-value for the programme for the insulation of floors, in as much as is physically and economically feasible, is:

- 0.36 W/m^2K, or
- 0.15 W/m^2K, where the refurbishment also includes the installation of underfloor heating

The installation of underfloor heating typically only applies to a floor with a concrete, ground-bearing floor slab and not to suspended timber floors. Where underfloor heating is to be incorporated into a suspended timber floor, a rigid insulation material certified by the NSAI Agrément or equivalent must be used and the guidance of the certificate holder should be sought on its use with underfloor heating.

This economic feasibility refers only to the economic performance of the installation itself. For example, where in exceptional circumstances a home may require significant additional modifications when compared to a normal case, making the initial investment in the insulation solution inappropriate

compared to the benefit the Customer will get out of the investment. Economic feasibility in this case does not refer to the ability of the Customer to fund their portion of the capital cost for a conventional installation. It is the responsibility of the Contractor to ensure that the optimum solution for each Customer is achieved, within the cost constraints and preference of each Customer.

Where the insulation material is made from polystyrene, electrical cables should be run in conduits to avoid direct contact between the polystyrene and the wiring. When polystyrene comes into direct contact with PVC cabling, it has the potential to cause material degradation of the PVC insulation, which may result in the wiring becoming unsafe. The Contractor should also (seek or sought) guidance from the insulation manufacturer should be sought where underfloor heating services are to be used where the insulation material is made from polystyrene.

Building Regulations

- Building Regulations (Part A): The insulation works should not reduce the floor-to-ceiling height of the room to below 2.4m or the clear door heights to below 2.0m.
- Building Regulations (Part B): The insulation must be suitable for use so that it does not compromise the property's ability to resist internal fire spread within the internal linings and internal fire spread within the structure and external fire spread.
- Building Regulations (Part C): When installed as per the system supplier's guidelines, the insulation should not affect the property's ability to resist weather and ground moisture.
- Building Regulations (Part D): When installed as per the system supplier's guidelines, the insulation should meet the Building Regulations requirements for materials and workmanship.
- Building Regulations (Part F): The insulation should also be suitable for use on a property and meet the ventilation requirements.
- Building Regulations (Part J): Correct installation of the system should also satisfy the Building Regulations such that the installation does not increase the risk of the property catching fire through the use of a heat producing appliance.
- Building Regulations (Part L): The insulation system shall conserve energy in keeping with the Building Regulations.

The design and installation of the recommended works must not compromise the ventilation (see section 5), air quality, humidity (and the potential for condensation) and quality of living environment in the home. Particular care must be given to the potential impact on the living environment in the home resulting from any measures installed under the Programme. It is the duty of the Contractor to prevent any detrimental changes to the living environment and to recommend to the Customer any measures necessary to ensure that there is no detrimental change to the living environment as a result of the works.

Installation Standards & Specifications – Suspended Timber Floor Insulation

a. Retrofit Floor insulation must be carried out in accordance with the guidelines as described in S.R. 54 – 2014 (Code of Practice for the energy efficient retrofit of dwellings) Clause 9 – Floors.

b. Suspended timber floor Insulation should be carried out using materials that are approved by an Irish, British or European Standard for floor insulation and installed in accordance with the relevant Irish, British or European Standards, where available.

c. The insulation materials should be stored in accordance with the manufacturer's recommendations.

d. Where rigid insulation panels are being used, they should be stored on a firm, clean, dry and level base. Where they are being stored outdoors, they should be kept off the ground and protected from prolonged exposure to sunlight either under cover in dry conditions or by covering with opaque polythene sheeting.

e. Care must be taken to avoid damage and contact between rigid insulation panels and solvents or bitumen products. The panels must not be exposed to open flame or other ignition sources.

f. Where practicable, all areas of the floor are to be insulated to the same depth.

g. Wool and other compactable insulation materials should not be compressed as this decreases its effectiveness considerably.

h. Water supply pipes should be kept above the insulation, where possible. Where it is not possible, these pipes should be completely insulated where they are below the level of the floor insulation. See TGD Part G of Building Regulations for further details.

i. The insulation material should be installed between the joists such that there are no void spaces between the underside of the flooring and the insulation unless a space is required for services. Loose-fill, spray-foam or quilt materials should be supported underneath by a thin sheet of plywood or a breathable membrane and rigid insulation materials should be supported on battens or similar. This allows the timber joists to breathe as well as prevent air movement above the insulation.

j. Where an airtight membrane is used to support the insulation material, it should be turned up at the edges and sealed against the walls around the complete perimeter of the floor. Where a breathable membrane has not been used, one should be installed underneath the timber joists. The membrane should be turned up at the edges and sealed against the walls around the complete perimeter of the floor. Where fuel-burning appliances are located within a space, please ensure there are adequate ventilation openings (see section 5).

k. The space between the last joist and the wall should be filled with insulation to the full depth of the joist so as to minimise thermal bridging at the junction between the wall and the floor.

l. It is essential to ensure that the external wall vents are not blocked in any way in order to ensure that the void beneath a suspended timber floor is adequately ventilated and that the ventilating air has a free path across the floor void. Where fuel burning appliance are located within a space please allow for adequate ventilation openings (see section 5).

Installation Standards & Specifications –Concrete Floor Insulation

This specification is applicable to both ground supported concrete floors and suspended precast concrete floors. Where sufficient space is available for safe access, or a basement exists, fitting insulation to the underside of the slabs is an option. NOTE Caution should be taken to ensure that the area beneath a suspended ground floor is ventilated to prevent the build-up of condensation and hazardous soil gases, such as radon.

a. Retrofit Floor insulation must be carried out in accordance with the guidelines as described in S.R. 54 – 2014 (Code of Practice for the energy efficient retrofit of dwellings) Clause 9 – Floors.

b. Materials to be used in the insulation of a concrete ground floor slab wall must be installed in accordance with the specifications laid out by the system supplier's specifications and in accordance with the system's NSAI Agrément (or equivalent) certificate.

c. Where the excavation of an existing ground floor is required, remedial measures for the reduction of indoor concentrations of Radon are required (see Section 4.1).

d. The ground floor slab must incorporate a damp-proof membrane (DPM). Where one is to be installed, it should be installed in accordance with the following British Standards:
- *Protection of buildings against water from the ground* (CP 102:1973), and
- *Design and installation of damp-proof courses in masonry construction* (BS 8215:1991)

e. The insulation works should not reduce the floor-to-ceiling height of the room to below 2.4m or the clear door heights to below 2.0m

f. Storage of insulation materials:
- The insulation panels should be stored on a firm, clean, dry and level base. Where they are being stored outdoors, they should be kept off the ground and protected from prolonged exposure to sunlight either under cover in dry conditions or by covering with opaque polythene sheeting. The insulation panels should be stored in accordance with the manufacturer's recommendations.
- Care must be taken to avoid damage and contact with solvents or bitumen products. The boards must not be exposed to open flame or other ignition sources.

g. Installation:

- The insulation may be placed above or below the DPM/radon barrier and should have a high moisture resistance.
- Where the insulation is laid on top of the DPM/radon barrier it should be laid on a well compacted hardcore that has been sand-blinded in order to provide a level surface. The DPM/radon barrier should have overlapping joints and be well sealed and also needs to be brought up the walls around the floor perimeter to meet the wall DPM/radon (for more information, see www.epa.ie).
- The concrete floor slab should be fully dried out before the installation of the insulation material.
- Insulation boards are cut to the required size and should be laid horizontally on the concrete slab with closely-butted, staggered cross-joints to ensure there are no gaps at joints.
- The boards should be laid such that all cut edges are at the perimeter of the floor or at some other feature, e.g. thresholds, access ducts, etc.
- Spreader boards should be used to protect the insulation boards.
- A thinner section of insulation should be placed vertically against the abutting wall around the perimeter of the floor area being insulated to prevent thermal bridging.

h. Finishing:

- If the DPM/radon barrier is placed below the insulation, the joints between insulation boards should be taped to prevent wet screed from entering when being poured. If the slab/screed is power-floated, the exposed edges of perimeter insulation should be protected during power-floating, e.g. by boards, or the areas close to the edge of the floor should be hand trowelled.
- If there is no DPM/radon barrier above the concrete floor a vapour control layer, e.g. polyethylene, should be placed between the insulation and the screed to protect moisture-sensitive finishes such as timber or timber-based flooring. This vapour control layer should be carried up along the edge of the screed. The screed should be allowed to dry before any floor finish is laid.
- Where a timber-based overlay is to be installed on top of the insulation, the following measures must be taken in the installation process:
  - Overlays should be installed in accordance with BS DD CEN/TS 12872:2007 (*Wood-based panels. Guidance on the use of load-bearing boards in floors, walls and roofs*).
  - Where the DPM/radon barrier is below the insulation, a vapour control layer must be installed between the insulation and the overlay boards. All joints in this vapour control layer must be sealed appropriately.
  - An expansion gap between overlay boards and perimeter walls or abutments must be provided at a rate of 2mm per meter run or a minimum of 10mm, whichever is greater.
  - A waterproof PVA adhesive should be applied to all joints before overlay boards are interlocked. Wedges should be inserted between the wall and floor to ensure the boards remain tightly locked together until the adhesive has set.
  - A suitable compressible filler must be used around the perimeter of the floor between the overlay boards and wall.
  - Overlay board protection should be considered in rooms where there is a likelihood of regular water spillage, e.g. in bathrooms, kitchens, etc.
- Where a cement-based floor screed is to be laid on the insulation, it should be laid in accordance with BS 8204 (*Screeds, bases and in situ floorings*)

i. Where possible, electrical conduits, gas and water pipes or other services should be contained in ducts or channels within the concrete slab. Where this is not possible, the non-electrical services may be accommodated within the insulation, provided they are securely fixed to the concrete slab. Electrical cables should be enclosed in a suitable conduit. With hot water pipes the insulation must be cut back to maintain an air space.

Radon

Where planned retrofit measures comprise of floor replacement consideration should be given to provision of radon preventative measures as detailed in Building Regulations Technical Guidance Document C. Post retrofit radon testing is recommended where extensive energy retrofit measures have been completed.

NOTE: For further guidance see:
http://www.epa.ie/radon/ and the Department of the Environment, Community and Local Government publication Radon in Existing Buildings - Corrective options.

7.7 Fully Integrated Heating Controls

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General Standards & Specifications

This section outlines the general Standards & Specifications to which Contractors, products and installation methods must conform.

Contractor Requirements & Competency

The installation of heating controls must be carried out by suitably qualified individuals in accordance with manufacturer's guidelines and industry best practice as a minimum. In addition to this, they must hold a Level 6 National Craft Certificate in Plumbing or an equivalent Plumbing qualification such as City and Guilds. Plumbers must have completed an electrical module during their course in order to carry out the 'minor' electrical works involved in specific control measures. If 'Controlled Works', as defined by the Commission for Energy Regulation (CER) document entitled 'Definition of the Scope of Controlled Works' are required, a Completion Certificate must be issued. The issuance of a Completion Certificate for 'Controlled works' can only be carried out by a Registered Electrical Contractor or an Inspector of one of the two Safety Supervisory Bodies as defined in Section 2.2 in this CER guidance.

Product Standard & Specification

All heating control products must conform to the appropriate BS, EN or IS standard for that particular measure. As a minimum, the following Standards should be satisfied:

- EN 60730-1 Automatic electrical controls for household and similar use. General requirements
- EN 60730-2-7 Automatic electrical controls for household and similar use Part 2-7: Particular Requirements for Timers and Time Switches
- EN 215 Thermostatic Radiator Valves. Requirements and Test Methods

Installation Standard & Specification

All Heating Controls installation should be carried out in accordance with the manufacturer's specifications and Industry Best Practice. All works should be installed in accordance with the National Standards Authority of Ireland Standard Recommendation S.R. 54:2014 - *Code of practice for the energy efficient retrofit of dwellings,* the Dept. of Environment, Heritage and Local Government and SEAI Document Heating and Domestic Hot Water Systems for Dwellings – Achieving Compliance with Part L, the TACMA Guide to Heating Controls, and Energy Savings Trust Guidelines:

- GPG 302 Controls for Domestic Central Heating and Hot Water – Guidance for Specifiers and Installers (Energy Savings Trust and BRE)
- CE29 Domestic Heating by Oil: Boiler Systems – Guidance for Installers and Specifiers
- CE30 Domestic Heating by Gas: Boiler Systems – Guidance for Installers and Specifiers
- All works should be carried out in accordance with the ETCI National Wiring Rules for Electrical Installations, Fourth Edition ET101:2008 and the latest draft of BS 5449 Specification of Forced Air Circulation Hot Water Central Heating Systems for Domestic Purposes (or equivalent Irish Standard) where applicable.

Particular attention should be given to good housekeeping and safety during installation. Every installed measure must be fully demonstrated by the Contractor to the Customer along with a written set of operating instructions. Before leaving the home, the Contractor must ensure that the owner can correctly operate their upgraded heating system.

Two Zones (Space Heating & Domestic Hot Water)

This element of the programme involves dividing the heating system into **two zones** and incorporating a **24 hour 7-day programmer** for time & temperature control along with a **boiler interlock arrangement** to prevent boiler operation when the heat demand drops off. These initial two zones must

be made up of the space heating zone and the domestic hot water heating zone. Further zones to split areas of the house can be added as additional zones (as discussed below).

Product Standard & Specification

All timers, programmers, thermostats, zoning manifolds and motorised control valves must conform to the appropriate BS or IS standard for that particular measure, for example: BS EN 60730-2-7 *'Automatic Electrical Controls for Household and similar Use Part 2-7: Particular Requirements for Timers and Time Switches'*. It should also be noted that 22 mm motorised control valves are usually suitable for boilers rated up to 20kW. For larger boilers, when fitting a motorised control valve on a gravity hot water circuit, 28 mm valves or larger should be used.

Installation Standard & Specification

Zoning: Zones should be divided according to Industry Best Practice as outlined in Good Practice Guide 302 "Controls for domestic central heating and hot water – guidance for specifiers and installers". This guide recommends using motorised control valves to subdivide the home into separate heating zones. A zoning manifold can also be used to achieve separate heating zones. Motorised control valves can be plumbed at an angle but must not be mounted so that the power-head is below the horizontal level of the pipework. If fitted in a confined space, adequate ventilation must be available in order to ensure that the valve will be kept within its recommended temperature range. There must also be adequate access so that the power head can be removed if necessary. Motorised valves should not be positioned in the line of the open safety vent pipe or the feed and expansion pipe. Solid fuel systems should use normally-open motorised valves (i.e. they close only when power is applied) to ensure safe operation in the event of power failure or malfunction.

A 24 hour 7-Day Programmer, facilitating time and temperature control should be installed in accordance with the manufacturer's guidelines and industry best practice as outlined in Good Practice Guide 302. The room thermostat must be located in an area where it is not subject to heat gains, direct sunlight or draughts. The thermostat should be located in a well-lit, easily accessible position with good air circulation. The chosen position must be representative of average room/zone temperature. Do not locate room thermostats in areas such as corners, behind furniture or curtains or in areas where the air flow may pick up extra heat such as close to TVs, computers, wall lights, in a room with a fixed heating appliance or direct sunlight. Locating a room thermostat in an area which may be subject to external draughts such as beside external doors etc. should also be avoided. Best practice recommends that thermostats are situated approx. 1.5 m from the floor. Furthermore, room thermostats should not be installed in any room which already uses TRVs for temperature control.

Best Practice recommends that **the Hot Water Cylinder Thermostat** (installed with the immersion timer and temperature control device) is installed between 1/4 and 1/3 of the way up the vertical height of the cylinder unless otherwise instructed by the manufacturer. Care should be taken to ensure that there is good clean contact between the thermostat and the cylinder when attaching. The thermostat should also be located on the front face of the cylinder so that it is easily accessible by the Customer. It is recommended that Contractor sets the hot water temperature no higher than 60^{o}C. It is not uncommon in many households for domestic hot water to be heated to temperatures higher than 60^{o}C only for residents to add cold water to it to bring the temperature down. This would be considered wasteful of energy. A temperature of 60^{o}C is recommended however to protect against the risk of Legionella.

Boiler Interlock - A boiler interlock arrangement must be included as part of this set of controls whereby the boiler will not fire when there is no demand for heat. All unnecessary boiler firing can be eliminated with this control measure. In order to assess whether a boiler interlock arrangement is already in place, the Contractor should turn all thermostats right down when the boiler is firing - if the boiler continues to fire, then there is no interlock. (The pump may continue to run if the boiler requires a pump to overrun, this is intentional and does not affect the boiler interlock). On a traditional central heating system with stored hot water, a boiler interlock arrangement can be set up by interconnecting the room

and cylinder thermostats with motorised valve(s). On a combination boiler all that is required to set up a boiler interlock arrangement is a room thermostat.

Boiler Management System – An acceptable alternative to the above control measures would be to install a boiler management system that delivers the specified zoning, timing and temperature and boiler interlock control provisions. Such systems must provide the same functionality as is described above and be installed in accordance with the manufacturer's guidelines and industry best practice.

In the exceptional case where the hot water cylinder is significantly isolated from the boiler and where the installation of additional pipes to connect it separately would involve substantial civil works, a manifold/valve arrangement to by-pass the hot water cylinder would be an acceptable alternative solution. This arrangement would allow the Customer to use their boiler for space heating without heating the water in the hot water cylinder. The contractor must explain to the Customer this new heating arrangement and how to use this system for heating hot water in the summer months e.g. turning off the radiators or using the time/temp programmer. The reasons for implementing this alternative solution as part of the heating control upgrades must be documented in the comments section of the Declaration of Works document.

An Additional Zone
In addition to establishing 2 zones (as described above), the Customer must also commission the installation of an additional space heating zone **OR** the installation of Thermostatic Radiator Valves (in rooms which do not contain room thermostats).

Installation Standard & Specification
A Third Zone can be established using an additional motorised control valve or a zoning manifold arrangement and room thermostat. Installation should be carried out in accordance with the manufcturer's instruction and Industry Best Practice.

Thermostatic Radiator Valves (TRVs)
In addition to establishing 2 zones (as described above), the contractor must also install either an additional space heating zone **OR** install Thermostatic Radiator Valves (TRVs) on at least three radiators but no less than half of all radiators in rooms which do not have room thermostats.

Product Standard & Specification
All TRVs must conform to the appropriate BS or IS standard for Thermostatic Radiator Valves (if available) such as BS EN 215 '*Thermostatic Radiator Valves. Requirements & Test Methods'.*

Installation Standard & Specification
TRVs should be installed in accordance with the manufacturers guideline, industry best practice, the National Standards Authority of Ireland Standard Recommendation S.R. 54:2014 - *Code of practice for the energy efficient retrofit of dwellings,* and the latest version of BS 7478 'Selection and use of thermostatic radiator valves'. This British Standard gives guidance on the selection, application and use of thermostatic radiator valves (TRVs) manufactured in accordance with BS EN 215-1 for use in domestic and commercial wet central heating systems up to a water temperature of 120^{o}C. TRVs must not be fitted in rooms, which already have temperature control through a thermostat.

When installing TRVs, the Contractor must ensure that the temperature selector scale and reference point are easily visible to the Customer and that the TRV is not positioned in an area, which may distort the temperature sensor. Avoid locating TRVs behind curtains, in direct sunlight, in very draughty locations or other areas, which may distort the temperature sensor. If these conditions are unavoidable, a remote sensor should be used. When inaccessibility of the valve to the user is unavoidable e.g. when the radiator and valve are located behind a decorative grille, valves with combined remote temperature sensors and adjuster should be used.

Most modern TRVs are bi-direction and can be installed in either the flow or return direction. Due care should however be taken to ensure that valve is bi-directional – if the valve is not bi-directional, the flow through the valve must correspond to the direction on the arrow of the valve body.

Where TRVs are being fitted to a one-pipe system, i.e. only the boiler is being replaced, units designed for minimum flow resistance should be used.

An automatic by-pass circuit must be installed (in fully pumped systems) in homes where there are 3 or more TRVs in place. When most TRVs are open, the automatic by-pass remains closed, allowing full circulation around the heating system. When the TRVs close, the automatic by-pass opens, allowing an appropriate flow rate through the boiler. The use of an automatic by-pass will also reduce the noise in the system due to excess water velocity. An automatic by-pass circuit must also be fitted if the boiler manufacturer requires one, or if it specifies that a minimum flow rate must be maintained while the boiler is firing. An automatic by-pass circuit must then incorporate an automatic by-pass valve, which will control water flow in accordance with the water pressure across it. The valve is used to maintain a minimum flow rate through the boiler and to limit circulation pressure when some radiators or zones are turned off. This level of control cannot be achieved using a fixed position valve. The valve should be installed between the boiler primary flow and return noting the direction of flow.

All systems should be flushed in order to remove debris prior to commissioning and this should be carried out with all thermostatic sensor heads removed and valves fully open. Thermostatic sensor heads should also be removed during hydraulic balancing of the system in order to prevent changes in room temperature affecting the balancing procedure.

Once the TRV has been correctly set to the desired temperature by the Contractor, it should not normally require further adjustment by the Customer but they should be made aware of how to adjust the temperature setting for future reference.

NOTE: The room where the main thermostat is fitted should **NOT** have a TRV fitted to the radiator in that location. This situation would render the thermostat sensing inaccurate.

Time & Temperature Control of Electric Immersion Heater

Product Standard & Specification

Timers and temperature control for electric immersion heaters must conform to the appropriate BS or IS standard for that particular measure (if available) such as BS EN 60730-2-7 *'Automatic Electrical Controls for Household and similar Use Part 2-7: Particular Requirements for Timers and Time Switches'*.

Installation Standard & Specification

Installation should be carried in accordance with the manufacturer's guidelines and Industry Best Practice as outlined in Good Practice Guide 302 "Controls for domestic central heating and hot water – guidance for specifiers and installers" or similar.

Additional Control Measures

It is possible that additional control measures may be specified by a Customer outside the scope of the Programme (such as weather compensation devices), which they wish to be installed at the same time as those measures covered by the Programme. Where this is the case, it is the responsibility of the Contractor to explain the cumulative impact of all measures being installed and the inter-relationship between each measure and the effects on performance that may occur as a result.

Hot Water Cylinder Insulation

- If the hot water cylinder is not being replaced with a pre insulated hot water cylinder during the upgrading of the boiler and/or controls upgrade under the Better Energy Homes programme then a correctly sized insulating jacket tested and approved to BS 5615 must be fitted.
- The insulation jacket shall not cover the immersion heater head and/or cylinder thermostat.
- The fixing bands shall be of a durable material and shall not be over tight or loose.
- Hot water storage cylinders having factory-applied thermal insulation shall not be fitted with insulating jackets unless existing thermal insulation has been rendered ineffective through mechanical damage or deterioration.
- Where the ESB specification details of an existing hot water storage cylinder jacket are not completely legible and/or are not perfectly visible, a self-adhesive label shall be additionally applied to the jacket at an accessible position stating the name of the jacket supplier and the Irish Standard reference details.
- For an existing jacket where the British Standards compliance marking are not indicated by any means the following action shall be undertaken:
    - The jacket shall be checked for compliance with this specification.
    - The insulating material, covering material and fastenings shall not have suffered any permanent deterioration.
    - The insulating material shall be at least 80mm nominal thickness.

7.8 High Efficiency Boilers

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Contractor Requirements & Competency

The installation of high efficiency boilers must be carried out by suitably qualified individuals in accordance with manufacturer's guidelines and industry best practice as a minimum. In addition to this, they must hold a Level 6 National Craft Certificate in Plumbing or an equivalent Plumbing qualification such as City and Guilds. Plumbers must have completed an electrical module during their course in order to carry out the 'minor' electrical works involved in specific control measures. If 'Controlled Works', as defined by the Commission for Energy Regulation (CER) document entitled 'Definition of the Scope of Controlled Works' are required, a Completion Certificate must be issued. The issuance of a Completion Certificate for 'Controlled works' can only be carried out by a Registered Electrical Contractor or an Inspector of one of the two Safety Supervisory Bodies as defined in Section 2.2 in this CER guidance.

Oil Boilers

Contractors installing oil-fired boilers must comply with requirements and competencies stated above. It is also recommended that the contractor should be registered with a professional organisation, e.g. OFTEC.

Gas Boilers

In addition to the above criterion, Contractors wishing to install Liquefied Petroleum Gas (LPG) or Natural Gas boilers under the Programme must hold a Gas Contractors Domestic Certificate (GI D, GI 2 or GI 3).

It is an offence for any person to carry out domestic Natural Gas or LPG works unless he/she is a registered gas installer with RGII. To align with this requirement all registered gas installers on the Better Energy Homes programme undertaking High Efficiency Gas Boiler and Heating Controls upgrade works must be on the RGII list. Details on how to register with RGII is available at www.rgii.ie .

Product Standard & Specification

Qualifying boilers must be listed on the SEAI Home-heating Appliance Register of Performance (HARP) database, or equivalent such as the UK SEDBUK database, and have a seasonal efficiency greater than 90%. Please note that boiler efficiency for this Programme at 90% is greater than is required by current Building Regulations. Technical Guidance Document Part L Dwellings 2008 states that new and replacement central heating systems must have boiler efficiency not less than 86%.

Where a replacement boiler installation involves a change of fuel, the procedure outlined in Section 1.4 of the Dept. Of Environment & SEAI Document entitled *"Heating and Domestic Hot Water Systems for Dwellings - Achieving Compliance with Part L"* must be adhered to. This procedure aims to discourage an existing appliance being replaced by a significantly less carbon-efficient one.
The contractor must discuss both the specification and sizing of the boiler with the Customer prior to final system selection. Size of home, levels of glazing and insulation should all be considered among other.

Installation Standard & Specification

Qualifying boilers must be fitted in accordance with manufacturer's guidelines, Industry Best Practice, the latest draft of Building Regulations Technical Guidance Document J - Home Heating Appliances, the ETCI National Wiring Rules for Electrical Installations, Fourth Edition ET101:2008 and the latest

draft of BS 5449 Specification of Forced Air Circulation Hot Water Central Heating Systems for Domestic Purposes (or equivalent Irish Standard) where applicable.

Condensing Boilers
Where condensing boilers are to be installed, the Department of the Environment, Heritage and Local Government (DECLG) and SEAI document 'Guide to the condensing boiler installation assessment procedure for Existing Dwellings' should be consulted prior to installation. This document is included as an Appendix in the DECLG and SEAI document entitled "Heating and Domestic Hot Water Systems for Dwellings - Achieving Compliance with Part L" and contains the detailed guidance referred to in paragraph 2.2 of Technical Guidance Document L - Dwellings to assess specific situations where the provision of condensing boilers is not practicable.

Gas Boilers
All qualifying Natural Gas and LPG boilers must be installed by a competent person and in accordance with the following documents:

- The latest version of I.S. 813 Domestic Gas Installations. This Standard covers the Code of Practice for the installation of Natural Gas or LPG, in domestic premises, from the point of delivery to the gas appliance.
- The CER Criteria document 'The Regulation of Gas Installers with respect to safety'.

7.8.1 Hot Water Cylinder Insulation

- If the hot water cylinder is not being replaced with a pre insulated hot water cylinder during the upgrading of the boiler and/or controls upgrade under the Better Energy Homes programme then a correctly sized insulating jacket tested and approved to BS 5615 must be fitted.
- The insulation jacket shall not cover the immersion heater head and/or cylinder thermostat.
- The fixing bands shall be of a durable material and shall not be over tight or loose.
- Hot water storage cylinders having factory-applied thermal insulation shall not be fitted with insulating jackets unless existing thermal insulation has been rendered ineffective through mechanical damage or deterioration.
- Where the specification details of an existing hot water storage cylinder jacket are not completely legible and/or are not perfectly visible, a self-adhesive label shall be additionally applied to the jacket at an accessible position stating the name of the jacket supplier and the Irish Standard reference details.
- For an existing jacket where the British Standards compliance marking are not indicated by any means the following action shall be undertaken:
    - The jacket shall be checked for compliance with this specification.
    - The insulating material, covering material and fastenings shall not have suffered any permanent deterioration.
    - The insulating material shall be at least 80mm nominal thickness.

7.8.2 Important guidance note for Electrical works associated with the Better Energy Homes programme

- All electrical works under the Better Energy Homes programme must be in full compliance with current ETCI rules.
- Earthing and Bonding must be in accordance with ETCI 101:2008 Chapter 54 (544 Equipotential bonding conductors) and Annex 63B (Guidelines for certification for alterations to existing installations).
- In order to comply with ETCI rules the following note from ETCI 101:2008 Annex 63B must be taken into consideration:
  As referred to in Annex 63B "Before commencing new work, the installer should assess the existing installation to ensure that it will not impair the safety of the proposed new work, and likewise the new work will not impair the safety of the existing installation. Should the installer

become aware of any defect in any part of the installation that would impair the safety of the new work, the client must be informed in writing thereof. No new work should commence until these defects have been made good."

- If the earthing/bonding is less than 6mm2 then the heating installer must either (a) issue an 'Electrical safety notice to the home owner' to notify them that their current wiring installation is not to current ETCI rules and work cannot commence on the installation until the wiring has been rectified to current ETCI rules or, (b) the bonding must be rectified to current ETCI rules by a competent suitably qualified person
- Work may commence on a heating system with earthing/bonding of 6mm2 and above however: Heating system with earthing/bonding of less than 10mm2 the heating installer must issue an 'Electrical safety notice to the home owner' to notify them that their current wiring installation is not to current ETCI rules.
- Where bonding arrangements are found not to be in accordance with the current ETCI National Rules then the consumer shall be informed in writing of the situation and advised to have the electrical installation checked and rectified by a competent person. In such circumstances the 'Electrical safety notice to the home owner' can be issued to a home owner when an electrical installation is not to current ETCI regulations. The 'Electrical safety notice to the home owner' can be downloaded from the following link: https://www.seai.ie/resources/publications/Electrical_Safety_Notice_to_Homeowners_2017.pdf

7.8.3 Important guidance note for the installation of safety valve discharge works associated with the Better Energy Homes programme

A safety valve is permitted to discharge externally or internally under the Better Energy Homes programme. A guidance note to what is acceptable under the programme, I.S. 813 (natural gas and LPG installations) and OFTEC (oil installations) is noted below:

External discharge:
A discharge pipe shall be run from the safety valve in ½" (15mm) copper. The pipework shall terminate in a visible position outside the building and have a 100mm minimum turn down with the outlet facing downwards, or use a boiler manufacture supplied purposed designed fitting, to ensure that the discharge of hot water or steam shall not endanger any person or property. The discharge pipework shall be installed with sufficient continuous fall to prevent the retention of water and the risk of pipework becoming blocked due to freezing.
Internal discharge:
A discharge pipe shall be run from the safety valve in ½" (15mm) copper, to a suitable discharge point into the waste water system within the dwelling, in pipework suitable for temperatures in excess of 100°C. The discharge of hot water or steam shall not endanger any person or cause damage to appliances controls, other equipment or property. The discharge into the waste water system shall be made in an accessible location and be fitted with a waste trap and a tundish or a (30mm) open ended riser of sufficient height to ensure that spillage cannot take place. The discharge pipework shall be installed with sufficient continuous fall to prevent the retention of water and the risk of the pipework becoming blocked due to freezing.

Additional Installation Guidance
The installation of boilers should also follow the guidance outlined in the following Energy Savings Trust and Good Practice Guide Publications:

- CE29 Domestic Heating by Oil: Boiler Systems - Guidance for Contractors & Specifiers
- CE30 Domestic Heating by Gas: Boiler Systems - Guidance for Contractors & Specifiers
- Good Practice Guide 301 Controls for Domestic Heating and Hot Water – Choice of Fuel and System Type

7.9 Heat Pump Systems

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Important: The requirement and specifications in this section are applicable to the Better Energy Homes Heat Pump System grants. For Heat Pump measures funded under Better Energy Communities in 2018, please refer to the transitional arrangements in section 7.10.

For the purposes of SEAI grants, a Heat Pump System is defined as a space heating and Domestic Hot Water[2] (DHW) system, and includes:

- An electrically driven heat pump as heat source,
- the heat distribution and control systems and
- the DHW system[2], including hot water storage

7.9.1 Contractor's Competence

The installation of heat pump systems must be carried out by suitably qualified personnel.
Personnel nominated to supervise and inspect the works, and to sign off the Declaration of Works must be competent in the different aspects of the works, including design and sizing of the whole heat pump system and its installation. The minimum qualification and training requirements that must be met by personnel nominated to sign off the Declaration of Works for grant purpose are:

Time scale	**Option 1**	**Option 2**
Immediately required	• Fetac/QQI Level 6 Advanced Craft in Plumbing, including a module on minor electrical works, or equivalent[3] • Certificate of competence from the specific manufacturer of the heat pumps installed, based on an adequate training programme.	
Recommended from the start, mandatory from 2019 or to support equivalence	Fetac/QQI Level 6 Heat Pump Systems (Course Code C30263) and supplemental Domestic Heat Pump Installation (Code 700606) or equivalent[3]	Registration on the Renewable Installers register for HP

Manufacturer's training programmes must be available for SEAI to examine and verify. Adequate training outcomes must include being able to successfully complete a heat pump system installation of the heat pump products from the specific manufacturer, and to carry out the correct heat distribution design and sizing. Installers must attend any refresher training that may be required to update their competence in relation to changes to products and technologies.

Important notes:

[2] Except for air-air
[3] Equivalence refers primarily to course content and is related to the competence required to correctly install heat pumps in accordance with these technical specifications. SEAI reserves the right to decide whether a qualification is equivalent to the reference Fetac/QQI curriculum. Supplementary certifications may be required to support equivalence.

I. A Registered Electrical Contractor (REC) is required to supervise and sign off the electrical installation of a heat pump system, in accordance with the definition of "Controlled Works and Restricted Works" by the Commission for Regulation of Utilities. A copy of the RECI certificate must be left with the homeowner and available for inspection.

II. An F-Gas engineer is required to carry out and certify heat pump system installations involving refrigerant pipework and charging as per the F-Gas Regulations[4]

It is also recommended that **all personnel** working on installation of heat pumps:

- are competent or training to be competent to the level specified above
- are competent in carrying out minor electrical works and in electrical safety
- are experienced in heat pump installation and heating systems design.

SEAI reserves the right to amend the training and certification requirements above. SEAI may require nominated personnel to attend additional training in accordance with the QADP and the Programme's Terms and Conditions.

7.9.2 Energy Performance of the building fabric

There is a minimum requirement for dwellings to qualify for heat pump systems grants in relation to the energy performance of the building fabric. Assessment of this pre-requisite must be carried out by an SEAI Registered Technical Advisor based on a published BER. Details of the role are published on the Contractor Support section of the SEAI Website, and the list of SEAI Registered Technical Advisors is available on the Better Energy Homes Heat Pump Systems page.

The process allows the homeowner to apply for the heat pump system grant before carrying out the fabric upgrade works required, as long as the level of these fabric upgrades has been documented and agreed. In order to receive payment for the heat pump system grant, however, completion of the fabric upgrades to the required level must be confirmed in the post-works BER. The level of upgrade works is included in the Technical Assessment Form completed by the Registered Technical Advisor, which must be submitted by the homeowner as part of the grant application.

The heat pump system installer must take this pre-requisite and the upgrade works into account when carrying out the calculation for the design heat load and sizing of the heat pump. The heat pump system installer must bring any concern in relation to the ability of the dwelling to meet this pre-requisite to the attention of the homeowner.

The minimum requirement is based on the total heat loss for the dwelling, which includes the fabric and ventilation heat loss. The Heat Loss Indicator, HLI, is calculated by the DEAP software, specified as the "Total Heat Loss per m^2". It is found in DEAP 3 in the Building Elements section, Heat Loss results tab, specified as the Total Heat Loss per m2. In DEAP 4 it will be located in "View Assessment – Building – Heat Loss (Building Fabric)".

It is defined as the Total Heat Loss per m^2 of dwelling floor area:

[4] Regulation EU No. 517/2014 which came into force on 1st January 2015

$$HLI = \frac{Fabric\ Heat\ Loss + Ventilation\ Heat\ Loss}{Floor\ area\ of\ dwelling}\left[\frac{W}{K \cdot m^2}\right]$$

The HLI is the quantity used to indicate the energy performance of the dwelling fabric for the purpose of BEH grants for heat pump systems. The requirement applying to the HLI calculated with the DEAP methodology is:

$$HLI \leq 2\ W/K\ m^2$$

7.9.3 Product and installation requirements

It is a basic requirement for a heat pump system to avail of the grant that the system design specifications are:

- Compliant with these specifications,
- Well documented by the installer,
- Discussed, explained and agreed with the homeowner at contract setup

It is particularly important that the homeowner is made aware at the time of contract setup of features and characteristics of the heat pump system, such as the low temperature heat distribution, the noise level of fans, compressors, pumps, and any other detail that may have an impact on their choice.

The following types of electrically driven heat pumps are included in the BEH grant programme. Only heat pump systems that do not involve onsite fossil fuel combustion are eligible for the grant:

- Air to water
- Ground source (horizontal) to water
- Ground source (vertical) to water
- Exhaust air to water
- Water to water
- Air to air

A heat pump system may include more than one type of heat pump (i.e. a combination of the above), provided the heat pump units and the whole system satisfy the requirements. More details are provided in point d below.

To avail of the grant, heat pumps must:

- Fully comply with the EU Energy Label and Ecodesign regulations[5]
- Provide the data required for the purpose of the Domestic BER assessment (Ecodesign datasheets). These must be based on EN14825 and EN16147 testing standards
- Be CE marked and have the EC declaration of conformity
- Be listed on the SEAI Triple E register[6]

[5] Regulations 813/2013 and 811/2013 for Air/Ground/Water/Exhaust air to water, and 206/2012 and 626/2011 for Air to air heat pumps

[6] Mandatory from 1st January 2019

- Satisfy the following minimum Ecodesign efficiency requirements and minimum Seasonal Performance Factor as per DEAP methodology as specified in the following table[7]:

Heat Pump type	Space Heating			DHW	
	Ecodesign ηs (55ºC)[%]	SCOP/A	DEAP Main Space Heating	Ecodesign ηwh [%]	DEAP Main Water Heating Efficiency [%]
Air to Water	125	N/A	350	72	180
Ground to water	125	N/A	350	72	180
Exhaust Air to Water	125	N/A	350	72	180
Water to Water	125	N/A	350	72	180
Air to Air	N/A	3.5	350	N/A	N/A

The following requirements for the Heat Pump system design and installation must be satisfied to qualify for the Better Energy Homes grant:

a. Design and installation must be carried out in accordance with the relevant Standards and Guidance documents

b. Contractors shall make their customers aware of all potential permissions and approvals required. Where required the Contractor shall ensure that these permissions and approvals have been obtained before work is commenced. The suitability of a proposed heat pump system installation site, including the location of ground loops or bore holes, where present, shall be assessed by a qualified professional experienced in heat pump systems, and an environmental assessment shall be carried out if required. For Water to Water and Ground to Water (vertical) heat pump types, the installer needs to contact the EPA and meet any additional requirements the EPA may have in relation to the installation.

c. Design, sizing and installation should be such that the heat pump system is capable to provide at least:
   - 100% of the designed space heating requirements of the floor area as per DEAP assessment, and
   - 80% of the Domestic Hot Water demand as per DEAP methodology estimates

   Oversizing of the heat pump system or any components should be avoided. The design and sizing details of the heat distribution system, as installed, must be included in the Designer/Installer spreadsheet (see section 7.9.5 Documentation requirements)

d. Heat pump systems may include a combination of heat pump units. To be eligible, all heat pump units must be tested to the standards specified, and the whole system must satisfy the heat pump system requirements. In cases where a heat pump system includes more than one type of heat pump, this needs to be explained in the Comment box provided in the Declaration of Works form. The type with the highest Rated Heat

[7] In order to ensure compliance with the minimum SPF required, installers need to carry out a preliminary assessment of the heat pump installation based on the DEAP methodology.

Output should be selected in the BEH grant application, and this must provide space heating.

e. Where existing heat sources are maintained (e.g. boilers), they shall be only used as backup. If a boiler and a heat pump are connected to the same distribution system, the pipework and controls must be configured so that the systems operate safely and efficiently.

f. Heat pump installations must not be used for cooling purposes. Reverse valves should be locked and no cooling shall be allowed from the user controls.

g. Heating Controls must include the items listed in the table below as a minimum:

Heat pump system controls and protection			
	Ground/Water to water	Air/Exhaust air to water	Air to air
24h 7 day programmer	√	√	√
room thermostat to regulate the space temperature and interlocked with the heat pump unit operation (minimum one space heating zone)	√	√	√
load and weather compensation	√	√	√
time and temperature control of DHW, separate from space heating	√	√	
control of water pump operation (internal and external as appropriate)	√	√	
control of water temperature for the distribution system	√	√	
control of outdoor or exhaust fan operation		√	√
defrost control of external airside heat exchanger		√	√
protection for water flow failure	√	√	
protection for high water temperature	√	√	
protection for high refrigerant pressure	√	√	√
protection for air flow failure		√	√

h. The DHW system must meet the following requirements:
- The Hot Water Cylinder must meet the heat pump manufacturer's requirements and the HPAI installation guidelines, with particular attention to the size of the heat exchanger and insulation;
- The system must be capable to operate at temperatures preventing growth of legionella. The heat pump must be capable of supplying hot water at 55ºC and the supplementary hot water heater shall provide stored hot water at 60ºC. See further guidance in standards, guidance and specifications documents;
- Any other requirements under the regulations and standards listed in the **Error! Reference source not found.**.

i. The location must be chosen to satisfy the following requirements:

- Must be agreed with the homeowner
- In relation to noise from external fans, pumps and compressors, nuisance to sleeping areas and neighbours must be avoided
- Must follow the manufacturer's instructions and guidance
- Must be in accordance with applicable regulations and planning requirements
- Must allow the system to be safely maintained
- Where external components of a heat pump are installed in a coastal or saline environment, additional corrosion protection must be provided.

j. Measures must be taken to minimise the transmission of vibrations in accordance with the manufacturer's installation instructions.

k. Documentation of Ground and Water collector design and installation must be provided to the homeowner. This must contain as a minimum:
   - Type of collector
   - Land area size and location
   - Heat extraction rates
   - Installation procedure and pipe specifications
   - Record of all welded connections of collector and horizontal pipework to the manifold
   - As built drawings for the ground portion of the collector showing detailed borehole and horizontal pipework locations
   - For boreholes: collector testing on the surface before insertion and once installed in accordance with IS EN 17628:2015, specification of grouting as required to ensure aquifers remain hydraulically separated during and after borehole completion, and to provide thermal conductivity within the ground

l. In addition to a minimum manufacturer's guarantee of 3 years on the heat pump unit(s), and to the manufacturer's guarantees on other new parts, the whole heat pump system in its design and installation aspects must be covered by a minimum installer's guarantee of 2 years, or as required by the Sales of Goods and Supply of Services Act, whichever is the longest.

m. Cleansing and pressure testing of the heat distribution system should be carried out as required and in accordance with the draft NSAI SR 50 and BS 7593 "Code of practice for treatment of water in domestic hot water central heating systems.

n. Earthing and Bonding must be in accordance with ETCI 101:2008 Chapter 54 (544 Equipotential bonding conductors) and Annex 63B (Guidelines for certification for alterations to existing installations).

o. Commissioning must be based on both the manufacturer's instructions and on the design specifications. All performance and design parameters must be achieved in accordance to these specifications. The commissioning report shall contain all the relevant parameters and checklists required to confirm that the heat pump system has been installed and set up to function according to the design objectives and Better Energy Homes specifications. A list of the installer settings shall be provided to the homeowner for future reference.

p. The installer must fulfil all documentation requirements, as specified in section **Error! Reference source not found.** below.

q. The homeowner shall be instructed on how to correctly use the controls and operate the heat pump system. Maintenance requirements and schedules shall also be explained to the homeowner.

r. Where applicable, homeowner must be made aware of obligations under the F-Gas regulations.

7.9.4 Standards and Guidance documents

Design and installation of the heat pump system shall be based on the latest version of the following standards, guidance and specifications:

- Building Regulations Technical Guidance Document Part J – Home Heating Appliances,
- Building Regulations Technical Guidance Document Part L – Conservation of Fuel and Energy – Dwelling
- Building Regulations Technical Guidance Document Part F – Ventilation (for exhaust-air heat pump systems)
- The ETCI National Wiring Rules for Electrical Installations, ET101
- EPA "Summary Guidance for Compliance with the ODS and F-Gas Regulations" and "Complying with Regulations Controlling Fluorinated Greenhouse Gases and Ozone Depleting Substances - A Guidance Note for Operators of Equipment Containing F-gases and ODS"
- I.S. EN 15450 Heating Systems in Buildings - Design of Heat Pump Heating Systems
- B.S. EN 12831 Heating Systems in Buildings – Method for calculation of the design heat load
- B.S. EN 12828+A1 Heating systems in buildings. Design for water-based heating systems
- HPAI Heat Pump installation guidelines
- Draft S.R. 50 – 1 Code of Practice for Building Services Part 1: Domestic Plumbing and Heating
- Microgeneration Certification Scheme MCS 021 Heat emitter guide for domestic heat pumps and "Heat Emitter supplement to the Domestic Heating Design Guide" by the Institute of Domestic Heating & Environmental Engineers (IDHEE)
- 'Heating and Domestic Hot Water Systems for Dwellings - Achieving Compliance with Part L', Section 8 from DECLG (now DHPLG)
- SEAI DEAP Heat Pump Methodology
- I.S. EN 378-1 and I.S. EN 378-3: Refrigerating systems and heat pumps - Safety and environmental requirements -Part1: Basic requirements, definitions, classification and selection criteria and -Part3: Installation site and personal protection
- Manufacturer's installation instructions for the specific Heat Pump model(s) and other parts of the system installed
- CIBSE TM 51 Ground Source Heat Pumps
- Microgeneration Certification Scheme (MCS) MIS 3005 "Requirements for MCS Contractors undertaking the supply, design, installation, set to work, commissioning and handover of microgeneration heat pump systems"
- I.S EN 17628 – Geotechnical Investigation and Testing – Geothermal Testing-Determination of thermal conductivity of soil and rock using borehole heat exchangers

- Environmental good practice guide for ground source heating and cooling (GEHO0311BTPA-E-E) by the UK Environment Agency
- GSI Geothermal Collector suitability Maps
- GSI Ground Source Heat and Shallow Geothermal Energy Homeowner Manual

7.9.5 Documentation requirements

As a minimum, the installer of the Heat pump system shall provide the following documentation to the Homeowner.

Before installation:

Written quotation for the heat pump systems including details of the system design specifications and terms and conditions as set out in the "Model Contract" available from the SEAI Website. The quotation must also include:

- The cost of any additional works (e.g. electrical works, earthing, wiring) necessary to satisfy the applicable requirements of the heat pump system, such as RECI certification
- Costs for required maintenance schedules, service agreements & spares, particularly when the guarantees are dependent on these.
- Where applicable, homeowner must be made aware of obligations under the F-Gas regulations for the equipment to be installed and of any cost implications.

After work completion:

1. Declaration of Works documentation to be left with the homeowner:
    - DOW form completed in all parts, including comments as required,
    - DOW supporting documents for the heat pump system installed (to be provided to the homeowner in two copies). For the following items, one copy will need to be sent with the DOW by the homeowner to SEAI, the other copy must be kept by the homeowner with the heat pump system documentation for inspection purposes:
        - Ecodesign datasheet (max 5 pages)
        - Completed Designer/Installer spreadsheet as per template available from the SEAI Contractor Supports Web page, including the DHW and Heat distribution design and specifications (radiator, underfloor sizing, air-to-air)
2. Heat Pump System documentation to be provided to the homeowner, and to be available for inspection[8]:
    - Ecodesign datasheet (max 5 pages)
    - Completed Designer/Installer spreadsheet as per template available from the SEAI Contractor Supports Web page, including the DHW and Heat distribution design and specifications (radiator, underfloor sizing, air-to-air)
    - Commissioning certificate completed in all relevant parts

[8] Make and model on all the documentation must match that of the unit installed.

- RECI certificate, completed in all relevant parts, as required by RECI. We recommend that the Registered Electrical Contractor takes into account Annex 63B where applicable, and that the MPRN is included in the RECI certificate.
- Details of F-Gas Certified engineer and sign-off
- Where applicable, documentation of Ground and Water collector design and installation (see point k above)
- User and Installation Manuals

The heat pump installer must also ensure to provide all required data and information to the BER Assessor carrying out the post-works BER assessment. If required, the heat pump system design data must be provided for the purpose of early assessment, before works are carried out.

7.9.6 Important notes

The following limitations apply to heat pump systems eligibility:

- Gas driven or gas absorption heat pumps are not eligible for the BEH grant, due to the restriction on onsite fossil fuel combustion;
- Hybrid heat pumps consisting of a combination of an electrical heat pump and gas or oil boiler are not eligible for grants under BEH as the requirement to meet 100% of space heating and 80% of hot water demand applies to the heat pump unit and not to the heat pump and boiler combined

7.10 Heat Pumps

BEP

Important: The requirement and specifications in this section are not applicable to the Better Energy Homes Heat Pump System Grants. As a transitional arrangement, this section describes the requirement for heat pump measures funded under Better Energy Communities 2018.

Contractor Requirements & Competency

The installation of heat pumps must be carried out by suitably qualified and in accordance with the following:

- The manufacturer's guidelines,
- Microgeneration Installation Standard: MIS 3005 *Requirements for Contractors Undertaking the Supply, Design, Installation, Set to Work, Commissioning and Handover of Microgeneration Heat Pump Systems,* which is considered to be industry best practice, and
- Dept. Of Environment, Community and Local Government (DECLG) and SEAI document, *Heating and Domestic Hot Water Systems for Dwellings - Achieving Compliance with Part L*.

In addition to this, they must either hold a Level 6 National Craft Certificate in Plumbing or an equivalent Plumbing qualification such as City and Guilds. Plumbers must have completed an electrical module during their course in order to carry out the 'minor' electrical works involved in specific control measures or the installer shall be listed on an approved manufacturer installers list. All electrical associated works must be carried out in accordance with the *ETCI National Wiring Rules for Electrical Installations (Fourth edition (ET101:2008).* If 'Controlled Works', as defined by the Commission for Energy Regulation (CER) document entitled 'Definition of the Scope of Controlled Works' are required, a Completion Certificate must be issued. The issuance of a Completion Certificate for 'Controlled works' can only be carried out by a Registered Electrical Contractor or an Inspector of one of the two Safety Supervisory Bodies as defined in Section 2.2 in this CER guidance.

The heating system must be divided into space heating and water heating zones with at least one more space heating zone added so that there are at least two zones for space heating.
This should incorporate a 24-hour 7-day programmer (installation and standards specifications outlined in Section 7.7) with/without a remote access and be interlocked with the operation of the heat pump unit or a controls package approved by the manufacturer for the specific heat pump installation.
The installation and standards specifications outlined in Section 7.7 will apply to the installation of the zoning measures.
In addition to this, a suitably sized pre-insulated hot water cylinder, with an insulant thickness of at least 50mm, should be installed where the existing cylinder does not meet this requirement.

Product Standard & Specification

Qualifying heat pumps must be listed on the SEAI Home-heating Appliance Register of Performance (HARP) database or one of the European Heat Pump Association (EHPA) database, the European Commission's Ecolabel catalogue or have Eurovent Certification, and have the following minimum Seasonal Performance Factor (SPF):

- Water-to-Water Heat Pump: 485%
- Air-to-Water Heat Pump: 350%
- Brine-to-Water Heat Pump: 390%

The design of the heat pump system should comply with IS EN 15450:2007 Heating Systems in Buildings - Design of Heat Pump Heating Systems.

The guidance in Section 8.1 of the DECLG and SEAI document entitled *'Heating and Domestic Hot Water Systems for Dwellings - Achieving Compliance with Part L'* must be adhered to. This guidance

provides a minimum requirement for the performance efficiency of heat pumps to prevent the replacement of a heating system with a significantly less carbon-efficient one.

The Contractor must discuss both the specification and sizing of the heat pump and the heat emitter type(s) with the Customer prior to final system selection.

Installation Standard & Specification

- **a.** Qualifying heat pumps must be fitted in accordance with:
  - Manufacturer's guidelines,
  - Microgeneration Installation Standard: MIS 3005 *Requirements for Contractors Undertaking the Supply, Design, Installation, Set to Work, Commissioning and Handover of Microgeneration Heat Pump Systems*,
  - Industry best practice,
  - Building Regulations Technical Guidance Document J – Home Heating Appliances,
  - The ETCI National Wiring Rules for Electrical Installations, Fourth Edition ET101:2008 and
  - The latest draft of B.S. 5449: Forced circulation hot water central heating system for domestic installation (or equivalent Irish standard) where applicable.
- **b.** The selection of heat pump must be based on the available heat sources, the heat distribution requirements, the existing heating system and whether cooling is required.
- **c.** The calculation of the heating requirement to be used for the sizing of the heat pump should be in accordance with IS EN 12831 *Heating systems in buildings – method for calculation of design heat load*.
- **d.** The heat pump selected will provide at least 100% of the designed space heating requirements of the house. Performance data from the manufacturers of the heat pump and the heat emitter system designer are used to support the heat pump selection. Heat pump thermal power output for the purposes of this selection shall not include any heat supplied by a supplementary electric heater
- **e.** For installations where other heat sources are available to the same building, a heat pump shall be selected such that the combined system will provide at least 100% of the calculated design space heating requirement. Heat pump thermal power output for the purposes of this section shall not include any heat supplied by a supplementary electric heater within the design temperature range. The heat sources shall be fully and correctly integrated into a single control system.
- **f.** For installations where other heat sources are available to the same building, the Contractor will provide the Customer with a written statement of what proportion of the building's space heating and domestic hot water has been designed to be provided by the heat pump. The figures shall be based only on the energy supplied by the heat pump and shall not include any heat supplied by a supplementary electric heater.
- **g.** The heat pumps should be located according to the manufacturer's instructions. For air source heat pumps, these will include consideration of factors that may detrimentally affect the performance of the heat pump system such as recirculation of chilled air.
- **h.** The suitability of a proposed heat pump system installation site, including the location of ground loops or bore holes, where present, shall be assessed by a qualified professional experienced in heat pump systems. Contractors shall make their customers aware of all potential permissions and approvals required. Where required the Contractor shall ensure that these permissions and approvals have been obtained before work is commenced.
- **i.** Heat pumps should not be located adjacent to sleeping areas or on floors that can transmit vibration.
- **j.** Anti-vibration pads/mats/mounts and flexible hose connections should be installed according to the manufacturer's instructions to reduce the effects of vibration on the building structure.
- **k.** The location of external fans and heat pump compressors should be chosen to avoid nuisance to neighbours.
- **l.** Internal fans and ducts should be fitted with sound attenuation devices.

m. The design of domestic hot water services should be based on an accurate assessment of the number and types of points of use and anticipated consumption within the property and be adjusted for the intended domestic hot water storage temperature and domestic hot water cylinder recovery rate. The reheat time shall be estimated, and then discussed and agreed with the customer. The design should be in accordance with EN 8558 *Guide to the design, installation, testing and maintenance of services supplying water for domestic use within buildings and their curtilages. Complementary guidance to EN 806.*

n. For domestic hot water cylinder heat exchanger specification, installers shall follow the heat pump manufacturers' and/or cylinder manufacturers'/suppliers' recommendations.

o. Domestic hot water systems shall incorporate a means to prevent bacterial growth (including Legionella bacteria).

p. The heat emitter(s) to be installed must be selected on the basis that it will optimise the performance of the heat pump for the distribution of heat within the house. The heat emitter chosen must be determined by the specific room heat losses, the heating system (e.g. radiators, etc.), the heating circuit flow temperature and the desired space heating temperature. The *Heat Emitter Guide for Domestic Heat Pumps* (MCS 021) is a useful tool in the selection of an appropriate heat emitter.

q. The water distribution system should be arranged for reverse return operation to maximise efficiency and ease commissioning and future maintenance

r. Pipework not contributing to the space heating should be insulated to prevent heat loss.

s. If summer cooling is provided by the heat pump, all water distribution pipework should be insulated to prevent condensation.

t. External pipework between the dwelling and the ground heat exchanger should be insulated.

u. The installed heat pump system shall be commissioned according to the manufacturer's instructions and the design system parameters.

v. Heat pump unit controls should include, as appropriate the following:

- Control of room air temperature
- Control of water temperature for the distribution system
- Control of outdoor fan operation
- Defrost control of external airside heat exchanger
- Protection for high water temperature
- Protection for high refrigerant pressure

Air-to Water Heat Pumps

- Consideration should be given to the removal of condensate water produced during a defrost cycle from the outdoor coil. The installation should make provision to deal with this water transferring it to a suitable drain or soak away thus preventing ice build-up within the unit or its location during extreme winter conditions.
- Refrigerant pipework connecting split units shall be of refrigerant quality copper tube or other material, where recommended by the heat pump manufacturer. The tube shall be insulated with a vapour barrier to prevent ice build-up, adequately supported and protected against corrosion and accidental damage. Joints on copper tube shall be welded, brazed or silver soldered.
- The refrigerant circuit shall be pressure tested and vacuum tested before being filled with refrigerant.

Water-to-Water Heat Pumps

- Care should be taken to ensure that the source water does not result in any damage to the evaporator.

Brine-to-Water Heat Pumps

- Ground excavations shall be undertaken with due regard to the protection of the environment including the prevention of contaminated rainwater run-off to adjacent watercourses.

- Shallow ground loops shall be constructed of PE 80, PE 100, PE 100RC, PE-Xa pipe, or a suitable equivalent, with a minimum rated pressure as per manufacturer's recommendations and minimum life of 50 years.
- Pipe depth and spacing shall be such that the possibility of frost heave is minimised.
- The minimum depth of ground loop at any point should not be less than 0.6 m. The minimum average depth of the ground loop should not be less than 1.2 m. loops should be laid at least 1m from foundations, the site boundary and other water supply or drainage pipes running parallel.
- If the collector crosses a water supply pipe then it should be separated by at least 0.5 m and insulated 0.5 m each side of the crossing point.
- Multiple pipe runs should be of the same length and hydraulic resistance.
- The specific heat extraction rate for the installed heat exchanger in different ground types is specified in IS EN 15450:2007 Heating Systems in Buildings - Design of Heat Pump Heating Systems.
- Brine solutions shall be selected to have environmental minimum impact from anti-freeze and inhibitor components in the case of accidental leakage.
- Brine concentration should contain sufficient anti-freeze to protect the evaporator from icing. Too high a concentration of anti-freeze will be detrimental to heat transfer and pumping efficiency.

Important guidance note for Electrical works associated with the Better Energy Homes programme

- All electrical works under the Better Energy Homes programme must be in full compliance with current ETCI rules.

- Earthing and Bonding must be in accordance with ETCI 101:2008 Chapter 54 (544 Equipotential bonding conductors) and Annex 63B (Guidelines for certification for alterations to existing installations).

- In order to comply with ETCI rules the following note from ETCI 101:2008 Annex 63B must be taken into consideration:
  As referred to in Annex 63B "Before commencing new work, the installer should assess the existing installation to ensure that it will not impair the safety of the proposed new work, and likewise the new work will not impair the safety of the existing installation. Should the installer become aware of any defect in any part of the installation that would impair the safety of the new work, the client must be informed in writing thereof. No new work should commence until these defects have been made good."
- If the earthing/bonding is less than 6mm^2 then the heating installer must either
  (a) issue an 'Electrical safety notice to the home owner' to notify them that their current wiring installation is not to current ETCI rules and work cannot commence on the installation until the wiring has been rectified to current ETCI rules or, (b) the bonding must be rectified to current ETCI rules by a competent suitably qualified person
- Work may commence on a heating system with earthing/bonding of 6mm^2 and above however:
  Heating system with earthing/bonding of less than 10mm^2 the heating installer must issue an 'Electrical safety notice to the home owner' to notify them that their current wiring installation is not to current ETCI rules.
- Where bonding arrangements are found not to be in accordance with the current ETCI National Rules then the consumer shall be informed in writing of the situation and advised to have the electrical installation checked and rectified by a competent person. In such circumstances the 'Electrical safety notice to the home owner' can be issued to a home owner when an electrical installation is not to current ETCI regulations. The 'Electrical safety notice to the home owner' can be downloaded from the following link:
  https://www.seai.ie/resources/publications/Electrical_Safety_Notice_to_Homeowners_2017.pdf

Additional Guidance

- Domestic Building Services Compliance Guide (Section 9)
- TR30 Guide to Good Practice – Heat Pumps (Building & Engineering Services Association)
- CIBSE Guide A – Environmental Design
- FB59 – Design of Low-Temperature Domestic Heating Systems – a Guide for System Designers and Installers (BRE Trust)
- Good Practice Guide 339, Domestic Ground Source Heat Pumps, Design and Installation of Closed-Loop System

7.11 Biomass Boilers (with/without thermal storage)

BEP

Contractor Requirements & Competency

The installation of biomass boilers must be carried out by suitably qualified individuals in accordance with the manufacturer's guidelines, industry best practice, and the Dept. of Environment, Community and Local Government (DECLG) and SEAI document entitled "Heating and Domestic Hot Water Systems for Dwellings - Achieving Compliance with Part L".

In addition to this, they must hold a Level 6 National Craft Certificate in Plumbing or an equivalent Plumbing qualification such as City and Guilds. Plumbers must have completed an electrical module during their course in order to carry out the 'minor' electrical works involved in specific control measures. All electrical associated works must be carried out in accordance with the ETCI National Wiring Rules for Electrical Installations (Fourth edition (ET101:2008). If 'Controlled Works', as defined by the Commission for Energy Regulation (CER) document entitled 'Definition of the Scope of Controlled Works' are required, a Completion Certificate must be issued. The issuance of a Completion Certificate for 'Controlled works' can only be carried out by a Registered Electrical Contractor or an Inspector of one of the two Safety Supervisory Bodies as defined in Section 2.2 in this CER guidance.

The heating system must be divided into space heating and water heating zones with at least one more space heating zone added so that there are at least two zones for space heating.
This should incorporate a 24-hour 7-day programmer (installation and standards specifications outlined in Section 7.7) with/without a remote access and be interlocked with the operation of the biomass boiler unit or a controls package approved by the manufacturer for the specific biomass boiler installation.
The installation and standards specifications outlined in Section 7.7 will apply to the installation of the zoning measures.
In addition to this, a suitably sized pre-insulated hot water cylinder, with an insulant thickness of at least 80mm, should be installed where the existing cylinder does not meet this requirement.

Product Standard & Specification

Qualifying biomass boilers must be CE marked to demonstrate compliance with The Low Voltage Directive (72/23/EEC) and The Machinery Directive (98/37/EC).

The boiler must also be listed on the SEAI Home-heating Appliance Register of Performance (HARP) database, or appropriate equivalent, and have the following minimum gross efficiency:

- With thermal store: 77%
- Without thermal store: 82%

For boilers without automatic ignition, it is recommended that a buffer (or accumulator) tank be connected to the boiler and the heating system. Where a buffer/accumulator tank is to be installed, the tank must meet the following requirements:

- Vented copper hot water storage vessels should comply with the heat loss and heat exchanger requirements of BS 1566-1:2000 'Plastics piping systems for soil and waste discharge (low and

high temperature) within the building structure. Chlorinated poly(vinyl chloride) (PVC-C). Specification for pipes, fittings and the system' or BS 3198 'Specification for copper hot water storage combination units for domestic purposes'

- Vented cylinders in materials other than copper should comply with the heat loss and heat exchanger requirements of BS 1566
- Unvented hot water storage system products should:
  - comply with IS. EN. 12897 'Water supply. Specification for indirectly heated unvented (closed) storage water heaters'; or
  - be certified by the Irish Agrément Board; or
  - be certified by another accredited body as complying with Building Regulations
- Unvented systems should not be used with gravity circulation

The guidance in Section 5.3 of the DECLG and SEAI document entitled "Heating and Domestic Hot Water Systems for Dwellings - Achieving Compliance with Part L" must be adhered to.
The Contractor must discuss both the specification and sizing of the biomass boiler and storage requirements with the Customer prior to final system selection.

Installation Standard & Specification

a. The Contractor must at all times comply with BS EN 14336:2004 'Heating systems in buildings. Installation and commissioning of water based heating systems' and the requirements of the system suppliers' specifications.

b. A pre-installation survey of the property should be carried out to assess site and location issues likely to affect installation and fuel storage, fuel delivery considerations and specific user requirements.

c. The survey should also determine heat demand and use trends. An assessment of the site and heating requirements is made and recommendations on the required boiler size, provision for back-up heating, fuel supply and any other relevant issues are made.

d. The calculation of the heating requirement to be used for the sizing of the biomass boiler should be in compliance with IS EN 12831 'Heating systems in buildings. Method for calculation of the design heat load or equivalent'.

e. The Contractor will discuss the implications of the fuel storage requirements and the available storage space and its impact on the cost-effectiveness of the system.

f. The biomass boiler should not be installed inside the house or outdoors. It should be installed in a suitable boiler room that conforms to local and national Building Regulations. The outbuilding/boiler room should have the required boiler and hopper clearances to allow the boiler installation, access for loading, cleaning and servicing as per manufacturer's instructions.

g. The Contractor will ensure that there is sufficient permanent ventilation to the boiler room. Where the manufacturer has not specified the minimum area for the required ventilation opening, a permanent air vent of at least 550mm^2 per kW of boiler output will be provided as per TGD Part J of the Building Regulations.

h. The Contractor shall ensure that the required electricity supply is available for the plant in the boiler room.

i. The Contractor will ensure there is adequate water supply and that the boiler is plumbed according to all relevant regulations and as per the manufacturer's instructions. Provision must also be made to ensure the safe and effective disposal of condensate from the boiler.

j. Where the boiler is fed directly from a bulk storage unit, the storage unit should be in accordance with the manufacturer's guidelines. Where the fuel is not supplied directly, the fuel storage facility to be provided should be in accordance with the fuel supplier's guidance.

k. The existing central heating system should be thoroughly cleaned and flushed out before installing a new boiler.

l. All components shall be installed in such a way that allows for maintenance, repair/replacement and insulation. Where components or joints are inaccessible, they shall be permanent. Permanent components and joints shall be maintenance free and have a durability that corresponds to the lifetime of the components in which they are installed.

m. An exhaust flue should be twin-walled insulated stainless steel. The inner wall should be grade 316 and the outer wall should be 306 or better. The flue should be certified as suitable for use with wood fuels and it should be the diameter specified by the boiler manufacturer.

n. Any pipework that is exposed as part of the work or is otherwise accessible should be insulated as recommended in *Heating and Domestic Hot Water Systems for Dwellings - Achieving Compliance with Part L*. A lesser standard is only acceptable where practical constraints dictate.

o. Biomass boilers must be commissioned to verify that the system has been installed in accordance with IS EN 12828 'Heating systems in buildings. Design for water-based heating systems', BS EN 14336 'Heating systems in buildings. Installation and commissioning of water based heating systems' and manufacturer's guidelines.

p. Commissioning should include:

- Testing for leakage to ensure the system is water tight;
- Pressure testing to a pressure 30% greater than the working pressure or as per manufacturers instruction;
- The system shall be cleaned and/or flushed;
- The system shall be filled with suitable water and vented;
- A check that any equipment susceptible to frost damage has been protected;
- All components of the system shall be checked for correct operation;
- Water flow rates shall be balanced to meet the requirements of the design;
- All controls shall be adjusted in accordance with the manufacturer's instructions and the design specification.

q. All written information on the operation, maintenance and use of the system shall be provided to the Customer, including the manufacturer's instructions. The Contractor shall also instruct the Customer in the safe and efficient operation, maintenance and use of the biomass heating system.

r. The Contractor shall provide the Customer with the records of all functional, pressure and environmental tests carried out and a balancing report.

Buffer/Accumulator Tanks

- The Contractor shall ensure that the buffer/accumulator tank is sized correctly as per manufacturer's recommendations. It is recommended that there should be at least 15 litres of storage for every kilowatt of output from the boiler. Where it is not possible to install a tank of sufficient size, the Customer should be made aware of this and of the implications of a smaller tank.
- A temperature sensor shall be fitted to the top and the bottom of the buffer/accumulator tank.
- If two or more buffer/accumulator tanks are to be used, they should be connected in series with the outlet from the bottom of the first tank connected to the inlet at the top of the next tank and so on.
- The Contractor shall ensure that the buffer/accumulator tank is insulated sufficiently. Where the tank is not pre-insulated, it should be insulated to a minimum of 80 mm in thickness.

Important guidance note for Electrical works associated with the Better Energy Homes programme

- All electrical works under the Better Energy Homes programme must be in full compliance with current ETCI rules.
- Earthing and Bonding must be in accordance with ETCI 101:2008 Chapter 54 (544 Equipotential bonding conductors) and Annex 63B (Guidelines for certification for alterations to existing installations).
- In order to comply with ETCI rules the following note from ETCI 101:2008 Annex 63B must be taken into consideration:
  As referred to in Annex 63B "Before commencing new work, the installer should assess the existing installation to ensure that it will not impair the safety of the proposed new work, and likewise the new work will not impair the safety of the existing installation. Should the installer become aware of any defect in any part of the installation that would impair the safety of the

new work, the client must be informed in writing thereof. No new work should commence until these defects have been made good."

- If the earthing/bonding is less than 6mm^2 then the heating installer must either
  (a) issue an 'Electrical safety notice to the home owner' to notify them that their current wiring installation is not to current ETCI rules and work cannot commence on the installation until the wiring has been rectified to current ETCI rules or, (b) the bonding must be rectified to current ETCI rules by a competent suitably qualified person
- Work may commence on a heating system with earthing/bonding of 6mm^2 and above however:
  Heating system with earthing/bonding of less than 10mm^2 the heating installer must issue an 'Electrical safety notice to the home owner' to notify them that their current wiring installation is not to current ETCI rules.
- Where bonding arrangements are found not to be in accordance with the current ETCI National Rules then the consumer shall be informed in writing of the situation and advised to have the electrical installation checked and rectified by a competent person. In such circumstances the 'Electrical safety notice to the home owner' can be issued to a home owner when an electrical installation is not to current ETCI regulations. The 'Electrical safety notice to the home owner' can be downloaded from the following link:
  https://www.seai.ie/resources/publications/Electrical_Safety_Notice_to_Homeowners_2017.pdf

Additional Guidance

- Microgeneration Installation Standard: MIS 3004 Requirements for Contractors Undertaking the Supply, Design, Installation, Set to Work, Commissioning and Handover of Solid Biofuel Heating Systems
- TR38 Guide to Good Practice – Installation of Biofuel Heating (Heating & Ventilation Contractors' Association)

7.12 Solar Water Heating

BEH BEP

Contractor Requirements & Competency

The installation of solar water heating system must be carried out by suitably qualified individuals in accordance with manufacturer's guidelines and industry best practice as a minimum. To be registered, the contractor and / or his nominated personnel who will undertake the works must hold a Level 6 FETAC Certificate in Solar Domestic Hot Water Systems or an equivalent qualification and must have achieved certification from an SEAI accredited solar training course.

Product Standard & Specification

Qualifying solar water heating systems must be listed on the SEAI Solar Thermal Registered Product List.

The solar thermal installation must contribute a portion of renewable energy for domestic hot water heating as detailed in the table below:

Floor Area of dwelling (as defined in the DEAP methodology)	Solar Renewable Energy contribution Per Year
0-170m^2	10 kWh/metre squared Calculated by Qs/floor area
171 – 200m^2	At least 1,700 solar hot water input Qs (kWh/year)*
201-250m^2	At least 1,850 solar hot water input Qs (kWh/year)*
250+m^2	At least 2,000 solar hot water input Qs (kWh/year)*

*Qs (kWh/year) Annual Solar Energy of the proposed collectors. This is based on the formula for Solar Energy available in Appendix H of the DEAP manual.

Solar Fraction is the Annual Solar Energy (Qs) as a percentage of the total heat required for Domestic Hot Water (DHW) and can be calculated using the formula below.

$$\textit{Solar Fraction} = \frac{\textit{Annual solar energy (Qs)}}{\textit{Total heat required for DHW}} \times 100$$

An Excel version of the calculator is available in the Better Energy Homes contractor section of the SEAI website www.seai.ie

Solar Fraction is recommended under best practice not to exceed 60% except when the system is also used for solar space heating. Where the system is only used for hot water the acceptable method of calculating the energy yield per solar system is as per Appendix H: Solar water heating in the DEAP Manual. Where the solar panel is installed to contribute to the space heating requirements the acceptable method of calculating the energy contribution is as per Appendix Q: Special features and specific data.

The contractor must discuss both the specification and the appropriate sizing (including hot water storage) of the solar water heating system with the Customer prior to final system selection. Size of home, levels of occupancy and payback periods etc. should be discussed. A review of the renewable energy contribution for the proposed system should also be undertaken with a BER assessor before the system is purchased/installed.

Installation Standard & Specification

Qualifying solar water heating systems must be fitted in accordance with manufacturer's guidelines and Industry Best Practice as set out in NSAI document "SR 50-2:2010 Code of practice for building services - Part 2: Solar panels", Building Regulations Technical Guidance Documents and the ETCI National Wiring Rules for Electrical Installations, Fourth Edition ET101:2008 where applicable.

A Standard Solar Commissioning Report (SCR), available on the SEAI website, must be completed and a copy provided to each homeowner. The Contractor must keep a copy for his/her own records.

SEAI recommends that a solar water heating system should have 'TMV2' type temperature mixing/blending valve(s) installed on the hot water system to prevent the likelihood of an occupant being scalded due to excess water temperatures (particularly in the case of elderly, infirmed or young users). SEAI requires that contractors discuss this matter fully with homeowners and that the homeowner is properly advised on the option, which will best meets their household needs, as part of the specification process ahead of installation commencement. Further guidance is available in the Better Energy Homes Contractors section www.seai.ie

All solar water heating works under the Better Energy Homes programme must be in full compliance with the published Technical Specification.

Water services should be operated at temperatures that prevent Legionella growth. Hot water storage cylinders (calorifiers) should store water at 60°C or higher. Hot water should be distributed at 50°C or higher. Consideration is needed to ensure that hot water draw offs have temperature mixing/blending valve(s) to prevent scalding.

The recommended maximum mixed hot water temperatures for safe use for the most common installations are listed in Table 1.

Table 1: Maximum mixed hot water temperatures for safe use	
44°C	For bath fill (46°C for assisted bathing)
41°C	For shower applications.
38°C	For bidet applications

SEAI recommends that a solar water heating system should have 'TMV2' type temperature mixing/blending valve(s) installed on the hot water system to prevent the likelihood of an occupant

being scalded due to excess water temperatures (particularly in the case of elderly, infirmed or young users).
A 'TMV2' type temperature mixing/blending valve is for use in domestic situations. 'TMV2' approval certifies that the valves conform to the performance requirements of BS EN 1111 and BS EN 1287.
SEAI requires that contractors discuss this matter fully with homeowners and that the homeowner is properly advised on the option, which will best meets their household needs, as part of the specification process ahead of installation commencement.
Note: A mixer tap is not deemed to be TMV2 type valves

If 'TMV2' type blending/mixing valves are not installed, the homeowner must be issued with a '**Solar water heating safety notice to the home owner**' informing the householder of the risks associated with not installing a 'TMV2' mixing/blending hot water valve(s). This document must be signed (in duplicate) by the installer and homeowner with a copy supplied to the home owner and a copy retained by installer. The document can be downloaded at the following link:
https://www.seai.ie/resources/publications/Solar_Hot_Water___Heating_Safety_Notice_2017.pdf

The **'Solar water heating safety notice to the home owner'** shall be retained with any documents supplied with the solar water heating installation i.e. operation manuals for both SEAI inspection and future maintenance purposes.

Failure to comply fully with the requirements set out above may lead to sanctions up to and including deregistration.
Important guidance note for Electrical works associated with the Better Energy Homes programme

- All electrical works under the Better Energy Homes programme must be in full compliance with current ETCI rules.
- Earthing and Bonding must be in accordance with ETCI 101:2008 Chapter 54 (544 Equipotential bonding conductors) and Annex 63B (Guidelines for certification for alterations to existing installations).
- In order to comply with ETCI rules the following note from ETCI 101:2008 Annex 63B must be taken into consideration:
  As referred to in Annex 63B "Before commencing new work, the installer should assess the existing installation to ensure that it will not impair the safety of the proposed new work, and likewise the new work will not impair the safety of the existing installation. Should the installer become aware of any defect in any part of the installation that would impair the safety of the new work, the client must be informed in writing thereof. No new work should commence until these defects have been made good."
- If the earthing/bonding is less than 6mm2 then the heating installer must either
  (a) issue an 'Electrical safety notice to the home owner' to notify them that their current wiring installation is not to current ETCI rules and work cannot commence on the installation until the wiring has been rectified to current ETCI rules or, (b) the bonding must be rectified to current ETCI rules by a competent suitably qualified person
- Work may commence on a heating system with earthing/bonding of 6mm2 and above however:
  Heating system with earthing/bonding of less than 10mm2 the heating installer must issue an 'Electrical safety notice to the home owner' to notify them that their current wiring installation is not to current ETCI rules.
- Where bonding arrangements are found not to be in accordance with the current ETCI National Rules then the consumer shall be informed in writing of the situation and advised to have the electrical installation checked and rectified by a competent person. In such circumstances the 'Electrical safety notice to the home owner' can be issued to a home owner when an electrical installation is not to current ETCI regulations. The 'Electrical safety notice to the home owner' can be downloaded from the following link:
  https://www.seai.ie/resources/publications/Electrical_Safety_Notice_to_Homeowners_2017.pdf

Additional Installation Guidance
The installation of solar water heating systems should also follow the guidance outlined in the following Energy Savings Trust and Good Practice Guide Publications:

- Solar Heating Design and Installation Guide – CIBSE Guide
- Renewable Energy Procurement Guidelines for Solar Thermal Systems – SEAI

Warranty
Each homeowner must be supplied with a warranty (product and labour) of at least 5 years.

7.13 Draught Proofing

WHS

Contractor Requirements & Competency
Draught proofing contractors must be competent to complete the installation and must agree to complete the work as set out in the guidance document entitled BS 7386:1997 Specification for draught strips for the draught control of existing doors and windows in housing. Draught proofing shall be installed in accordance with Best Practice Guides/ Technical Guides supplied by the material manufacturer. Where a product is covered by an NSAI Agrément Certificate it must be installed in accordance with this certificate and by such qualified people as specified.

Product Standards & Specification
Materials to be used for draught proofing must be manufactured to a relevant Irish, British or European Standard.

Draught proofing of windows and doors shall be installed as per manufcturer's instruction and shall be installed as per draught strip class relating to nominal and maximum compression of the strips.
Other NSAI Agrément-certified products may also be used. It is the responsibility of the Contractor to ensure that the optimum solution for each Customer is achieved, within the cost constraints and preference of each Customer.

Building Regulations

- Building Regulations (Part B): The draught proofing must be suitable for use so that it does not compromise the property's ability to resist internal fire spread within the internal linings and internal fire spread within the structure and external fire spread.
- Building Regulations (Part C): When installed as per the system supplier's guidelines, the insulation should not affect the property's ability to resist weather and ground moisture.
- Building Regulations (Part D): When installed as per the system supplier's guidelines, the insulation should meet the Building Regulations requirements for materials and workmanship.
- Building Regulations (Part F): The draught proofing should also be suitable for use on a property and meet the ventilation requirements.
- Building Regulations (Part J): Correct installation of the system should also satisfy the Building Regulations such that the installation does not increase the risk of the property catching fire through the use of a heat producing appliance.
- Building Regulations (Part L): The draught proofing shall conserve energy in keeping with the Building Regulations.

The design and installation of the recommended works must not compromise the ventilation, air quality, humidity (and the potential for condensation) and quality of living environment in the home. Particular care must be given to the potential impact on the living environment in the home resulting from any measures installed under the Programme. It is the duty of the Contractor to prevent any detrimental changes to the living environment and to recommend to the Customer on any measures necessary to ensure that there is no detrimental change to the living environment as a result of the works. (See section 5)

Installation Standards & Specifications

a. Draught proofing should be carried out using materials that are approved by an Irish, British or European Standard for draught proofing and installed in accordance with the relevant Irish, British or European Standards, where available.
b. Manufacturer's instructions should be followed. The following are intended to be helpful guidelines.
c. Where carrier based products are used, initial compression of the draught strip is listed in the table below. The recommended gap sizes given by the manufacturers assume this compression on fitting and take into account the need to avoid fixing positions too close to the edge of timber sections.

Draught strip Class	Nominal Compression (mm)	Maximum Compression (mm)
1	3.0	6.0
2	1.5	3.0
3	1.5	3.0

d. Draught-strips shall be fixed utilising all available fixing holes and if necessary, additional fixing holes shall be made in line with the existing fixing holes to ensure that the draught strip is firmly fixed at a maximum of 25mm from each end of the carrier.
e. Corners should be butt, mitered or notch cut as appropriate with a maximum gap of 1mm at the corners to ensure a good seal at the join.
f. All fixings shall be fully driven home perpendicular to the structure being draught-proofed.
g. It is recommended that draught proofing should **not** be applied to windows/doors in a dwelling with a fixed heating device or gas cooking appliance that doesn't have the correct permanent ventilation provisions as detailed in TGD Part J of the Building Regulations.

7.14 Window Replacement

BEP

Contractor Competency

Contractors installing windows must be competent to complete the installation and must agree to complete the work in accordance with British Standard document entitled *Code of practice for the survey and installation of windows and external doorsets* (BS 8213-4) and the manufacturer's guidelines as a minimum requirement.

Product Standards & Specification

All window units and glazing to be installed must meet the requirements of the *Construction Products Directive* (Council Directive 89/106/EEC).

All window units to be installed must carry the CE marking and must conform to the requirements of EN 14351-1:2006 (*Windows and doors - Product standard, performance characteristics*). The glazing must conform to EN 1279-1 (*Glass in building. Insulating glass units. Generalities, dimensional tolerances and rules for the system description*) and EN 1279-2 (*Glass in building. Insulating glass units. Long term test method and requirements for moisture penetration)*

The objective is to put in place materials that will achieve a level of performance in the home that is in excess of the required standard of the most recent update of Part L of the Building Regulations. Thus, the objective for replacement windows is to, in as much as is physically and economically feasible, achieve a U-value of 1.4 W/m^2k.

The stated U-value of the units must be certified by an appropriate independent body, e.g. NSAI Window Energy Performance (WEP) certification, British Fenestration Rating Council, and have been calculated according to either IS EN ISO 12567 or IS EN ISO 10077 (Parts 1 and 2).

This economic feasibility refers only to the economic performance of the installation itself. For example, where in exceptional circumstances a home may require significant additional modifications when compared to a normal case, making the initial investment in the window installation solution inappropriate compared to the benefit the homeowner will get out of the investment. Economic feasibility in this case does not refer to the ability of the homeowner to fund their portion of the capital cost for a conventional installation.

Building Regulations

The installed windows must comply with TGD Part B of the Building Regulations relating to the use of windows as an alternative means of escape or for rescue purposes.

The installed windows must comply with TGD Part K of the Building Regulations (Part K) relating to the guarding of windows.

The installed windows must also meet the TGD part D of the Building Regulations requirements for materials and workmanship.

The installed windows must comply with TGD Part F of the Building Regulations for the purposes of providing a means of rapid ventilation of the habitable rooms. Correct installation will also satisfy the Building Regulations (Part J) on the maintenance of an adequate air supply for the efficient working of gas-burning appliances, in particular, after installation work.

The windows units shall conserve energy in keeping with TGD Part L of the Building Regulations in as far as is practicably possible.

The installed windows must also meet the TGD Part M of the Building Regulations requirements for adequate provision of access to the building.

There are certain works that may change the external character of a conventional property, not on the RPS, to such an extent that approval may need to be sought from the Local Authority. An alteration to windows may require permission from the relevant Local Authorities.

Installation Standards & Specifications

- **a.** All glazing should conform to the recommendations given in the relevant part of BS 6262 and in BS 8000-7. In addition, any glass or insulating glass unit manufacturer's instructions should be followed.
- **b.** A survey of the walls must be carried out prior to the installation by a competent surveyor on behalf of the approved Contractor. A complete survey will ascertain the condition of the structural opening into which the window will be installed, the suitability of the window and any other issues affecting the installation of the window.
- **c.** Any structural defects recorded in the survey, which may affect the performance of the window when installed, should be notified to, and rectified by, the Customer with or without the involvement of the Contractor before installation work commences.
- **d.** The existing windows must be removed with care to avoid unnecessary damage to the building structure and its finishings and without permitting any subsidence of the superstructure during or after the installation procedure. Reasonable care should be taken to keep damage to the reveals to a minimum.
- **e.** The number, location and quantity of frame fixings to be used in the installation of the replacement windows and/or doors shall be appropriate for the material from which the window frame has been manufactured.
- **f.** Where lugs are used externally, they should be secured to the walls using suitable security screws.
- **g.** Finishing trims should be compatible with the material of the frame and external trims should be suitable for exterior use.

h. The area of openings should not be reduced below that required for the provision of adequate daylight as per BS 8206-2:2008.

i. The replacement windows and/or doors should be positioned to minimise the amount of making good and without any twist, racking or distortion of the frame.

j. The frame should be positioned within the structural opening so that it:
- bridges the DPM/radon barrier. Any damage to the DPM/radon barrier should be repaired before installation.
- is as far back in the reveal as is feasible to reduce exposure and facilitate the required level of weather performance.
- allows sufficient space for expansion of the window set.

k. Open cavities between the inner and outer leaf of a cavity wall should be closed with an insulating material. Care should be taken to maintain the integrity if the DPM/ radon barrier and adequate purchase for fixings should be ensured.

l. Installation packers should be used adjacent to fixing positions to prevent outer frame distortion during installation. Installation packers should be resistant to compression, rot and corrosion. They should span the full depth of the outer frame.

m. Upon completion of the installation of the windows and/or doors, the structure around the window is made good. This may involve some or all of the following:
- Debris or contaminants should be removed and any drainage paths should be cleared.
- Internal reveals should be made good, as agreed with the Customer, ready for the Customer to redecorate if necessary.
- Any materials such as trims or sealant should not be applied on top of loose material.
- Protective tapes should be removed as soon as practicable, as ageing of tapes can cause difficulties in removal. Refer to the manufacturer's guidance.
- Sand and cement should not be used to fill the gap between the outer frame and the substrate except for backfill for steel windows, nowadays usually limited to windows in stone surrounds or interior fair-faced brick and concrete.
- Where the replacement window has a smaller front to back dimension than the original, then there might be mastic and/or paint line visible on the substrate which should be removed as much as practicable or covered with a trim.
- The method of, and responsibility for, repair to any render should be as agreed with the Customer.

n. After installation a final inspection should be carried out, preferably accompanied by the Customer, to ensure that the installation is fully in accordance with the surveyor's and manufacturer's instructions.

o. It is essential that the Customer is made aware of the method(s) of operation, locking and unlocking and fire egress. This should be accompanied by written operating and maintenance instructions.

p. The home owner/occupier shall be supplied with a written specification of the windows detailing the U-Value of the unit/s. The home owner shall be advised that this material should be retained if an inspection of the installation is required. The specification of the units shall be retained by the installer for audit purposes.

The design and installation of the recommended works must not compromise the ventilation, air quality, humidity (and the potential for condensation) and quality of living environment in the home. Particular care must be given to the potential impact on the living environment in the home resulting from any measures installed under the Programme. It is the duty of the Contractor to prevent any detrimental changes to the living environment and to recommend to the Customer any measures necessary to ensure that there is no detrimental change to the living environment as a result of the works.

7.15 External Door Replacement

BEP

Contractor Competency

Contractors carrying out the installation of doors must be competent to complete the installation and must agree to complete the work in accordance with British Standard document entitled *Code of practice for the survey and installation of windows and external doorsets* (BS 8213-4:2007) and the manufacturer's guidelines as a minimum requirement.

Product Standards & Specification

All door sets to be installed must meet the requirements of the *Construction Products Directive* (Council Directive 89/106/EEC).

All door sets to be installed must carry the CE marking and must conform to the requirements of EN 14351-1:2006 (Windows and doors - Product standard, performance characteristics).

All single-leaf door sets to be installed must have been tested to and passed PAS 23-1:1999 (General performance requirements for door assemblies – Part 1: Single leaf, external door assemblies to dwellings) and PAS 24-1:1999 (Enhanced security performance requirements for door assemblies - Part 1: Single leaf, external door assemblies to dwellings).
The objective is to put in place materials that will achieve a level of performance in the home that is in excess of the required standard of the most recent update of Part L of the Building Regulations. Thus, the objective for replacement doors is to, in as much as is physically and economically feasible, achieve a U-value of 1.4 W/m^2k.

The stated U-value of the door sets must be certified by an appropriate independent body and have been calculated according to either IS EN ISO 12567 or IS EN ISO 10077 (Parts 1 and 2).

This economic feasibility refers only to the economic performance of the installation itself. For example, where in exceptional circumstances a home may require significant additional modifications when compared to a normal case, making the initial investment in the installation of external doors a solution inappropriate compared to the benefit the homeowner will get out of the investment. Economic feasibility in this case does not refer to the ability of the homeowner to fund their portion of the capital cost for a conventional installation.

Building Regulations

The installed door sets must comply with TGD Part B of the Building Regulations relating to the use of windows as an alternative means of escape or for rescue purposes.

The installed door sets must also meet the TGD Part D of the Building Regulations requirements for materials and workmanship

The installed door sets must comply with TGD Part F of the Building Regulations for the purposes of providing a means of rapid ventilation of the habitable rooms.

Correct installation will also satisfy the TGD Part J of the Building Regulations on the maintenance of an adequate air supply for the efficient working of gas-burning appliances, in particular, after installation work.

The door sets shall conserve energy in keeping with TGD Part L of the Building Regulations in as far as is practicably possible.

The installed door sets must also meet the TGD Part M of the Building Regulations requirements for adequate provision of access to the building.

There are certain works that may change the external character of a conventional property, not on the RPS, to such an extent that approval may need to be sought from the Local Authority. An alteration to doors may require permission from the relevant Local Authorities.

Installation Standards & Specifications

- **a.** All glazing should conform to the recommendations given in the relevant part of BS 6262 and in BS 8000-7. In addition, any glass or insulating glass unit manufacturer's instructions should be followed.
- **b.** A survey of the walls must be carried out prior to the installation by a competent surveyor on behalf of the approved Contractor. A complete survey will ascertain the condition of the structural opening into which the door will be installed, the suitability of the door and any other issues affecting the installation of the door.
- **c.** Any structural defects recorded in the survey, which may affect the performance of the door when installed, should be notified to, and rectified by, the Customer with or without the involvement of the Contractor before installation work commences.
- **d.** The existing door(s) must be removed with care to avoid unnecessary damage to the building structure and its finishings and without permitting any subsidence of the superstructure during or after the installation procedure. Reasonable care should be taken to keep damage to the reveals to a minimum.
- **e.** The number, location and quantity of frame fixings to be used in the installation of the replacement door(s) shall be appropriate for the material from which the door frame has been manufactured.
- **f.** Where lugs are used externally, they should be secured to the walls using suitable security screws.
- **g.** Finishing trims should be compatible with the material of the frame and external trims should be suitable for exterior use.
- **h.** The area of openings should not be reduced below that required for the provision of adequate daylight as per BS 8206-2:2008.
- **i.** The replacement doors should be positioned to minimise the amount of making good and without any twist, racking or distortion of the frame.
- **j.** The frame should be positioned within the structural opening so that it:
  - bridges the DPM/radon barrier. Any damage to the DPM/radon barrier should be repaired before installation.
  - is as far back in the reveal as is feasible to reduce exposure and facilitate the required level of weather performance.
  - allows sufficient space for expansion of the door set.
- **k.** Open cavities between the inner and outer leaf of a cavity wall should be closed with an insulating material. Care should be taken to maintain the integrity if the DPM/radon barrier and adequate purchase for fixings should be ensured.
- **l.** Installation packers should be used adjacent to fixing positions to prevent outer frame distortion during installation. Installation packers should be resistant to compression, rot and corrosion. They should span the full depth of the outer frame.
- **m.** Upon completion of the installation of the doors, the structure around the door is made good. This may involve some or all of the following:
  - Debris or contaminants should be removed and any drainage paths should be cleared.
  - Internal reveals should be made good as agreed, ready for the Customer to redecorate if necessary.
  - Any materials such as trims or sealant should not be applied on top of loose material.
  - Protective tapes should be removed as soon as practicable, as ageing of tapes can cause difficulties in removal. Refer to the manufacturer's guidance.

- Sand and cement should not be used to fill the gap between the outer frame and the substrate except for backfill for steel doors, nowadays usually limited to doors in stone surrounds or interior fair-faced brick and concrete.
- Where the replacement door has a smaller front to back dimension than the original, then there might be mastic and/or paint line visible on the substrate which should be removed as much as practicable or covered with a trim.
- The method of, and responsibility for, repair to any render should be as agreed with the Customer.

n. After installation a final inspection should be carried out, preferably accompanied by the Customer, to ensure that the installation is fully in accordance with the surveyor's and manufacturer's instructions.

o. It is essential that the Customer is made aware of the method(s) of operation, locking and unlocking and fire egress. This should be accompanied by written operating and maintenance instructions.

p. The home owner/occupier shall be supplied with a written specification of the external doors detailing the U-Value of the unit/s. The home owner shall be advised that this material should be retained if an inspection of the installation is required. The specification of the units shall be retained by the installer for audit purposes.

The design and installation of the recommended works must not compromise the ventilation, air quality, humidity (and the potential for condensation) and quality of living environment in the home. Particular care must be given to the potential impact on the living environment in the home resulting from any measures installed under the Programme. It is the duty of the Contractor to prevent any detrimental changes to the living environment and to recommend to the Customer any measures necessary to ensure that there is no detrimental change to the living environment as a result of the works.

7.16 Window Glazing Envelope Replacement

BEP

Contractor Competency

Contractors installing window glazing envelopes must be competent to complete the installation and must agree to complete the work in accordance with British Standard document entitled *Code of practice for the survey and installation of windows and external doorsets (BS 8213-4:2007) and* the manufacturer's guidelines as a minimum requirement.

Contractors carrying out the installation of glazing within existing frames must be competent to complete the installation and must agree to complete the work in accordance with British Standard document entitled *Workmanship on building sites – Code of practice for glazing* (BS 8000-7:1990).

In all cases the manufacturer's instructions should be followed. Insulating glass units, setting and location blocks (see Figure 5 of BS 8213-4:2007), distance pieces, frame to glass and bead to glass gaskets, bead to frame airseals, corner sealing blocks, beads and bead end caps, bedding and capping sealants should be installed in accordance with BS 8000-7.

Product Standards & Specification

All glazing to be installed must meet the requirements of the *Construction Products Directive* (Council Directive 89/106/EEC).

The glazing must conform to EN 1279-1 (Glass in building. Insulating glass units. Generalities, dimensional tolerances and rules for the system description) and EN 1279-2 (Glass in building. Insulating glass units. Long term test method and requirements for moisture penetration). All glazing should conform to the recommendations given in the relevant part of BS 6262 and in BS 8000-7.

The objective is to put in place materials that will achieve a level of performance in the home that is in line with the required standard of the most recent update of Part L of the Building Regulations. Thus,

the objective for replacement window envelopes is to, in as much as is physically and economically feasible; achieve a U-value for the glazing of envelopes of 2.1 W/m^2k.

All U-values of the glazing envelopes shall be calculated according to either EN standards 410 and 673/12898.

This economic feasibility refers only to the economic performance of the installation itself. For example, where in exceptional circumstances a home may require significant additional modifications when compared to a normal case, making the initial investment in the glazing replacement installation solution inappropriate compared to the benefit the homeowner will get out of the investment. Economic feasibility in this case does not refer to the ability of the homeowner to fund their portion of the capital cost for a conventional installation.

Building Regulations

The installed windows must comply with TGD Part B of the Building Regulations relating to the use of windows as an alternative means of escape or for rescue purposes.

The installed windows must comply with TGD Part K of the Building Regulations (Part K) relating to the guarding of windows.

The installed glazing must also meet the TGD Part D of the Building Regulations requirements for materials and workmanship

The installed glazing must comply with TGD Part F of the Building Regulations for the purposes of providing a means of rapid ventilation of the habitable rooms.
Correct installation will also satisfy the TGD Part J of the Building Regulations on the maintenance of an adequate air supply for the efficient working of gas-burning appliances, in particular, after installation work.

The glazing units shall conserve energy in keeping with TGD Part L of the Building Regulations in as far as is practicably possible.

The installed glazing must also meet TGD Part M of the Building Regulations requirements for adequate provision of access to the building.

There are certain works that may change the external character of a conventional property, not on the RPS, to such an extent that approval may need to be sought from the Local Authority. An alteration to windows may require permission from the relevant Local Authorities.

Installation Standards & Specifications

- **q.** All glazing should conform to the recommendations given in the relevant part of BS 6262 and in BS 8000-7. In addition, any glass or insulating glass unit manufacturer's instructions should be followed.
- **r.** A survey of the walls must be carried out prior to the installation by a competent surveyor on behalf of the approved Contractor. A complete survey will ascertain the condition of the structural opening into which the glazing will be installed, the suitability of the glazing and any other issues affecting the installation of the glazing.
- **s.** Any structural defects recorded in the survey, which may affect the performance of the glazing when installed, should be notified to, and rectified by, the Customer with or without the involvement of the Contractor before installation work commences.
- **t.** The existing glazing must be removed with care to avoid unnecessary damage to the building structure and its finishing and without permitting any subsidence of the superstructure during or after the installation procedure. Reasonable care should be taken to keep damage to the reveals to a minimum.

u. Finishing trims should be compatible with the material of the frame and external trims should be suitable for exterior use.

v. The area of openings should not be reduced below that required for the provision of adequate daylight as per BS 8206-2:2008.

w. The replacement glazing should be positioned to minimise the amount of making good and without any twist, racking or distortion of the frame.

x. Care should be taken to maintain the integrity if the DPM/ radon barrier and adequate purchase for fixings should be ensured.

y. Upon completion of the installation of the replacement glazing, the area around the window is made good. This may involve some or all of the following checks s to the installation:

- Debris or contaminants should be removed and any drainage paths should be cleared.
- The sealed units should be free from scratches and signs of failure
- All obscure and coated glasses shall be oriented properly
- The glazing shall be held properly by beads/gaskets, etc.
- Safety glass shall be installed where necessary
- All joints should be smooth and correctly formed
- The sealant shall be continuous around the frame
- Any materials such as trims or sealant should not be applied on top of loose material.
- The replacement frame position and joint construction must be as per manufcturer's guidelines
- The method of, and responsibility for, repair to any render should be as agreed with the Customer.

z. After installation a final inspection should be carried out, preferably accompanied by the Customer, to ensure that the installation is fully in accordance with the surveyor's and manufacturer's instructions.

aa. It is essential that the Customer is made aware of the method(s) of operation and maintenance of the glazing units. This should be accompanied by written operating and maintenance instructions.

bb. The home owner/occupier shall be supplied with a written specification of the window envelopes detailing the U-Value of the units. The home owner shall be advised that this material should be retained if an inspection of the installation is required. The specification of the units shall be retained by the installer for audit purposes.

The design and installation of the recommended works must not compromise the ventilation, air quality, humidity (and the potential for condensation) and quality of living environment in the home. Particular care must be given to the potential impact on the living environment in the home resulting from any measures installed under the Programme. It is the duty of the Contractor to prevent any detrimental changes to the living environment <u>and</u> to recommend to the Customer any measures necessary to ensure that there is no detrimental change to the living environment as a result of the works.

7.17 Window Glazing Low E-Film

BEP

Contractor Competency

Contractors installing window glazing low e-film must be competent to complete the installation and must agree to complete the work in accordance with the manufacturer's guidelines.
Contractors carrying out the installation must be trained and registered by the manufacture. In all cases the manufacturer's instructions should be followed.

Product Standards & Specification

All glazing to be installed must meet the requirements of the *Construction Products Directive* (Council Directive 89/106/EEC).

The objective is to put in place materials that will achieve a level of performance in the home that is in line with the required standard of the most recent update of Part L of the Building Regulations. Thus, the objective for window glazing low e-film is to, in as much as is physically and economically feasible; achieve a U-value for the glazing of envelopes of 2.4 W/m^2k for double glazing envelope and 3.5 W/m^2K for single glazing envelope.

All U-values for window glazing low e-film shall be calculated according to EN standards 410 'Glass in building. Determination of luminous and solar characteristics of glazing' and 673 'Glass in building. Determination of thermal transmittance (U value) Calculation method before the installation of the film'.

This economic feasibility refers only to the economic performance of the installation itself. For example, where in exceptional circumstances a home may require significant additional modifications when compared to a normal case, making the initial investment in the glazing replacement installation solution inappropriate compared to the benefit the homeowner will get out of the investment. Economic feasibility in this case does not refer to the ability of the homeowner to fund their portion of the capital cost for a conventional installation.

Building Regulations

The installed window glazing low e-film must comply with TGD Part B of the Building Regulations relating to the use of windows as an alternative means of escape or for rescue purposes.

The installed window glazing low e-film must comply with TGD Part K of the Building Regulations (Part K) relating to the guarding of windows.

The installed window glazing low e-film must also meet the TGD Part D of the Building Regulations requirements for materials and workmanship

The installed window glazing low e-film must comply with TGD Part F of the Building Regulations for the purposes of providing a means of rapid ventilation of the habitable rooms.

Correct installation will also satisfy the TGD Part J of the Building Regulations on the maintenance of an adequate air supply for the efficient working of gas-burning appliances, in particular, after installation work.

The window glazing low e-film shall conserve energy in keeping with TGD Part L of the Building Regulations in as far as is practicably possible.

The installed window glazing low e-film must also meet TGD Part M of the Building Regulations requirements for adequate provision of access to the building.

There are certain works that may change the external character of a conventional property, not on the RPS, to such an extent that approval may need to be sought from the Local Authority. An alteration to windows may require permission from the relevant Local Authorities.

Installation Standards & Specifications

- **a.** All window glazing low e-film should conform to the recommendations given in the manufacturer's instructions and should be followed.
- **b.** A complete survey will ascertain the condition of the windows into which the window glazing low e-film will be installed, the suitability of the glazing and any other issues affecting the installation of the glazing.
- **c.** Any structural defects recorded in the survey, which may affect the performance of the window glazing low e-film when installed, should be notified to, and rectified by, the Customer with or without the involvement of the Contractor before installation work commences.
- **d.** The area of openings should not be reduced below that required for the provision of adequate daylight as per BS 8206-2:2008 'Lighting for buildings. Code of practice for daylighting'.
- **e.** Upon completion of the installation of the window glazing low e-film. This may involve some or all of the following checks s to the installation:
  - Debris or contaminants should be removed and any drainage paths should be cleared.
  - The window glazing low e-film should be free from scratches and signs of failure
  - All obscure and coated glasses shall be oriented properly
  - Safety glass shall be installed where necessary
  - The method of, and responsibility for, repair to any render should be as agreed with the Customer.
- **f.** After installation a final inspection should be carried out, preferably accompanied by the Customer, to ensure that the installation is fully in accordance with the surveyor's and manufacturer's instructions.
- **g.** It is essential that the Customer is made aware of the method(s) of operation and maintenance of the window glazing low e-film. This should be accompanied by written operating and maintenance instructions.
- **h.** The home owner/occupier shall be supplied with a written specification of the window glazing low e-film detailing the U-Value of the units to EN standards 410 and 673.
- **i.** The home owner shall be advised that this material should be retained if an inspection of the installation is required. The specification of the units shall be retained by the installer for audit purposes.

The design and installation of the recommended works must not compromise the ventilation, air quality, humidity (and the potential for condensation) and quality of living environment in the home. Particular care must be given to the potential impact on the living environment in the home resulting from any measures installed under the Programme. It is the duty of the Contractor to prevent any detrimental changes to the living environment and to recommend to the Customer any measures necessary to ensure that there is no detrimental change to the living environment as a result of the works.

7.18 Entry Level Heating Controls

BEP

General Standards & Specifications
This section outlines the general Standards & Specifications that Contractors, products and installation methods must conform to.

Contractor Requirements & Competency
The installation of heating controls must be carried out by suitably qualified individuals in accordance with manufacturer's guidelines and industry best practice as a minimum. In addition to this, they must hold a Level 6 National Craft Certificate in Plumbing or an equivalent Plumbing qualification such as City and Guilds. Plumbers must have completed an electrical module during their course in order to carry out the 'minor' electrical works involved in specific control measures. If 'Controlled Works', as defined by the Commission for Energy Regulation (CER) document entitled 'Definition of the Scope of Controlled Works' are required, a Completion Certificate must be issued. The issuance of a Completion Certificate for 'Controlled works' can only be carried out by a Registered Electrical Contractor or an Inspector of one of the two Safety Supervisory Bodies as defined in Section 2.2 in this CER guidance.

Product Standard & Specification
All heating controls products must conform to the appropriate BS, EN or IS standard for that particular measure. As a minimum, the following Standards should be satisfied:

- EN 60730-1:2011 Automatic electrical controls for household and similar use. General requirements
- BS EN 60730-2-7 Automatic Electrical Controls for Household and similar Use Part 2-7: Particular Requirements for Timers and Time Switches

Installation Standard & Specification

All Heating Controls installation should be carried out in accordance with the manufacturer's specifications and Industry Best Practice. All works should be installed in accordance with the National Standards Authority of Ireland Standard Recommendation S.R. 54:2014 - Code of practice for the energy efficient retrofit of dwellings, the Dept. of Environment, Heritage and Local Government and SEAI Document Heating and Domestic Hot Water Systems for Dwellings – Achieving Compliance with Part L, the TACMA Guide to Heating Controls, and Energy Savings Trust Guidelines:

- GPG 302 Controls for Domestic Central Heating and Hot Water – Guidance for Specifiers and Installers (Energy Savings Trust and BRE)
- CE29 Domestic Heating by Oil: Boiler Systems – Guidance for Installers and Specifiers
- CE30 Domestic Heating by Gas: Boiler Systems – Guidance for Installers and Specifiers
- All works should be carried out in accordance with the ETCI National Wiring Rules for Electrical Installations, Fourth Edition ET101:2008 and the latest draft of BS 5449 Specification of Forced Air Circulation Hot Water Central Heating Systems for Domestic Purposes (or equivalent Irish Standard) where applicable.

Particular attention should be given to good housekeeping and safety during installation. Every installed measure must be fully demonstrated by the Contractor to the Customer along with a written set of operating instructions. Before leaving the home, the Contractor must ensure that the owner can correctly operate their upgraded heating system.

7.18.1 Single Zones (Space Heating)

This element of the programme involves controlling the heating system into **a single zone** and incorporating a **24 hour 7-day programmer** for time & temperature control along with a **boiler**

interlock arrangement to prevent boiler operation when the heat demand drops off. These initial single zone must be made up of the space heating zone. Further zones to split areas of the house can be added as additional zones (this is classed under the fully integrated heating controls upgrade).

Product Standard & Specification

All timers, programmers and thermostats must conform to the appropriate BS or IS standard for that particular measure, for example:

- EN 60730-1:2011 Automatic electrical controls for household and similar use. General requirements
- BS EN 60730-2-7 Automatic Electrical Controls for Household and similar Use Part 2-7: Particular Requirements for Timers and Time Switches

Installation Standard & Specification

A 24 hour 7-Day Programmer facilitating time and temperature control should be installed in accordance with the manufacturer's guidelines and industry best practice as outlined in Good Practice Guide 302. The room thermostat must be located in an area where it is not subject to heat gains, direct sunlight or draughts. The thermostat should be located in a well-lit, easily accessible position with good air circulation. The chosen position must be representative of average room/zone temperature. Do not locate room thermostats in areas such as corners, behind furniture or curtains or in areas where the air flow may pick up extra heat such as close to TVs, computers, wall lights, in a room with a fixed heating appliance or direct sunlight. Locating a room thermostat in an area which may be subject to external draughts such as beside external doors etc. should also be avoided. Best practice recommends that thermostats are situated approx. 1.5 m from the floor. Furthermore, room thermostats should not be installed in any room which already uses TRVs for temperature control.

Boiler Interlock - A boiler interlock arrangement must be included as part of this set of controls whereby the boiler will not fire when there is no demand for heat. All unnecessary boiler firing can be eliminated with this control measure. In order to assess whether a boiler interlock arrangement is already in place, the Contractor should turn all thermostats right down when the boiler is firing - if the boiler continues to fire, then there is no interlock. (The pump may continue to run if the boiler requires a pump to overrun, this is intentional and does not affect the boiler interlock). On a traditional central heating system with stored hot water, a boiler interlock arrangement can be set up by interconnecting the room thermostats with the boiler. On a combination boiler all that is required to set up a boiler interlock arrangement is a room thermostat.

7.19 Entry Level Heating Controls with Remote Access

BEP

General Standards & Specifications

This section outlines the general Standards & Specifications to which that Contractors, products and installation methods must conform.

Contractor Requirements & Competency

The installation of heating controls with remote access must be carried out by suitably qualified individuals in accordance with manufacturer's guidelines and industry best practice as a minimum. In addition to this, they must hold a Level 6 National Craft Certificate in Plumbing or an equivalent Plumbing qualification such as City and Guilds. Plumbers must have completed an electrical module during their course in order to carry out the 'minor' electrical works involved in specific control measures. If 'Controlled Works', as defined by the Commission for Energy Regulation (CER) document entitled 'Definition of the Scope of Controlled Works' are required, a Completion Certificate must be issued. The issuance of a Completion Certificate for 'Controlled works' can only be carried out by a Registered Electrical Contractor or an Inspector of one of the two Safety Supervisory Bodies as defined in Section 2.2 in this CER guidance.

Product Standard & Specification

All heating controls products with remote access must conform to the appropriate BS, EN or IS standard for that particular measure. As a minimum, the following Standards should be satisfied:

- EN 60730-1:2011 Automatic electrical controls for household and similar use. General requirements
- BS EN 60730-2-7 Automatic Electrical Controls for Household and similar Use Part 2-7: Particular Requirements for Timers and Time Switches

Installation Standard & Specification

All Heating Controls installation should be carried out in accordance with the manufacturer's specifications and Industry Best Practice. All works should be installed in accordance with the National Standards Authority of Ireland Standard Recommendation S.R. 54:2014 - Code of practice for the energy efficient retrofit of dwellings, the Dept. of Environment, Heritage and Local Government and SEAI Document Heating and Domestic Hot Water Systems for Dwellings – Achieving Compliance with Part L, the TACMA Guide to Heating Controls, and Energy Savings Trust Guidelines:

- GPG 302 Controls for Domestic Central Heating and Hot Water – Guidance for Specifiers and Installers (Energy Savings Trust and BRE)
- CE29 Domestic Heating by Oil: Boiler Systems – Guidance for Installers and Specifiers
- CE30 Domestic Heating by Gas: Boiler Systems – Guidance for Installers and Specifiers
- All works should be carried out in accordance with the ETCI National Wiring Rules for Electrical Installations, Fourth Edition ET101:2008 and the latest draft of BS 5449 Specification of Forced Air Circulation Hot Water Central Heating Systems for Domestic Purposes (or equivalent Irish Standard) where applicable.

Particular attention should be given to good housekeeping and safety during installation. Every installed measure must be fully demonstrated by the Contractor to the Customer along with a written set of operating instructions. Before leaving the home, the Contractor must ensure that the owner can correctly operate their upgraded heating system.

7.19.1 Single Zones (Space Heating)

This element of the programme involves controlling the heating system into **a single zone** and incorporating a **24 hour 7-day programmer** for time & temperature control with remote access along with a **boiler interlock arrangement** to prevent boiler operation when the heat demand drops off. Further zones to split areas of the house can be added as additional zones (this is classed under the fully integrated heating controls upgrade).

Product Standard & Specification

All timers, programmers, thermostats and remote access must conform to the appropriate BS or IS standard for that particular measure, for example:

- EN 60730-1:2011 Automatic electrical controls for household and similar use. General requirements
- BS EN 60730-2-7 Automatic Electrical Controls for Household and similar Use Part 2-7: Particular Requirements for Timers and Time Switches

Installation Standard & Specification

A 24 hour 7-Day Programmer with remote access, facilitating time and temperature control should be installed in accordance with the manufacturer's guidelines and industry best practice as outlined in Good Practice Guide 302. The room thermostat must be located in an area where it is not subject to heat gains, direct sunlight or draughts. The thermostat should be located in a well-lit, easily accessible position with good air circulation. The chosen position must be representative of average room/zone temperature. Do not locate room thermostats in areas such as corners, behind furniture or curtains or in areas where the air flow may pick up extra heat such as close to TVs, computers, wall lights, in a room

with a fixed heating appliance or direct sunlight. Locating a room thermostat in an area which may be subject to external draughts such as beside external doors etc. should also be avoided. Best practice recommends that thermostats are situated approx. 1.5 m from the floor. Furthermore, room thermostats should not be installed in any room which already uses TRVs for temperature control.

Boiler Interlock - A boiler interlock arrangement must be included as part of this set of controls whereby the boiler will not fire when there is no demand for heat. All unnecessary boiler firing can be eliminated with this control measure. In order to assess whether a boiler interlock arrangement is already in place, the Contractor should turn all thermostats right down when the boiler is firing - if the boiler continues to fire, then there is no interlock. (The pump may continue to run if the boiler requires a pump to overrun, this is intentional and does not affect the boiler interlock). On a traditional central heating system with stored hot water, a boiler interlock arrangement can be set up by interconnecting the room thermostats with the boiler. On a combination boiler all that is required to set up a boiler interlock arrangement is a room thermostat.

7.20 Fully Integrated Heating Controls with Remote Access

BEP

General Standards & Specifications

This section outlines the general Standards & Specifications to which Contractors, products and installation methods must conform.

Contractor Requirements & Competency

The installation of heating controls with remote access must be carried out by suitably qualified individuals in accordance with manufacturer's guidelines and industry best practice as a minimum. In addition to this, they must hold a Level 6 National Craft Certificate in Plumbing or an equivalent Plumbing qualification such as City and Guilds. Plumbers must have completed an electrical module during their course in order to carry out the 'minor' electrical works involved in specific control measures. If 'Controlled Works', as defined by the Commission for Energy Regulation (CER) document entitled 'Definition of the Scope of Controlled Works' are required, a Completion Certificate must be issued. The issuance of a Completion Certificate for 'Controlled works' can only be carried out by a Registered Electrical Contractor or an Inspector of one of the two Safety Supervisory Bodies as defined in Section 2.2 in this CER guidance.

Product Standard & Specification

All heating controls with remote access products must conform to the appropriate BS, EN or IS standard for that particular measure. As a minimum, the following Standards should be satisfied:

- EN 60730-1:2011 Automatic electrical controls for household and similar use. General requirements
- BS EN 60730-2-7 Automatic Electrical Controls for Household and similar Use Part 2-7: Particular Requirements for Timers and Time Switches
- BS EN 215 Thermostatic Radiator Valves. Requirements and Test Methods

Installation Standard & Specification

All Heating Controls installation should be carried out in accordance with the manufacturer's specifications and Industry Best Practice. All works should be installed in accordance with the National Standards Authority of Ireland Standard Recommendation S.R. 54:2014 - *Code of practice for the energy efficient retrofit of dwellings,* the Dept. of Environment, Heritage and Local Government and SEAI Document Heating and Domestic Hot Water Systems for Dwellings – Achieving Compliance with Part L, the TACMA Guide to Heating Controls, and Energy Savings Trust Guidelines:

- GPG 302 Controls for Domestic Central Heating and Hot Water – Guidance for Specifiers and Installers (Energy Savings Trust and BRE)
- CE29 Domestic Heating by Oil: Boiler Systems – Guidance for Installers and Specifiers
- CE30 Domestic Heating by Gas: Boiler Systems – Guidance for Installers and Specifiers

- All works should be carried out in accordance with the ETCI National Wiring Rules for Electrical Installations, Fourth Edition ET101:2008 and the latest draft of BS 5449 Specification of Forced Air Circulation Hot Water Central Heating Systems for Domestic Purposes (or equivalent Irish Standard) where applicable.

Particular attention should be given to good housekeeping and safety during installation. Every installed measure must be fully demonstrated by the Contractor to the Customer along with a written set of operating instructions. Before leaving the home, the Contractor must ensure that the owner can correctly operate their upgraded heating system.

Two Zones (Space Heating & Domestic Hot Water)
This element of the programme involves dividing the heating system into **two zones** and incorporating a **24 hour7-day programmer with remote access** for time & temperature control along with a **boiler interlock arrangement** to prevent boiler operation when the heat demand drops off. These initial two zones must be made up of the space heating zone and the domestic hot water heating zone. Further zones to split areas of the house can be added as additional zones (as discussed below).

Product Standard & Specification
All timers, programmers, thermostats, zoning manifolds and motorised control valves must conform to the appropriate BS or IS standard for that particular measure, for example:

- EN 60730-1:2011 Automatic electrical controls for household and similar use. General requirements
- BS EN 60730-2-7 Automatic Electrical Controls for Household and similar Use Part 2-7: Particular Requirements for Timers and Time Switches

It should also be noted that 22 mm motorised control valves are usually suitable for boilers rated up to 20kW. For larger boilers, when fitting a motorised control valve on a gravity hot water circuit, 28 mm valves or larger should be used.

Installation Standard & Specification
Zoning: Zones should be divided according to Industry Best Practice as outlined in Good Practice Guide 302. This guide recommends using motorised control valves to subdivide the home into separate heating zones. A zoning manifold can also be used to achieve separate heating zones. Motorised control valves can be plumbed at an angle but must not be mounted so that the power-head is below the horizontal level of the pipework. If fitted in a confined space, adequate ventilation must be available in order to ensure that the valve will be kept within its recommended temperature range. There must also be adequate access so that the power head can be removed if necessary. Motorised valves should not be positioned in the line of the open safety vent pipe or the feed and expansion pipe. Solid fuel systems should use normally-open motorised valves (i.e. they close only when power is applied) to ensure safe operation in the event of power failure or malfunction.

A 24 hour 7-Day Programmer with remote access, facilitating time and temperature control with remote access should be installed in accordance with the manufacturer's guidelines and industry best practice as outlined in Good Practice Guide 302. The room thermostat must be located in an area where it is not subject to heat gains, direct sunlight or draughts. The thermostat should be located in a well-lit, easily accessible position with good air circulation. The chosen position must be representative of average room/zone temperature. Do not locate room thermostats in areas such as corners, behind furniture or curtains or in areas where the air flow may pick up extra heat such as close to TVs, computers, wall lights, in a room with a fixed heating appliance or direct sunlight. Locating a room thermostat in an area which may be subject to external draughts such as beside external doors etc. should also be avoided. Best practice recommends that thermostats are situated approx. 1.5 m from the floor. Furthermore, room thermostats should not be installed in any room which already uses TRVs for temperature control.

Best Practice recommends that **the Hot Water Cylinder Thermostat** (installed with the immersion timer and temperature control device) is installed between 1/4 and 1/3 of the way up the vertical height of the cylinder unless otherwise instructed by the manufacturer. Care should be taken to ensure that there is good clean contact between the thermostat and the cylinder when attaching. The thermostat should also be located on the front face of the cylinder so that it is easily accessible by the Customer. It is recommended that Contractor sets the hot water temperature no higher than 60^{o}C. It is not uncommon in many households for domestic hot water to be heated to temperatures higher than 60^{o}C only for residents to add cold water to it to bring the temperature down. This would be considered wasteful of energy. A temperature of 60^{o}C is recommended however to protect against the risk of Legionella.

Boiler Interlock - A boiler interlock arrangement must be included as part of this set of controls whereby the boiler will not fire when there is no demand for heat. All unnecessary boiler firing can be eliminated with this control measure. In order to assess whether a boiler interlock arrangement is already in place, the Contractor should turn all thermostats right down when the boiler is firing - if the boiler continues to fire, then there is no interlock. (The pump may continue to run if the boiler requires a pump to overrun, this is intentional and does not affect the boiler interlock). On a traditional central heating system with stored hot water, a boiler interlock arrangement can be set up by interconnecting the room and cylinder thermostats with motorised valve(s). On a combination boiler all that is required to set up a boiler interlock arrangement is a room thermostat.

Boiler Management System – An acceptable alternative to the above control measures would be to install a boiler management system that delivers the specified zoning, timing and temperature with remote access and boiler interlock control provisions. Such systems must provide the same functionality as is described above and be installed in accordance with the manufacturer's guidelines and industry best practice.

In the exceptional case where the hot water cylinder is significantly isolated from the boiler and where the installation of additional pipes to connect it separately would involve substantial civil works, a manifold/valve arrangement to by-pass the hot water cylinder would be an acceptable alternative solution. This arrangement would allow the Customer to use their boiler for space heating without heating the water in the hot water cylinder. The contractor must explain to the Customer this new heating arrangement and how to use this system for heating hot water in the summer months e.g. turning off the radiators or using the time/temp programmer. The reasons for implementing this alternative solution as part of the heating control upgrades must be documented in the comments section of the Declaration of Works document.

An Additional Zone
In addition to establishing 2 zones (as described above), the Customer must also commission the installation of an additional space heating zone **OR** the installation of Thermostatic Radiator Valves (in rooms which do not contain room thermostats) per clause 7.16.4.

Product Standard & Specification
The Product Standards & Specifications outlined in Section 7.16.1 will also apply to the components required for the establishment of an additional heating zone (room thermostat & motorised control valve).

Installation Standard & Specification
A Third Zone can be established using an additional motorised control valve or a zoning manifold arrangement and room thermostat. Installation should be carried out in accordance with the manufcturer's instruction, the National Standards Authority of Ireland Standard Recommendation S.R. 54:2014 - *Code of practice for the energy efficient retrofit of dwellings,* and Industry Best Practice. The Installation Standards & Specifications outlined in Section 7.16.1 will also apply to the installation of an additional heating zone.

Thermostatic Radiator Valves (TRVs)
In addition to establishing 2 zones (as described above), the contractor must also install either an additional space heating zone **OR** install Thermostatic Radiator Valves (TRVs) on at least three radiators but no less than half of all radiators in rooms which do not have room thermostats.

Product Standard & Specification
All TRVs must conform to the appropriate BS or IS standard for Thermostatic Radiator Valves (if available) such as BS EN 215 '*Thermostatic Radiator Valves. Requirements & Test Methods'.*

Installation Standard & Specification
TRVs should be installed in accordance with the manufacturers guideline, the National Standards Authority of Ireland Standard Recommendation S.R. 54:2014 - *Code of practice for the energy efficient retrofit of dwellings*, industry best practice and the latest version of BS 7478 'Selection and use of thermostatic radiator valves'. This British Standard gives guidance on the selection, application and use of thermostatic radiator valves (TRVs) manufactured in accordance with BS EN 215-1 for use in domestic and commercial wet central heating systems up to a water temperature of 120ºC. TRVs must not be fitted in rooms which already have temperature control through a thermostat.

When installing TRVs, the Contractor must ensure that the temperature selector scale and reference point are easily visible to the Customer and that the TRV is not positioned in an area which may distort the temperature sensor. Avoid locating TRVs behind curtains, in direct sunlight, in very draughty locations or other areas which may distort the temperature sensor. If these conditions are unavoidable, a remote sensor should be used. When inaccessibility of the valve to the user is unavoidable e.g. when the radiator and valve are located behind a decorative grille, valves with combined remote temperature sensors and adjuster should be used.

Most modern TRVs are bi-direction and can be installed in either the flow or return direction. Due care should however be taken to ensure that valve is bi-directional – if the valve is not bi-directional, the flow through the valve must correspond to the direction on the arrow of the valve body.

Where TRVs are being fitted to a one-pipe system, i.e. only the boiler is being replaced, units designed for minimum flow resistance should be used.

An automatic by-pass circuit must be installed (in fully pumped systems) in homes where there are 3 or more TRVs in place. When most TRVs are open, the automatic by-pass remains closed, allowing full circulation around the heating system. When the TRVs close, the automatic by-pass opens, allowing an appropriate flow rate through the boiler. The use of an automatic by-pass will also reduce the noise in the system due to excess water velocity. An automatic by-pass circuit must also be fitted if the boiler manufacturer requires one, or if it specifies that a minimum flow rate must be maintained while the boiler is firing. An automatic by-pass circuit must then incorporate an automatic by-pass valve which will control water flow in accordance with the water pressure across it. The valve is used to maintain a minimum flow rate through the boiler and to limit circulation pressure when some radiators or zones are turned off. This level of control cannot be achieved using a fixed position valve. The valve should be installed between the boiler primary flow and return noting the direction of flow.

All systems should be flushed in order to remove debris prior to commissioning and this should be carried out with all thermostatic sensor heads removed and valves fully open. Thermostatic sensor heads should also be removed during hydraulic balancing of the system in order to prevent changes in room temperature affecting the balancing procedure.

Once the TRV has been correctly set to the desired temperature by the Contractor, it should not normally require further adjustment by the Customer but they should be made aware of how to adjust the temperature setting for future reference.

NOTE: The room where the main thermostat is fitted should **NOT** have a TRV fitted to the radiator in that location. This situation would render the thermostat sensing inaccurate.

Time & Temperature Control of Electric Immersion Heater

Product Standard & Specification

All timers, programmers, thermostats, zoning manifolds and motorised control valves must conform to the appropriate BS or IS standard for that particular measure, for example:

- EN 60730-1:2011 Automatic electrical controls for household and similar use. General requirements
- BS EN 60730-2-7 Automatic Electrical Controls for Household and similar Use Part 2-7: Particular Requirements for Timers and Time Switches

Installation Standard & Specification

Installation should be carried in accordance with the manufacturer's guidelines and Industry Best Practice as outlined in Good Practice Guide 302 or similar.

Additional Control Measures

It is possible that additional control measures may be specified by a Customer outside the scope of the Programme (such as weather compensation devices), which they wish to be installed at the same time as those measures covered by the Programme. Where this is the case, it is the responsibility of the Contractor to explain the cumulative impact of all measures being installed and the inter-relationship between each measure and the effects on performance that may occur as a result.

7.20.1 Hot Water Cylinder Insulation

- If the hot water cylinder is not being replaced with a pre insulated hot water cylinder during the upgrading of the boiler and/or controls upgrade under the Better Energy Homes programme then a correctly sized insulating jacket tested and approved to BS 5615 must be fitted.
- The insulation jacket shall not cover the immersion heater head and/or cylinder thermostat.
- The fixing bands shall be of a durable material and shall not be over tight or loose.
- Hot water storage cylinders having factory-applied thermal insulation shall not be fitted with insulating jackets unless existing thermal insulation has been rendered ineffective through mechanical damage or deterioration.
- Where the specification details of an existing hot water storage cylinder jacket are not completely legible and/or are not perfectly visible, a self-adhesive label shall be additionally applied to the jacket at an accessible position stating the name of the jacket supplier and the Irish Standard reference details.
- For an existing jacket where the British Standards compliance marking are not indicated by any means the following action shall be undertaken:
    - The jacket shall be checked for compliance with this specification.
    - The insulating material, covering material and fastenings shall not have suffered any permanent deterioration.
    - The insulating material shall be at least 80mm nominal thickness.

7.21 Solid Multi-Fuel Stoves (incl. Biomass)

WHS BEP

Contractor Competency

Contractors carrying out the installation of high performance stoves must be competent to complete the installation and must agree to complete the work in accordance with the British Standard document *Installation of domestic heating and cooking appliances burning solid mineral fuels* (BS 8303: Parts 1, 2 & 3) and also in accordance with *Domestic Heating: Solid fuel systems* (CE 47) published by the Energy Saving Trust.

Where the manufacturer operates an Approved Installer list, the Contractor must demonstrate their inclusion on the list or certification by the manufacturer.

Where the installation of a multi-fuel stove will incorporate the installation of a back boiler unit or works to connect the solid fuel boiler to another oil/gas boiler to form a linked-up system, the installation must be carried out by suitably qualified individuals in accordance with manufacturer's guidelines and industry best practice as a minimum. They must hold a Level 6 National Craft Certificate in Plumbing or an equivalent Plumbing qualification such as City and Guilds. Plumbers must have completed an electrical module during their course in order to carry out the 'minor' electrical works involved in specific control measures. If 'Controlled Works', as defined by the Commission for Energy Regulation (CER) document entitled 'Definition of the Scope of Controlled Works' are required, a Completion Certificate must be issued. The issuance of a Completion Certificate for 'Controlled works' can only be carried out by a Registered Electrical Contractor or an Inspector of one of the two Safety Supervisory Bodies as defined in Section 2.2 in this CER guidance.

Product Standards & Specification

The multi-fuel stove to be installed must meet the requirements of the British Standard document BS EN 13240 (*Room heaters fired by solid fuel. Requirements and test methods***)**.
The objective is to install a multi-fuel stove that will achieve a level of performance in the home, equivalent to the standard required in Part L of the Building Regulations. The multi-fuel stove to be installed should be as efficient in use as is reasonably practicable. Guidance on appropriate efficiency for various systems and fuels is contained in the Department of the Environment, Community and Local Government and SEAI Document "*Heating and Domestic Hot Water Systems for dwelling – Achieving Compliance with Part L*, in particular Table 16. The contractor must discuss both the specification and output of the stove with the Customer prior to final system selection.

Building Regulations

- Building Regulations (Part B): The installed multi-fuel stove must comply with Building Regulations relating the contribution to fire spread.
- Building Regulations (Part D): The installed multi-fuel stove must also meet the Building Regulations requirements for materials and workmanship.
- Building Regulations (Part F): There should be an appropriate level of ventilation in the room(s) where the multi-fuel stove is installed in order to comply with Building Regulations.
- Building Regulations (Part J): Correct installation must also satisfy the Building Regulations on the maintenance of an adequate air supply for the efficient working and to prevent overheating of the multi-fuel stove (and other heat-producing appliances, especially gas-burning appliances) after installation work.
- Building Regulations (Part L): The installed multi-fuel stove shall be as efficient in use as is reasonably practicable in keeping with the Building Regulations.

The design and installation of the recommended works must not compromise the ventilation, air quality, humidity (and the potential for condensation) and quality of living environment in the

home. Particular care must be given to the potential impact on the living environment in the home resulting from any measures installed under the Programme. It is the duty of the Contractor to prevent any detrimental changes to the living environment and to recommend to the Customer any measures necessary to ensure that there is no detrimental change to the living environment as a result of the works.

Installation Standards & Specifications

a. Handling and Storage On Site

- The appliance and components shall be handled in a manner such as to prevent damage/breakage. Any manufacturer's instructions on how to handle components must be followed. Care should be taken before, during and after installation to ensure that equipment is not damaged. This is particularly important with fittings that are vitreous enamelled, plated or fitted with glass
- Any components removed during transit or storage shall be handled so that they can be identified and refitted correctly to the original equipment. This is important where several different appliances are stored together as some parts are individually fitted to each appliance by the manufacturer and are not interchangeable.
- All components shall be stored:
  - On a firm level base in the original packaging and in accordance with the manufacturer's instructions.
  - On a sheet of polythene, pallets or timber to prevent any rising damp affecting them where storage is on a solid floor, components shall be stacked.
  - In a safe, dry and frost-free environment
- The appliance instructions and any operating, stoking and cleaning tools shall be kept safely in store until they can be handed directly to the user on completion of the installation.

b. Installation preparation

- In preparing for the installation of an appliance, the following preparations need to be made:
  - site access is available,
  - cooperation between trades is arranged and sufficient time is allowed for completing each phase of the installation.
  - all accessories and materials for construction are available on site;
  - chases are formed true to size and correctly positioned;
  - the fireplace recess, chimney, lintels and flue-connecting blocks are installed in accordance with the design specification in their true relation to the appliance, and hearth;
  - the pipework is ready for connection to the boiler as soon as the appliance has been fixed in place;
  - any ducts or vents required to be formed in builder's work have been laid or constructed;
  - the fitter's and finishing tradesmen's work is coordinated and protection is provided for vulnerable surface finishes, e.g. hearths, floors.
  - The hearth area shall be capable of taking the weight of the stove.

c. Installation work on site

- The multi-fuel stove should be installed on a solid, level concrete hearth capable of bearing the weight of the stove, i.e. a non-combustible base that conforms to the Building Regulations (Part J).
- The instructions of the appliance manufacturer shall be followed in conjunction with the design specification in accordance with BS 8303: Part 1 (*Installation of domestic heating and cooking appliances burning solid mineral fuels – Specification for the design of installations*)
- All components must be installed in a way that allows installation, maintenance and repair / replacement. There shall be sufficient clearance, in accordance with the

manufacturer's instructions, between the multi-fuel stove and the adjacent materials to allow for cleaning and maintenance.

- Inaccessible components shall be permanent. Such permanent components shall be maintenance free and have a durability corresponding to the lifetime of the components in which they are installed.
- Components (i.e. flues) shall be placed, fixed and supported in such a way that no harmful deformations occur and so that thermal expansion is possible.
- Where appropriate, existing chimneys should be lined or relined with rigid or flexible flue liners having the appropriate designation and performance level specific to the type of fuel and appliance to be used, as required by Part J of the Building Regulations.
- If a supply of electricity is necessary to operate the control equipment or initiate ignition in an appliance, the electrical installation and supply shall be installed in accordance with BS 7671: 1992 (*Requirements for electrical installations*). All Electrical components shall be installed in accordance with the *ETCI National Wiring Rules for Electrical Installations, Fourth Edition* (ET101:2008).
- Any soot door required for cleaning the chimney shall be correctly located and fitted. (See clause 10 of BS 8303: Part 1: 1994). Before proceeding with appliance installation, a check shall be made to ensure that the flue is clean, clear of any obstruction, in a sound condition and of adequate size to suit the appliance being installed.
- Where the stove has an integrated boiler, the boiler shall be coupled to the hot water system by means of unions. Easy access shall be provided for removal. If flow and return pipes are taken through a fireplace recess wall they shall be sleeved for easy removal or replacement. A drain cock shall be fitted at the lowest point (where practical) in the system for draining down when required. For insert appliances fitted with a boiler it is important that connection of pipework to the boiler and leak-testing shall take place before the space around the appliance is in-filled with insulating material.
- An inset multi-fuel stove shall be installed using in-fill material behind firebacks or boilers and around room heater casings (see BS 8303: Part 1: 1993, figures 1, 2, 3, 13 and 15). Further information is given in clause 14 of BS 8303: Part 3: 1994 (Installation of domestic heating and cooking appliances burning solid mineral fuels – Recommendations for design and on site installation).
- If a gas point is required for connecting to an ignition burner or independent gas poker it shall be installed close to the appliance.
- NOTE. Attention is drawn to the Gas Safety (Installation and Use) Regulations IS 813.
- Following installation, all building works etc. shall be made good.

d. Post-Installation

- Where a multi-fuel stove has been installed, a carbon monoxide (CO) alarm, which complies with I.S. EN 50291-1:2010/A1:2012, should be provided as per TGD Part J of the Building Regulations.
- It is recommended that not less than 48 hours after the appliance has been installed, an inspection of the installation shall be carried out to ensure that:
    - All fittings (in particular dampers, boiler flue pipe, flue adaptor and boiler pipes) are firmly fixed in the correct position and that no gaps allowing possible air or water leakage have appeared.
    - Air supply intakes and ducts shall be checked for size and position.
- After installation the appliance shall not be used for burning builder's rubbish.
- Before lighting a fire, any water system connected to the appliance shall be filled. The installation shall be dried out under slow fire conditions preferably for about 2 days using the type and size of fuel recommended in the appliance manufacturer's instructions.

- The installer shall confirm that the fire responds to the operation of the controls and that there is no visible emission of combustion products to the room.
- Appliances incorporating a boiler shall be tested to ensure that the water is circulating throughout the system (For further information see clause 15 of BS 8303: Part 3: 1994).
- Where a hearth, fireplace, flue or chimney is provided or extended, a notice plate containing information on the type of heat producing appliance, which can be safely served by the installed hearth, fireplace, flue or chimney shall be permanently fixed in a suitable place in the building.
- On completion of installing and commissioning the system, the installer shall hand over the manufacturer's operating instructions to the user in order to provide full information regarding its safe and effective operation and maintenance.

***Important guidance note for Electrical works associated with the Better Energy Homes programme where* the installation of a multi-fuel stove will incorporate the installation of a back boiler unit or works to connect the solid fuel boiler to another oil/gas boiler to form a linked-up system**

- All electrical works under the Better Energy Homes programme must be in full compliance with current ETCI rules.
- Earthing and Bonding must be in accordance with ETCI 101:2008 Chapter 54 (544 Equipotential bonding conductors) and Annex 63B (Guidelines for certification for alterations to existing installations).
- In order to comply with ETCI rules the following note from ETCI 101:2008 Annex 63B must be taken into consideration:
  As referred to in Annex 63B "Before commencing new work, the installer should assess the existing installation to ensure that it will not impair the safety of the proposed new work, and likewise the new work will not impair the safety of the existing installation. Should the installer become aware of any defect in any part of the installation that would impair the safety of the new work, the client must be informed in writing thereof. No new work should commence until these defects have been made good."
- If the earthing/bonding is less than 6mm2 then the heating installer must either
  (a) issue an 'Electrical safety notice to the home owner' to notify them that their current wiring installation is not to current ETCI rules and work cannot commence on the installation until the wiring has been rectified to current ETCI rules or, (b) the bonding must be rectified to current ETCI rules by a competent suitably qualified person
- Work may commence on a heating system with earthing/bonding of 6mm2 and above however:
  Heating system with earthing/bonding of less than 10mm2 the heating installer must issue an 'Electrical safety notice to the home owner' to notify them that their current wiring installation is not to current ETCI rules.
- Where bonding arrangements are found not to be in accordance with the current ETCI National Rules then the consumer shall be informed in writing of the situation and advised to have the electrical installation checked and rectified by a competent person. In such circumstances the 'Electrical safety notice to the home owner' can be issued to a home owner when an electrical installation is not to current ETCI regulations. The 'Electrical safety notice to the home owner' can be downloaded from the following link:
  https://www.seai.ie/resources/publications/Electrical_Safety_Notice_to_Homeowners_2017.pdf

7.22 Gas Fired Room Heater

BEP

Contractor Requirements & Competency

The installation of a gas fired room heater must be carried out by suitably qualified individuals in accordance with manufacturer's guidelines and industry best practice as a minimum. Contractors wishing to install Liquefied Petroleum Gas (LPG) or Natural Gas boilers under the Programme must hold a Gas Contractors Domestic Certificate (GI D, GI 2 or GI 3) and be registered with RGI.

It is an offence for any person to carry out domestic Natural Gas or LPG works unless he/she is a registered gas installer with RGII. To align with this requirement all registered gas installers on the Better Energy Homes programme proposing to undertake High Efficiency Gas Boiler and Heating Controls upgrade works must be on the RGII list. Details on how to register with RGII is available at www.rgii.ie .

Product Standard & Specification

Qualifying gas-fired independent space heaters must meet the following conditions:

1. It must be replacing an open fire e.g. the fire place must not be fitted with an existing gas fire or a low efficiency (in the region of 35%) decorative gas fire (DGF)
2. It must have a minimum efficiency (gross calorific value) of 65% awarded by an independent test body
3. The correct level of permanent ventilation must be installed as per TGD Part J of the Building Regulations and/or I.S. 813.
4. It must meet the conditions specified in Section 2.5 of the Department of the Environment, Community and Local Government and SEAI Document '*Heating and Domestic Hot Water Systems for dwelling – Achieving Compliance with Part L 2008'*

The manufacturer's declaration of the efficiency (gross calorific value) of the appliance (gross calorific value) should include the following words:

> *"The efficiency of this appliance has been measured as specified in BS 7977-1:2009+A1:2013 'Specification for safety and rational use of energy of domestic gas appliances. Radiant/convectors' and BS EN 613:2001 and the result is minimum 65%* gross calorific value. *The test data from which it has been calculated has been certified by {insert name and/or identification of Notified Body. The efficiency value may be used in the Dwelling Energy Assessment Procedure (DEAP) for energy rating of dwellings."*

Installation Standard & Specification

A qualifying gas-fired independent space heater must be installed by a registered gas installer (RGII) and in accordance with the latest version of TGD Part J and I.S. 813 Domestic Gas Installations. I.S. 813 covers the Code of Practice for the installation of Natural Gas or LPG appliances in domestic premises. The gas fired appliance must also be installed in accordance with manufacturer's guidelines, the CER Criteria document 'The Regulation of Gas Installers with respect to safety' and the latest draft of the appropriate standard, as listed in Section 2.5 of the Department of the Environment, Community and Local Government and SEAI Document '*Heating and Domestic Hot Water Systems for dwelling – Achieving Compliance with Part L 2008'*.

If the installation involves work to the electrical wiring:

- All wiring is to be in accordance with the latest edition of the ETCI National Rules for Electrical Installations ET101
- Where applicable the contractors should be members of the Register of Electrical Contractors (RECI) or the Electrical Contractor's Safety and Standards Association (ECSSA)

Building Regulations

- Building Regulations (Part B): The installed appliance must comply with Building Regulations relating the contribution to fire spread.
- Building Regulations (Part D): The installed appliance must also meet the Building Regulations requirements for materials and workmanship.
- Building Regulations (Part F): There should be an appropriate level of ventilation in the room(s) where the appliance is installed in order to comply with Building Regulations.
- Building Regulations (Part J): Correct installation must also satisfy the Building Regulations on the maintenance of an adequate air supply for the efficient working of the appliance (and other heat-producing appliances, especially gas-burning appliances) after installation work.
- Building Regulations (Part L): The installed appliance shall be as efficient in use as is reasonably practicable in keeping with the Building Regulations.

WHS BEP

7.23 Mechanically-assisted powered cleanse and flush (power flushing) of Heating system

Contractor Requirements & Competency

Contractors undertaking a mechanically-assisted powered cleanse and flush (power flushing) of a heating system must be carried out by suitably qualified individuals in accordance with manufacturer's guidelines and industry best practice as a minimum. In addition to this, they must hold a Level 6 National Craft Certificate in Plumbing or an equivalent Plumbing qualification such as City and Guilds.

Oil Boilers

Contractors undertaking a mechanically-assisted powered cleanse and flush (power flushing) of a heating system to oil-fired system they must comply with requirements and competencies stated above. It is also recommended that the contractor should be registered with a professional organisation, e.g. OFTEC.

Gas Boilers

In addition to the above criterion, Contractors wishing to carry out a mechanically-assisted powered cleanse and flush (powerflushing) of a heating system to a Liquefied Petroleum Gas (LPG) or Natural Gas system under the Programme must hold a Gas Contractors Domestic Certificate (GI D, GI 2 or GI 3).

It is an offence for any person to carry out domestic Natural Gas or LPG works unless he/she is a registered gas installer with RGII. To align with this requirement all registered gas installers on the Better Energy Homes programme undertaking High Efficiency Gas Boiler and Heating Controls upgrade works must be on the RGII list. Details on how to register with RGII is available at www.rgii.ie .

Product Standard & Specification

Mechanically-assisted powered cleanse and flush (powerflushing) of system must be performed as per section 5.3 of BS 7593. Mains pressure and gravity cleanse and flush (section 5.4 and 5.5 of BS 7593) is **not** deemed as an acceptable method of flushing of a heating system under the Energy Credits programme.

As a part of this measure boiler service must be must be provided where an existing boiler is installed. The boiler service should be to manufcturer's instructions or as per SEAI boiler servicing checklist.
http://www.seai.ie/Power_of_One/Heat_Your_Home_For_Less/Servicing_Your_Boiler/

Building Regulations

- Building Regulations (Part B): The mechanically-assisted powered cleanse and flush (powerflushing) of a heating system must comply with Building Regulations relating the contribution to fire spread.
- Building Regulations (Part D): The mechanically-assisted powered cleanse and flush (powerflushing) of a heating system must also meet the Building Regulations requirements for materials and workmanship.
- Building Regulations (Part J): The mechanically-assisted powered cleanse and flush (powerflushing) of a heating system shall also satisfy the Building Regulations such that the installation does not increase the risk of the property catching fire through the use of a heat producing appliance.
- Building Regulations (Part L): The mechanically-assisted powered cleanse and flush (powerflushing) of a heating system shall be as efficient in use as is reasonably practicable in keeping with the Building Regulations.

The design and installation of the recommended works must not compromise the ventilation, air quality, humidity (and the potential for condensation) and quality of living environment in the home. Particular care must be given to the potential impact on the living environment in the home resulting from any measures installed under the Programme. It is the duty of the Contractor to prevent any detrimental changes to the living environment <u>and</u> to recommend to the Customer any measures necessary to ensure that there is no detrimental change to the living environment as a result of the works.

<u>Installation Standard & Specification</u>

Mechanically-assisted powered cleanse and flush (powerflushing) of a heating system must be performed in accordance with manufacturer's guidelines, Industry Best Practice and the latest draft of BS 7593 Code of practice for treatment of water in domestic hot water central heating systems where applicable.

The powerflushing procedure should include:

- Operation of the unit for at least 10 min (circulation mode) with all radiator and system valves open, reversing the flow regularly;
- Disposal of the dirty water by an appropriate method whilst mains water is continually added via the powerflushing reservoir tank until the water runs clear;
- Addition of the chosen cleansing chemical to the reservoir of the powerflushing machine and circulating to disperse throughout the system;
- Circulating the cleanser through each radiator for at least 5 min in turn by isolating the other radiators and the hot water circuit, reversing the flow regularly;
  NOTE Tapping of the radiator with a rubber hammer will help to remove any loose material.
- Cleansing of the hot water circuit for at least 5 min (circulation mode) by isolating the radiators, reversing the flow regularly;
- Flushing of each radiator in turn for at least 5 min by isolating the other radiators and the hot water circuit, and dumping to foul drain until the water runs clear;
- Flushing of the hot water circuit for at least 5 min by isolating the radiators, and dumping to foul drain until the water runs clear;
- Flushing of the system with all radiator and system valves open for at least 5 min and dumping by an appropriate method until water runs clear;
- Continual flushing and appropriate disposal until all of the cleanser and debris have been removed. Refer to the manufacturer's instructions.

After this procedure, re-commissioning should be carried out in accordance with BS 7593 Code of practice for treatment of water in domestic hot water central heating systems section 5.6 where applicable.

On completion, a suitable inhibitor should then be added to protect the system from further or future problems. The inhibitor levels should be checked at the systems annual service and topped up if required.

It is recommended to check the manufacturer's instructions that the chemical cleaner and inhibitor are suitable for the equipment installed. A label stating the date of application, the type and the amount of inhibitor used shall be fixed in a prominent position on the system.
It is recommended to check the manufacturer's instructions that the chemical cleaner and inhibitor are suitable for the equipment installed. A label stating the date of application, the type and the amount of inhibitor used shall be fixed in a prominent position on the system.

The home owner/occupier shall be supplied with a certificate detailing that a mechanically-assisted powered cleanse and flush (powerflushing) was carried out on the heating system. The home owner shall be advised that this material should be retained if an inspection of the installation is required. A duplicate of the certificate detailing that a mechanically-assisted powered cleanse and flush (powerflushing) was carried out on the heating system shall be retained by the installer for audit purposes.

WHS BEP

7.24 Mechanically-Assisted Powered Cleanse and Flush (Powerflushing) of Heating System and Installation Of Magnetic Filtration System to Existing Heating System

Contractor Requirements & Competency
Contractors undertaking a mechanically-assisted powered cleanse and flush (powerflushing) and installing a magnetic filtration system to existing heating system must be carried out by suitably qualified individuals in accordance with manufacturer's guidelines and industry best practice as a minimum. In addition to this, they must hold a Level 6 National Craft Certificate in Plumbing or an equivalent Plumbing qualification such as City and Guilds.

Oil Boilers
Contractors undertaking a mechanically-assisted powered cleanse and flush (powerflushing) of a heating system and installing a magnetic filtration system to existing heating system to oil-fired system they must comply with requirements and competencies stated above. It is also recommended that the contractor should be registered with a professional organisation, e.g. OFTEC.

Gas Boilers
In addition to the above criterion, Contractors wishing to perform a mechanically-assisted powered cleanse and flush (powerflushing) and installing a magnetic filtration system to existing heating system of a heating system to a Liquefied Petroleum Gas (LPG) or Natural Gas system under the Programme must hold a Gas Contractors Domestic Certificate (GI D, GI 2 or GI 3).

It is an offence for any person to carry out domestic Natural Gas or LPG works unless he/she is a registered gas installer with RGII. To align with this requirement all registered gas installers on the Better Energy Homes programme undertaking High Efficiency Gas Boiler and Heating Controls upgrade works from the **27th of June 11** must be on the RGII list. Details on how to register with RGII is available at www.rgii.ie .

Product Standard & Specification
Mechanically-assisted powered cleanse and flush (powerflushing) of system must be performed as per section 7.19 of the Better Energy Homes Specification.

A boiler service must be must be provided where an existing boiler is installed. The boiler service should be to manufcturer's instructions or as per SEAI boiler servicing checklist
http://www.seai.ie/Power_of_One/Heat_Your_Home_For_Less/Servicing_Your_Boiler/

The installation of a magnetic filtration system to existing heating system must be as per manufacturer's guidelines, Industry Best Practice and the latest draft of SR-50-1 Code of practice for building services – Part 1: Domestic plumbing & heating where applicable

Building Regulations

- Building Regulations (Part B): The installation of magnetic filtration system to an existing heating system must comply with Building Regulations relating the contribution to fire spread.
- Building Regulations (Part D): The Installation of magnetic filtration system to an existing heating system must also meet the Building Regulations requirements for materials and workmanship.
- Building Regulations (Part J): Installation of magnetic filtration system to an existing heating system shall also satisfy the Building Regulations such that the installation does not increase the risk of the property catching fire through the use of a heat producing appliance.
- Building Regulations (Part L): Installation of magnetic filtration system to an existing heating system shall be as efficient in use as is reasonably practicable in keeping with the Building Regulations.

The design and installation of the recommended works must not compromise the ventilation, air quality, humidity (and the potential for condensation) and quality of living environment in the home. Particular care must be given to the potential impact on the living environment in the home resulting from any measures installed under the Programme. It is the duty of the Contractor to prevent any detrimental changes to the living environment and to recommend to the Customer any measures necessary to ensure that there is no detrimental change to the living environment as a result of the works.

Installation Standard & Specification

Mechanically-assisted powered cleanse and flush (powerflushing) of a heating system must be performed in section 7.19 of the Better Energy Homes Specification.

Installation of magnetic filtration system to an existing heating system must be performed in accordance with manufacturers guidelines, Industry Best Practice and the latest draft of SR-50-1 Code of practice for building services – Part 1: Domestic plumbing & heating where applicable.

The power flushing of the heating system must be carried out before the installation of the magnetic filtration unit.

The magnetic filtration unit should have the following properties include:

The filter should be installed on the return pipework and as close to the boiler as possible. Flexibility of filter orientation during installation is essential to accommodate all existing pipework layouts. The filter must be capable of maximising the volume of magnetite collected on first pass with a recommendation that this level achieves in excess of 90% of suspended black iron oxide. This figure should increase to virtually 100% during subsequent passes.

Recommended minimum capacity for a domestic filter is 130 g of iron oxide sludge for a standard 22 mm (3/4") system and 28 mm (1") over a period of at least 12 months. At capacity, the filter must allow unrestricted flow without loss of pressure.

Domestic filter magnet strength should achieve a minimum gauss rating of 7,500 with an anticipated lifespan exceeding that of the central heating boiler. The filter should not be susceptible to blockage, even when full.

7.25 Chimney Draught Limiter

BEP

Contractor Requirements & Competency
Contractors installing a Chimney Draught Limiter must be carried out by suitably qualified individuals in accordance with manufacturer's guidelines and industry best practice as a minimum.

Product Standard & Specification
The Chimney Draught Limiter conform to BS 1251 'Specification for open-fireplace components' and BS 3376 'Specification for solid mineral fuel open fires with convection, with or without boilers'
A permanent mechanically fixed chimney draught limiter alters the geometry of the chimney therefore altering the ventilation rate as per DEAP methodology.

Temporary draught limiting devices, which are removed when a fire is lit are **not** eligible for the above Energy Credits. A temporary draft limiter is wholly reliant on its reinstatement on a continuous basis when a fire is not lit and they do not alter the geometry of a chimney within DEAP methodology therefore Energy Credits are not applicable.

Building Regulations
- Building Regulations (Part B): The installed Chimney Draught Limiter must comply with Building Regulations relating the contribution to fire spread.
- Building Regulations (Part D): The installed Chimney Draught Limiter must also meet the Building Regulations requirements for materials and workmanship.
- Building Regulations (Part F): There should be an appropriate level of ventilation in the room(s) where the Chimney Draught Limiter is installed in order to comply with Building Regulations.
- Building Regulations (Part J): The Installation of the Chimney Draught Limiter should not increase the risk of fire in the property due to the use of a heat-producing appliance.
- Building Regulations (Part L): The installed Chimney Draught Limiter shall be as efficient in use as is reasonably practicable in keeping with the Building Regulations.

The design and installation of the recommended works must not compromise the ventilation, air quality, humidity (and the potential for condensation) and quality of living environment in the home. Particular care must be given to the potential impact on the living environment in the home resulting from any measures installed under the Programme. It is the duty of the Contractor to prevent any detrimental changes to the living environment and to recommend to the Customer any measures necessary to ensure that there is no detrimental change to the living environment as a result of the works.

Installation Standard & Specification
The Installation of chimney draft limiter shall be installed to manufacturer's recommendations.
The chimney draft limiter is installed in accordance with the design specification in their true relation to the appliance. The instructions of the appliance manufacturer shall be followed in conjunction with the design specification in accordance with BS 1251 'Specification for open-fireplace components' and BS 3376 'Specification for solid mineral fuel open fires with convection, with or without boilers'. All components must be installed in a way that allows installation, maintenance and repair / replacement. There shall be sufficient clearance, in accordance with the manufacturer's instructions, between the chimney draft limiter and the adjacent materials to allow for cleaning and maintenance. Components shall be placed, fixed and supported in such a way that no harmful deformations occur and so that thermal expansion is possible.
On completion of installing and commissioning the system, the installer shall hand over the manufacturer's operating instructions to the user in order to provide full information regarding the operation and maintenance of the appliance

7.26 Boiler Service

WHS BEP

Contractor Requirements & Competency

Contractors performing a boiler service to an existing heating system must be carried out by suitably qualified individuals in accordance with manufacturer's guidelines and industry best practice as a minimum. In addition to this, they must hold a Level 6 National Craft Certificate in Plumbing or an equivalent Plumbing qualification such as City and Guilds.

Oil Boilers

Contractors performing a boiler service must comply with requirements and competencies stated above. It is also recommended that the contractor should be registered with a professional organisation, e.g. OFTEC.

Gas Boilers

In addition to the above criterion, Contractors wishing to perform a boiler service to a Liquefied Petroleum Gas (LPG) or Natural Gas boiler under the Programme must hold a Gas Contractors Domestic Certificate (GI D, GI 2 or GI 3).

It is an offence for any person to carry out domestic Natural Gas or LPG works unless he/she is a registered gas installer with RGII. To align with this requirement all registered gas installers on the Better Energy Homes programme undertaking High Efficiency Gas Boiler and Heating Controls upgrade works must be on the RGII list. Details on how to register with RGII is available at www.rgii.ie .

Standard & Specification

A boiler service should be to manufcturer's instructions or as per SEAI boiler servicing checklist

The gas boiler checklist can be downloaded for the following link:
http://www.seai.ie/Power_of_One/Heat_Your_Home_For_Less/Servicing_Your_Boiler/gas_checklist.pdf
The oil boiler checklist can be downloaded for the following link:
http://www.seai.ie/Power_of_One/Heat_Your_Home_For_Less/Servicing_Your_Boiler/oil_checklist.pdf
The home owner/occupier shall be supplied with a certificate detailing that a boiler service was performed on the boiler an entered into the boiler log book. Further guidance on log books is available at the following link:
http://www.seai.ie/Grants/Better_energy_homes/contractor/Newsletter/Contractor_Good_Practice_Note_-_Boiler_Log_Books.pdf

The home owner shall be advised that this material should be retained if an inspection of the installation is required. A duplicate of the certificate detailing that a boiler service was carried out on the boiler shall be retained by the installer for audit purposes.

7.27 CFL and LED domestic lighting

WHS BEP

Contractor Requirements & Competency
Contractors installing CFL and LED lighting must be competent to complete the installation.

Standard & Specification
For CFL luminaires:
CFLs installed must be in accordance with EC 244/2009: Ecodesign requirements for non-directional household lamps and EU 1194/2012 Ecodesign requirements for directional lamps, light emitting diode lamps and related equipment
EC244/2009 sets minimum lamp efficacy requirements in Annex II, Table 1, and functionality requirements for CFL's (Table 4).
EU1194/2012 sets minimum energy efficiency requirements in Annex III Section 1.1, and functionality requirements in Table 2, 3 and 4.
Only CFL can be installed under the Better Energy Warmer Homes programme

For LED luminaires and lamps:
LED luminaires and lamps installed must be in accordance with EC 244/2009: Ecodesign requirements for non-directional household lamps and EU 1194/2012 Ecodesign requirements for directional lamps, light emitting diode lamps and related equipment

EC244/2009 sets minimum lamp efficacy requirements in Annex II, Table 1, and functionality requirements for non-CFL's (Table 5).
EU1194/2012 sets minimum energy efficiency requirements in Annex III Section 1.1, and functionality requirements in Table 2, 3 and 4.

CFL and LED lights are classed as secondary measures and must be installed along with a primary package of measures. Secondary measures can only account towards a maximum of 10% of credits towards targets.

If the retrofit involves work to the mains wiring:

- All wiring is to be in accordance with the latest edition of the ETCI National Rules for Electrical Installations ET101
- Contractors should be members of the Register of Electrical Contractors (RECI) or the Electrical Contractor's Safety and Standards Association (ECSSA)

7.28 Home Energy Reports

BEP

Standard & Specification
Natural Gas and Electricity Home Energy Reports for Behavioural Energy Efficiency

- Reports must include personalised comparison, comparing a consumer's energy use (based on natural gas or electrical consumption as dictated on the dwellings bi-monthly energy bill) against a group of no more than 200 similar households (e.g. by location, size, etc.)
- A minimum of six energy reports (three paper reports and three e-reports) shall be issued per year to the occupants of the dwelling. The energy reports should follow the issuing of an energy bill and reference the energy (Natural Gas/Electricity of the whole dwelling) usage during that period.
- Reports shall include advice for saving energy, potentially including but not limited to:
  - Savings behaviours that become habituated (e.g., turning off the lights),
  - Savings behaviours that are individually prompted (e.g., adjusting thermostat settings), and
  - Purchasing decisions (e.g., selection and installation of more energy efficient appliances)
  - Advice should be seasonally appropriate

- Advice for saving energy is personalised to the recipient (e.g. provided data available to distinguish homeowners from renters, homeowners may receive more recommendations focused on installed measures, whereas renters may receive more behavioural prompts)
- Contact information for final customers' organisations, energy agencies or similar bodies, including website addresses, from which information may be obtained on available energy efficiency improvement measures e.g. SEAI's 'Power of One' campaign, comparative end-user profiles and objective technical specifications for energy-using equipment.

7.29 Electricity Energy Monitors

BEP

Standard & Specification

Energy monitor complete with in-house display connected to electricity meter (e.g. linked via clamp on transmitter)

In-house display to displaying real time energy and cost consumption

- Individual single point energy monitors i.e. three pin plug energy displays are not eligible as they do not display the overall energy consumption of the dwelling
- MPRN must be submitted with application for Energy Credits for energy monitors
- The Installation of energy monitors shall be installed to manufacturer's recommendations.

7.30 High Heat Retention Electric Storage Heaters

BEP

Contractor Requirements & Competency

The installation of a high heat retention electric storage heater should be carried out by an electrical contractor in accordance with manufacturer's guidelines and industry best practice as a minimum and must be registered with the Register of Electrical Contractors of Ireland (RECI) or Electrical Contractors Safety & Standards Association (ECSSA).

To align with this requirement all registered electrical contractors on the Better Energy Homes programme proposing to undertake Electric Storage Heater upgrade works must be registered with RECI or ECSSA. Details on how to register are available at www.reci.ie and www.ecssa.ie

Product Standard & Specification

To qualify, the high heat retention electric storage heater must meet the following conditions:

5. It must be replacing an existing electric storage heater.
6. It must be a whole dwelling solution.
7. It must have a minimum heat retention not less than 45% as measured in accordance with BS EN 60531 (*Household Electric Thermal Storage Room Heaters - Methods For Measuring Performance*)
8. The heat retention testing must have been carried out by an organisation accredited to test in accordance with BS EN 60531 or the testing must be endorsed by a body accredited to test in accordance with BS EN 60531
9. It must include both input and output controls
10. It also must include both a timer and a room thermostat, which can be controlled by the user.

Installation Standard & Specification

A qualifying high heat retention electric storage heater must be sized appropriately for the room in which it is being installed. Suitable design methods for ensuring the heater is sized correctly is DOM 8, *Guide to the Design of Electric Space Heating Systems*, TEHVA or the manufacturer's sizing methodology.

The high heat retention electric storage heater should be installed by an electrical contractor registered with RECI and in accordance with the latest edition of the ETCI National Rules for Electrical Installations ET101. The high heat retention electric storage heater must also be installed in accordance with manufacturer's guidelines, the National Standards Authority of Ireland Standard Recommendation S.R. 54:2014 - Code of practice for the energy efficient retrofit of dwellings and the latest draft of the appropriate standard, as listed in Section 2.5 of the Department of the Environment, Community and Local Government and SEAI Document '*Heating and Domestic Hot Water Systems for dwelling – Achieving Compliance with Part L 2008'*.

Building Regulations

- Building Regulations (Part B): The installed appliance must comply with Building Regulations relating the contribution to fire spread.
- Building Regulations (Part D): The installed appliance must also meet the Building Regulations requirements for materials and workmanship.
- Building Regulations (Part F): There should be an appropriate level of ventilation in the room(s) where the appliance is installed in order to comply with Building Regulations.
- Building Regulations (Part L): The installed appliance shall be as efficient in use as is reasonably practicable in keeping with the Building Regulations.

APPENDIX 1: REFERENCE DOCUMENTS

Reference (Publisher)	Cavity Wall	External Wall	Internal Wall	Ceiling-Level	Rafter-level	Floor Insulation	Heating Controls	Boiler
NSAI Agrément Certificate (NSAI)	●	●						
CE 17/GPG/138: Internal wall insulation in existing housing – a guide for specifiers and contractors (Energy Saving Trust)			●					
CE 83/GPG155: Energy-efficient Refurbishment of existing houses (Energy Saving Trust)				●	●	●		
CE309: Sustainable Refurbishment (Energy Saving Trust)	●	●	●	●	●	●		
CE 184 Practical refurbishment of solid-walled houses	●	●	●	●	●			
CE 29 Domestic Heating by Oil: Boiler Systems (Energy Saving Trust)							●	●
CE 30 Domestic Heating by Gas: Boiler Systems (Energy Saving Trust)							●	●
GBG 301: Controls for Domestic Heating & Hot Water (Energy Saving Trust)								●
GBG 302: Controls for Domestic Central Heating & Hot Water – Guidance for Specifiers and Installers (Energy Saving Trust)							●	
BR 262 Thermal insulation avoiding risks	●	●	●	●	●			
BS 8215:1991: Design and installation of damp-proof courses in masonry construction (BSI)	●	●				●		
BS 7671: Requirements for Electrical Installations (BSI)							●	●
BS 5449: Specification for forced circulation hot water central heating systems for domestic premises (BSI)								●
BS 7478: Selection & Use of Thermostatic Radiator Valves (BSI)							●	
Heating and Domestic Hot Water Systems for Dwellings - Achieving Compliance with Part L (DEHLG & SEAI)							●	●
Guide to the Condensing Boiler Installation Assessment Procedure for Existing Dwellings (DEHLG & SEAI)								●
I.S. 813 Domestic Gas Installations (NSAI)								●
CER/09/083: The Regulation of gas installers with respect to safety (CER)								●
Heating Controls Guide (TACMA)							●	
GBG 28 Part 1 Domestic floors: construction, insulation and damp-proofing (BRE)						●		
GBG 45 Insulating ground floors (BRE)						●		
CP 102:1973 Protection of buildings against water from the ground						●		
BS DD CEN/TS 12872:2007 Wood-based panels. Guidance on the use of load-bearing boards in floors, walls and roofs						●		
S.R. 54:2014 Code of Practice	●	●	●	●	●	●	●	●

All measures must also be installed as per the Manufacturer's Installation guidelines

Reference (Publisher)	Solar water heating	Draught Proofing	Insulation of pipework and CWST	Window Replacement	Ex door replacement	Window Glazing Envelope Replacement
CIBSE Solar heating design and installation guide	●					
Renewable energy procurement guidelines for solar thermal systems- SEAI	●					
BS7386:1987 Specification for draught strips for the draught control of existing doors and windows in housing		●				
BS 5970 Code of practice for thermal insulation of pipework and equipment in the temperature range of -100°C to +870°C			●			
BS 5422 Method for specifying thermal insulating materials for pipes, tanks, vessels, duckwork and equipment operating within a temperature range -40°C to +700°C			●			
BS 8213-4:2007 Code of practice for the survey and installation of windows and external doorsets				●	●	●
EN 14351-1:2006 Windows and doors - Product standard, performance characteristics				●	●	
EN 1279-1 Glass in building. Insulating glass units. Generalities, dimensional tolerances and rules for the system description				●		●
EN 1279-2 Glass in building. Insulating glass units. Long term test method and requirements for moisture penetration				●		●
IS EN ISO 12567 Thermal performance of windows and doors -- Determination of thermal transmittance by hot box method -- Part 1: Complete windows and doors				●	●	
IS EN ISO 10077 (Parts 1 and 2) Thermal performance of windows, doors and shutters				●	●	
BS 6262 Glazing for buildings. Code of practice for safety related to human impact				●	●	●
BS 8000-7 Workmanship on building sites. Code of practice for glazing				●	●	●
BS 8206-2:2008 Lighting for buildings. Code of practice for daylighting				●	●	●
PAS 23-1:1999 General performance requirements for door assemblies – Part 1: Single leaf, external door assemblies to dwellings						
PAS 24-1:1999 Enhanced security performance requirements for door assemblies - Part 1: Single leaf, external door assemblies to dwellings				●	●	
BS EN 410:2011 Glass in building. Determination of luminous and solar characteristics of glazing						●
BS EN 673:2011 Glass in building. Determination of thermal transmittance (U value). Calculation method						●
BS EN 12898:2001 Glass in building. Determination of the emissivity						●

All measures must also be installed as per the Manufacturer's Installation guidelines

Reference (Publisher)	Heating Controls with Remote Access	Multi Fuel Stoves	Powerflushing of heating systems	Magnetic filtration	Chimney Draught Limiter	Boiler Service	CFL	LED
CE 29 Domestic Heating by Oil: Boiler Systems (Energy Saving Trust)	●							
CE 30 Domestic Heating by Gas: Boiler Systems (Energy Saving Trust)	●							
GBG 302: Controls for Domestic Central Heating & Hot Water – Guidance for Specifiers and Installers (Energy Saving Trust)	●							
BS 7671: Requirements for Electrical Installations (BSI)	●	●						
BS 7478: Selection & Use of Thermostatic Radiator Valves (BSI)	●							
Heating and Domestic Hot Water Systems for Dwellings - Achieving Compliance with Part L (DEHLG & SEAI)	●							
Heating Controls Guide (TACMA)	●							
BS 8303: Parts 1, 2 & 3 Installation of domestic heating and cooking appliances burning solid mineral fuels		●						
CE 47 Domestic Heating: Solid fuel systems		●						
Heating and Domestic Hot Water Systems for Dwellings - Achieving Compliance with Part L (DEHLG & SEAI)		●						
ET101:2008 ETCI National Wiring Rules for Electrical Installations, Fourth Edition		●						
BS 7671: 1992 Requirements for electrical installations		●						
I.S. 813 Domestic Gas Installations (NSAI)		●						
BS 7593:2006 Code of practice for treatment of water in domestic hot water central heating systems			●					
SR-50-1 Code of practice for building services – Part 1: Domestic plumbing & heating where applicable				●				
BS 1251 Specification for open-fireplace components					●			
BS 3376 Specification for solid mineral fuel open fires with convection, with or without boilers					●			
SEAI gas boiler checklist						●		
SEAI oil boiler checklist						●		
EN 13032-1&2 Light and lighting – Measurement and presentation of photometric data of lamps and Luminaires							●	●
IES LM-79-08 Electrical and photometric measurements of Solid-State lighting products								●

All measures must also be installed as per the Manufacturer's Installation guidelines

Reference (Publisher)	Heat Pumps	Biomass Boilers (with/without thermal storage)	Window glazing low e film
Micro generation Installation Standard: MIS 3005 Requirements for Contractors Undertaking the Supply, Design, Installation, Set to Work, Commissioning and Handover of Micro generation Heat Pump Systems	●		
Dept. Of Environment, Community and Local Government (DECLG) and SEAI document, Heating and Domestic Hot Water Systems for Dwellings - Achieving Compliance with Part L	●		
IS EN 15450 Heating Systems in Buildings - Design of Heat Pump Heating Systems	●		
ETCI National Wiring Rules for Electrical Installations, Fourth Edition ET101:2008	●		
B.S. 5449: Forced circulation hot water central heating system for domestic installation	●		
IS EN 12831 Heating systems in buildings – method for calculation of design heat load	●	●	
B.S. EN 12828+A1 Heating systems in buildings. Design for water-based heating systems	●		
EN 8558 Guide to the design, installation, testing and maintenance of services supplying water for domestic use within buildings and their curtilages. Complementary guidance to EN 806.	●		
The Heat Emitter Guide for Domestic Heat Pumps (MCS 021)	●		
Domestic Building Services Compliance Guide (Section 9)	●		
TR30 Guide to Good Practice – Heat Pumps (Building & Engineering Services Association)	●		
CIBSE Guide A – Environmental Design	●		
Good Practice Guide 339, Domestic Ground Source Heat Pumps, Design and Installation of Closed-Loop System	●		
FB59 – Design of Low-Temperature Domestic Heating Systems – a Guide for System Designers and Installers (BRE Trust)	●		
EPA “Summary Guidance for Compliance with the ODS and F-Gas Regulations”	●		
H.P.A.I. Heat Pump installation guidelines	●		
SEAI DEAP Heat Pump Methodology	●		
I.S. EN 378-1 and I.S. EN 378-3: Refrigerating systems and heat pumps - Safety and environmental requirements -Part1: Basic requirements, definitions, classification and selection criteria and -Part3: Installation site and personal protection	●		
CIBSE TM 51 Ground Source Heat Pumps	●		
I.S EN 17628 – Geotechnical Investigation and Testing – Geothermal Testing	●		
Environmental good practice guide for ground source heating and cooling (GEHO0311BTPA-E-E) by the UK Environment Agency	●		
GSI Geothermal Collector suitability Maps	●		
GSI Ground Source Heat and Shallow Geothermal Energy Homeowner Manual	●		
BS 1566-1:2000 ‘Plastics piping systems for soil and waste discharge (low and high temperature) within the building structure. Chlorinated poly(vinyl chloride) (PVC-C). Specification for pipes, fittings and the system’		●	
BS 3198 ‘Specification for copper hot water storage combination units for domestic purposes’		●	
IS. EN. 12897 ‘Water supply. Specification for indirectly heated unvented (closed) storage water heaters’		●	

Reference (Publisher)	Heat Pumps	Biomass Boilers (with/without thermal storage)	Window glazing low e film
BS EN 14336:2004 'Heating systems in buildings. Installation and commissioning of water based heating systems' and the requirements of the system suppliers'		●	
IS EN 12828 'Heating systems in buildings. Design for water-based heating systems'		●	
Micro generation Installation Standard: MIS 3004 Requirements for Contractors Undertaking the Supply, Design, Installation, Set to Work, Commissioning and Handover of Solid Biofuel Heating Systems		●	
TR38 Guide to Good Practice – Installation of Biofuel Heating (Heating & Ventilation Contractors' Association)		●	
BS 8206-2:2008 'Lighting for buildings. Code of practice for daylighting'			●
EN 410 'Glass in building. Determination of luminous and solar characteristics of glazing'			●
EN 673 'Glass in building. Determination of thermal transmittance (U value). Calculation method before the installation of the film'.			●

All measures must also be installed as per the Manufacturer's Installation guidelines

Reference (Publisher)	Gas fired room heaters	high heat retention electric storage heater
TGD Part J of the Building Regulations	●	
I.S. 813. Domestic Gas Installation	●	
Department of the Environment, Community and Local Government and SEAI Document 'Heating and Domestic Hot Water Systems for dwelling – Achieving Compliance with Part L 2008'	●	
BS 7977-1:2009+A1:2013 'Specification for safety and rational use of energy of domestic gas appliances. Radiant/convectors'	●	
ETCI National Rules for Electrical Installations ET101	●	●
BS EN 60531 (Household Electric Thermal Storage Room Heaters - Methods For Measuring Performance)		●
DOM 8, Guide to the Design of Electric Space Heating Systems, TEHVA or the manufacturer's sizing methodology		●

All measures must also be installed as per the Manufacturer's Installation guidelines

Appendix 2: Summary Table of Competencies and Standards

Measure	Installer Competence	Product Standards & Specification	Installation Standards & Specification
Cavity wall insulation	NSAI Agrément approved www.nsai.ie	• The insulation system must be approved by the NSAI Agrément www.nsai.ie • Must help achieve a U-value of 0.27 W/m2K for external walls (Building Regulations – Part L 2008) in as much as is physically and economically possible. www.environ.ie	• The insulation system must be installed as per the conditions specified in the NSAI Agrément certificate. www.nsai.ie • S.R. 54:2014 Code of Practice
External Wall Insulation	Trained by manufacturer in the installation of the system. NSAI Agrément certified installer on ETICS. To facilitate full ETICS certification a contractor can complete a maximum of one job if they have validly applied to NSAI Agrément to become a registered installer of this particular system.	• The insulation system must be approved by the NSAI Agrément or equivalent. www.nsai.ie • the system must be NSAI Agrément approved. • Must help achieve a U-value of 0.27 W/m2K for external walls (Building Regulations – Part L) in as much as is physically and economically possible. www.environ.ie	• The insulation system must be installed as per the manufacturer's technical guidance and specifications and also the NSAI Agrément certificate. www.nsai.ie • S.R. 54:2014 Code of Practice
Internal Wall Insulation	Must be competent to install insulation in accordance with 'Internal wall insulation in existing housing – a guide for specifiers and contractors' (CE17/GPG/138) published by the Energy Savings Trust. www.energysavingtrust.org.uk	• The insulation system must be approved by the NSAI Agrément or equivalent. www.nsai.ie • Must help achieve a U-value of 0.27 W/m2K for external walls (Building Regulations – Part L) in as much as is physically and economically possible. www.environ.ie	• The insulation system must be installed as per 'Internal wall insulation in existing housing – a guide for specifiers and contractors' (CE17/GPG/138) published by the Energy Savings Trust. www.energysavingtrust.org.uk • S.R. 54:2014 Code of Practice
Ceiling-Level Attic Insulation	Must be competent to install insulation in accordance with 'Energy-efficient Refurbishment of existing houses'	• Must help achieve a U-value of 0.16 W/m2K where possible (Building Regulations – Part L).	• The insulation must be installed as per 'Energy-efficient Refurbishment of existing houses' (CE83/GPG155) published by the Energy Savings Trust.

Measure	Installer Competence	Product Standards & Specification	Installation Standards & Specification
	(CE83/GPG155) published by the Energy Savings Trust. www.energysavingtrust.org.uk	• Must not compromise the property's ability to resist internal fire spread within the internal linings and internal fire spread within the structure (Building Regulations – Part B). • Must meet Building Regulations definition of 'proper materials' and conform to workmanship standards (Building Regulations – Part D). • The insulation should also be suitable for use on a property and meet the ventilation requirements in the Building Regulations (Part F). • Installation of the system should not increase the risk of fire in the property due to the use of a heat-producing appliance (Building Regulations – Part J). www.environ.ie	www.energysavingtrust.org.uk • S.R. 54:2014 Code of Practice

Measure	Installer Competence	Product Standards & Specification	Installation Standards & Specification
Rafter-Level Attic Insulation	Must be competent to install insulation in accordance with 'Energy-efficient Refurbishment of existing houses' (CE83/GPG155) published by the Energy Savings Trust. www.energysavingtrust.org.uk	• Must help achieve a U-value of 0.20 W/m2K where possible (Building Regulations – Part L). • Must not compromise the property's ability to resist internal fire spread within the internal linings and internal fire spread within the structure (Building Regulations – Part B). • Must meet Building Regulations definition of 'proper materials' and conform to workmanship standards (Building Regulations – Part D). • The insulation should also be suitable for use on a property and meet the ventilation requirements in the Building Regulations (Part F). • Installation of the system should not increase the risk of fire in the property due to the use of a heat-producing appliance (Building Regulations – Part J). www.environ.ie	• The insulation must be installed as per 'Energy-efficient Refurbishment of existing houses' (CE83/GPG155) published by the Energy Savings Trust. www.energysavingtrust.org.uk • S.R. 54:2014 Code of Practice
Floor Insulation	Must be competent to install insulation in accordance with • Domestic floors: construction, insulation and damp-proofing (GBG 28 Part 1) published by the BRE • Insulating ground floors (GBG 45), published by the BRE • Energy-efficient Refurbishment of existing houses (CE83/GPG155) published by the Energy Saving Trust • Sustainable Refurbishment (CE309) published by the Energy Saving Trust	• The insulation system must be approved by the NSAI Agrément or equivalent. www.nsai.ie • Must help achieve a U-value of 0.36 W/m2K or 0.15 W/m2K (underfloor heating) for floors (Building Regulations – Part L) in as much as is physically and economically possible. www.environ.ie	The insulation must be installed as per • Domestic floors: construction, insulation and damp-proofing (GBG 28 Part 1) published by the BRE • Insulating ground floors (GBG 45), published by the BRE • Energy-efficient Refurbishment of existing houses (CE83/GPG155) published by the Energy Saving Trust • Sustainable Refurbishment (CE309) published by the Energy Saving Trust • S.R. 54:2014 Code of Practice

Measure	Installer Competence	Product Standards & Specification	Installation Standards & Specification
New Boiler (Boiler must be installed complete with heating controls as outlined below)	• The installation of high efficiency boilers must be carried out by suitably qualified individuals in accordance with manufacturer's guidelines and industry best practice as a minimum. In addition to this, they must hold a Level 6 National Craft Certificate in Plumbing or an equivalent Plumbing qualification such as City and Guilds. Plumbers must have completed an electrical module during their course in order to carry out the 'minor' electrical works involved in specific control measures. If 'Controlled Works', as defined by the Commission for Energy Regulation (CER) document entitled 'Definition of the Scope of Controlled Works' are required, a Completion Certificate must be issued. The issuance of a Completion Certificate for 'Controlled works' can only be carried out by a Registered Electrical Contractor or an Inspector of one of the two Safety Supervisory Bodies as defined in Section 2.2 in this CER guidance. • For gas boiler installation contractors must hold a Gas Contractors Domestic Certificate(GID, GI2 or GI3) • For Natural Gas and LPG works the contractor must be RGII registered www.rgii.ie	• Seasonal efficiency > 90% www.seai.ie/harp • Carbon equivalent efficiency of new boiler must be better than existing boiler	• Manufacturers Guidelines • CE 29 Domestic Heating by Oil: Boiler Systems • CE 30 Domestic Heating by Gas: Boiler Systems • Dept. of Environment, Heritage and Local Government & SEAI Document Heating and Domestic Hot Water Systems for Dwellings - Achieving Compliance with Part L www.environ.ie • Dept. of Environment, Heritage and Local Government Building Regulations Technical Guidance Document J - Home Heating Appliances www.environ.ie • Dept. of Environment, Heritage and Local Government & SEAI Guide to the condensing boiler installation assessment procedure for Existing Dwellings www.environ.ie • Dept. of Environment, Heritage and Local Government Building Regulations Technical Guidance Document Part L Dwellings 2008 – Conservation of Fuel & Energy and "Heating and Domestic Hot Water Systems for dwellings – Achieving compliance with Part L 2010" (to be published). www.environ.ie & www.nsai.ie • ETCI National Wiring Rules for Electrical Installations, Fourth Edition ET101:2008 www.ecti.ie • BS 5449 Specification for forced circulation hot water central heating systems for domestic premises

Measure	Installer Competence	Product Standards & Specification	Installation Standards & Specification
			www.bsi-global.com • Good Practice Guide 301 Controls for Domestic Heating & Hot Water – Choice of Fuel & System Type www.energysavingtrust.org.uk • I.S. 813 Domestic Gas Installations www.standards.ie • CER Criteria Document - The Regulation of gas installers with respect to safety www.cer.ie • CER Decision Paper – Definition of the Scope of Controlled Works www.cer.ie
2 Separate Zones with 24 hour 7-day Programmer (incl remote access controls) – incorporating a room thermostat, DHW cylinder thermostat, motorised control valve and boiler interlock.	• The installation of heating controls must be carried out by suitably qualified individuals in accordance with manufacturer's guidelines and industry best practice as a minimum. In addition to this, they must hold a Level 6 National Craft Certificate in Plumbing or an equivalent Plumbing qualification such as City and Guilds. Plumbers must have completed an electrical module during their course in order to carry out the 'minor' electrical works involved in specific control measures. If 'Controlled Works', as defined by the Commission for Energy Regulation (CER) document entitled 'Definition of the Scope of Controlled Works' are required, a Completion Certificate must be issued. The issuance of a Completion Certificate for 'Controlled works' can only be carried out by a Registered Electrical Contractor or an Inspector of one of the two Safety	• BS EN 60730-2-7 Automatic Electrical Controls for Household and similar Use Part 2-7: Particular Requirements for Timers and Time Switches www.bsi-global.com	• Manufacturers Guidelines • Good Practice Guide 302 Controls for Domestic Central Heating & Hot Water – Guidance for Specifiers and Installers www.energysavingtrust.org.uk • TACMA Controls Guide www.heatingcontrols.co.uk • ETCI National Wiring Rules for Electrical Installations, Fourth Edition ET101:2008 www.ecti.ie • BS 5449 Specification for forced circulation hot water central heating systems for domestic premises www.bsi-global.com • Dept. of Environment, Heritage and Local Government Building Regulations Technical Guidance Document Part L Dwellings 2008 – Conservation of Fuel & Energy and "Heating and Domestic Hot Water Systems for dwellings –

Measure	Installer Competence	Product Standards & Specification	Installation Standards & Specification
	Supervisory Bodies as defined in Section 2.2 in this CER guidance.		Achieving compliance with Part L 2010" (to be published). www.environ.ie and www.nsai.ie • CE29 Domestic Heating by Oil: Boiler Systems – Guidance for Installers and Specifiers www.energysavingtrust.org.uk • CE30 Domestic Heating by Gas: Boiler Systems – Guidance for Installers and Specifiers www.energysavingtrust.org.uk • CER Decision Paper – Definition of the Scope of Controlled Works www.cer.ie
Additional Heating Zone	• As above	• As above	• As above
Thermostatic Radiator Valves	• The installation of this control measure must be carried out by suitably qualified individuals in accordance with manufacturer's guidelines and industry best practice as a minimum. In addition to this, they must hold a Level 6 National Craft Certificate in Plumbing or an equivalent Plumbing qualification such as City and Guilds	• BS EN 215 Thermostatic Radiator Valves. Requirements & Test Methods	• Manufacturers Guidelines • BS 7478 Selection & Use of Thermostatic Radiator Valves • Good Practice Guide 302 Controls for Domestic Central Heating & Hot Water – Guidance for Specifiers and Installers www.energysavingtrust.org.uk • TACMA Controls Guide www.heatingcontrols.co.uk • Dept. of Environment, Heritage and Local Government & SEAI Document Heating and Domestic Hot Water Systems for Dwellings - Achieving Compliance with Part L www.environ.ie

Measure	Installer Competence	Product Standards & Specification	Installation Standards & Specification
Time & Temperature Control of Electric Immersion Heater	• The installation of this control measure must be carried out by suitably qualified individuals in accordance with manufacturer's guidelines and industry best practice as a minimum. In addition to this, they must hold a Level 6 National Craft Certificate in Plumbing or an equivalent Plumbing qualification such as City and Guilds. Plumbers must have completed an electrical module during their course in order to carry out the 'minor' electrical works involved in specific control measures. If 'Controlled Works', as defined by the Commission for Energy Regulation (CER) document entitled 'Definition of the Scope of Controlled Works' are required, a Completion Certificate must be issued. The issuance of a Completion Certificate for 'Controlled works' can only be carried out by a Registered Electrical Contractor or an Inspector of one of the two Safety Supervisory Bodies as defined in Section 2.2 in this CER guidance.	• BS EN 60730-2-7 Automatic Electrical Controls for Household and similar Use Part 2-7: Particular Requirements for Timers and Time Switches. www.bsi-global.com www.standards.ie	• Manufacturers Guidelines • Good Practice Guide 302 Controls for Domestic Central Heating & Hot Water – Guidance for Specifiers and Installers www.energysavingtrust.org.uk • TACMA Controls Guide www.heatingcontrols.co.uk • ETCI National Wiring Rules for Electrical Installations, Fourth Edition ET101:2008 www.ecti.ie • Dept. of Environment, Heritage and Local Government & SEAI Document Heating and Domestic Hot Water Systems for Dwellings - Achieving Compliance with Part L www.environ.ie • CER Decision Paper – Definition of the Scope of Controlled Works www.cer.ie Dept. of Environment, Heritage and Local Government Building Regulations Technical Guidance Document Part L Dwellings 2008 – Conservation of Fuel & Energy and "Heating and Domestic Hot Water Systems for dwellings – Achieving compliance with Part L 2010" (to be published). www.environ.ie & www.nsai.ie
Additional Control Measures	• The installation of additional control measure must be carried out by suitably qualified individuals in accordance with manufacturer's guidelines and industry best practice as a minimum. In addition to this, they must hold a Level 6 National Craft Certificate in Plumbing or an equivalent Plumbing qualification such as	• BS EN 60730-2-7 Automatic Electrical Controls for Household and similar Use Part 2-7: Particular Requirements for Timers and Time Switches. www.bsi-global.com	• Manufacturers Guidelines • Good Practice Guide 302 Controls for Domestic Central Heating & Hot Water – Guidance for Specifiers and installers www.energysavingtrust.org.uk • TACMA Controls Guide www.heatingcontrols.co.uk

Measure	Installer Competence	Product Standards & Specification	Installation Standards & Specification
	City and Guilds. Plumbers must have completed an electrical module during their course in order to carry out the 'minor' electrical works involved in specific control measures. If 'Controlled Works', as defined by the Commission for Energy Regulation (CER) document entitled 'Definition of the Scope of Controlled Works' are required, a Completion Certificate must be issued. The issuance of a Completion Certificate for 'Controlled works' can only be carried out by a Registered Electrical Contractor or an Inspector of one of the two Safety Supervisory Bodies as defined in Section 2.2 in this CER guidance.	• Other Relevant IS, BS or EN Standards (if available) www.bsi-global.com	• ETCI National Wiring Rules for Electrical Installations, Fourth Edition ET101:2008 www.ecti.ie Dept. of Environment, Heritage and Local Government Building Regulations Technical Guidance Document Part L Dwellings 2008 – Conservation of Fuel & Energy and "Heating and Domestic Hot Water Systems for dwellings – Achieving compliance with Part L 2010" (to be published). www.environ.ie & www.nsai.ie • Dept. of Environment, Heritage and Local Government & SEAI Document Heating and Domestic Hot Water Systems for Dwellings - Achieving Compliance with Part L www.environ.ie • CER Decision Paper – Definition of the Scope of Controlled Works www.cer.ie
Heat Pump Systems (BEH)	• Fetac/QQI Level 6 Advanced Craft in Plumbing, including a module on minor electrical works, or equivalent • Certificate of competence from the specific manufacturer of the heat pumps installed, based on an adequate training programme • Fetac/QQI Level 6 Heat Pump Systems (Course Code C30263) and supplemental Domestic Heat Pump Installation (Code 700606) or equivalent	See section 7.9.3 Product and installation requirements	See section 7.9.3 Product and installation requirements
Heat Pumps (BEC)	• Level 6 National Craft Certificate in Plumbing or an equivalent Plumbing qualification such as City and Guilds. Plumbers must have completed an electrical module during their course in order to carry out the 'minor'	Qualifying heat pumps must be listed on the SEAI Home-heating Appliance Register of Performance (HARP) database or one of the European Heat Pump Association (EHPA)	• Manufacturer's guidelines, • Microgeneration Installation Standard: MIS 3005 Requirements for Contractors Undertaking the Supply, Design, Installation,

Measure	Installer Competence	Product Standards & Specification	Installation Standards & Specification
	electrical works involved in specific control measures or • the installer shall be listed on an approved manufacturer installers list.	database, the European Commission's Ecolabel catalogue or have Eurovent Certification. IS EN 15450:2007 Heating Systems in Buildings - Design of Heat Pump Heating Systems. The guidance in Section 8.1 of the DECLG and SEAI document entitled 'Heating and Domestic Hot Water Systems for Dwellings - Achieving Compliance with Part L'	Set to Work, Commissioning and Handover of Microgeneration Heat Pump Systems, • Industry best practice, • Building Regulations Technical Guidance Document J – Home Heating Appliances, • The ETCI National Wiring Rules for Electrical Installations, Fourth Edition ET101:2008 and • The latest draft of B.S. 5449: Forced circulation hot water central heating system for domestic installation (or equivalent Irish standard) where applicable. • The Heat Emitter Guide for Domestic Heat Pumps (MCS 021) • IS EN 15450:2007 Heating Systems in Buildings - Design of Heat Pump Heating Systems • Domestic Building Services Compliance Guide (Section 9) • TR30 Guide to Good Practice – Heat Pumps (Building & Engineering Services Association) • CIBSE Guide A – Environmental Design • FB59 – Design of Low-Temperature Domestic Heating Systems – a Guide for System Designers and Installers (BRE Trust) • Good Practice Guide 339, Domestic Ground Source Heat Pumps, Design and Installation of Closed-Loop System
Biomass boilers (with/without thermal storage)	• Level 6 National Craft Certificate in Plumbing or an equivalent Plumbing qualification such as City and Guilds. Plumbers must have completed an electrical module during their course in order to carry out the 'minor' electrical works involved in specific control measures.	Vented copper hot water storage vessels should comply with the heat loss and heat exchanger requirements of BS 1566-1:2000 'Plastics piping systems for soil and waste discharge (low and high temperature) within the building structure. Chlorinated poly(vinyl chloride) (PVC-C). Specification for pipes, fittings and the system' or BS 3198 'Specification for copper hot water storage combination units for domestic purposes'	• BS 1566-1:2000 'Plastics piping systems for soil and waste discharge (low and high temperature) within the building structure. Chlorinated poly(vinyl chloride) (PVC-C). Specification for pipes, fittings and the system' • BS 3198 'Specification for copper hot water storage combination units for domestic purposes'

Measure	Installer Competence	Product Standards & Specification	Installation Standards & Specification
		• Vented cylinders in materials other than copper should comply with the heat loss and heat exchanger requirements of BS 1566 • Unvented hot water storage system products should: – comply with IS. EN. 12897 'Water supply. Specification for indirectly heated unvented (closed) storage water heaters'; or – be certified by the Irish Agrément Board; or – be certified by another accredited body as complying with Building Regulations • Unvented systems should not be used with gravity circulation Section 5.3 of the DECLG and SEAI document entitled "Heating and Domestic Hot Water Systems for Dwellings - Achieving Compliance with Part L" must be adhered to.	• IS. EN. 12897 'Water supply. Specification for indirectly heated unvented (closed) storage water heaters' • BS EN 14336:2004 'Heating systems in buildings. Installation and commissioning of water based heating systems' and the requirements of the system suppliers' • IS EN 12828 'Heating systems in buildings. Design for water-based heating systems' • Micro generation Installation Standard: MIS 3004 Requirements for Contractors Undertaking the Supply, Design, Installation, Set to Work, Commissioning and Handover of Solid Biofuel Heating Systems • TR38 Guide to Good Practice – Installation of Biofuel Heating (Heating & Ventilation Contractors' Association)
Solar heating system	• National Craft Certificate in a relevant trade (Electrical, Plumbing or Fitting) or a Level 6 qualification in a related area such as Building Services, G.I.D. etc and FETAC accredited Domestic Solar Heating Installation course	The product must be registered on the Greener Homes Programme product list (Requirements for this list are the provision of a product registration questionnaire and an EN 12975 Performance Test Report and an EN 12975 Durability Test) Each homeowner must be supplied with a warranty (product and labour) of at least 5 years	• NSAI document 'Draft Irish guidelines (SR 50-2:2010 Code of practice for building services - Part 2: Solar panels, • ETCI National Wiring Rules for Electrical Installations, Fourth Edition ET101:2008 www.ecti.ie • Dept. of Environment, Heritage and Local Government Building Regulations Technical Guidance Document Part L Dwellings 2008 – Conservation of Fuel & Energy and "Heating and Domestic Hot Water Systems for dwellings – Achieving compliance with Part L 2010" (to be published) • Solar Heating Design and Installation Guide – CIBSE Guide

Measure	Installer Competence	Product Standards & Specification	Installation Standards & Specification
			• Renewable Energy Procurement Guidelines for Solar Thermal Systems – SEAI • A Standard Solar Commissioning Report (SCR) as available on the Better Energy Homes website must be completed and a copy provided to each homeowner.
Draught Proofing	Must be competent to install draught proofing in accordance with BS 7386:1997 Specification for draught strips for the draught control of existing doors and windows in housing.	• The draught proofing system must be manufactured to relevant IS, BS or EN standard • Installed as per manufacturer's instructions	The insulation must be installed as per • Manufacturers Guidelines
Insulation of pipework and water storage tanks	Must be competent to install Insulation of pipework and water storage tanks in accordance TGD part G of the Building Regulations	• BS 5970 Code of practice for thermal insulation of pipework and equipment in the temperature range of -100°C to +870°C and • BS 5422 Method for specifying thermal insulating materials for pipes, tanks, vessels, ductwork and equipment operating within the temperature range -40°C to +700°C.	The insulation must be installed as per • Manufacturers Guidelines
Window Replacement	Must be competent to install windows in accordance with Code of practice for the survey and installation of windows and external doorsets (BS 8213-4:2007) and the manufacturer's guidelines as a minimum requirement.	• EN 14351-1:2006 (Windows and doors - Product standard, performance characteristics). • Glazing must conform to EN 1279-1 (Glass in building. Insulating glass units. Generalities, dimensional tolerances and rules for the system description) • EN 1279-2 (Glass in building. Insulating glass units. Long term test method and requirements for moisture penetration) • NSAI Window Energy Performance (WEP) certification, British Fenestration Rating Council	The window must be installed as per • Manufacturers Guidelines • Code of practice for the survey and installation of windows and external doorsets (BS 8213-4:2007)

Measure	Installer Competence	Product Standards & Specification	Installation Standards & Specification
		• Calculated according to either IS EN ISO 12567 Thermal performance of windows and doors -- Determination of thermal transmittance by hot box method -- Part 1: Complete windows and doors or • IS EN ISO 10077 (Parts 1 and 2) Thermal performance of windows, doors and shutters • BS 6262 Glazing for buildings. Code of practice for safety related to human impact • BS 8000-7 Workmanship on building sites. Code of practice for glazing • BS 8206-2:2008 Lighting for buildings. Code of practice for daylighting	
External Door Replacement	Must be competent to install doors in accordance with Code of practice for the survey and installation of windows and external doorsets (BS 8213-4:2007) and the manufacturer's guidelines as a minimum requirement.	• EN 14351-1:2006 (Windows and doors - Product standard, performance characteristics). • PAS 23-1:1999 (General performance requirements for door assemblies – Part 1: Single leaf, external door assemblies to dwellings) • PAS 24-1:1999 (Enhanced security performance requirements for door assemblies - Part 1: Single leaf, external door assemblies to dwellings). • Calculated according to either IS EN ISO 12567 Thermal performance of windows and doors -- Determination of thermal transmittance by hot box method -- Part 1: Complete windows and doors or • IS EN ISO 10077 (Parts 1 and 2) Thermal performance of windows, doors and shutters • BS 6262 Glazing for buildings. Code of practice for safety related to human impact • BS 8000-7 Workmanship on building sites. Code of practice for glazing • BS 8206-2:2008 Lighting for buildings. Code of practice for daylighting	The external door must be installed as per • Manufacturers Guidelines • Code of practice for the survey and installation of windows and external doorsets (BS 8213-4:2007)

Measure	Installer Competence	Product Standards & Specification	Installation Standards & Specification
Window Glazing Envelope Replacement	Must be competent to install window Glazing Envelope in accordance with Code of practice for the survey and installation of windows and external doorsets (BS 8213-4:2007) and the manufacturer's guidelines as a minimum requirement and BS 8000-7 Workmanship on building sites. Code of practice for glazing	• Window Glazing Envelope must conform to EN 1279-1 (Glass in building. Insulating glass units. Generalities, dimensional tolerances and rules for the system description) • EN 1279-2 (Glass in building. Insulating glass units. Long term test method and requirements for moisture penetration) • BS 6262 Glazing for buildings. Code of practice for safety related to human impact • BS 8000-7 Workmanship on building sites. Code of practice for glazing • BS EN 410:2011 Glass in building. Determination of luminous and solar characteristics of glazing • BS EN 673:2011 Glass in building. Determination of thermal transmittance (U value). Calculation method • BS 8206-2:2008 Lighting for buildings. Code of practice for daylighting	The Window Glazing Envelope must be installed as per • Manufacturers Guidelines • Code of practice for the survey and installation of windows and external doorsets (BS 8213-4:2007)
Multi fuel stoves	Must be competent to install Multi Fuel Stoves in accordance document Installation of domestic heating and cooking appliances burning solid mineral fuels (BS 8303: Parts 1, 2 & 3) and also in accordance with Domestic Heating: Solid fuel systems (CE 47) published by the Energy Saving Trust	• BS EN 13240 (Room heaters fired by solid fuel. Requirements and test methods) • TGD Part L of the Building Regulations	Multi Fuel Stoves must be installed as per • Manufacturers Guidelines • Installation of domestic heating and cooking appliances burning solid mineral fuels (BS 8303: Parts 1, 2 & 3) • Domestic Heating: Solid fuel systems (CE 47) published by the Energy Saving • BS 7671: 1992 (Requirements for electrical installations • ETCI National Wiring Rules for Electrical Installations, Fourth Edition (ET101:2008). • I.S. 813 Domestic Gas Installations
Gas fired room heaters	The installation of a gas fired room heater must be carried out by suitably qualified individuals in accordance with manufacturer's guidelines and industry best practice as a minimum. Contractors	• TGD Part J of the Building Regulations • I.S. 813. • Section 2.5 of the Department of the Environment, Community and Local	• TGD Part J of the Building Regulations • I.S. 813. Domestic Gas Installation • Department of the Environment, Community and Local Government and SEAI Document

Measure	Installer Competence	Product Standards & Specification	Installation Standards & Specification
	wishing to install Liquefied Petroleum Gas (LPG) or Natural Gas boilers under the Programme must hold a Gas Contractors Domestic Certificate (GI D, GI 2 or GI 3) and be registered with RGI.	Government and SEAI Document 'Heating and Domestic Hot Water Systems for dwelling – Achieving Compliance with Part L 2008' • BS 7977-1:2009+A1:2013 'Specification for safety and rational use of energy of domestic gas appliances. Radiant/convectors' and • BS EN 613:2001	'Heating and Domestic Hot Water Systems for dwelling – Achieving Compliance with Part L 2008' • BS 7977-1:2009+A1:2013 'Specification for safety and rational use of energy of domestic gas appliances. Radiant/convectors' • ETCI National Rules for Electrical Installations ET101
Mechanically-assisted powered cleanse and flush (powerflushing) of a heating system	Must be competent to mechanically-assisted powered cleanse and flush (powerflushing) of a heating system must be carried out by suitably qualified individuals in accordance with manufacturer's guidelines and industry best practice as a minimum. In addition to this, they must hold a Level 6 National Craft Certificate in Plumbing or an equivalent Plumbing qualification such as City and Guilds.	• BS 7593 Code of practice for treatment of water in domestic hot water central heating systems	Mechanically-assisted powered cleanse and flush (powerflushing) of a heating system must be performed as per • Manufacturers Guidelines • BS 7593 Code of practice for treatment of water in domestic hot water central heating systems
Installation of magnetic filtration system to existing heating system	Must be competent to install magnetic filtration system to existing heating system and must be carried out by suitably qualified individuals in accordance with manufacturer's guidelines and industry best practice as a minimum. In addition to this, they must hold a Level 6 National Craft Certificate in Plumbing or an equivalent Plumbing qualification such as City and Guilds	• SR-50-1 Code of practice for building services – Part 1: Domestic plumbing & heating where applicable	Magnetic filtration system to existing heating system must be installed as per • Manufacturers Guidelines • SR-50-1 Code of practice for building services – Part 1: Domestic plumbing & heating where applicable
Chimney Draught Limiter	Must be competent to install a Chimney Draught Limiter and must be carried out by suitably qualified individuals in accordance with manufacturer's guidelines and industry best practice as a minimum.	• BS 1251 'Specification for open-fireplace components' and • BS 3376 'Specification for solid mineral fuel open fires with convection, with or without boilers'	Chimney Draught Limiter must be installed as per • Manufacturers Guidelines

Measure	Installer Competence	Product Standards & Specification	Installation Standards & Specification
Boiler Service	Must be competent to service a boiler and must be carried out by suitably qualified individuals in accordance with manufacturer's guidelines and industry best practice as a minimum. In addition to this, they must hold a Level 6 National Craft Certificate in Plumbing or an equivalent Plumbing qualification such as City and Guilds.	• Manufacturers Guidelines • SEAI checklist • I.S. 813 Domestic Gas Installations(where applicable)	Boiler Service must be carried out as per • Manufacturers Guidelines • SEAI checklist • I.S. 813 Domestic Gas Installations(where applicable) www.standards.ie
CFL	Contractors installing CFL lighting must be competent to complete the installation.	• EN 13032-1&2 "Light and lighting – Measurement and presentation of photometric data of lamps and Luminaires"	CFL Installation must be carried out as per • Manufacturers Guidelines
LED	Contractors installing LED lighting must be competent to complete the installation.	LED luminaires: EN 13032-1&2 "Light and lighting – Measurement and presentation of photometric data of lamps and Luminaires" OR IES LM-79-08 "Electrical and photometric measurements of Solid-State lighting products". LED lamps IES LM-79-08 "Electrical and photometric measurements of Solid-State lighting products".	LED Installation must be carried out as per • Manufacturers Guidelines
High heat retention electric storage heater	The installation of a high heat retention electric storage heater should be carried out by an electrical contractor in accordance with manufacturer's guidelines and industry best practice as a minimum and must be registered with the Register of Electrical Contractors of Ireland (RECI) or Electrical Contractors Safety & Standards Association (ECSSA).	It must be replacing an existing electric storage heater. It must be a whole dwelling solution. It must have a minimum heat retention not less than 45% as measured in accordance with BS EN 60531 (Household Electric Thermal Storage Room Heaters - Methods For Measuring Performance) The heat retention testing must have been carried out by an organisation accredited to test in accordance with BS EN 60531 or the testing must be endorsed by a body accredited to test in accordance with BS EN 60531 It must include both input and output controls It also must include both a timer and a room thermostat, which can be controlled by the user.	High heat retention electric storage heater Installation must be carried out as per • Manufacturer's guidelines • DOM 8, Guide to the Design of Electric Space Heating Systems, TEHVA or the manufacturer's sizing methodology. • ETCI National Rules for Electrical Installations ET101. • S.R. 54:2014 - Code of practice for the energy efficient retrofit of dwellings • Department of the Environment, Community and Local Government and SEAI Document 'Heating and Domestic Hot Water Systems for dwelling – Achieving Compliance with Part L 2008'.

Measure	Installer Competence	Product Standards & Specification	Installation Standards & Specification

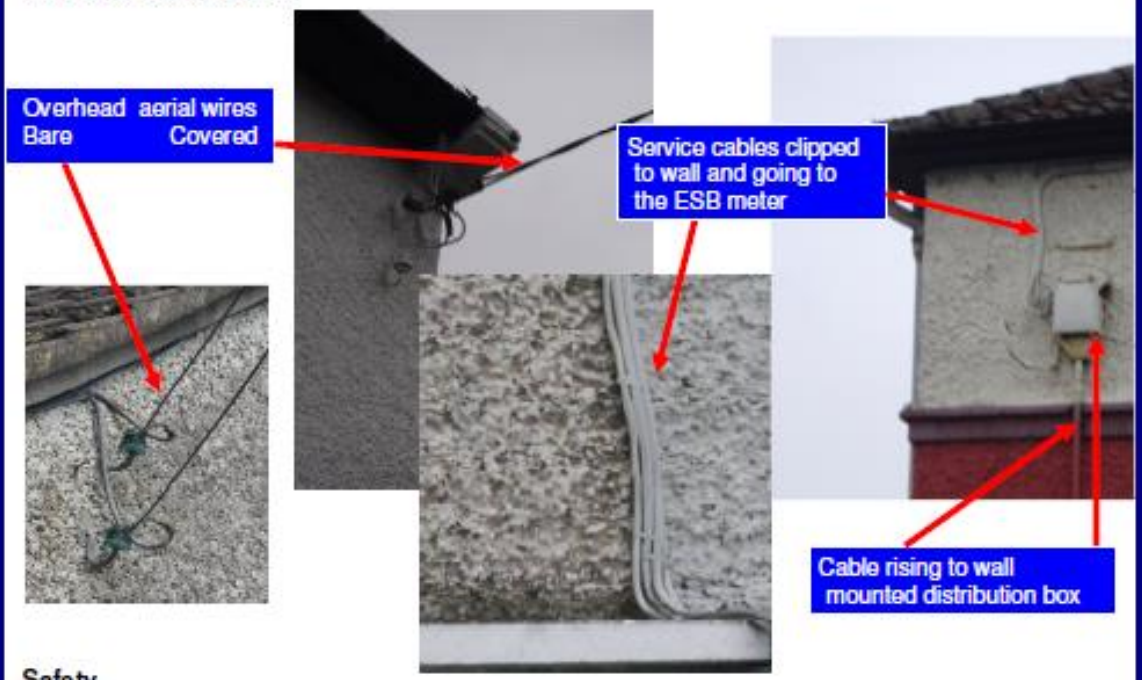
APPENDIX 3: ESB NETWORKS GUIDANCE DOCUMENTS

ESB Networks
Serving all electricity customers

EXTERNAL WALL INSULATION
Guidelines for Homeowners and Contractors on ESB Networks requirements and charges

Introduction

Houses which are suitable for external wall insulation are in most instances connected to the ESB network by either, an overhead aerial wire(s) or a wall mounted distribution box. Surface mounted service cables are then used to complete the connection to the Electricity Meter position. Examples of each are shown in the following photographs:



Safety

For Health and Safety reasons - including fire safety, External Wall Insulation or other materials MUST NOT be placed over ESB Networks electricity cables or fixtures.

Where the electricity supply to a house is attached to external walls or soffits, as shown in the photographs above, ESB Networks must be contacted to arrange for the required alteration. The insulation contractor or other third party must not attempt to remove or touch any service cable, aerial wires or other fixtures belonging to ESB Networks. Only ESB trained and approved personnel are permitted to alter or work on these cables/wires.

Sustainable Energy Authority of Ireland (SEAI)

SEAI's Terms and Conditions for grant approvals require compliance with this Guideline.
SEAI's '**Contractors Code of Practice and Standards and Specification Guidelines**' under the '**Better Energy Homes Scheme**' also specifies the need for full compliance with this Guideline. A set of drawings showing technical specifications titled '**External Wall Insulation**' also form part of the Code of Practice and should be referred to for guidance.

Charge for Service Alterations

ESB Networks apply a standard charge where the service cables / aerial wires etc. to a domestic house have to be altered. This charge, which is approved by the Commission for Energy Regulation, is €397 payable in advance and is subject to change.

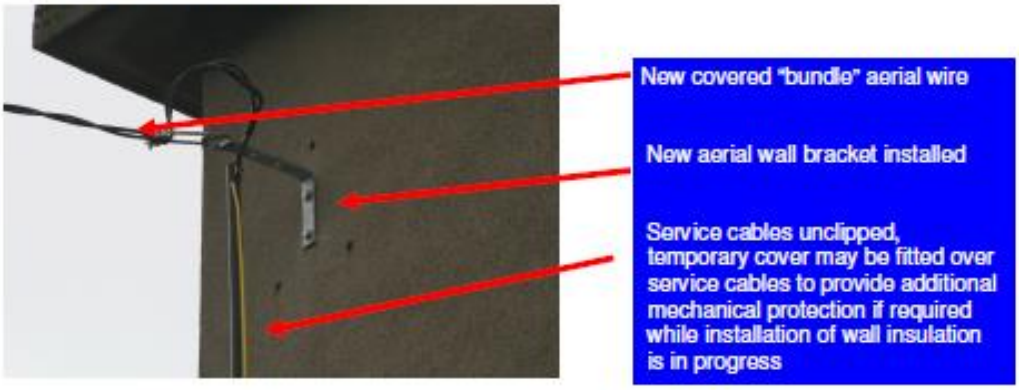
Contacting ESB Networks

ESB Networks can be contacted by calling **1850-372-757**. The **M**eter **P**oint **R**eference **N**umber (**MPRN**) for the property where the work is being carried out is required by the Call Centre when logging a service alteration request. The **MPRN** number can be found on your electricity bill directly beneath the ESB Networks emergency phone number. **ESB Networks require a minimum notice of 5 working days from receipt of payment for a site visit.**

Site Visit

As part of the initial site visit, ESB Networks will carry out all preliminary work **to allow the wall insulation work to commence.** This preliminary work will include:

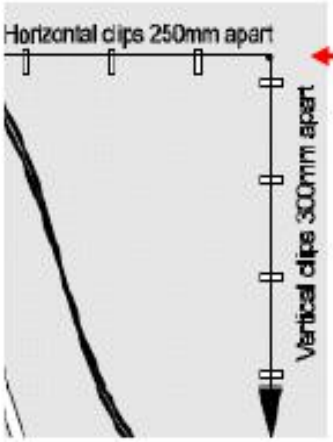
- **Unclipping of existing service cables** (and replacement of cables where required)
- **Removal of anchor insulators and the fitting of a new extended aerial bracket**
- **Installation of new covered "bundle" aerial wire if the existing aerial wire is bare or PVC covered (See photograph below)**
- **Fit lead in pipe if required**



Reinstatement of Service Cables

The homeowner or contractor must notify ESB Networks as soon as the work is complete. The contractor is required to fit non load bearing fixing elements for cable clips along the service route to enable ESB Networks to re-clip the service. These fixing elements should be spaced at 250mm intervals for horizontal runs and 300mm for vertical runs. They must have sufficient strength to support the service cable. The contractor shall mark the location of these fixing elements on the finished render to avoid the risk of damage to the render during re-clipping. For Safety reasons ESB Network service cables **must not** come into contact with un-rendered insulation materials. A lead in pipe is required where the service cables pass through insulation to the meter position. ESB Networks will supply and fit this where required.

Alternatively: The service cable can be placed in a 50mm by 50mm UPVC trunking. **The contractor is responsible for supplying and fitting this trunking.** The trunking must be securely fixed with non load bearing fixing elements. **Trunking fixed with an adhesive backing is not acceptable.**

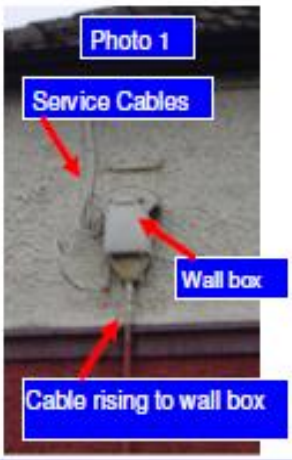


Spacing of non load bearing fixing elements for reinstating service cables to finished render.

Alternatively the service cables can be enclosed in UPVC trunking.

Wall Distribution Box

In some urban situations a Wall Distribution Box will be found at an elevated level instead of overhead aerial wire(s). **ESB Networks must be contacted to remove this box before external wall insulation is fitted.** The three photographs below show the stages involved in replacing a Wall Distribution Box. Photo 1 shows an existing Wall Distribution Box. The Wall Box is connected to the ESB underground network by a surface mounted cable. The electricity supply to a number of houses is taken from the box. Photos 2 and 3 show the existing surface mounted cable and Wall Distribution Box replaced with a new cable enclosed in a 100 x100mm steel trunking (supplied by ESB Networks). The steel trunking is mounted on a timber backing. **The timber backing must be supplied and fitted by the contractor carrying out the external wall insulation**. The wall insulation and finished render cover the sidewall of the steel trunking. The lid of the trunking must not be covered as this provides access for ESB to their cables (photo 3). Ground excavation for connecting the cable is normally located on the property, but it may be necessary to locate this trench on the public footpath.



Outdoor Meter Cabinet

Where an outdoor meter cabinet exists, the ESB Networks equipment in the meter cabinet may be connected to the Network by:

1. **Overhead aerial wires and service cable or a wall mounted box and service cable** (see photos on Page 1)
2. **An underground service cable** (from a pole or ground mounted pillar or buried mains cable)

Where the connection to the cabinet is by means of an underground service cable which runs within the wall cavity along its full length from the cabinet to the network, then it is not necessary to contact ESB Networks before proceeding with the external wall insulation. However, care must be exercised when drilling or attaching fixings under or in the vicinity of the cabinet, to ensure that electric cables within the cavity are not damaged.

In any situation where the connection from the ESB network to the meter involves any cables, wires or other fixtures that are attached to an external wall or soffit, then ESB Networks must be contacted to carry out the required alteration.

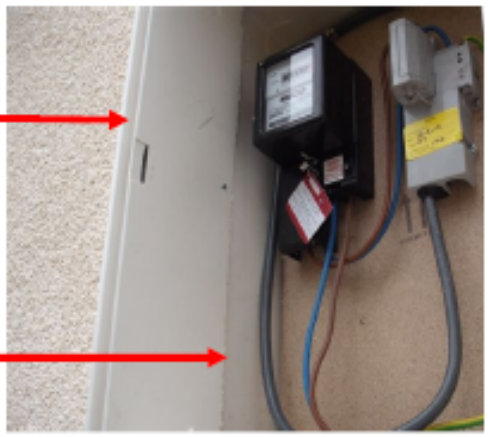
Do not attempt to move the existing cabinet. Doing so will disturb the existing connections and increase the risk of damage to the cables creating a potential fire hazard.

Meter Cabinet Door

The contractor must modify the existing meter cabinet in order to fill the recess created by the fitting of external wall insulation. This is done by removing the door from the existing cabinet and cutting away the back from a new cabinet. The new cabinet is then placed in the recess with the sidewalls of the new and old cabinets overlapping. Accurate fitting is essential to "seal off" the wall insulation from the inner cabinet. The photograph below shows a modified cabinet fitted to an existing meter cabinet.

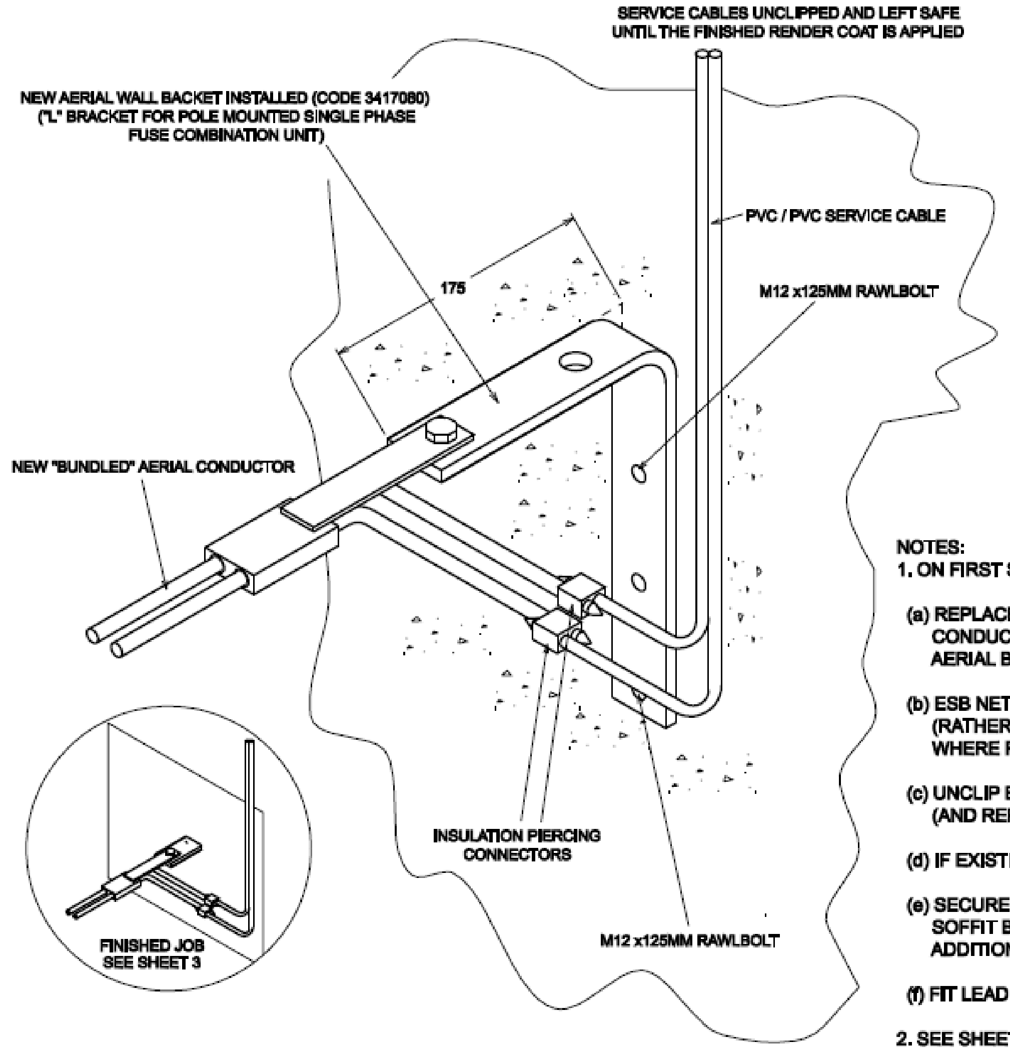
New meter cabinet with back removed is placed into existing cabinet.

The sidewalls of the new cabinet overlap the sidewalls of the existing cabinet to seal off the wall insulation from the inner cabinet



Meter cabinets are manufactured to a specific standard to give protection in the event of fire. Do not use alternative materials to modify the meter cabinet.

A4 CAD



SHEET 1 OF 5

REFER TO ESB NETWORKS DOCUMENT TITLED "EXTERNAL WALL INSULATION GUIDELINES FOR HOMEOWNERS AND CONTRACTORS ON ESB NETWORKS REQUIREMENTS AND CHARGES"

NOTES:

1. ON FIRST SITE VISIT, ESB NETWORKS WILL:

(a) REPLACE EXISTING SWAN NECK OR "D" BRACKET ANCHORS AND NON-INSULATED AERIAL CONDUCTORS WITH A NEW "L" BRACKET ANCHOR AND INSULATED AERIAL BUNDLE CONDUCTOR.

(b) ESB NETWORKS WILL ATTACH THE SHORT SIDE OF THIS BRACKET TO THE WALL (RATHER THAN THE LONG SIDE AS SHOWN IN THIS DRAWING) WHERE PROPOSED INSULATION THICKNESS IS GREATER THAN 130mm

(c) UNCLIP EXISTING SERVICE CABLES (AND REPLACEMENT OF CABLES WHERE REQUIRED)

(d) IF EXISTING SERVICE CABLE IS UNDERSIZED, REPLACE WITH PVC / PVC SERVICE CABLE.

(e) SECURE SERVICE CABLE TEMPORARILY TO THE FACIA OR SOFFIT BOARD UNTIL THE FINISHED RENDER COAT IS APPLIED. ADDITIONAL TEMPORARY MECHANICAL PROTECTION MAY BE FITTED IF REQUIRED.

(f) FIT LEAD IN PIPE IF REQUIRED.

2. SEE SHEET 2 FOR DETAILS OF FINAL FIXING OF SERVICE CABLES.

Rev | Date | Revision Description | Drn | Prod | Ver | App

Purpose of Issue - Preliminary unless indicated
Tender ☐ Client Approval ☐ Construction ☐ As-built ☐ Revised ☐

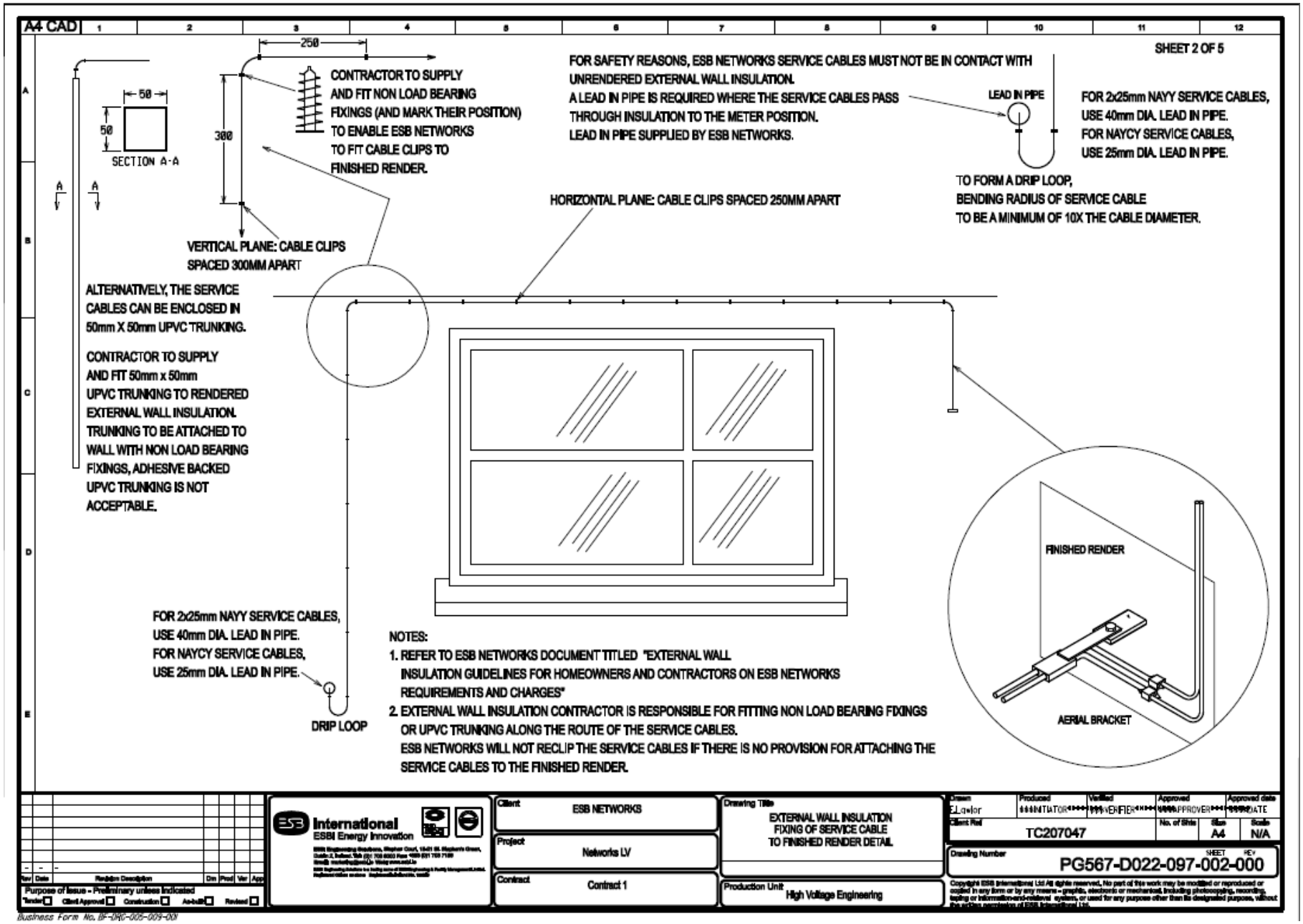
ESB International
ESBI Energy Innovation

Client: ESB NETWORKS
Project: Networks LV
Contract: Contract 1 Contract 2

Drawing Title: EXTERNAL WALL INSULATION AERIAL BRACKET DETAIL
Production Unit: High Voltage Engineering

Drawn: E.Lawlor | Produced: ###INITIATOR### | Verified: ###VERIFIER### | Approved: ###APPROVER### | Approved date: ###DATE
Client Ref: TC207047 | No. of Shts | Size: A4 | Scale: N/A
Drawing Number: PG567-D022-097-001-000 (SHEET, REV)

Business Form No. BF-DRG-005-009-001


A4 CAD
SHEET 2 OF 5
250
50
50
SECTION A-A
300
CONTRACTOR TO SUPPLY AND FIT NON LOAD BEARING FIXINGS (AND MARK THEIR POSITION) TO ENABLE ESB NETWORKS TO FIT CABLE CLIPS TO FINISHED RENDER.
FOR SAFETY REASONS, ESB NETWORKS SERVICE CABLES MUST NOT BE IN CONTACT WITH UNRENDERED EXTERNAL WALL INSULATION.
A LEAD IN PIPE IS REQUIRED WHERE THE SERVICE CABLES PASS THROUGH INSULATION TO THE METER POSITION.
LEAD IN PIPE SUPPLIED BY ESB NETWORKS.
LEAD IN PIPE
FOR 2x25mm NAYY SERVICE CABLES, USE 40mm DIA. LEAD IN PIPE.
FOR NAYCY SERVICE CABLES, USE 25mm DIA. LEAD IN PIPE.
TO FORM A DRIP LOOP, BENDING RADIUS OF SERVICE CABLE TO BE A MINIMUM OF 10X THE CABLE DIAMETER.
HORIZONTAL PLANE: CABLE CLIPS SPACED 250MM APART
VERTICAL PLANE: CABLE CLIPS SPACED 300MM APART
ALTERNATIVELY, THE SERVICE CABLES CAN BE ENCLOSED IN 50mm X 50mm UPVC TRUNKING.
CONTRACTOR TO SUPPLY AND FIT 50mm x 50mm UPVC TRUNKING TO RENDERED EXTERNAL WALL INSULATION. TRUNKING TO BE ATTACHED TO WALL WITH NON LOAD BEARING FIXINGS, ADHESIVE BACKED UPVC TRUNKING IS NOT ACCEPTABLE.
FINISHED RENDER
AERIAL BRACKET
FOR 2x25mm NAYY SERVICE CABLES, USE 40mm DIA. LEAD IN PIPE.
FOR NAYCY SERVICE CABLES, USE 25mm DIA. LEAD IN PIPE.
DRIP LOOP
NOTES:
1. REFER TO ESB NETWORKS DOCUMENT TITLED "EXTERNAL WALL INSULATION GUIDELINES FOR HOMEOWNERS AND CONTRACTORS ON ESB NETWORKS REQUIREMENTS AND CHARGES"
2. EXTERNAL WALL INSULATION CONTRACTOR IS RESPONSIBLE FOR FITTING NON LOAD BEARING FIXINGS OR UPVC TRUNKING ALONG THE ROUTE OF THE SERVICE CABLES.
ESB NETWORKS WILL NOT RECLIP THE SERVICE CABLES IF THERE IS NO PROVISION FOR ATTACHING THE SERVICE CABLES TO THE FINISHED RENDER.
Purpose of Issue - Preliminary unless indicated
ESB International
ESBI Energy Innovation
Client: ESB NETWORKS
Project: Networks LV
Contract: Contract 1
Drawing Title: EXTERNAL WALL INSULATION FIXING OF SERVICE CABLE TO FINISHED RENDER DETAIL
Production Unit: High Voltage Engineering
Client Ref: TC207047
Drawing Number: PG567-D022-097-002-000
Business Form No. BF-DRG-005-009-001

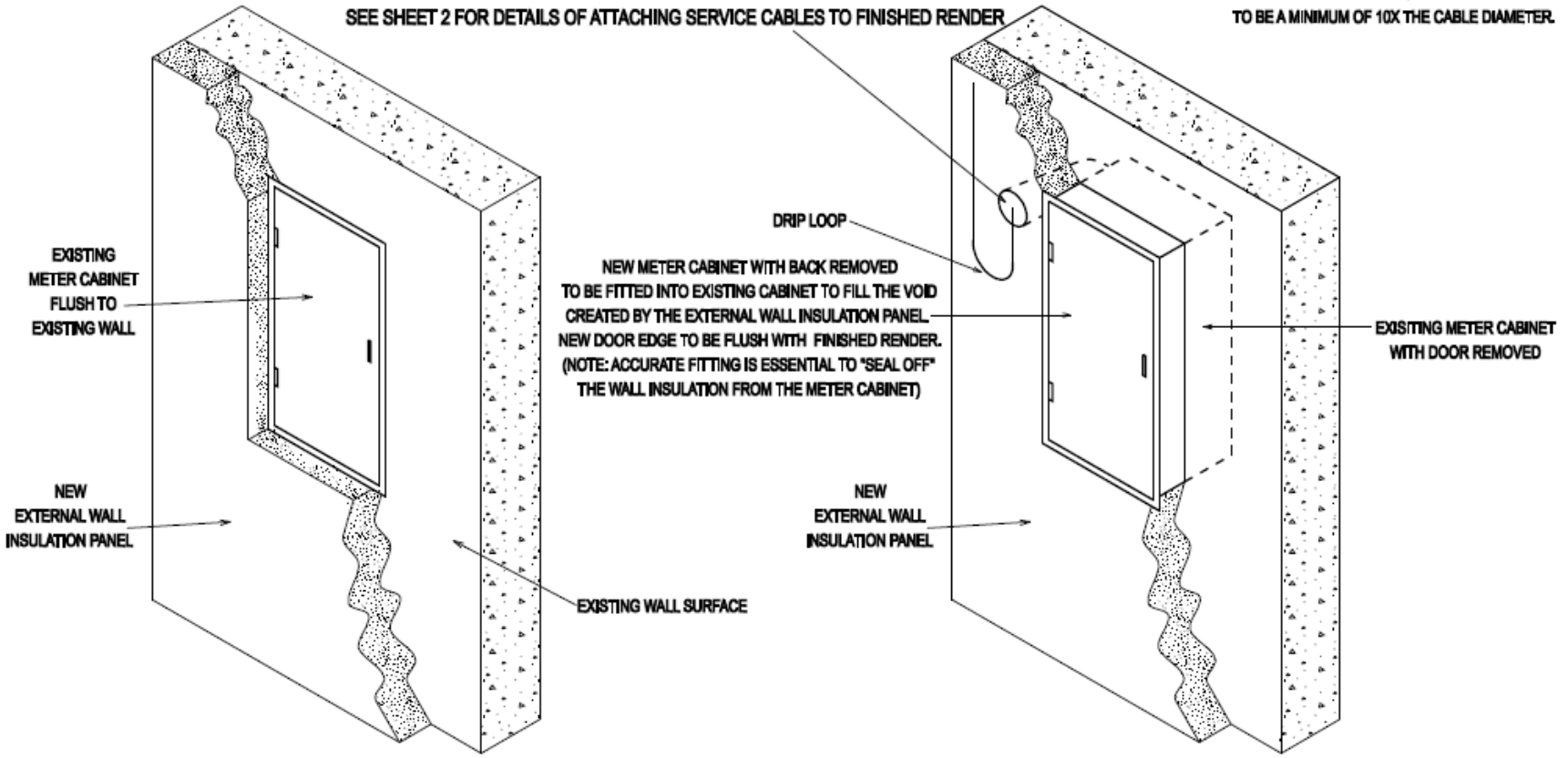
REFER TO ESB NETWORKS DOCUMENT TITLED "EXTERNAL WALL INSULATION GUIDELINES FOR HOMEOWNERS AND CONTRACTORS ON ESB NETWORKS REQUIREMENTS AND CHARGES"

FOR SAFETY REASONS, ESB NETWORKS SERVICE CABLES MUST NOT BE IN CONTACT WITH UNRENDERED EXTERNAL WALL INSULATION, A LEAD IN PIPE IS REQUIRED WHERE THE SERVICE CABLES PASS THROUGH INSULATION TO THE METER POSITION.
POSITION THE LEAD IN PIPE AT THE TOP LEFT HAND CORNER OF THE METER CABINET.
SEE SHEET 2 FOR DETAILS OF ATTACHING SERVICE CABLES TO FINISHED RENDER

LEAD IN PIPE

FOR 2x25mm NAYY SERVICE CABLES, USE 40mm DIA. LEAD IN PIPE.
FOR NAYCY SERVICE CABLES, USE 25mm DIA. LEAD IN PIPE.

TO FORM A DRIP LOOP, BENDING RADIUS OF SERVICE CABLE TO BE A MINIMUM OF 10X THE CABLE DIAMETER.



Rev	Date	Revision Description	Drn	Prod	Ver	App
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Purpose of Issue - Preliminary unless Indicated
Tender ☐ Client Approval ☐ Construction ☐ As-built ☐ Revised ☐

ESB International
ESBI Energy Innovation

Client: ESB NETWORKS
Project: Networks LV
Contract:

Drawing Title: EXTERNAL WALL INSULATION EXTENSION OF EXISTING METER CABINET

Production Unit: High Voltage Engineering

Drawn	Produced	Verified	Approved	Approved date
E.Lawlor	INITIATOR	VERIFIER	APPROVER	DATE

Client Ref: TC207047
No. of Shts: –
Size: A4
Scale: N/A

Drawing Number: PG567-D022-097-003-000
SHEET –
REV –

A4 CAD

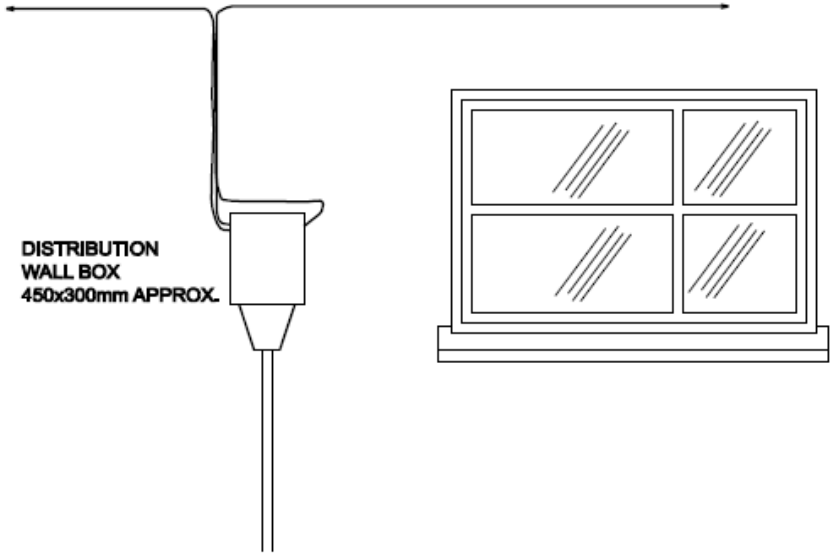
SHEET 4 OF 5

REFER TO ESB NETWORKS DOCUMENT TITLED "EXTERNAL WALL INSULATION GUIDELINES FOR HOMEOWNERS AND CONTRACTORS ON ESB NETWORKS REQUIREMENTS AND CHARGES"

EXISTING CONNECTION TO ESB NETWORK

ESB NETWORKS DISTRIBUTION WALL BOX,
MAINS & SERVICE CABLES SURFACE MOUNTED
ON EXISTING WALL.

SERVICE CABLES TO MULTIPLE HOUSES
CONNECTED TO DISTRUBUTION WALL BOX.

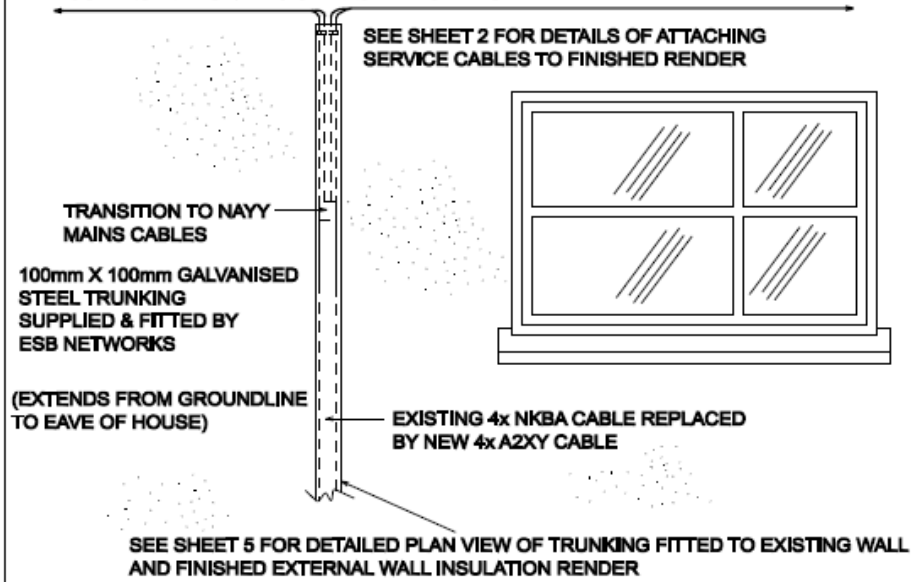


EXISTING WALL BOX, MAINS CABLE FROM UNDERGROUND
NETWORK & SERVICE CABLES TO A NUMBER OF HOUSES

NEW CONNECTION TO ESB NETWORK

SURFACE MOUNTED DISTRIBUTION WALL BOX REMOVED,
MAIN CABLE ENCLOSED IN 100mm X 100mm GALVANISED
STEEL TRUNKING, TRUNKING PROJECTS A MINIMUM
OF 15mm BEYOND FINISHED RENDER.

SERVICE CABLES FOR MULTIPLE HOUSES
CONNECTED TO MAINS CABLES IN TRUNKING.



WALL BOX REPLACED BY GALVANISED TRUNKING & MAINS CABLE FROM UNDERGROUND
NETWORK & SERVICE CABLES TO A NUMBER OF HOUSES

Rev	Date	Revision Description	Drn	Prod	Ver	App
-	-	-				

Purpose of Issue – Preliminary unless Indicated
Tender ☐ Client Approval ☐ Construction ☐ As-built ☐ Revised ☐

ESB International
ESBI Energy Innovation

Client: ESB NETWORKS
Project: Networks LV
Contract:
Drawing Title: EXTERNAL WALL INSULATION REPLACEMENT OF DISTRIBUTION BOX, & FITTING 100mm X 100mm GALVANISED TRUNKING
Production Unit: High Voltage Engineering

Drawn	Produced	Verified	Approved	Approved date
E.Lawlor	INITIATOR	VERIFIER	APPROVER	DATE

Client Ref: TC207047
No. of Shts:
Size: A4
Scale: N/A
Drawing Number: PG567-D022-097-004-000
SHEET
REV

Business Form No. BF-DRC-005-009-001