

## Local Authority Housing Stock

### Standards and Specifications Guidelines

Version 1.35  
20<sup>th</sup> July 2010

*Created by:*

*The Tipperary Energy Agency for and on behalf of Tipperary Local Authorities.*

The information provided herein is offered in good faith for the guidance of Local Authorities and contractors to the best practice in upgrading social housing, but no warranty or representation is given as to the accuracy or completeness of any of it and the Contracting Authority and their advisers shall not be under any liability for any error, misstatement or omission.





## Table of Contents

Table of Contents .....	2
1. Introduction .....	5
2. General Contract Requirements .....	5
2.1 INSPECTION OF Sites .....	6
2.2 CONDITIONS OF EMPLOYMENT .....	6
2.3 TENDERS.....	7
2.4 Tax Certificate Procedure.....	7
2.5 SUBCONTRACTORS.....	7
2.6 DAYWORKS.....	7
2.7 TIME FOR COMPLETION .....	7
2.8 LIQUIDATED DAMAGES.....	8
2.9 ENGINEER OR ARCHITECT .....	8
2.10 DEFECTS LIABILITY .....	8
2.11 RETENTIONS.....	8
2.12 SAMPLES.....	8
2.13 PLANT, SCAFFOLDING AND SUPER-INTENDENCE OF WORK.....	8
2.14 RESPONSIBILITY FOR DAMAGE & INJURIES.....	9
2.15 PROTECTION.....	9
2.16 VARIATIONS, EXTRAS AND OMISSIONS .....	9
2.17 WATER FOR WORKS & FOR CONCRETE MORTARS & PLASTERING.....	10
2.18 CLEAR AWAY PLANT & WORKS & BUILDINGS.....	10
2.19 HANDING OVER WORKS ON COMPLETION.....	10
2.20 DEFINITION.....	10
2.21 P.C.SUMS.....	10
2.22 COPIES OF DRAWINGS ETC. ....	10
2.23 CHARGES .....	10
2.24 GENERAL REQUIREMENTS .....	10
3. Technical Standards.....	11
3.1 General Installation Standards.....	11
3.2 SAFETY:.....	12
4. Quality Assurance and Inspections.....	13
5. VENTILATION .....	14
6. Wall Upgrade Options.....	16
6.1 CAVITY WALL INSULATION .....	16
6.2 EXTERNAL WALL INSULATION.....	17
6.3 INTERNAL WALL INSULATION .....	20
7. ROOF INSULATION.....	22
7.1 CEILING LEVEL ATTIC INSULATION .....	22
7.2 RAFTER LEVEL ATTIC INSULATION (WARM ROOF).....	24
8. HEATING CONTROLS.....	26
8.1 General Standards & Specifications.....	26
8.2 Two Zones (Space Heating & Domestic Hot Water) .....	27

## Local Authorities Social Housing Specification for Energy Upgrades

8.3	An Additional Zone.....	29
8.4	Thermostatic Radiator Valves (TRVs).....	29
8.5	Additional Control Measures .....	30
8.6	Incorporating a secondary heat source into the heating and hot water circuit. ....	31
9.	HIGH EFFICIENCY BOILERS .....	33
9.1	Sizing of Condensing Boiler .....	34
9.2	Installation of External Oil Boiler .....	35
10.	Multi Fuel Stoves .....	37
11.	Solar Water Heating: .....	39
12.	Window Replacement. ....	40
13.	APPENDIX A.....	43

## 1. Introduction

Local Authorities are aiming to reduce the energy consumption of social housing. In order to ensure that these measures are done to the correct standard with required results for energy performance. Each dwelling will be upgraded, ideally to a C1 rating by undergoing a specific set of measures as detailed by the BER assessor. It is vital that these measures are undertaken to the correct standard, as detailed below to ensure the finished building meets the standard as assumed by implementing these upgrade measures with the specification below for conformance.

The remedial measures include:

1. Ventilation to 2009 Part F requirements.
2. Roof Insulation
3. Wall Insulation
  - a. Cavity Wall Insulation
  - b. Internal Wall Insulation
  - c. External Wall Insulation
4. High Efficiency boiler
  - a. 91% for Gas boilers
  - b. 94% for Oil Boilers
  - c. 85% for Wood pellet based boilers
5. High efficiency stove
  - a. EN13240/13229 tested
  - b. Minimum gross efficiency of 75% when burning smokeless fuels (as identified on the UK HETAS part 1 register of Stove efficiencies)
6. Heating Control to include:
  - a. Installation of a Time & Temperature Zone control of the space through a digital thermostat and either a central programmer or three no. individual time clocks.
  - b. Installation of Zone Control over at least three zones in the home (these minimum three zones are defined as being two space heating zones and one domestic hot water zones)
  - c. Installation of a Timer and Temperature Control on an Electric Immersion Water Cylinder
  - d. Installation of a Boiler Interlock (which prevents the boiler from firing where the set temperature in the home has been reached.
  - e. No services will be surface mounted and all surfaces will be made good to previous standard, to include tiled, painted etc. as part of cost.
7. Solar Panels – in some rare cases, solar panels may be identified as a required measure.
8. Windows – in some rare cases window upgrades may be identified.

In the event of any of these items not being achieved, prior authorisation from the local authority contracted BER assessor that the dwelling will still meet the standard as identified will be required.

## 2. General Contract Requirements

The Contractor shall comply with the relevant provisions of the Building Regulations, 1997, 2000, 2002, 2005, 2007 of the Department of the Environment Heritage and Local Government

and Safety, Health and Welfare at Work Act, 2005, the Safety, Health and Welfare at Work (Construction) Regulations, 2006 (S.I. No. 504 of 2006) and the Safety, Health and Welfare at Work (General Application) Regulations, 2007 (S.I. No. 299 of 2007).

**Please Note:**

**Typical installations common of construction practices over the past decade often do not meet the current standards outlined in the above current technical guidance documents. Tenderers are requested to review all these documents prior to submitting any tenders, as adherence to standards will be strictly enforced at the contractors cost.**

## **2.1 Inspection of sites**

The Contractor shall be deemed to have inspected and examined the site and its surroundings and to have satisfied himself, before submitting his tender, as to the nature of the ground and subsoil (so far as is practicable and having taken into account any information in connection therewith which may have been provided by or on behalf of the Employer). He shall also have satisfied himself as to the form and nature of the site to the extent and nature of the work and materials necessary for the completion of the works, the means of access to the site, the accommodation he may require and in general, to have obtained for himself all necessary information (subject to the above-mentioned) as to risks, contingencies and all other circumstances influencing or affecting his tender. No claims will be allowed on the grounds of ignorance of the conditions under which the works will be executed.

The Conditions of Contract and Form of Articles of Agreement shall be:

- (i) "Short Public Works Contract for Civil Engineering and Building works Designed by the Employer"

Or

- (ii) "Public Works Contract for Minor Building and Civil Engineering Works Designed by the Employer",

(Delete as applicable, if neither is deleted (i) above shall be deemed to apply)

## **2.2 CONDITIONS OF EMPLOYMENT**

Contractors shall note that the Conditions require the Contractor and Contractor's Personnel on site to ensure that the rates of pay and the conditions of employment [including in relation to pension contributions] of each work person comply with all applicable Law, and that those rates and conditions are no less favourable than those for the relevant category of work person in any employment agreements registered under the Industrial Relations Acts 1946 to 2004 and is required to keep proper records [including time sheets, wage books and copies of pay slips] showing the wages and other sums paid to and the time worked by each work person, deductions from each work person's pay and their disposition, and pension and other contributions made in respect of each work person, and produce these records for inspection and copying by any persons authorised by the Employer, whenever required by the Employer.

Contractors shall also note that the Construction Federation pension/sick pay scheme for manual employees is legally binding on all Contractors and Contractor's Personnel.

### **2.3 TENDERS**

When tendering, the Contractor shall include provision for everything necessary for the full and proper completion of the works according to the true intent and meaning of the drawings and specification, taken together, whether the same is or is not particularly shown on the drawings or described in the specification, provided that it can be reasonably inferred there from.

Note that all reference to "drawings" shall be understood to refer to Architect's or Engineer's drawings, as appropriate.

The Contractor shall return the drawings and specification with his tender. The Employer does not bind himself to accept the lowest or any tender. No Contractor will be reimbursed for costs incurred in the making up of a tender.

### **2.4 Tax Certificate Procedure.**

It will be the responsibility of the Contractor to ensure that all subcontractors employed by him comply with the tax clearance procedures. In accordance with the provisions of the 1986 Finance Act "the tax clearance certificate procedures will apply to the Contractor, to all nominated subcontractors, non-construction subcontract and to all domestic subcontractors including labour only subcontractors, irrespective of the value of the subjunctives."

Contractors shall therefore nominate all subcontractors at the time of submitting their tender. If, during the course of the works other subcontractors are employed, the Employer shall be notified of their appointment and furnished with a C2 certificate.

It is a condition of the award of a contract that a firm or individual (subcontractor) shall be able to produce promptly a Tax Clearance certificate.

### **2.5 SUBCONTRACTORS**

If, with the Employer's Representative's approval, the Contractor sub-lets any portion of the work, the Specification shall apply to such Sub-Contractors, factors, manufacturers and others executing orders for the Contractor in the same way as it applies to the Contractor in so far as it is applicable to their work, and the necessary extracts shall be sent to them. The Contractor shall be fully responsible for the performance and workmanship of subcontractors.

### **2.6 DAYWORKS**

No work of any kind, payment for which is to be made in accordance with a record of "Dayworks" shall be executed unless the complete arrangements for such are specially authorised by the Engineer in writing. Valuation of variations shall be in accordance with the Conditions of Contract.

### **2.7 TIME FOR COMPLETION**

The Contractor is to complete the works in the time stated in the Schedule attaching to the Conditions of Contract.

## **2.8 LIQUIDATED DAMAGES**

The Contractor shall pay liquidated damages for delay at the rate in the Schedule attaching to the Conditions of Contract.

## **2.9 ENGINEER OR ARCHITECT**

The term Architect or Engineer whenever used within the Articles of Agreement or in the contract documents therein referred to, shall mean the person who is appointed by North Tipperary County Council and acting as or on behalf of the Employer's Representative.

## **2.10 DEFECTS LIABILITY**

The Employer's Representative will issue a Defects Certificate at a time listed in the Conditions of Contract.

## **2.11 RETENTIONS**

The Contractor shall from time to time be paid instalments of the contract sum on (the Employer's Representative) estimate of the value of the work done less the appropriate retentions in the Schedule attaching to the Conditions of Contract.

## **2.12 SAMPLES**

If the Engineer so requires, samples of materials, manufactured articles or appliances shall be submitted for his approval before their adoption in the works. Approval shall not relieve the Contractor of responsibility under the contract for any defects which appear. Materials and manufactured articles supplied or fixed or work executed without approval of samples shall be removed and any necessary reinstatements shall be executed at the Contractor's expense.

The Contractor shall make such tests of executed work and shall supply such samples of materials, fixed or unfixed, for tests as the Engineer may direct, executing the necessary removal or reinstatements. The cost of all tests shall be borne in full by the Contractor, except where otherwise specified in the conditions of contract.

## **2.13 PLANT, SCAFFOLDING AND SUPER-INTENDENCE OF WORK**

The Contractor shall provide for all and every kind of scaffolding, platforms, ladders, tools, tackle, hoists, machinery, rods, stakes, properly constructed wooden boxes as measures and everything else of the nature of plant that is required for the proper execution of works. He shall also pay all freightage charges, costs, charges and expenses, incidental to the complete performance of works, unless special exemption shall have been granted to him by the Engineer. The Contractor shall provide all necessary barricades, screens etc. required.

The Contractor shall be responsible for the setting out of the works and for keeping them correct. Errors in setting out shall be put right at the Contractor's own expense.

The Contractor shall provide all necessary personal superintendence during the execution of the works and shall maintain on site at least one competent general Foreman approved by the



Engineer, and who shall be constantly on the works and who shall have power to act on the Contractor's behalf during the Contractor's absence from site and for all purposes be empowered to act as his general agent.

## **2.14 RESPONSIBILITY FOR DAMAGE & INJURIES**

The Contractor shall take charge of the works from commencement to completion of the contract and he shall be held responsible for making good all injuries damages and repairs occasioned or rendered necessary to the works by any act over which he has control. He shall take proper precautions to prevent injuries/damages and take all risks and indemnify the Employer from any claims for injuries to persons, animals and things, and for structural damage to property, happening from any neglect, default, want of proper care, or misconduct, on the part of the Contractor or anyone in his employment during the execution of the works.

## **2.15 PROTECTION**

The Contractor shall effectively protect the site, works, constructed works, materials and plant, against all trespass and damage, either by means of the erection of suitable hoarding with gates or by means of any other acceptable methods. Notwithstanding any protective measures taken in this regard, he shall be responsible for and make good any damage to the complete works or the incomplete works that may occur.

The Contractor shall also protect existing roads and services and adjoining properties and he shall make good any damage to same that is caused by his operatives or by trespassers from the works site.

The Contractor shall take particular account of the fact that when access to the scheme is through an existing housing estate, all access roads shall be kept clean and protected from damage. Provision shall be made as necessary for washing muck, soil and other dirt off trucks as they leave the site so as to ensure that roads are kept clean. As and when any damage is caused to existing roads such damage shall immediately be made good and, on completion, these roads shall be left in a fully reinstated state (and to the satisfaction of the Engineer).

The Contractor shall provide all requisite watching and lighting during the progress of the works and he shall be responsible for any damage occasioned by want of sufficient watching and lighting.

## **2.16 VARIATIONS, EXTRAS AND OMISSIONS**

The Contract Price will change only as expressly provided in the Conditions of Contract. The Contractor's cost of performing this Contract is all at the Contractor's risk except to the extent that the Price is to be increased under this Contract.

The Contract Price will be adjusted in the event of a Compensation Event as expressly provided for in the Conditions of Contract.

The valuation of Compensations Events shall be as provided for the Conditions of Contract.

**A Wages and Price Variation clause no longer applies.**

## **2.17 WATER FOR WORKS & FOR CONCRETE MORTARS & PLASTERING**

The Contractor shall provide all water required for the works (including that required by sub-contractors) together with all temporary plumbing & storage; and alter, and maintain as necessary, and pay all charges in connection with same. Water for cement products shall be clean potable water, complying with the requirements of BS3148 and its appendix.

## **2.18 CLEAR AWAY PLANT & WORKS & BUILDINGS**

On completion of the works the Contractor shall take down and clear away all plant and temporary works and buildings, including latrines, offices, sheds, etc. unless otherwise instructed and make good.

## **2.19 HANDING OVER WORKS ON COMPLETION**

On completion of the works the Contractor shall remove all rubbish, debris (including that of subcontractors) and surplus materials as they accumulate, from the site, and clean floors, paving's, external surfaces and glass (to both sides), and leave the whole works and site clean and perfect.

## **2.20 DEFINITION**

The terms "Approved", "Directed", or "Selected" shall mean the approval, direction or selection of or by the Engineer. (Refer Clause 9 for definition of "Engineer").

## **2.21 P.C.SUMS**

Prime Cost Sums or Provisional Sums are no longer applicable under these Conditions of Contract.

## **2.22 COPIES OF DRAWINGS ETC.**

Two copies of all drawings and specification will be furnished, free of charge to the Contractor for his own use until the completion of contract, and shall be accessible at all reasonable times to the Engineer on site or his representative, to whom they shall be returned at the completion of the contract.

## **2.23 CHARGES**

The Contractor shall be liable for all charges in relation to water and sewerage connections, road openings, etc. and shall provide all materials required for same and shall liaise with the County Council's Water Services Section in relation to connections and any testing required by them.

## **2.24 GENERAL REQUIREMENTS**

To successfully register to complete works under this Scheme, the Contractor shall meet the general requirements as shown below. The Contractor shall 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 suspension of the eligibility of the contractor to perform any further works under any tender from the contracting Authority

Contractors nominated personnel where they exist.

Each Contractor shall:

- Hold a valid Tax Clearance Certificate
- Be able to produce a valid C2
- Required to meet Local Authority Contractor Insurance requirements for small/medium works programmes.
- be able to carry out the works in line with the guidelines set out by Local Authority or it's Agents
- submit to performance audits of their works and review of same the Local Authority or their Agents
- Be SEAI approved
- Produce evidence of compliance with the terms of the Construction Federation Operatives Pension Scheme or equivalent
- Confirm that they will perform the role of Project Supervisor Construction Stage

### **3. Technical Standards**

In general, all products used shall be 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 shall meet relevant product standards. Adherence to applicable standards shall be followed in relation to materials that are used, and their installation.

All aspects of this guidance document will be subject to audit and QA inspection and verification.

#### **3.1 General Installation Standards**

Prior to the installation of any measure:

- the property shall be assessed to ensure that it is suitable for the measure proposed
- If the contractor feels that the measure specified by the BER assessor is not suitable or will not achieve the C1 rating then the contractor shall agree an alternative with the BER assessor with the approval of the Local Authority.

In addition,

- 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 shall not compromise the ventilation, air quality, humidity (and the potential for condensation) and quality of living environment in the home. Particular care shall**

**be given to the potential impact on the living environment in the home resulting from any measures installed under the Scheme. It is the duty of the Contractor to prevent at his cost any detrimental changes to the living environment and to advise to the Local Authority any measures necessary to ensure that there is no detrimental change to the living environment as a result of the works PRIOR TO ANY works commencing at the dwelling. Any works identified by the contractor or otherwise after the work has been completed shall be remedied by the contractor as part of the fixed price contract. E.g. installation of adequate room ventilation or roof ventilation.**

In general, all works shall be carried out in accordance with the best practice and technical guidance documents outlined herein and available from the following:

- Building Regulations Technical Guidance Documents (Part L 2008, Part B 2006, Part D 2000, Part F 2008, Part J 2005 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
- Sustainable Energy Authority of Ireland
- The UK Energy Saving Trust
- The UK Building Research Establishment ([www.bre.co.uk](http://www.bre.co.uk))

In each case, the Irish Standard or NSAI Agrément Certification shall be considered the primary certification and preferred guidance.

Where Building Regulations are referred to within this document, it is the most recent amendment to and version of those Regulations which shall be adhered to by the Contractor at all times.

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

### **Note:**

Section 11 of the Building Control Act, 1990, empowers an authorised officer of a building control authority to take samples of the materials used in the carrying out of any construction work to establish whether the requirements of building regulations are being complied with.

All works and materials required under the contract shall be in compliance with the requirements of this specification and the standards referred to therein.

## **3.2 SAFETY:**

Tenderers shall include adequate provision in the overall tender sum for: -

- (i) The execution of the project in compliance with all relevant statutory enactments and regulations.

(ii) The acceptance of the role and duties of Project Supervisor (Construction Stage) - main contractors will be required at tender stage to nominate a competent person employed by them to fulfil this role.

The acceptance of a tender is subject to: -

- (a) Submission of the proposed Safety Statement for the project;
- (b) In the case of civil engineering works, submission of the Proposed Method Statement, if and when requested;
- (c) Confirmation that the Time Schedule is adequate to enable the Safe construction of the project; and
- (d) The submission of the developed Health and Safety Plan for the Construction Stage.

#### **4. Quality Assurance and Inspections.**

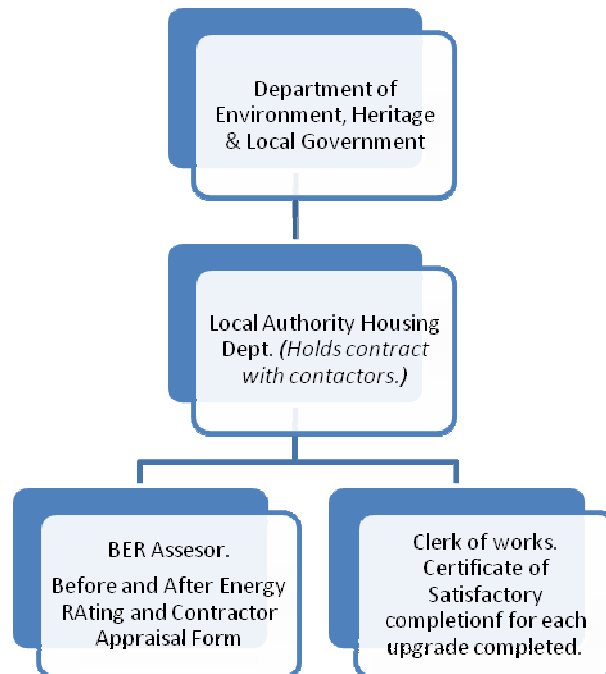
The Employers Representative may delegate in writing to the named representatives any functions or powers under the Contract and revoke any delegation. The appointment of such a representative shall not prevent the Employer's Representative from exercising directly any functions or powers. The Employer's Representative shall notify the Contractor and the Employer of any delegation, and the names of the representatives, and of any subsequent changes, within 5 working days after the event in each case.

The Local Authority and its Agents will monitor carefully the standard of workmanship and installations during the upgrade works. Any contractor who is found to complete works that are not in meeting with the minimum specification will be subject to a warning. A second issue of non conforming works may result in the contractor being ineligible for further works under any procurement process.

Each project will have a declaration of works issued to the BER assessor by the contractor on completion. The BER assessor will then inspect and sign off on the installation. Once the Local Authority receives a certificate from the BER assessor they will then and only then release payment to the contractor.

Additional inspections will be carried out by the Local Authority or its agents to ensure that the BER assessors are ensuring that the minimum standards are being achieved and that the energy savings prescribed by the BER assessor are being achieved.

The following arrangements for QA and work inspections will be employed.



The BER assessor is expected to highlight any issues encountered and report to the LA Clerk of Works, this will trigger an inspection and may result in the penalising of the contractor responsible for the non conforming works.

## 5. VENTILATION

Each house will be upgraded such that the ventilation complies with Part F of the building regulations 2009.

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 fuel burning appliances
- minimisation of condensation risk
- avoidance of radon accumulation in affected areas

Technical guidance document part F 2009 gives the minimum requirement for ventilation in habitable space.

A Contactor shall note any potential ventilation issues encountered during the initial assessment of the property. It is the responsibility of the contractor to install ventilation in accordance with the latest published Building Regulations and is deemed to be included in the rates offered at tender.

### **Extract from TGD Part F: Existing Buildings**

In the case of material alterations or change of use of existing buildings, the adoption without modification of the guidance in this document may not, in all circumstances, be appropriate. In particular, the adherence to guidance, including codes, standards or technical specifications, intended for application to new work may be unduly restrictive or impracticable. Buildings of

architectural or historical interest are especially likely to give rise to such circumstances. In these situations, alternative approaches based on the principles contained in the document may be more relevant and shall be considered.

Refer to each measure for any specific requirements for additional ventilation in rooms, particularly where an additional heat source is introduced or the existing one altered.

Note that part F: 2009 requires the installation of mechanical extract ventilation in bathrooms, kitchens etc. This may not be practical in all cases. Mechanical extraction shall not be installed:

- In the event of this requirement not being specifically identified on the BER assessors report.
- In the event that this will require a re-wiring of the main distribution panel and/ or part thereof i.e. the installation of an ELCB and circuit breaker.

## **6. Wall Upgrade Options.**

### **6.1 CAVITY WALL INSULATION**

#### **Contractor Competency**

Contractors of cavity wall insulation shall be approved by the NSAI Agrément and shall 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 shall be certified by the NSAI Agrément. The objective of this Scheme is to put in place materials that will achieve a level of performance in the building, 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 0.3 W/m<sup>2</sup>K for external walls. It is the policy of this local authority to achieve as high a performance as possible in the limited cavity space and therefore a maximum thermal conductivity of 0.033W/m K for any pumped cavity material.

The product shall 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 as per Building Regulations (Amendment) Regulations 2006 (Part B). The Contractor shall ensure that 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 C). It shall also meet the Building Regulations requirements for materials and workmanship (Part D).

Correct installation will also satisfy the Building Regulations (Part J1) on the maintenance of an adequate air supply for the efficient working of any flue or chimney after installation work. The insulation system shall conserve energy in keeping with Part L of the Building Regulations in as far as is practicably possible.

The installation of foam or bead insulation systems into the voids of Hollow Block Walls is not permitted. The system shall also be suitable for use on a property and meet the ventilation requirements in the Building Regulations (Part F).

In order to eliminate dust entering a premises, whether occupied or vacant, all wall vents, windows, doors or other openings will be closed or sealed appropriately prior to drilling commencing. Contractors are asked to notify any tenant that they must keep openings closed. Where a contractor is working and there is a risk of dust ingress to another nearby house, the contractor is asked to take appropriate action to minimise dust ingress to any other houses nearby. Any failure on this will be made good at the contractors cost.

#### **Installation Standards & Specifications**



All cavity wall insulation shall be installed in accordance with the specifications laid out by the system supplier and in accordance with the relevant system's NSAI Agrément certificate.

A survey of the walls shall 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 shall be provided to the Local authority for every building. This is to ascertain the suitability of the property for the recommended insulation system. Existing buildings shall be assessed in accordance with BS 8208: Part 1: 1985.

Any defects recorded in the survey, which may affect the performance of the insulation system when installed, shall be notified to, and rectified by, the Local authority before installation work commences.

Installation shall 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 shall carry an identity card issued by the system supplier/manufacturer.

Cavity filling with expanded polystyrene shall not be carried out where PVC-sheathed electrical cables are passing through the cavity but are not protected within electrical conduits.

If the cavity is uncapped, it shall 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 shall be discussed with the Customer prior to completion. Particular attention shall be paid to ensuring that gas, oil and solid fuel appliances are correctly ventilated as per the system supplier's specifications and the Building Regulations (Part J).

Ventilation openings shall be checked to ensure there are no obstructions due to the insulation. All flues shall also be checked for obstructions using an appropriate test (e.g. smoke test).

Certification is valid once the conditions outlined in the certificate are met. The Contractor shall indicate to the Customer the methods he intends to use to ensure the successful insulation of the full extent of the cavity wall.

## **6.2 EXTERNAL WALL INSULATION**

### **Contractor Requirements & Competency**

Contractors installing external wall insulation shall be approved by the NSAI Agrément and shall agree to carry out the installation to the standards required by this approval and certification. This shall be demonstrated to the Local Authority prior to completion of the works. Contractors shall appear on the HES registered list of contractors.

### **Product Standards & Specification**

The objective of this Scheme 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 a U-value of 0.27 W/m<sup>2</sup>K or better for external walls.

The insulation system shall be incorporated into the property's structure so that it complies with the loading and ground movement requirements of the Building Regulations (Part A). The system shall 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 as per Building Regulations (Amendment) Regulations 2006 (Part B). When installed as per the system suppliers guidelines, the system shall not affect the property's ability to resist weather and ground moisture (Building Regulations – Part C). It shall also meet the Building Regulations requirements for materials and workmanship (Part D).

The system shall also be suitable for use on a property and meet the ventilation requirements in the Building Regulations (Part F). Correct installation shall also satisfy the Building regulations (part J) so that the insulation shall be separated from any flue pipe or opening to a heating appliance that penetrates the wall by a solid, non-combustible material no less than 200mm thick. The insulation system shall conserve energy in keeping with Part L of the Building Regulations.

### **Installation Standards & Specifications**

Where the system supplier/manufacturer operates an Approved Contractor scheme, the Contractor shall carry appropriate identification stating they are an Approved Contractor. The Contractor shall at all times comply with the requirements of the system suppliers specifications. The insulation panels shall 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. When handling the insulation boards, care shall be taken to avoid damage and contact with solvents or bitumen products. The boards shall not be exposed to open flame or other ignition sources. Any metal lathes, renders, paints, texture synthetic finish coatings and sealants shall be stored in accordance with the manufacturer's instructions in a dry environment at the required temperatures.

A pre-installation survey of the property shall be carried out to determine suitability for treatment and any repairs necessary to the building structure before application of the insulation system. The survey shall 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. 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 down pipes and gully traps.
- Areas where flexible sealants shall be used;
- Where required, the position of fire barriers.

All necessary repairs to the property's structure shall be completed and dry before the installation of the insulation. Surfaces shall be sound, clean and free from any loose material.

The vertical tolerance of surfaces shall be checked. This may be achieved using a straight edge spanning the storey height. Local areas may be assessed using a straight edge spanning 3 metres. Any excessive irregularities shall be made good before installation. If the existing wall surface is covered with a render, the bond between the background and render shall be **sufficiently strong to accommodate the wall insulation system**. Otherwise it shall be removed and reinstated with a sufficient bond.

Where appropriate, external plumbing, including rainwater down pipes and gully traps shall be removed and alterations made to underground drainage before installation of the system, to accommodate repositioning on the finished face of the system. Application of the external insulation system is carried out in accordance with the current installation instructions of the system supplier/manufacturer. The first row of insulation boards is positioned on the base profile, which is secured to the external wall above the dpc. The insulation boards shall be firmly pressed to the wall and mechanically fixed in place with a fixing arrangement as per the relevant approval documentation. Care shall be taken to ensure that the boards are butted tightly together and surface alignment shall be checked as work proceeds. Any gaps at joints shall be sealed, e.g. using basecoat material. Gaps of 2mm or greater shall be filled with either slivers of insulation board or polyurethane foam. Surface irregularities shall be removed by planing with a rasp over the whole surface. To fit around doors and windows, insulation boards may be cut with a sharp knife or a fine-toothed saw only. If required, purpose-made window sills may be installed at this point. They shall prevent water ingress. When the basecoat has been applied to the insulation boards, the reinforcing mesh is embedded into the basecoat before it dries. The mesh shall be fully embedded in the basecoat and be free of any creases. Additional mesh may be required at corners and openings.

Installation continues until the whole wall is completely covered including, where appropriate, the building soffits. Application of the undercoat and finishes shall be carried out within the permitted temperature range and shall be protected from rapid drying. Drying shall take 24hours in favourable conditions. All rendering shall be carried out in accordance with IS EN 13914-1:2005 and BS 8000-10:1995.

Movement joints shall be provided in accordance with the system supplier's technical specifications. Where there is a risk of insulate exposure, e.g. window reveals, eaves, etc., the system shall be protected by an adequate overhang or by an adequately sealed, purpose-made flashing.

On completion of the insulation, external fittings such as rainwater fittings etc. are fixed through the system into the structure. A system supplier guarantee shall be issued to the Local Authority.

**Timber frame homes cannot be insulated externally.**

#### **External Wall Insulation and Electrical Installations**

Where installers encounter the following situations: ESB Networks service cable clipped directly to the surface of a wall: DO NOT REMOVE OR TOUCH THE CABLES. Call ESNB (at earliest opportunity). ESNB service crew will unclip the service safely allowing

the contractor to install the external insulation and various renderings required. The contractor will be asked to supply and fit uPVC electrical trunking suitable for external situations. In most cases 50mm X 50mm will be the size required. Adequate fixings shall be applied to cater for this trunking and its contents i.e. the service cable. Where expanded polystyrene is used it shall not be in come in direct contact with the PVC insulated conductors at any point in 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.

ESB Networks overhead service line fixed to e.g. gable end of house (fed from overhead networks): **DO NOT REMOVE OR TOUCH THE CABLES.** Call ESNB (at earliest opportunity). ESNB service crew will fit a modified bracket and re-erect the line and service cable safely. This standard bracket mounted directly on e.g. the gable will allow the correct termination of the overhead line /service and will also cater for the mechanical stress levels present at this particular point.

**ESB Networks outside 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 shall remain untouched. ESNB will not be involved. One acceptable solution is to fit an extension to the existing cabinet by removing the door and fitting a new cabinet with the base cut away, leaving a side wall depth equal to the depth of the new additional wall structure. There shall be no exposed insulation visible when the “new” door is opened i.e. the new collar shall fit snugly against the front section of the existing cabinet. Remember that these meter cabinets are manufactured to specific standards to reduce the effects of fire. Do not introduce products which do not comply with these standards.

To contact ESB Networks there are some useful phone numbers for ESNB engineering bases nationwide available on Appendix E of the National Code of Practice at Local Authority Interface. This can be accessed at [www.esb.ie/esbnetworks/ncp](http://www.esb.ie/esbnetworks/ncp)

## **6.3 INTERNAL WALL INSULATION**

**Contractor Competency:**

Contractors of internal wall insulation shall be competent to install same and shall 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 shall demonstrate their inclusion on the list or certification by the manufacturer. Where a product is covered by an NSAI Agrément Certificate it shall be installed in accordance with this certificate and by such qualified people as specified. Prior to internal dry-lining works commencing the homeowner shall 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 shall be certified by the NSAI Agrément or equivalent.

The objective of this Scheme is to put in place materials that will achieve a level of performance in the property, equivalent to the standard required in Part L of the Building Regulations. Thus, the objective for Internal Wall Insulation is to achieve a U-value of 0.27 W/m<sup>2</sup>K for external walls.

Where a U-value of 0.27 W/m<sup>2</sup>K is not achievable the internal insulation systems shall have a maximum u-value that is less than 0.7 W/m<sup>2</sup>K in order to prevent surface condensation being an issue. In particular, the installation of internal wall insulation shall not compromise the ventilation, air quality, humidity (and the potential for condensation) and quality of living environment in the home.

Particular care shall be given to the potential impact on the living environment in the home resulting from internal wall insulation installed under the scheme. It is the duty of the Contractor at his cost to prevent any detrimental changes to the living environment and to recommend to the Local Authority any measures necessary to ensure that there is no detrimental change to the living environment as a result of the works.

The system shall 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 as per Building Regulations (Amendment) Regulations 2006 (Part B). When installed as per the system supplier's guidelines, the system shall not affect the property's ability to resist weather and ground moisture (Building Regulations – Part C). It shall also meet the Building Regulations requirements for materials and workmanship (Part D). Correct installation shall also satisfy the Building Regulations (Part J) where the installation does not increase the risk of the property catching fire through the use of a heat producing appliance.

The insulation system shall conserve energy in keeping with Part L of the Building Regulations.

#### **Installation Specifications:**

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. Insulated dry-lining boards shall be installed in accordance with good dry-lining practice and the manufacturer's instructions.

The wall/ceiling shall be surveyed to assess its flatness and suitability for the system. The system may be used on any dry walls capable of taking the fixings for the timber battens. Where the insulation panels are being applied directly to the wall using adhesive dabs, the dabs shall be applied to the wall ensuring a continuous 50 mm ribbon top and bottom to provide fire stops.

Dabs shall be applied in accordance with BS 8212: 1995 and BS 8000 Part 8: 1994. Additional mechanical fixings shall be provided to each board applying a minimum of 3 metal fixings, after the adhesive has set, in accordance with BS 8212: 1995 and manufacturer's instructions. Metal fixings shall penetrate at least 35mm into the masonry.

Where insulation panels are being mechanically fixed to the wall using battens, the metal fixings through the battens shall penetrate at least 35mm into the masonry. Fixings through boards shall penetrate at least 25mm into the batten.

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

Avoid contact between PVC-insulated wiring and polystyrene insulation. For example, run the wires through flexible cable conduit.

In order for the insulation panels to perform as intended, it is important that the panels are sealed with adhesive or battens around its perimeter with adjoining walls, the floor and ceiling. It shall also be sealed around windows, doors and any other openings. A system supplier or contractor guarantee shall be issued to the Local Authority where applicable.

Care shall be taken to ensure that any gaps to the side or at the top/bottom of the insulation are sealed in order to ensure that no air leaks into the void behind the insulation.

Avoiding interstitial condensation within the dry lined wall build-up:

- Adequate ventilation shall be in place to a dry lined room to prevent high humidity levels in the room.
- The external surface shall be sealed with a non-porous render or a silicone based masonry sealant.

## **7. ROOF INSULATION.**

### **7.1 CEILING LEVEL ATTIC INSULATION**

#### **Contractor Requirements & Competency:**

Contractors of ceiling level attic insulation shall be competent to complete the installation and shall 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. Where a product is covered by an NSAI Agrément Certificate it shall 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 shall be manufactured to a relevant Irish, British or European Standard.

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

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.

The insulation shall 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 as per Building Regulations (Amendment) Regulations 2006 (Part B). When installed as per the system supplier's guidelines, the system shall meet the Building Regulations requirements for materials and workmanship (Part D). The insulation shall also be suitable for use on a property and meet the ventilation requirements in the Building Regulations (Part F). Correct installation shall also satisfy the Building Regulations (Part J) where the installation doesn't increase the risk of the property catching fire through the use of a heat producing appliance. The insulation system shall conserve energy in keeping with Part L of the Building Regulations.

### **Installation Standards & Specifications**

Attic Insulation shall 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. If there is evidence of bats or bat roosts present in the attic space to be insulated, the Contractor shall consult with the Bat Conservation Ireland at [www.Batconservationireland.org](http://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](http://www.npws.ie).

Where practicable, all areas of the ceiling are to be insulated to the same depth. Mineral wool and other compactable insulation materials shall not be compressed as this decreases its effectiveness considerably. Contractor shall maintain a gap at eaves at least equal to a continuous strip 10mm wide to ensure adequate ventilation via appropriate ventilation openings. 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. Installing an airtight membrane at ceiling level is recommended where possible. To maintain a high level of insulation under any flooring or storage space, where flooring is required or is being retained by the Local Authority the following minimum standard is required.

It is essential that any heavy-duty cables (e.g. for cookers and showers) are not covered by the insulation material and shall 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 shall be left either side of the (heavy duty) cables for their entire length within the attic area. 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.

Recessed down-lights shall 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 shall advise the Local Authority of the need to keep the recessed lights clear of insulation. 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 them and the Contractor shall, where considered appropriate, include in his quotation for the removal and replacement of the stored items to facilitate installation of the insulation material.

The Contractor is to identify any form of water penetration in the attic and attic insulation shall not be installed if the roof or pipe-work is leaking. All pipe-work and water storage vessels shall be insulated. No insulation material shall be laid below water storage tanks located in the attic space where the underside of the storage tanks is less than 300mm above the finished level of insulation. Where this is the case, the insulation around the water storage tank shall continue down to the finished level of the attic to form a skirt around the tank. If the water storage tank is greater than 300mm above the finished level of the insulation, the insulation shall be installed below the tank and the underside of the tank shall also be insulated.

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.

The Contractor is to draught proof attic hatches.

In every roof space where cold water tanks or other fitted appliances occur, the Contractor shall 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 shall be supported above the first layer of insulation to prevent any compaction of insulation below the walkway.

**Defined Storage Space. (Minimum requirement of 4m<sup>2</sup> per unit.)**

The boarded storage and/ or walkway shall be constructed of flooring grade chipboard or equivalent with 100mm PIR board bonded to the underside. ( $\lambda = 0.023$  minimum), equivalent U value of other materials are acceptable. Walkway to be mechanically fixed to the joisting at 300mm centres. If the boarded storage and/ or walkway needs to cross pipes or cables they shall be supported to 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. The walkway shall be of minimum dimensions of 19mm thickness by 450mm wide to be fixed to battens base with screws. Any cables of Significant current, e.g. ring main, shower cooker etc. shall not be covered.

## **7.2 RAFTER LEVEL ATTIC INSULATION (WARM ROOF)**

### **Contractor Requirements & Competency**

Contractors of rafter level attic insulation shall be competent to complete the installation and shall 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 shall demonstrate their inclusion on the list or certification by the manufacturer. Where a product is covered by



an NSAI Agrément Certificate it shall 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 shall be certified by the NSAI Agrément or equivalent.

The objective of this Scheme 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 scheme for attics insulated at rafter level is, in as much as is physically and economically feasible, 0.20 W/m<sup>2</sup>K.

. The required thickness depends on the material used. It is the responsibility of the Contractor to ensure that the optimum solution for each Local Authority is achieved, within the cost constraints and preference of each Local Authority. The insulation shall 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 as per Building Regulations (Amendment) Regulations 2006 (Part B).

When installed as per the system supplier's guidelines, the system shall meet the Building Regulations requirements for materials and workmanship (Part D). The insulation shall also be suitable for use on a property and meet the ventilation requirements in the Building Regulations (Part F).

Correct installation shall also satisfy the Building Regulations (Part J) where the installation does not increase the risk of the property catching fire through the use of a heat producing appliance. The insulation system shall conserve energy in keeping with Part L of the Building Regulations.

### **Installation Standards & Specifications**

Attic Insulation shall be carried out in accordance with Energy Saving Trust Guide No. CE83 'Energy-efficient Refurbishment of existing houses' and Best Practice/Technical Guides supplied by the material manufacturer.

Attic Insulation shall be carried out using materials that are approved by an Irish, British or European standard for loft insulation, where available. If there is evidence of bats or bat roosts present in the attic space to be insulated, the contractor shall consult with the Bat Conservation Ireland at [www.Batconservationireland.org](http://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](http://www.npws.ie)

Particular attention shall be given to ventilation and condensation requirements of the attic in relation to the materials used. The installed insulation shall not impede cross flow ventilation. Unless a breathable sarking membrane is present, the insulation shall be retained at least 50mm from the membrane. A constant coverage shall 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 thereafter. 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.

Unless the product has a built in vapour control layer, a separate vapour control layer shall be fitted between the insulation and any plasterboard, i.e. on the warm side of the insulation.

Insulation/vapour control layer joints shall be fully sealed by appropriate tape. 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; whilst the Contractor is in the roof space he shall identify any form of water penetration and attic insulation shall not be installed if the roof is leaking. Where rafter level insulation is used on a partial attic conversion, the vertical walls of the room shall also be insulated to the same standard. Where there is unused attic space outside of the conversion, insulation shall be applied at ceiling level to the standard detailed in 'Ceiling Level Insulation' above.

## **8. HEATING CONTROLS**

### **8.1 General Standards & Specifications**

This section outlines the general Standards & Specifications that Contractors, products and installation methods shall conform to. In the event that a category 3 heating control cannot be achieved then the contractor shall revert to the BER assessor to analyse what BER can be achieved. The BER assessor will state what requirements are detailed for each house in order to achieve a C1 energy Rating.

#### **Contractor Requirements & Competency**

The installation of heating controls shall 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 shall hold a Level 6 National Craft Certificate in Plumbing or an equivalent Plumbing qualification such as City and Guilds. Plumbers shall 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 shall 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 shall conform to the appropriate BS, EN or IS standard for that particular measure. As a minimum, the following Standards shall be satisfied: 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 shall be carried out in accordance with the manufacturer's specifications and Industry Best Practice. All works shall be installed in accordance with 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 SpecifiersCE30 Domestic Heating by Gas: Boiler Systems – Guidance for Installers and Specifiers.

All works shall 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 shall be given to good house keeping and safety during installation. All works shall be sub surface mounted with the surface restored to original finish including painting and/ or tiling etc. Each installed measure shall be fully demonstrated by the Contractor to the homeowner along with a written set of operating instructions. Before leaving the home, the Contractor shall ensure that the owner can correctly operate their upgraded heating system.

## **8.2 Two Zones (Space Heating & Domestic Hot Water)**

This element of the scheme involves dividing the heating system into two zones and incorporating for time & temperature control along with a boiler interlock arrangement to prevent boiler operation when the heat demand drops off. These initial two zones shall 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).

Note that all cabling and pipe work will be flush mounted into surfaces (floors & walls), with the surfaces made good to the same or better standard as before. This shall include plastering, painting, and tiling as appropriate. If skirting boards are removed and replaced, they shall be restored to previous standard – i.e. caulk and paint if necessary. This works shall be included in tender price.

### **Product Standard & Specification**

All timers, programmers, thermostats, zoning manifolds and motorised control valves shall 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 shall 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 gravity hot water circuit, 28 mm valves or larger shall be used.

### **Installation Standard & Specification**

Zoning: Zones shall 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 shall not be mounted so that the power head is below the horizontal level of the pipe-work. If fitted in a confined space, adequate ventilation shall be available in order to ensure that

the valve will be kept within its recommended temperature range. There shall also be adequate access so that the power head can be removed if necessary.

Time control shall be installed for each Zone. It is required in order to simplify the heating controls to use **a separate 24hour analogue time clock for each zone**. I.e. one for domestic hot water, one for main space heating and a third for the second zone if applicable. Note the use of programmers **shall not be allowed** under this scheme.

Temperature control shall be installed for each zone. The room thermostat shall be located in an area where it is not subject to heat gains, direct sunlight or draughts. The thermostat shall be located in a well lit, easily accessible position with good air circulation. The chosen position shall 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 or direct sunlight. Locating a room thermostat in an area which may be subject to external draughts such as beside external doors etc. shall also be avoided. Best practice recommends that thermostats are situated approx. 1.5 m from the floor. Furthermore, room thermostats shall not be installed in any room which already uses TRVs for temperature control.

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

Boiler Interlock - A boiler interlock arrangement shall 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 shall turn all thermostats right down when the boiler is firing -if the boiler continues to fire, and 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 setup 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.

Frost Stat on external boiler installations shall be fitted as the warranties on boilers is null and void if not fitted. If in any installation it is found that the frost thermostat is omitted, then the contractor installing the boiler is responsible for the replacement in the event of a failure.

### **8.3 An Additional Zone**

In addition to establishing 2 zones (as described above), the homeowner shall also commission the installation of an additional space heating zone OR the installation of 3 Thermostatic Radiator Valves (in rooms which do not contain room thermostats).

#### **Product Standard & Specification**

The Product Standards & Specifications outlined in Section 10.2.6 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 shall be carried out in accordance with the manufactures instruction and Industry Best Practice. The Installation Standards & Specifications outlined in Section 10.2.6 will also apply to the installation of an additional heating zone.

### **8.4 Thermostatic Radiator Valves (TRVs)**

In addition to establishing 2 zones (as described above), the home owner shall also install either an additional space heating zone OR 3 TRVs (in rooms which do not have room thermostats).

#### **Product Standard & Specification**

All TRVs shall conform to the appropriate BS or IS standard for Thermostatic Radiator Valves (if available) such as BS EN 215 'Thermostatic Radiator Valves. Requirements & Best Methods'

#### **Installation Standard & Specification**

TRVs shall be installed in accordance with the manufacturers guideline, 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 shall not be fitted in rooms which already have temperature control through a thermostat.

When installing TRVs, the Contractor shall ensure that the temperature selector scale and reference point are easily visible to the homeowner 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 shall be used. When inaccessibility of the valve to the user is unavoidable i.e. when the radiator and valve are located behind a decorative grille, valves with combined remote temperature sensors and adjuster shall be used. Most modern TRVs are bi-direction and can be installed in either the flow or return direction. Due care shall however be taken to ensure that valve is bi-directional – if the valve is not bidirectional, the flow through the valve shall correspond to the direction on the arrow of the valve body.

An automatic by-pass circuit shall 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 shall also be fitted if the boiler manufacturer requires one, or if it specifies that a minimum flow rate shall be maintained while the boiler is firing. An automatic by-pass circuit shall 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 shall be installed between the boiler primary flow and return noting the direction of flow.

All systems shall be flushed in order to remove debris prior to commissioning and this shall be carried out with all thermostatic sensor heads removed and valves fully open. Thermostatic sensor heads shall 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 shall not normally require further adjustment by the homeowner but they shall be made aware of how to adjust the temperature setting for future reference.

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

Frost Stat on external boiler installations shall be fitted as the warranties on boilers is null and void if not fitted. If in any installation it is found that the frost thermostat is omitted, then the contractor installing the boiler is responsible for the replacement in the event of a failure.

### **Time & Temperature Control of Electric Immersion Heater**

#### **Product Standard & Specification**

Timers and temperature control for electric immersion heaters shall 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 shall be carried in accordance with the manufacturer's guidelines and Industry Best Practice as outlined in Good Practice Guide 302 or similar.

## **8.5 Additional Control Measures**

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

## **8.6 Incorporating a secondary heat source into the heating and hot water circuit.**

Typical examples of secondary heat sources shall be

- a) Solid Fuel Range.
- b) Multi Fuel Stove with back boiler.
- c) Open fire with Back boiler

The traditional method of controlling temperature from a solid fuel range has been to heat an un-insulated cylinder that doubles as a heat dump. This integration required this heat dump to be in a controlled manner.

A dual coil insulated cylinder shall be fitted with the lower coil fed from the appropriate solid fuel system. If required a pipe stat shall operate a pump on the output of the solid fuel system, refer to the appliance installations instructions.

In the event of a sufficiently large boiler output a hot water dump facility shall be incorporated into the heating circuit. This shall be installed in such a manner as to (using a pipe stat) control a diverter valve to the radiator system to dump excess heat from the hot water circuit. Refer to the appliance manufacturers instructions for a diagram of the plumbing arrangement.

Minimum heat load shall be maintained to provide sufficient heat output. In practice this requires that sufficient radiators remain without thermostatic radiator valves present to satisfy slumber conditions on the range or back boiler.

The integration with the main space heating boiler shall be such that the boiler shall automatically shut down if any of the temperature requirements are met, but at the same time leave the valves open regardless - i.e. there is priority given to the integrated range/back boiler.

### **Heating controls as per above spec.**

- i. Additional pipe stat on the feed from the range that pumps into the dedicated DHW circuit as appropriate.
- ii. Additional pipe stat on the return from the DHW zone that diverts flow into the space heating zones.
- iii. All valves will spring open in the event of a power cut to dissipate heat.
- iv. Integration of both systems to ensure that the boiler will only add heat if required.
- v. Safety Valve / device: The design shall ensure that there is no case where the solid fuel appliance will over heat and over pressure the circuit (e.g. due to a damaged thermostat etc.)

## 8.7 Pipe insulation

Pipe insulation shall meet the standards as outlined in Part L of the building regulations. Guidance below is detailed to aid contractors meet those standards.

### Hot & Cold Water Pipe insulation:

Material	Description	Thermal Conductivity at		Brand Example
		0°C	40°C	
Closed Cell Polyethylene	Standard Grey Domestic pipe insulation (commonly used in 9mm thickness)	0.039	0.035	Tubolit
Closed Cell Elastomeric Nitrile Rubber	Black, standard Class 0 fire rated commercial grade pipe insulation	0.034	0.034	Armaflex

Guidance taken from BS5422:2009 table 20 (hot water) & BRE 262 (cold Water) for above Materials:

Pipe Diameter	Insulation Thickness (Cold Water Pipes – protection from freezing)	Insulation Thickness (hot Water Pipes)
15mm	60mm	19mm
22mm	25mm	25mm
28mm	13mm	25mm
35mm	9mm	25mm
42mm	9mm	32mm



## **9. HIGH EFFICIENCY BOILERS**

### **Contractor Requirements & Competency**

The installation of high efficiency boilers shall 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 shall hold a Level 6 National Craft Certificate in Plumbing or an equivalent Plumbing qualification such as City and Guilds. Plumbers shall 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 shall 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 shall comply with requirements and competencies stated above. It is also recommended that the contractor shall be registered with a professional organisation, e.g. OFTEC.

### **Gas Boilers**

In addition to the above criterion, Contractors wishing to install LPG or Natural Gas boilers under the Scheme shall hold a Gas Contractors Domestic Certificate (GI D, GI 2 or GI 3). In addition from the 26<sup>th</sup> of June 09 it will be an offence for any person to carry out domestic natural gas works unless he/she is a registered gas installer with RGII.

### **Product Standard & Specification**

Qualifying boilers shall 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 net efficiency greater than:

- Gas – 91%
- Oil – 94%
- Wood 85%

The use of weather or load compensation can be utilised to achieve the above efficiency figures, as defined in DEAP.

Please note that boiler efficiency for this Scheme is greater than is required by current Building Regulations. Technical Guidance Document Part L Dwellings 2010 states that new and replacement central heating systems shall have boiler efficiency not less than 90%. 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" shall be adhered to. This procedure aims to discourage an existing appliance being replaced by a significantly less carbon-efficient one. The contractor shall discuss both the specification and sizing of the boiler with the Local Authority prior to final system

selection. Size of home, levels of glazing and insulation shall all be considered among other.

### **Installation Standard & Specification**

Qualifying boilers shall 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.

### **Gas Boilers**

All qualifying natural gas and LPG boilers shall 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 liquid petroleum gas (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'.

### **Additional Installation Guidance**

The installation of boilers shall 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

## **9.1 Sizing of Condensing Boiler**

The installation of high efficiency boilers shall be carried out by suitably qualified individuals in accordance with the heat load requirement of the property. This shall be included to allow for return temperature to allow them to operate in condensing mode which will allow them to operate at peak efficiency.

In order to gain maximum efficiency from a condensing boiler, a good control system shall also be in place (Refer to Section 4.6 – Heating Controls.).

By using such a control system, the water returning to the boiler will more often be in the range needed for it to condense – around the mid 50s degrees centigrade (just below the 'dew point' of the flue – 58 degrees). The boiler will then be in condensing mode for most of the time it is operating, so will run at its maximum efficiency almost all the time.

Modulation reduces cycling, maximizes fuel savings.

The controls automatically modulate gas input up or down according to demand. Ordinary boilers run inefficiently when they repeatedly cycle on and off, just as stop and go driving reduces a car's gas mileage. It will closely match the boiler's output to just what is needed to meet demand for heat, it has longer run times and wasteful cycling is reduced. A controller also resets supply water temperature automatically when connected to an outdoor sensor, further enhancing efficiency of the entire heating system.

It is envisaged that any local authority house of typical size 50m<sup>2</sup> - 90m<sup>2</sup> with upgraded insulation in attic (0.16 or better) and Walls of (0.37 or better) shall not require a boiler of > 12kW. This shall be noted in the sizing of boilers and shall be noted to the local authority when sizes of boilers > 15kW are installed. Please also note that the nozzle size installed in the case of an oil burner shall be such that the boiler is sized appropriately, typically they are sized for the mid range of the boiler (e.g. an 18kW nozzle for a 15kW - 21kW (50/70 kBTU)

**Achieving compliance with Part L:**

**All items listed as required in the document:** "Heating and Domestic Hot Water Systems for Dwellings- Achieving Compliance with Part L 2008" supplemental document to part L 2008. This document is available from [www.environ.ie/en/tgd](http://www.environ.ie/en/tgd) as is all other building regulations. Certification/ boiler passport/ RGII/ OFtec documents will be handed over to local authority representative for checking.

Any costs associated with following this guidance document, as with all the building regulations shall be completed at the contractors expense.

## **9.2 Installation of External Oil Boiler**

Heating systems shall be installed as per Building Regulations Technical Guidance Document part J 1997.

**Heating Pipe Flow and Return**

Ensure that the pipe work shall 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 use of a High Quality District heating pipe such shall be used that provides

- No corrosion
- Resistance to ageing and abrasion.
- No encrustation.
- Suitable for temperatures up to 90<sup>0</sup>Celsius.
- Tested to 10 bar pressure.

The DH pipe shall be run into the Building, properly clamped as per pipe manufacturer's requirements and entry points sealed correctly. It shall be installed minimum 300mm below finished ground level with sand bed and surround. Warning tape to be laid 150mm below the finished ground level.

Alternative pipe systems may be used where all of the above criteria are met. Note that insulating a pipe with a non weather and moisture proof insulation is not considered sufficient. Evidence of alternate pipework shall be supplied prior to commencement or else district heating pipe will be assumed.

### **Oil feed Pipes: Standards & Specification's.**

All external oil feed pipes shall be fitted below ground level. They shall be made of plastic coated copper piping. Plastic piping is not permitted above ground as it cannot be exposed to UV light and is also non fire rated. Stainless steel pipe shall have corrosive protections applied.

It shall be installed minimum 300mm below finished ground level with sand bed and surround. Warning tape to be laid 150mm below the finished ground level.

Gravity fed systems shall have the pipe fitted with in a continuous rise in the direction of flow. This will prevent air locks.

Non gravity fed systems requires that the pipe be sized correctly to ensure that the flow rate to the pump is correct. If this is incorrectly sized then the boiler will not run at the correct efficiency. The installer is responsible for the correct sizing of this pipe.

### **Oil Tank:**

Oil tanks shall be installed as per building regulations Technical Guidance Documents part J 1997.

A fixed plinth; storage tank shall be located as to reduce to a reasonable level the risk of fire spreading from a building to the tank. Ensure that the tank is located a reasonable distance from the boiler.

For a gravity feed system with a bottom outlet, the tank shall be in a raised position higher than the boiler oil inlet.

For pumped top outlet tanks (sub-gravity system) they may be placed on the ground.

All tanks shall be double skinned.

All tanks shall be capable of supplying oil with only 50 litres of oil remaining in the tank.

## **10. Multi Fuel Stoves**

### **Contractor Requirements & Competency**

The objective of this Scheme is to put in place secondary heating system that will achieve a level of performance in the Home greater than the traditional open fire.

Contractors of solid fuel stove shall be competent to complete the installation and shall 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 product manufacturer. Where the manufacturer operates an Approved Installer list, the Contractor shall demonstrate their inclusion on the list or certification by the manufacturer. Where a product is covered by an NSAI Agrément Certificate it shall be installed in accordance with this certificate and by such qualified people as specified.

### **Product Standards & Specification**

There are many stoves on market that conform to various quality standards. A good quality stove will conform to the European Standard EN13240/13229. Stoves that do not meet this standard are not acceptable. Stoves shall also reach a **gross rated efficiency of 75%**, as measured on the HETAS guide Part 1 when burning solid smokeless fuel (note this is different to the Seasonal efficiency as noted in DEAP/ HARP). Most high quality brands will have at least one model that will exceed this standard. Care shall be taken to ensure your stove meets the above standard.

**Note:** It is the intention to install room heater stoves rather than boiler stoves. If boiler stoves are specified, then stoves of a boiler heat output of < 5kW (16,000 Btu) shall be installed unless confirmed by the BER assessor in writing that it is appropriate to install a higher output boiler.

### **Installation Standards & Specifications**

When installed as per the system supplier's guidelines, the system shall comply with the current building regulation TGD part J.

Correct installation shall also satisfy the Building Regulations (Part J) where the installation does not increase the risk of the property catching fire through the use of a heat producing appliance.

### **Air Supply**

Any room or space containing an appliance shall have a ventilation opening (or openings) of at least the size indicated on table below.

A stove shall have a secure air supply for safe operation (see Part J of the current Building Regulations – go to [www.enviro.ie](http://www.enviro.ie)). This can be either in the form of a controlled dedicated air supply directly to the appliance, or in the form of a permanent ventilation opening to the room in which the appliance is located. Best practice is to rely upon dedicated ventilation and not on air infiltration or leakage into the room. The size of the opening depends on the size of the appliance. Your installer shall be able to size this correctly. In addition, extractor fans may interfere with the operation of the appliance

causing smoke to escape out of the appliance into the surrounding area so please consult with your installer.

**Flues**

The flue is used for the exhaust of the stove. It can be installed through a chimney or outside the building. The flue shall be installed to current Building Regulations. (Part J, check [www.environ.ie](http://www.environ.ie)). If installed outside the building some things to look for shall be:

- It is above the eaves line by 1metre or 600mm if coming out near the roof apex.
- It is double walled and insulated.
- It has a cowl on top to prevent downdraughts.

It shall be separated from any possible combustible material

TABLE 1	Air Supply to Appliances
Solid Fuel burning open appliance	A ventilation opening (or openings) with a total free area of at least 50% of the appliance throat opening area ( of which at least 6500mm <sup>2</sup> is permanent ventilation) shall be provided.
Other Solid Fuel Appliances	<p>A permanent air entry or opening with a total free area of at least 550mm<sup>2</sup> per kW of rated output above 5kW shall be provided but in no case less than 6500mm<sup>2</sup>.</p> <p>Where a flue draught stabiliser is used the total free area shall be increased to 300mm<sup>2</sup> for each kW of rated output.</p>

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

## **11. Solar Water Heating:**

### **Contractor Requirements & Competency**

The installation of solar DHW system shall 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 shall hold a Level 6 National Craft Certificate in Plumbing or an equivalent Plumbing qualification such as City and Guilds. Plumbers shall 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 shall 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**

It is recommended to use a flat plate solar collector on the merits of robustness. 4m<sup>2</sup> of Flat plate shall be installed with the following minimum standards:

1. Optical efficiency shall be no less than 75%
2. Zero loss co-efficient shall be < 4 W/ m<sup>2</sup> K

All solar heating products shall conform to the appropriate BS, EN or IS standard for that particular measure.

### **Installation Standard & Specification**

All Solar DHW Installation shall be carried out in accordance with the manufacturer's specifications and Industry Best Practice. All works shall be installed in accordance with the Dept. of Environment, Heritage and Local Government and SEAI Document Heating and Domestic Hot Water Systems.

All works shall 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 shall be given to good house keeping and safety during installation. Each installed measure shall be fully demonstrated by the Contractor to the homeowner along with a written set of operating instructions. Before leaving the home, the Contractor shall ensure that the owner can correctly operate their upgraded heating system.

Location - The optimum location for solar panel collectors for all year round energy collection is roughly south facing and at a tilt angle of 30° - 45° to the horizontal (however angles between 15° and 60° are also acceptable). It is also important that the collectors are positioned so there are no shadows on them during the middle of the day. Shading can be from the collectors themselves, or from trees, chimneys, part of the building or adjacent buildings.

Cylinder – An appropriately sized cylinder shall be chosen for the house. The volume of your solar hot water cylinder is related to the maximum cylinder temperature. It is recommended that at a maximum cylinder temperature of 60°C, 70 litres per square metre of aperture area is supplied and at a maximum cylinder temperature of 80 – 90 °C, 50 litres per square metre of aperture area is supplied. Smaller capacities will limit the benefit from the system and may lead to frequent overheating of the solar circuit. Generally Dual Coil cylinders shall be used, having the coils at the top and bottom of the cylinder. The solar collector circuit shall be connected to the bottom coil and the auxiliary circuit to the top coil, which will enable the solar system to pre-heat in bad weather. The contractor is responsible for the provision of a suitably sized cylinder.

Thermal Mixing Valve (Anti-Scald Valve)–Shall be fitted. This applies to all hot water systems and not just solar heated water systems. With the current recommendation to store hot water at 60°C to prevent the growth of legionella bacteria it is becoming more of a consideration to install thermal mixing valves.

Controller – After commissioning, a permanent power supply shall be provided for the solar controller to ensure circulation in the solar loop.

Pipe Insulation: All Pipe insulation shall be fit for purpose, UV stable and high temperature. Class 0 Fire rated insulation does not imply suitability.

## **12. Window Replacement.**

The replacement will achieve a U-value of 1.6 W/m<sup>2</sup>k for PVC or timber frames

- Glazing within critical locations will be replaced with safety glass.
- Existing measures for background and natural ventilation will be retained.
- Existing measures for means of escape from relevant rooms will be retained. (If the window pattern is to be changed this may affect means of escape).
- Open flue appliances affected by the window/door replacement will be checked for adequacy of combustion air supply by a suitably qualified person.
- If necessary, a suitable means of support will be provided above the replacement window/door.
- Where the dwelling was required to be constructed to provide an easily accessible threshold at entrance doors this will be retained.

### **Replacement Windows and Doors**

Current Building Regulations request that building owners installing replacement windows or doors shall obtain Building Regulations consent and have the installation inspected to ensure compliance with relevant regulations. The relevant regulations are:

L1 Conservation of fuel and power

N1 Glazing protection against impact

In addition, you shall also ensure that replacement windows and doors are no less



suitable than the existing windows and doors in relation to the following regulations:

**Guidance on how to satisfy the requirements**

**Requirement A1-structure.**

When installing new windows or doors an assessment shall be undertaken by the contractor as to the suitability of the support of lintel above the replacement window or door.

**Requirement B1- means of escape in fire**

all windows to habitable rooms (but not kitchens, utility rooms, dressing rooms, bathrooms, WC's or shower rooms) at floors above ground level are required to be suitable for escape in fire. In addition, rooms at ground floor level whose only escape route is via another room shall be provided with suitable escape windows.

A suitable escape window is defined as 'a window whose unobstructed open able area is at least 0.33m<sup>2</sup> and at least 450mm high and 450mm wide (a 450mm wide opening will need to be 735mm high). The bottom of the open able area shall be no more than 1100mm above the floor. Any key required to open the window shall be readily available.

**F1-means of ventilation**

See table 1 below for current requirements. If your original windows have trickle ventilators any replacement frames shall also be provided with such. The area of opening windows shall not be less than that which was originally provided.

As an alternative approach to the ventilation provisions listed in table 1 below, the overall provisions for background ventilations for the dwelling shall be equivalent to an average of 6000mm<sup>2</sup> per room for the rooms listed, with a minimum provision of 4000mm<sup>2</sup> in each room.

Table 1 Ventilation: current requirements for various rooms

Room	Rapid ventilation	Background ventilation
Habitable room	1/20th of the floor area of the room served	8000mm <sup>2</sup>
Kitchen and utility	Opening window (No minimum size)	4000mm <sup>2</sup>
Bathroom/Shower rooms	Opening window (No minimum size)	4000mm <sup>2</sup>
Sanitary accommodation	1/20th of the floor area of the room served	4000mm <sup>2</sup>

**J2 Combustion appliances and fuel storage systems**

certain fires and heating appliances rely on air infiltration for them to function correctly. They may require purpose made ventilators, or may have relied on air infiltration through existing ill-fitting windows and doors, if you have an open flue appliance in the house that does not have separate provision of combustion air, a check shall be made by a suitably qualified person to ensure that adequate permanent combustion ventilation is provided.

The boiler or fire manufacturer's advice shall be followed with regard to proximity of opening windows and doors.

#### K2 - protection for falling

Where a first floor window cill height is less than 800 mm above the floor level suitable guarding shall be provided to prevent a person falling through an open window. This requirement may conflict with Regulation B1 and provision of escape windows. One way of achieving the requirement may be to provide a restricted opening device that can be easily overridden in the event of an emergency.

#### L1- conservation of fuel and power

All UPVC and wood replacement windows shall attain a U value of 2.0W/m<sup>2</sup>K. For this scheme the specification has been improved to incorporate a U value  $\leq 1.6$  W/m<sup>2</sup>K. One way of achieving this requirement is by providing a UPVC or timber double glazed window system incorporating a 16mm air gap between panes and an approved low emissivity coating soft 0.5. This is not the only option, but if another system is used, substantiation may be required to prove that a U value of 1.6W/m<sup>2</sup> is attained.

#### M2 - access and facilities for disabled people

Where the property was subject to the Disabled Regulations, any new principal entrance door shall have a minimum 775mm clear opening with a low threshold.

#### N1- glazing protection against impact

Glazing shall either:

- Break safely as defined in BS 6206:1981 Specification for impact performance requirements for flat safety glass and safety plastics for use in buildings, clause 5.3
- Be inherently robust, i.e. annealed glass, glass blocks, polycarbonate or glass that gains strength through thickness.
- Be in small panes (a maximum area of 0.5m<sup>2</sup> with a maximum width of 250mm is acceptable). Annealed glass shall be not less than 6mm thick, except where it is in traditional leaded- or copper- lights in which 4mm glass is considered acceptable when fire resistance is not a factor.
- Be permanently protected by a suitable screen which has a minimum height of 800mm and which incorporates a gap no greater than 75mm.

### 13. APPENDIX A

Table of Minimum Standards Required for each measure that may be undertaken in the scheme to achieve a BER rating of  $\geq$  C1. (Each measure shall have to be specified following the issue of the pre BER xml from before the upgrade commences.) Prices quoted shall be linked to the U value achieved and verified by the post BER xml prior to payment to contractors.

Measure	Standard Required
Attic Insulation	<ul style="list-style-type: none"> <li>• Most recent Building Regulations</li> <li>• U-value of 0.12 w/m<sup>2</sup>/k (equivalent to 300mm of fibreglass)</li> </ul>
Wall Insulation - Cavity Fill - Internal - External	<ul style="list-style-type: none"> <li>• Most recent Building Regulations</li> <li>• U-value of 0.27w/m<sup>2</sup>/k or as near as practicable.</li> <li>• Maximum thermal conductivity of cavity wall insulation material to be 0.033W/ m K (i.e. no fibre based products)</li> </ul> <p>An optimal whole element solution shall be carried out. This means that if you have more than one wall type, each wall type shall be insulated. Partial solutions are only acceptable in exceptional cases where it is not “physically or economically possible” to provide a whole-element solution.</p>
Boiler Upgrade	<ul style="list-style-type: none"> <li>• Boilers need to be condensing (in case of fossil fuel) of minimum efficiency as follows.                             <ul style="list-style-type: none"> <li>○ GAS – 91% efficient.</li> <li>○ OIL – 94% efficient.</li> <li>○ Wood – 85% efficient</li> </ul> </li> <li>• Equivalent efficiency may be achieved using weather / load compensation (as defined in DEAP)</li> </ul>
Heating Controls	<ul style="list-style-type: none"> <li>• 2 zones (space &amp; water) with programmer (time &amp; temperature) control &amp; boiler interlock – Plus</li> <li>• Time &amp; temperature control of electric immersion (if immersion is present) – Plus</li> <li>• Either one more zone control or 3 Thermostatic Radiator Valves (TRVs) (note TRV shall never be installed in room with space heating thermostat)</li> <li>• Integrated with existing systems</li> </ul>
High Efficiency Cylinder	<ul style="list-style-type: none"> <li>• 50mm PU Factory Foam Insulated to 2008 Building Regulations (0.8W/L) Equivalent</li> <li>• Dual Coil in the event of solid fuel integration</li> <li>• Anode fitted to all cylinders &amp; immersions</li> </ul>

<p>Secondary Heating System</p>	<ul style="list-style-type: none"> <li>• Multi Fuel Stove</li> <li>• EN 13229/ EN 13240 Tested</li> <li>• Meets minimum standards for distances to combustible materials as set out in part J of the building regulations or manufacturers guidelines.</li> <li>• Minimum 75% gross efficiency as measured on the HETAS part 1 appliance register for multi-fuel combustion. Available from:   <a href="http://www.hetas.co.uk/pdfs/Part_1_Appliances.pdf">http://www.hetas.co.uk/pdfs/Part_1_Appliances.pdf</a>                      E.g. Standard Stanley Stove.</li> </ul>
---------------------------------	---

<p>Windows*</p>	<ul style="list-style-type: none"> <li>• Upgrade to U value <math>\leq 1.6\text{w/m}^2\text{K}</math> (Double glazed, low e soft 0.5 coating with thermally broken frame.)</li> </ul>
<p>Lighting – Low Energy Bulbs</p>	<ul style="list-style-type: none"> <li>• Be of an appropriate wattage bulb. i.e. not less than CFL equivalent of:                         <ol style="list-style-type: none"> <li>1. 18W in living rooms and kitchens.</li> <li>2. 15W in bedrooms and bathrooms</li> <li>3. 11W in corridors and low use spaces</li> </ol> </li> <li>• All bulbs will be ROHS compliant, CE marked.</li> <li>• A Rated.</li> </ul>