

Section E – ENERGY PERFORMANCE

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E.0 Compliance with Materials & Workmanship with the Building Regulations

In order to demonstrate conformity with the Building Regulations (Part D; Materials and Workmanship), and with the Construction Products Regulation (Regulation (EU) No.305/2011) as set out in national rules for Ireland (S.I. no.225 of 2013), the Contractor shall provide proof (a Declaration of Performance (DoP)) and (where applicable) a CE marking for all building products to be placed in the works.

The Contractor shall ensure that the product to be incorporated in the works, while complying with the CPR, is fit for the use for which it is intended. The Contractor may be required to demonstrate this by means of manufacturer's confirmation, or independent testing certificate.

GENERAL (New build + Retrofit)

E.1 Energy Performance generally

New dwellings and refurbishment of existing dwellings shall achieve a set standard of energy performance set out by the latest building regulations. The Job Architect shall use the Building Energy Rating benchmark system to set a target for the proposed dwelling's final use energy performance.

The Job Architect shall insert the BER target of the dwellings as: **A BER rating of no worse than (Insert rating here) for each dwelling.**

E.2 BER (Building Energy Rating) Testing

A Building Energy Rating test shall be conducted by an accredited SEAI BER Assessor and shall carry out the BER test in a competent and professional manner.

INSULATION

E.3 Insulation Generally

All insulation to be provided in all locations specified and/or shown on drawings so designed as to meet current U-Values stated in the current Technical Guidance Document, Part L: Conservation of Fuel and Energy for Dwellings.

E.4 Glass Fibre Mats

Glass Fibre mats for thermal insulation (Thickness as shown on drawings) shall comply with IS EN 13162:2012, while having a thermal conductivity of no more than 0.045W/mK. Manufacturer's or suppliers' certificates of compliance with the standard shall be provided when requested by the Architect.

E.5 Rock Fibre Mats

Rock fibre mats (Rockwool) for fire stopping and thermal insulation (Thickness as shown on drawings) shall comply with IS EN 13162:2012, while having a thermal conductivity of no more than 0.045W/mK. Manufacturer or suppliers' certificates of compliance with the standard shall be provided when requested by the Architect.

E.6 Insulation for Concrete Ground Floors

Insulation for concrete ground floors shall be of High performance rigid Polyisocyanurate (PIR) insulation board (Thickness as shown on drawings) and shall comprise of a CFC- free rigid urethane core with low emissivity composite foil facings on both sides, ('Kingspan ThermaFloor TF70' or equivalent), while having a thermal conductivity no more than 0.022 W/mK, unless

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otherwise shown in drawings. The insulation shall extend under the entire floor with perimeter insulation provided at the vertical edges as shown on the drawings. All Polyisocyanurate insulation shall comply to IS EN 13165:2012

E.7 **Insulation for Suspended Timber Floors** GENERAL HOUSING SPECIFICATION - FRAMEWORK FOR RESPONSE and GENERAL MAINTENANCE to GROUP HOUSING & TRAVELLER ACOMODATION - FINGAL 2018 - 2020

Insulation for suspended timber floors shall be High performance rigid Polyisocyanurate (PIR) insulation board (thickness as shown on drawings) and shall comprise of a CFC- free rigid urethane core with low emissivity composite foil facings on both sides, ('Kingspan ThermaFloor TF70' or equivalent), while having a thermal conductivity no more than 0.022 W/mK), unless otherwise shown in drawings. All Polyisocyanurate insulation shall comply with IS EN 13165:2012.

E.8 **Cavity Wall Insulation**

Cavity wall insulation shall be high performance rigid phenolic insulation board (thickness as shown on drawings) comprising of a CFC-free rigid insulation core with low emissivity composite foil facings on both sides and having a thermal conductivity of no more than 0.020 W/mK, (Kingspan Kooltherm K8 Cavity Board' or 'Xtratherm Safe-R partial fill cavity board' or equivalent), unless otherwise shown in drawings.

Or (Job Architect shall delete where appropriate)

High performance rigid polyisocyanurate (PIR) insulation board (thickness as shown on drawings), comprising of a CFC-free rigid insulation core with low emissivity foil facings and having a thermal conductivity of no more than 0.021 W/mK, (XtroLiner XO/CW Partial fill cavity board' or equivalent), unless otherwise shown in drawings.

E.9 **External Wall Insulation**

External wall insulation shall be high performance rigid phenolic external insulation board (thickness as shown on drawings) comprising of a CFC-free rigid insulation core with low emissivity composite foil facings on both sides, (Kingspan Kooltherm K5 External Wall Board' or equivalent), while having a thermal conductivity of no more than 0.020 W/mK, unless otherwise shown in drawings. All Phenolic foam insulation to comply with IS EN 13166:2012.

All ETICS (External Thermal Insulation Composite Systems) shall comply to IS EN 13499:2003.

E.10 **Insulation to Timber Roof Spaces (Warm and Cold roof Design)**

Roof insulation material (including its thickness and method of laying may vary from contract to contract. The Contractor must check the tender drawings and confirm the requirements with the Architect before work commences. Generally, roof insulation shall be: -

Cold Roof Design

Insulating mat for thermal insulation to timber pitched roof spaces shall be mineral wool mat as Clauses E.5 and E.6 with a total thickness of 300mm and have a thermal conductivity of no more than 0.044W/mK., unless otherwise described. The mat shall be laid between joists (or trusses if specified) for full extent of roof-space, (excluding under the water tank), and tucked tightly to the joists and carried over the wallplate ensuring that the insulation does not obstruct the ventilation path from the roof eaves. Installation shall be by a specialist firm approved by the Architect.

In addition to the mineral wool mat insulation to timber pitched roof spaces the ceiling board shall be a composite laminate comprising of 12.5mm plasterboard bonded to 30mm thick high-performance CFC-free rigid urethane insulation board during manufacture, (Kingsapn Thermawall TW56, with an overall thickness of 42.5mm, or equivalent). Unless otherwise shown on the drawings, Installation, workmanship, and storage shall be in accordance with the manufacturer's recommendations. The boards must be placed with the long edge running perpendicular to the

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joists or battens and all edges must be supported with a minimum of 20mm support. Provide noggins between joists longitudinally and at right angles to support board edges.

Note: Use of Polystyrene board and bead insulation is prohibited for use as insulation in an attic space, unless requested by the Architect.

Or (Job Architect shall delete where appropriate)

Warm Roof Design

Insulating board for thermal insulation to timber pitched roof spaces shall be high performance rigid insulation, (Kingspan Kooltherm K7, or equivalent), while having a thermal conductivity of 0.020 W/mk) and shall be placed between the roof rafters supported by battens giving a minimum of 20mm support for the long board edges.

The insulation must not obstruct the 50mm minimum space provided for the passage of air to remove condensation from the roof space.

In addition to the rigid board insulation shall be a composite laminate comprising of 12.5mm plasterboard bonded to 30mm thick high-performance CFC-free rigid urethane insulation board during manufacture (Kingspan Thermawall TW56, with an overall thickness of 42.5mm, or equivalent). Unless otherwise shown on the drawings, Installation, workmanship, and storage shall be in accordance with the manufacturer's recommendations. The boards must be placed with the long edge running perpendicular to the rafters or battens and all edges must be supported with a minimum of 20mm support. Insulation must not obstruct the ventilation path at the roof eaves to the roof space, and a minimum air space shall be provided between the insulation layer and the underside of the roof weatherproof membrane/sarking felt.

E.11 Loft Hatch Insulation

Insulate trap door with high performance rigid urethane insulation board as clause E.8.

For new dwellings loft hatches servicing a cold roof design must be properly sealed with around the edges of the door to ensure there is no passage for draughts by installing EPDM draught excluder strips along the doors edge. Trap door build as Clause N.59. See drawings for appropriate detailing.

E.12 Cold Bridging

Provide Expanded Polystyrene insulation board (Thickness as shown on drawings) to prevent "cold bridging" as shown at details indicated on the drawings. Expanded Polystyrene board for thermal insulation shall comply with IS EN 13163:2012 and unless other wise specified shall be Grade SD Type A of the thickness shown on the drawings.

Note: Expanded Polystyrene must not come into contact with P.V.C, insulated electric cabling.

E.13 Fire Stopping to Ducts

Provide and fit fire stopping plasterboard around all ducts that penetrate compartment spaces. Minimum of 2 hour fire integrity rating is required for the plasterboard material, ('Gyproc Fireline plasterboard' or equivalent), and shall consist of 2 layered boards with staggered jointing to prevent passage of smoke.

Final construction shall meet the specifications set out in the Fire Safety Certificate in order to satisfy compliance with TGD, Part B.

Unless otherwise described fire stopping at pipe penetrations at compartment floors and walls shall consist of that stated in Clause R.9.

E.14 Insulation of Plumbing and Heating Services

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Insulation of hot and cold plumbed services shall be as set out in Section R Plumbing Installation, Clause R/W/17.

Insulation for central heating services shall be as set out in Fingal County Council Standard Specifications for Gas, Oil, or Solid Fuel Central heating systems in New and Existing houses.

E.15 **Alternative Materials**

Where it is proposed to use an alternative insulating products, they shall be certified to have the same performance, or better, and be of the same thickness than those specified above.

In any event all insulating materials shall be approved by the Architect before delivery to site.

AIRTIGHTNESS

E.16 **Airtightness Generally**

All homes must reach Airtightness requirement listed in the Technical Guidance Document, Part L: Conservation of Fuel and Energy in Dwellings. The Contractor shall be responsible for achieving the airtightness levels set by the latest requirements of TGD part L: Conservation of Fuel and Energy in Dwellings and shall co-ordinate between subcontractors to establish the extent of their responsibilities.

The Contractor shall highlight any elements of work within the identified airtight envelope, which may present a risk of the final air test failing and make them known to the Architect.

New builds shall be sealed at areas shown on general drawings to ensure a continuous and effective Airtightness envelope is created.

E.17 **Air permeability test method**

All air permeability tests shall be carried out by an individual that has been accredited and approved by a third party, (e.g.: National Standards Authority of Ireland), to carry out the test. All air permeability tests must comply with the procedures of I.S. EN 13829:2000.

For one off houses a single test is required, however in the case of a large development of housing units the number of tests required is dependent on the Table 4, 'Number of Pressure tests per dwelling type' in Technical Guidance Document, Part L: Conservation of Fuel and Energy in Dwellings.

New builds must pass an air permeability test to ensure that the building is achieving a rate of less than $7\text{m}^3/(\text{h.m}^2)$ @ 50 Pascals. If the building air leakage is greater than the required value then the Contractor shall arrange for appropriate remedial action to be taken.

If building fails to pass a test then remedial work is to be carried out before another test commences on the same test house until the building has achieved a satisfactory level of compliance. Any additional buildings built after the most recent test of its type should be given the same remedial work as given the complaint test building.

E.18 **Vapour Control Barrier**

The vapour control barrier shall be of polyethylene ('Pro Clima Intelligent airtight system 'INTELLO PLUS' from www.ecologicalbuildingsystems.ie, or equivalent) and shall comply with IS EN 13984:2013. The vapour control barrier must be continuous in its surrounding of the building's envelope and must be taped appropriately to other building elements such as doors and windows as to the manufacturer's recommendation with the Architects approval. All vapour control barriers and accessories shall at the time of installation have a valid NSAI Agrément Certificate.

OR (Job Architect shall delete where appropriate)

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A well-built inner concrete wall leaf with a coat of wet-finish plaster can if properly applied alongside proper detailing can provide an airtight layer.

E.19 Sealing of Vapour barrier

All horizontal and vertical overlaps of the vapour control barrier must be a minimum of 150mm overlap with double back jointing tape between the two laps and then sealed using a sealing tape recommended by the manufacturer.

E.20 Areas of General Air Leakage

The Contractor is required to take into account the possible air leakage points that can appear in an airtight envelope. The Contractor shall also highlight any elements of work within the identified airtight envelope, which may present a risk of the final air test failing and make them known to the Architect.

The Contractor's attention is drawn to the following list of areas where air leakage can occur in the building's airtight envelope. NOTE: This list does not include all areas of air leakage from the building and is NOT a minimum benchmark that should be aimed for.

Common Areas of Air Leakage	Method of Airtightening
Window and door openings.	All window and door surrounds shall be appropriately weather sealed and taped to prevent air leakage.
Pipe penetrations through the exterior walls or ground floor.	Seal around pipes that penetrate the exterior wall and ground floor creating a draught-proof seal at the pipe's penetration of the envelope.
Pipe Penetrations to the Roof Space.	All pipe penetrations into the roof space shall be sealed and taped to create a draught-proof seal.
Ground Floor meeting Exterior Wall.	Seal between the floor, wall and air barrier layer shall be appropriate sealed.
Intermediate Timber Joist Floor and Exterior Wall junction.	Where the airtightness barrier meets an upper floor connecting the building's exterior wall the barrier shall be sealed and taped to the underside and topside of the floor's substructure (E.g. plasterboard, plywood, MDF), unless shown on drawings.
Intermediate Concrete Floor and Exterior Wall junction.	Where the airtightness barrier meets an upper floor connecting the building's exterior wall the barrier shall be sealed and taped to the underside and topside of the floor's concrete structure, unless shown on drawings.
Existing timber joists built into external wall.	Existing timber joists built into the exterior walls shall have applied mortar to close any gaps between the concrete wall and the timber. Then sealed and taped to prevent air leakage. This shall be repeated at all instances where joists penetrate the exterior wall.
Underside of ceiling joists to the exterior wall.	As above the airtightness barrier shall be sealed and taped the underside of the ceiling joists substructure (E.g. Insulation board or plasterboard), unless show on drawings.
Loft Hatch to Attic space	The surround of the Loft hatch shall be appropriately sealed and the loft hath to be fitted with EPDM draught strips to prevent air leakage between the hatch board and the hatch frame.

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Further information on acceptable airtightness details can be found in the 'Acceptable Construction Details' by the Department of Environment, Community, and Local Government. www.environ.ie

VENTILATION

E.21 **Room Ventilation**

Provision requirements providing adequate air exchange for room ventilation can be found in TGD Part F; Ventilation.

E.22 **Mechanical Ventilation with heat recovery**

Mechanical ventilation units with fitted heat recovery system shall conform to the room ventilation requirements listed in section 1.2.3.1 of the TGD Part F; Ventilation. The unit's location, ventilation inlets/outlets, and ducts runs shall be in accordance to the manufacturer's instructions.

Contractor's attention is drawn to the calculation table and requirements for the MVHR system can be found in the TGD Part F; ventilation.

E.23 **Passive Stack Ventilation**

Passive stack ventilation system for use in room ventilation ('Intelligent Passive Stack Ventilation from Passivent or equivalent) with a mechanical assisted fan shall be installed in according to BRE IP 13/94.

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Appendix A: List of References and Standards

Item No.	Clause no.	Reference	Comment
1.	E.1	Technical Guidance Document, Part L:2011	Part L 'Conservation of Fuel and Energy' 2011 edition. by Department of Environment, www.environ.ie
2.	E.5	IS EN 13162:2012	Thermal insulation products for buildings – factory made mineral wool (MW) products – Specification.
3.	E.8	IS EN 13165:2012	Thermal insulation products for buildings – Factory made rigid polyurethane foam (PU) products – Specification.
4.	E.13	IS EN 13163:2012	Thermal insulation products for buildings – factory made expanded polystyrene (EPS) products – Specification.
5.	E.18	IS EN 13829:2000	Thermal performance of buildings – determination of air permeability of buildings – Fan pressurization method.
6.	E.19	IS EN 13984:2013	Flexible sheets for waterproofing – Plastic and rubber vapour control layers – Definitions and characteristics.

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Appendix B: Amendments List	
Date of Amendments	Amendments
1/05/2014	This section was amended by Barry Sheils and approved by David Byrne, Senior Architect, Fingal County Council.