# T Level Technical Qualification in Onsite Construction (8711-30)

## 8711-033 Employer-Set Project

## Exemplar – A Grade

## Summer 2025

# Contents

# Introduction

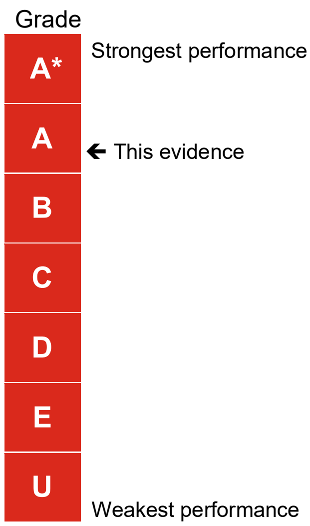
**Summer 2025 Results**

This document is aimed at providers and learners to help understand the standard that was required in the summer 2025 assessment series to achieve an A grade for the 8711-033 Onsite Construction Employer-Set Project (ESP).

Providers and learners may wish to use it to benchmark the performance in formative assessment against this to help understand a potential grade that may be achieved if a learner was to attempt the next summative assessment series.

The Employer-Set Project is graded A* to E and Unclassified.

The exemplar evidence provided for the A grade displays the holistic standard required across the tasks to achieve 2 marks above the A grade boundary for the summer 2025 series.




The Employer-Set Project brief and tasks can be downloaded from here:

**Important things to note**:

- We discussed the approach to standard setting/maintaining with Ofqual and the other awarding organisations before awarding this year. As in 2024, we have agreed to take account of the newness of T Level qualifications in how we award, to recognise that students and teachers are less familiar with the assessments in the first years of awards, whilst also recognising the standards required for these qualifications (Ofqual guide for schools and colleges 2025 - GOV.UK).

- The exemplar evidence presented, as a whole, was sufficient to achieve 2 marks above the A grade. However, performance across the tasks may vary (i.e. some tasks completed to a higher/lower standard than an A grade).

Marking of this Employer-Set Project is by task and Assessment Objective, below is a summary of these along with the mark achieved by the evidence presented and the maximum mark available for each aspect.

| Task | Assessment Objectives | Mark achieved | Max mark available |
|---|---|---|---|
| **Task 1.1 Research** | - AO1 Planning skills and strategies<br>- AO2a Apply knowledge to the context of the project<br>- AO3 Analyse contexts to make informed decisions<br>- AO4c Use digital skills | 6 | 9 |
| **Task 1.2 Report** | - AO1 Planning skills and strategies | 4 | 6 |
| | - AO2 Apply knowledge and skills to the context of the project | 8 | 12 |
| | - AO3 Analyse contexts to make informed decisions | 2 | 2 |
| | - AO4 Use maths, English and digital skills | 5 | 6 |
| **Task 1.3 Project plan** | - AO1 Planning skills and strategies<br>- AO3 Analyse contexts to make informed decisions<br>- AO4a Use maths skills | 6 | 8 |
| | - AO2 Apply knowledge and skills to the context of the project | 12 | 16 |
| **Task 1.4 Presentation** | - AO1 Planning skills and strategies<br>- AO3 Analyse contexts to make informed decisions<br>- AO4b Use English skills | 5 | 6 |
| | - AO2 Apply knowledge and skills to the context of the project | 10 | 12 |

| | | | |
|---|---|---|---|
| **Task 2.1 Collaborative problem-solving** | - AO2 Apply knowledge and skills to the context of the project<br>- AO3 Analyse contexts to make informed decisions<br>- AO5a Carry out tasks | 9 | 15 |
| **Task 2.2 Evaluation** | - AO4b Use English skills<br>- AO5b Evaluate for fitness for purpose | 4 | 8 |

# Task 1.1 Research

| | |
|---|---|
| **Assessment number (eg 1234-033)** | 8711-033 |
| **Assessment title** | Employer-Set Project |

| | |
|---|---|
| **Candidate name** | <first name> <surname> |
| **City & Guilds candidate No.** | ABC1234 |

| | |
|---|---|
| **Provider name** | <provider name> |
| **City & Guilds provider No.** | 999999a |

| | |
|---|---|
| **Task(s)** | 1.1 |
| **Evidence title / description** | Research notes (with record of sources) |
| **Date submitted by candidate** | DD/MM/YY |

**Part L**

**What is an approve document?**

Approved documents are approved by the Secretary of State and give practical guidance on common building situations about how to meet the requirements of the Building Regulations 2010 for England. Different approved documents give guidance on each of the technical parts of the regulations. These are all listed in the back of the approved documents. In addition to guidance, some approved documents include provisions that must be followed exactly, as required by regulations or where methods of test or calculation are approved by the Secretary of State. Each approved document covers the requirements of the Building Regulations 2010 relating to a different aspect of building work. Building work must also comply with all other applicable requirements of the Building Regulations 2010 and all other applicable legislation.

Approved Document L: Conservation of fuel and power, Volume 1: Dwellings

**What does part L cover?**

This page holds the current guidance covering the energy efficiency requirements of the building regulations as set out in Part L of Schedule 1 to the Building Regulations and in a number of specific building regulations.

**Current technical guidance is contained in:**

- Approved Document L, Conservation of fuel and power, Volume 1: Dwellings
- Approved Document L, Conservation of fuel and power, Volume 2: Buildings other than dwellings

Conservation of fuel and power: Approved Document L - GOV.UK

**Thermal Bridging**

**What is thermal bridging?**

Thermal bridges occur when an area of a building has significantly higher heat transfer than the surrounding parts. Breaks in insulation, reduced insulation or more conductive materials can contribute to thermal bridge effects. The building fabric should be constructed so that thermal bridging, including at the party wall, is reasonably limited.

Approved Document L: Conservation of fuel and power, Volume 1: Dwellings

**How to reduce thermal bridging in existing dwellings:**

When carrying out work in existing dwellings, care should be taken to reduce unwanted heat loss through thermal bridging. Thermal bridges can be limited in an existing dwelling by following the junction details from a reputable non-government database containing independently assessed thermal junction details, such as Local Authority Building Control's Construction Details library. Follow the guidance in paragraph 4.17 where appropriate.

Approved Document L: Conservation of fuel and power, Volume 1: Dwellings

Foundations: wherever possible, blocks below the damp-proof course should be the same as those specified in the design for the above-ground main wall element (in masonry construction).

Ground floor and external walls: the wall-to-floor junctions should be detailed to achieve continuity of insulation.

i. Perimeter floor insulation should abut or extend the full depth of the main floor insulation.

ii. Masonry construction: external or cavity wall insulation should extend below the dampproof course (where applicable) and be at least the equivalent of one full block height (215mm) below the underside of the floor structure/slab and beyond the depth of the floor insulation.

iii. Timber construction: insulation between boards/within sheathing should extend to the floor plate. The wall insulation and the floor perimeter insulation should abut.

Intermediate floors: floor-to-wall junctions should be detailed to ensure that insulation in the external wall is continuous. For a timber frame where the intermediate floor structure breaches the external wall insulation, further insulation – of the same thickness as the insulation used in the external wall – should be included within the depth of the intermediate floor structure.

Roofs: continue the insulation across the wall-to-eaves and wall-to-gable junctions.

i. Wall insulation should be installed to the top of the wall plate; in some places, such as the eaves, this may be above the cavity closure or barrier. In all cases, roof insulation should be continuous with wall insulation.

ii. Roofs insulated at ceiling level: loft insulation at the eaves should extend beyond the wall insulation without any reduction in thickness due to the pitch of the roof. The roof insulation should be installed when the eaves are still accessible. At gables and party walls, insulation should extend to the wall; if the space between the wall and joist is less than 100mm, perimeter insulation may be required.

iii. Roofs insulated at rafter level: at the eaves, insulation should extend to the top of the external wall. Voids between insulation at the top of the external wall and the cavity wall/ timber frame insulation should be fully filled with insulation.

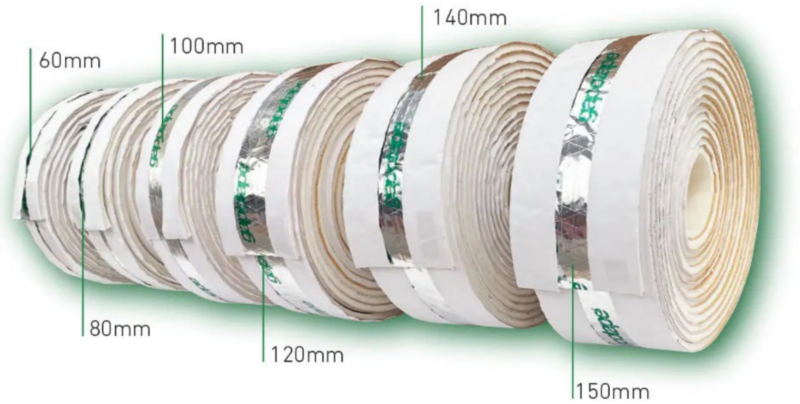
Approved Document L: Conservation of fuel and power, Volume 1: Dwellings

**What techniques can be utilised to prevent thermal bridging?**

- Staggering of Studs
- Insulated Studs
- Insulation backed plasterboard
- GAPO tape

Gapotape is an innovative and multi-award-winning product that ingeniously combines foil and foam tape to deliver outstanding insulation. Tailored specifically for use with rigid insulation boards, it effectively prevents air leaks and thermal bridging, ensuring that the performance of your build matches its design. Fully compliant with Part L Building Regulations, Gapotape guarantees that your projects meet top-tier energy efficiency standards. Enhance your insulation with Gapotape for unparalleled performance, dependability, regulatory compliance, and energy savings!

[Quality Insulation Tape- Gapogroup]




[66e0438ab7b5b_Gapotape-Roll-Image-1.jpg (1250×789)]

- Insulation foil tape
- Silicone sealant for air tightness

**EPC:**

**An Energy Performance Certificate (EPC) tells you how energy efficient a property is. You must have an EPC when you're:**

- selling a property
- renting out a property
- building a new property

You must order an EPC for potential buyers and tenants before you market your property to sell or rent.

In Scotland, you must display the EPC somewhere in the property, for example in the meter cupboard or next to the boiler.

**An EPC contains:**

- information about a property's energy use and typical energy costs
- steps to improve a property's energy efficiency and save money

**What is the scale of an EPC?**

An EPC gives a property an energy efficiency rating from A (best) to G (worst) and is valid for 10 years.

[Selling a home: Energy Performance Certificates - GOV.UK]

**R-Values**

**What is R-Value?**
R-value indicates an insulation's resistance to conductive heat flow. The higher the R-value, the better the thermal performance.

**R-value is measured in:**

Ft2×°F×h/Btu (imperial)

m2×K/W (metric)

For insulation materials, R-value per inch thickness is commonly provided. Thicker insulation has higher overall R-value.

**R-value depends on:**

- **Material** - Plastic foams have higher R-values than fiber insulation.
- **Thickness** - Doubling thickness nearly doubles R-value.
- **Density** - Higher density means higher R-value.
- **Temperature** - R-value varies with temperature. Values are given for standard conditions.
- **Moisture** - Exposure to moisture reduces R-value.

**Typical R-Values:**

| Material | R-value per Inch Thickness |
|---|---|
| Polyisocyanurate Foam | 8.0 |
| Extruded Polystyrene | 5.0 |
| Expanded Polystyrene | 4.0 |
| Fiberglass Batt | 3.0 - 4.0 |
| Mineral Wool Batt | 3.0 - 4.0 |
| Cellulose | 3.5 - 4.0 |

**U-Values**

**Why U-Value Matters**
U-value is useful for several reasons:

- It quantifies the overall heat transfer through an entire assembly, not just the insulation.
- Lower U-values reduce heating and cooling costs.
- It accounts for the real temperature conditions a building experience.
- U-values are used in building energy modelling to calculate heat loss and energy use.
- Building codes and standards set maximum U-value limits for assemblies.

**Calculating U-Values**
U-values can be calculated with this formula:

$$U = \frac{1}{R_{total}}$$

Where:

U = U-value (W/m2K or Btu/hr×ft2 ×°F)

Rtotal = Total thermal resistance (R-value) of the assembly

With known R-values, the U-value is easily computed.

[Mastering U-Value & R-Value for Insulation – Insulation & More]

**Typical U-Values:**

| Assembly | Typical U-value |
|---|---|
| Wall with R-20 insulation | 0.05 W/m2K |
| Roof with R-30 insulation | 0.03 W/m2K |
| Triple Glazed Low-E Argon Filled Window | 1.0 W/m2K |
| Slab-on-Grade Floor | 0.15 W/m2K |

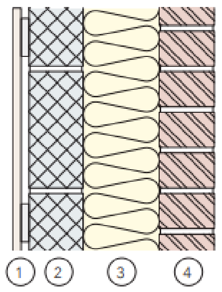
[Mastering U-Value & R-Value for Insulation – Insulation & More]

**U-Values in external walls:**

| U-value | Aircrete blockwork (λ = 0.15 W/mK) | | Ultra lightweight blockwork (λ = 0.28 W/mK) | | Dense blockwork (λ = 1.33 W/mK) | |
|---|---|---|---|---|---|---|
| | Insulation thickness | Wall thickness | Insulation thickness | Wall thickness | Insulation thickness | Wall thickness |
| 0.23 W/m²K | 115 mm | 345 mm | 125 mm | 355 mm | 140 mm | 370 mm |
| 0.20 W/m²K | 140 mm | 370 mm | 150 mm | 380 mm | 160 mm | 390 mm |
| 0.18 W/m²K | 160 mm | 390 mm | 175 mm | 405 mm | 180 mm | 410 mm |
| 0.15 W/m²K | 195 mm | 425 mm | | | | |

Wall type 1: fully filled external wall

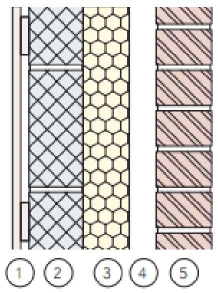
1. Plasterboard on dabs
2. 100 mm blockwork
3. Mineral wool insulation (λ = 0.032 W/mK)
4. 100 mm brickwork




| U-value | Aircrete blockwork (λ = 0.15 W/mK) | | Ultra lightweight blockwork (λ = 0.28 W/mK) | | Dense blockwork (λ = 1.33 W/mK) | |
|---|---|---|---|---|---|---|
| | Insulation thickness | Wall thickness | Insulation thickness | Wall thickness | Insulation thickness | Wall thickness |
| 0.23 W/m²K | 65 mm | 345 mm | 75 mm | 355 mm | 80 mm | 360 mm |
| 0.20 W/m²K | 80 mm | 360 mm | 90 mm | 370 mm | 95 mm | 375 mm |
| 0.18 W/m²K | 95 mm | 375 mm | 105 mm | 385 mm | 110 mm | 390 mm |
| 0.15 W/m²K | 120 mm | 400 mm | 125 mm | 405 mm | 135 mm | 415 mm |

Wall type 2: partially filled external wall

1. Plasterboard on dabs
2. 100 mm blockwork
3. Rigid PIR insulation (λ = 0.022 W/mK)
4. 50 mm clear cavity
5. 100 mm brickwork




part-I-2013---where-to-start.pdf (NHBC)

**Target U-Values:**

- **Building codes** - Specify maximum U-values for assemblies. Some examples:
  - Walls: 0.35 W/m2K
  - Roofs: 0.20 W/m2K
  - Floors: 0.25 W/m2K

Mastering U-Value & R-Value for Insulation – Insulation & More

**Insulation**

**Were 1970 dwelling walls solid or cavity?**

CWI was first introduced in the UK during the 1930s as a way to improve the energy efficiency of homes with cavity walls. These walls, featuring two layers of brick with a gap in between, were initially created to reduce dampness. However, it became clear that this gap allowed significant heat loss, prompting the development of insulation to fill the void.

By the 1970s, CWI gained momentum as energy efficiency and rising heating costs became a priority. Houses built after 1970 were commonly designed with insulation-ready cavity walls, while older Victorian and Edwardian properties, which typically had solid walls, required retrofitting to improve thermal performance through solid wall insulation.

When Was Cavity Wall Insulation Introduced in the UK?

**What should you expect to save when insulating a dwelling?**

**Insulation methods:**

**External load bearing walls:**

**External Wall insulation:**

**What is external wall insulation?**

External wall insulation, also known as EWI and external solid wall insulation, is a type of insulation that is attached to the outside of your walls. Two layers of material are used - one to offer insulation, and an outer layer of mineral or synthetic render to protect against weather and provide a decorative finish.

Installing EWI will add around 100mm to your house, depending on the thickness of insulation used.

**What buildings can external wall insulation be used on?**

EWI is suitable for any building with solid walls. These can be:

- Older properties built before 1930 that have solid brick walls
- System built (concrete) properties that tend to have been built between the 1930s and 1980s
- Solid wall properties with timber or steel frames

Houses built with cavity walls do not need EWI because they already have a space within the walls that insulation can be injected in to. Many properties with cavity walls have already been insulated apart from what are known as "hard to treat" cavity walls that require more specialist treatment.

External Wall Insulation – A Simple Guide | YES Energy Solutions

**What is external wall insulation made up of?**

EWI creates a barrier that stops heat escaping through your walls. This barrier is attached to the outside of your walls in several layers. The main insulating component is normally made of expanded polystyrene (EPS), phenolic boards or mineral wool. EPS is most commonly used.

The components of EWI:

**1. Insulation layer**
This is the main insulation - it is normally made of either expanding polystyrene or mineral wool. Technologies such as phenolic resin insulation are also available. All of these materials are used to prevent heat escaping through walls. The insulation is typically fastened to the building using direct fixings such as self-tapping screws.

**2. Primer**
The primer helps waterproof the EWI system and act as a barrier to moisture passing from the outside in. Some primers also have inherent insulation properties adding to the overall efficiency of the system.

**3. Glass fibre mesh & fixing anchor**
This part is used to hold the primer in place whilst it dries. Another layer of primer is then applied over the top of it.

**4. Render finish**
This is the final layer of EWI and has a decorative function, enhancing the look of your home. There are various different renders available.

External Wall Insulation – A Simple Guide | YES Energy Solutions

(External Cladding Insulation)

Advice on insulating your solid walls - Energy Saving Trust

Internal Wall Insulation:

### Internal wall insulation

Internal wall insulation is done by fitting rigid insulation boards to the wall, or by building a stud wall filled in with insulation material such as mineral wool fibre.

Internal insulation:

- Is generally cheaper to install than external wall insulation.
- Will slightly reduce the floor area of any rooms in which it is applied (the thickness of the insulation is around 100mm).
- Can be quite disruptive, but can be done room by room.

- Requires skirting boards, door frames and external fittings to be removed and reattached.
- Can make it hard to fix heavy items to inside walls – although special fixings are available.
- Cannot be done before fixing any problems with penetrating or rising damp.

Advice on insulating your solid walls - Energy Saving Trust

(Internal Wall insulation)

Advice on insulating your solid walls - Energy Saving Trust

**Cavity wall insulation on an existing property:**

**Injected and blown fill insulation:**

| Material | Standard | Settlement class |
|---|---|---|
| Mineral wood | BS EN 14064-1 Thermal insulation products for buildings. In-situ formed loose-fill mineral wool (MW) products — Specification for the loose-fill products before installation<br><br>BS EN 14064-2 Thermal insulation products for buildings. In-situ formed loose-fill mineral wool (MW) products — Specification for the installed products | S1 |
| Expanded polystyrene (EPS) beads | BS EN 16809-1 Thermal insulation products of buildings. In-situ formed products from loose-fill expanded polystyrene (EPS) beads and bonded expanded polystyrene beads — Specification for the bonded and loose-fill products before installation<br><br>BS EN 16809-2 Thermal insulation products of buildings. In-situ formed products from loose-fill expanded polystyrene (EPS) beads and bonded expanded polystyrene beads — Specification for the bonded and loose-fill products after installation | N/A |

Injected and blown fill insulation systems should meet the requirements of the relevant standards and hold a satisfactory assessment by an appropriate technical approvals authority acceptable to NHBC, confirming suitability for use in a masonry cavity wall and for the exposure rating of the site.

Separating wall and floor constructions and their associated flanking walls should be detailed correctly when using injected and blown fill insulation. Cavity stops should be installed at the ends of separating walls and separating floors. Refer to the Robust Details Handbook for the specification of materials and construction details.

**Before installing injected or blown fill insulation materials, the home should be in a condition ready to receive the insulation. This will be defined in each system's instruction documents but, as a minimum, would require that:**

- the cavity wall is inspected by the installing team
- the roof is in place and the tops of the walls are protected from rain
- all edges of cavities at window, door and other openings are closed with the permanent cavity closers, as per the design.

Areas that cannot be accessed during the fill process by appropriate adaptation of the installation method (eg below gas membranes or low level continuous DPCs, where there is a cavity tray one course above a lintel, or where separate lintels are used for each leaf) should be insulated with appropriate built-in materials.

On completion of the work, the installer shall provide a declaration of compliance in accordance with the relevant standard for the product.

6.1.7 Thermal insulation - NHBC Standards 2025 NHBC Standards 2025

**Loft insulation:**

**Loft insulation between joists:**

**Insulation thickness**

The required **roof insulation thickness** varies depending on the type of roof and insulation material:

- **Pitched roofs:** In new builds, thicknesses often range between **150mm** and **270mm**, depending on the material's thermal conductivity. Mineral wool usually requires more thickness than PIR or phenolic boards. In existing pitched roofs, insulating roof rafters by adding extra insulation layers meets the updated U-values.
- **Flat roofs:** Given their higher thermal efficiencies, to meet the 0.18 W/m²K target, insulation thickness for flat roofs typically ranges between **100mm** to **200mm** for rigid insulation boards like PIR.

**Ventilation requirements**

Proper ventilation is crucial to avoid condensation and protect the roof structure. Building regulations specify different requirements based on roof types:

- **Pitched roofs:** When it comes to **pitched roof insulation**, for cold roofs (insulation below rafters), eaves or ridge ventilation is necessary to allow airflow and prevent moisture buildup. A minimum gap of **50mm** is generally required. Warm-pitched roofs, with insulation above and between the rafters, must maintain continuous airflow beneath the roof membrane. Proper vapour barriers are needed to prevent condensation from forming on cold surfaces.
- **Flat roofs:** Warm flat roofs (insulation above the structural deck) should have a fully sealed and vapour-proof membrane. For cold flat roofs, where insulation is below the deck, regulations mandate cross-ventilation to manage condensation risks effectively.

**Fire safety**

Building regulations for roof insulation prioritise fire safety, requiring the **best roof insulation material in the UK** and methods that do not compromise safety:

- **Material standards:** Insulation products must meet specific fire resistance classifications. While commonly used for their thermal efficiency, PIR and phenolic boards must be installed with fire-resistant barriers or membranes when applied in specific settings.
- **Cavity and fire barriers:** Regulations call for cavity barriers in multi-occupancy buildings to prevent fire from spreading through loft or roof spaces. This is critical at structural junctions, such as wall-to-roof connections. The **PAS 2030** and **PAS 2035 standards** also emphasise the importance of designing fire barriers when retrofitting insulation.

What Are the Roof Insulation Building Regs in the UK (2025)

**Insulating materials:**

**What are the typical costs of insulating a dwelling?**

| Insulation type | Typical installation costs | Energy bill savings (£/year) | CO2 savings (kgCO2/year) |
|---|---|---|---|
| Cavity walls (270mm) | £2,700 | £280 | 650 |
| Solid walls (internal) | £7,500 | £380 | 880 |
| Solid walls (external) | £12,000 | £380 | 880 |
| Floors (suspended timber) | £4,700 | £80 | 185 |
| Lofts | £930 | £270 | 620 |

| Material type | Insulation uses | Average price (per $m^2$) |
|---|---|---|
| Fibreglass | Lofts and roofs, floors, walls. | £10 |
| Polystyrene (EPS) | (External) walls, lofts and roofs, floors. | £10 |
| Cellulose | (Cavity) walls, attic and roof cavities. | £10 - £12 |
| PIR board | (Solid & cavity) walls, roofs, and floors. | £5 – £15 |
| Mineral wool (glass) | (Solid & cavity) walls, floors, lofts and roofs, piping. | £13 - £17.5 |
| Sheep wool | (Solid & cavity) walls, floors, lofts and roofs, piping. | £17.5 - £22 |
| Polyurethane (foam) | (Cavity) walls, floors, roofs, door and window perimeters. | £21.5 |

[House insulation costs in the UK - 2025]

**Sustainable:**

**Cellulose fibre:**

One such material is cellulose fibre insulation (CFI). Comprising mostly of recycled paper fibres, cellulose is increasing in popularity due to its eco-friendly nature and favourable thermal and acoustic properties. Even amongst other insulation materials CFI presents some of the lowest embodied energy per kg of material, as is shown in Table 1 [18]. Despite growing interest, Cellulose and other natural insulation materials still only represent a low percentage of total European market share [29]. This is partly due to the fact that cellulosic fibres, while having favourable thermal properties, still have some disadvantages compared to traditional fibres. Some factors such as its high hygroscopisity, potential for combustibility and for fungal growth can limit CFI from having a more widespread usage in construction and renovation projects. Proper knowledge of these limits, their causes and their effect on the properties of the insulation material are necessary to ensure that sustainable materials such as CFI become more common in the building sector and thus help contribute to the reduction of the environmental impact of construction and renovation projects.

A review on the properties of cellulose fibre insulation - ScienceDirect

**Composition**

Cellulose fibre insulation is mainly composed of ground paper fibres treated with inorganic additives that act as fire retardants and mould growth inhibitors. Its consistency is similar to that of cotton wool. The source material for the cellulose fibres are usually recycled newspaper, coming from either unsold or recovered papers. Newsprint is generally manufactured by mechanical pulp. Recycled newsprint or chemical pulp could also be incorporated. As with most lignocellulosic fibres,

**Density and settling**

When dealing with loose fibres as an insulating material, it is important to distinguish between the “blown” density and the “design” density of the fibres. The blown density is the declared density after installation in vertical or horizontal applications, and the design density (which takes settling into account) is determined via impact testing and/or cyclic humidity testing. Impact testing consists of subjecting the loose cellulose samples to a series of vibrations.

A review on the properties of cellulose fibre insulation - ScienceDirect

blown-cavity-insulation-768x384.jpg (768×384)

**Sheep Wool Insulation**

Sheep have survived long, cold winters outside for thousands of years, thanks to their fluffy warm fleeces. No matter how harsh the environment, the wool on their backs keeps them warm and dry. Due to its crimped nature, wool fibres form millions of tiny air pockets that trap the air and slow the transfer of heat. This is what makes wool a natural insulating material, keeping buildings warm in winter and cool in summer.

Sheep are no longer farmed for their wool, but they still need to be clipped annually for health reasons. Wool insulation is made from sheep wool fibres that are either mechanically held together or bonded to form insulating batts and rolls. Wool insulation can be cut to size and used in the same way as other forms of insulation. Some manufacturers offer 100 per cent sheep's wool insulation while others provide wool-rich insulation (75 per cent wool) mixed with recycled polyester.

**PROS**

**Natural, renewable and sustainable.**
Sheep's wool is among the top insulating materials in terms of sustainability. Sheep are shorn every year (some twice) and the wool just keeps growing back naturally. As a raw material, wool is abundant, continuously renewable and locally produced in Britain. It lasts for decades and at the end of its life can simply be composted. Unlike, oil-based insulation, there are no plastic fibres.

There is growing awareness of the damaging effects of plastic pollution on our planet. While the amount of recycled plastic insulation is increasing, the majority still ends up in landfill.

**Low embodied carbon**
This attempts to balance the global warming gases used in producing materials with the amount conserved by the insulation. It takes into consideration the gases released from usually fossil fuel and energy spent extracting the raw material as well as the manufacturing process.

For example, to manufacture plastic insulation you need oil, chemicals and lots of energy. Meanwhile manufacturing rock wool involves re-melting lava from volcanic rocks in a furnace and spinning it into fibres.

Sheep's wool uses a fraction of the energy used to produce man-made insulating materials. Sheep's wool has a value of 6 MJ/kg compared to 101 for Polyurethane foam and 26 for glass mineral wool, according to an analysis by GreenSpec.

**Protection against moisture**
Manufacturers claim wool is one of the few insulation materials that is breathable - naturally absorbing and releasing moisture.

While the exterior layer of wool is hydrophobic (water resistant), its cortex or inner layer is hydrophilic (water loving). The cortex can absorb water without the wool feeling damp. This helps to protect the surrounding timbers from moisture and prevent mould.

Unlike many other materials, wool can absorb 30 per cent of its weight in moisture before it begins to affect its thermal properties. This makes it perfect for damp climates like the UK.

**Help control temperature**
When wool fibres absorb moisture, they release it back into the air as heat, raising the temperature of its surrounding area. Manufacturers claim that wool's natural ability to absorb moisture in humid conditions and give it off when dry, can help maintain stable temperatures within a building - providing more comfort.

**Ease of installation**

Sheep's wool is safe and easy to install. Unlike many man-made insulations, it won't cause irritation to the skin (unless you have a wool allergy), eyes or lungs. Whereas a full-face mask, goggles and gloves are required when handling glass wool or rock wool insulation.

Sheep's wool insulation is easy to cut and shape for an exact fix. It can be used throughout your home for heat and sound insulation, including attics, roofs, walls, floors, ceilings, insulating pipes, ducting and water tanks, say manufacturers.

**Specific heat capacity**

This is the amount of energy needed to raise the temperature of the material by one degree. Good insulators will have a high specific heat capacity as it takes time to absorb more heat before the temperature rises and it transfers the heat. According to an analysis by GreenSpec, sheep's wool insulation outperforms plastic and mineral wool – 1800 J/Kg.K for sheep's wool compared to only 1030 for glass mineral wool and 1300 for expanded polystyrene (EPS), for example. This means sheep's wool can absorb more heat trying to get into your house, useful for the hot summer months.

**Flame resistant**

Sheep's wool is naturally fire resistant. The material only chars as there is insufficient oxygen in the air to support combustion of wool. In the event of a blaze, it will not fuel the fire and produces no toxic gases.

Sheep's wool, like all insulating materials, must pass fire tests to ensure it is fit for purpose. Products are tested to Euro Class C or British Standards such as BS 476 or BS 5803. Inorganic mineral based fire retardants are added where necessary.

**Soundproof**

The acoustic properties of natural fibre insulation is another advantage. Sheep's wool can significantly reduce noises that can be heard through a building. The high density, irregular shape and soft fibrous quality of wool means it can provide excellent sound proofing comparable to the best mineral fibres and outperforming plastic insulation materials. This makes it ideal for bedrooms, home offices and music rooms.
The pros and cons of sheep's wool insulation for your home | Local Surveyors Direct

**Non-Sustainable:**

**Rigid Board Insulation**

What is rigid foam insulation?

Well, there are lots of different types of rigid insulation available, so I'm going to give you an overview of the most common types used in the construction of homes throughout the UK and Ireland.

The term rigid insulation typically refers to the large pre-formed sheets of insulation which can be bought from your local builders merchant or indeed online and delivered direct to your site.

They come in three main types i.e. PIR/PUR boards, Phenolic boards and EPS boards

Performance of Rigid Foam Insulation:

If you were to take each of the three types of rigid foam insulation boards discussed above in 100mm thick boards you'd get the following approximate R-values.

- Phenolic board would typically provide an R-value of around 5.0.
- The PIR or PUR board would typically provide an R-value of around 4.5.
- EPS board would typically provide an R-value of around 2.6.

PIR/PUR boards tend to offer the optimum performance vs. price ratio as they're pretty close to phenolic boards when it comes to R-Value and yet they're cheaper.

Although you will need a slightly thicker board to achieve the same R-Value.

Another way of looking at it is as follows:

If you wanted an R-value of 4.5 for each type of rigid foam insulation boards, you'd need the following approximate thicknesses:

- PIR/PUR – 100mm
- Phenolic – 90mm
- EPS – 170mm

**Fibreglass Insulation:**

Fibreglass insulation is a manufactured product made of fragile glass fibres initially used in homes circa 1930. It gained popularity, in particular once it was revealed that asbestos, another good insulator, was dangerous and a risk to human life.

In spite of its structure and the high-energy manufacturing process, fibreglass insulation was considered an excellent alternative.

Fibreglass insulation, whether in the form of batts, rolls or blown insulation, works similarly to other types of insulation in that it traps escaping heat within its structure. Air pockets surrounding the fibreglass material prevent the exit of warm air and also help with noise insulation. These air pockets must remain dry for the insulation to be effective.

In most cases, fibreglass is simple to install and may be completed as a simple do-it-yourself project, as long as there are no issues with damp or access. This is why for many people it is a highly popular home insulation product.

**The Pros of Fibreglass Insulation**

Fibreglass insulation benefits are many, making it one of the most used type of home insulation. It comes in the form of blankets, sheets or loose fill and is commonly used as an acoustic and thermal insulation material indoors. It is usually used beneath wooden floors, interior walls and pitched roofs. and offers many advantages over other types of insulation…

- Frequently produced from recycled glass, making it more beneficial for the environment. In addition, because glass is manufactured from sand, including the portion that is not made from recycled materials, it is an excellent renewable alternative.
- Has non-combustible or fire resistant properties, making it an excellent choice for walls, ceiling insulation, and around light fixtures and other electrical devices.
- Does not shrink or collapse easily and has many air pockets that help it retain its shape and retain its insulation value over time.

- An excellent choice for blown insulation because it settles in a more uniform layer with plenty of air pockets.
- In most cases it is usually easy to install and may be completed by the DIYer.
- Provides good thermal and acoustic insulation and might help to reduce noise in the home.
- Is one of the least expensive insulation options yet still a good insulator and will improve energy efficiency and potentially bring energy bills savings of up to £445 per year.

A Complete Guide to Fibreglass Insulation - Pros, Cons & Cost

**Spray foam Insulation:**

**What is spray foam insulation?**

Spray foam insulation is a liquid polyurethane foam that installers apply using a spray gun in the area they want to insulate. The foam then sets, forming an insulating layer. As it's a liquid, installers can apply it quickly. They can also apply it in tricky areas that may be more complicated and time consuming than if you were to use solid insulation materials.

Spray foam can be used to insulate the:

- roof
- walls
- floors

There are two main types of spray foam insulation, closed-cell and open-cell.

**Closed-cell foam**

Closed-cell polyurethane foam is one of the most effective insulation materials commonly used in homes. It sets solidly and contains lots of gas pockets that can slow the escaping heat from a space. It can also help support the structure of the insulation area.

Its main drawback is that it's not vapour permeable. That means that any moisture in the surrounding air or other building materials can't travel through the closed-cell foam insulation and escape.

**Open-cell spray foam insulation**

This type of spray foam is the more vapour permeable, which is generally a good thing. It's also lighter and more flexible, but it is a less effective insulator. This means you'll need to use a thicker layer than closed-cell foam to get the same insulating effect.

**How is spray foam used?**

Foam can be used in various parts of the home:

- **Roofs:** if a home has a pitched roof with an uninsulated loft, foam is sometimes sprayed onto the underside of the sloping roof. This is one alternative to laying mineral wall insulation at joist level (or what you might call the horizontal 'floor' of the loft).
- **Walls:** foam is sometimes sprayed into empty cavity walls, usually in situations where standard cavity wall insulation isn't considered suitable.
- **Floors:** foam can be sprayed to the underside of a suspended timber floor, often using a robot to access the underfloor space. This is a less disruptive alternative to lifting the floorboards and fitting insulation material from above.

Spray foam insulation explained - Energy Saving Trust

**Mineral Wool Insulation:**

**What is Mineral Wool Insulation?**

Mineral wool—not to be confused with sheep's wool—is fiber-based, loose-fill insulation. It has a similar appearance to fiberglass insulation, though it is a bit stiffer and denser. In general, there are two main types of mineral wool insulation.

The first type of wool insulation is mainly made from natural stone fibers such as molten basalt or diabase. This type of mineral wool is sourced from volcanic rock, melted at around 1,600°C. This melted rock is subsequently spun into "wool" and bound together by different resins and oils.

The second is made from spinning slag. Slag is a waste product in the production of steel. Manufacturers can also make it from natural rock or a combination of molten slag and natural rock and even glass. Typically, mineral or stone insulation contains up to 90% recycled content.

Both types of mineral wool are typically sold in batts and as loose-fill and can be used for all home insulation applications, including walls, roofs, attics, ceilings, and floors. Like other types of insulation, mineral wool offers thermal insulation benefits. Many builders also prefer it because it provides noise insulation and fire protection as added side benefits. In terms of thermal performance, mineral wool batts made for traditional 2×4 walls achieve an impressive R-value of 15. These R-values are significantly higher than the R-11 to R-13 values that characterize most fiberglass insulation batts.

What is Mineral Wool Insulation?

**Garden Office**

**What are the methods for constructing a garden office?**

**Volumetric or Modular Construction:**

- Involves the off-site production of three-dimensional units. Quality controlled systems of production in the factory should be in place and expected as part of any third party approval. Modules may be brought to the site in a wide array of different forms ranging from fairly basic structural shells to ones in which all the internal and external finishes and services are already installed.

- Volumetric construction can consist of timber frame, light gauge steel and concrete or composite constructions. External cladding may form part of the prefabricated system, with only localised on site specialist sealing required. Alternatively, traditional masonry cladding may need to be constructed. In this case, specific detailing for the support of cladding, cavity barriers and DPC must be pre-agreed and checked by site managers.

**Panelised:**

- Panel units are produced off-site in a factory in a quality controlled process and are then assembled on-site to produce a 3D structure. The panels generally consist of wall, floor and roof units and are sometimes referred to as cassettes.

**Closed Panels:**

- Involving factory installation of lining materials and insulation. May be constructed of timber, steel frame or concrete panels. Panels often include services, windows, doors and finishes.

**Open Panel Systems:**

- Open panel systems do not include insulation, lining boards or vapour control layers. These are applied to the steel frame on site, together with any external cladding and internal finishing. Therefore, careful control of on-site finishing will be required and the panels must be protected against the elements until weather tight.
- More conventional timber frame panels are typically classed as open panel systems and would normally arrive on-site with the sheathing board fixed but without insulation or internal boards. For warranty purposes, these types of open panel systems can normally be classified as established or traditional construction, providing that such open panel systems have quality assured systems in place and are registered either with the Structural Timber Association or BM TRADA

Modern Methods of Construction (MMC)

**What are the benefits of modular construction?**

**1. Reduced Waste and Increased Sustainability**

Traditional construction is notorious for waste, with 32% of all construction waste being sent to landfill.

Off-site construction methods, on the other hand, significantly reduce material waste by taking place in a controlled factory environment where resources are managed efficiently, and material requirements can be accurately calculated. In this setting, materials are carefully measured and repurposed, leading to less leftover debris and minimising the environmental impact.

Additionally, modular construction has been shown to reduce greenhouse gas emissions by 17–30% compared to conventional construction methods.

Transportation requirements to the building site are also reduced, as fewer materials need to be transported separately.

Combined, these factors make modular construction an ideal choice for sustainable building projects, aligning with the global push for greener, more environmentally friendly practices.

**2. Reduced Risk and Disruption**

Construction sites are inherently hazardous, with risks such as falls, equipment malfunctions, and environmental hazards presenting constant challenges. Off-site construction relocates the bulk of labour-intensive work to a factory environment where conditions are more stable and safer.

By reducing on-site labour needs, this method helps minimise worker exposure to the unpredictable conditions found on traditional job sites, such as bad weather, limited visibility, and restricted space.

In addition to safeguarding workers, off-site construction is less disruptive to the surrounding community. The quieter, more streamlined assembly process on-site reduces pollution, traffic, and noise in populated areas, helping projects achieve better community relations.

**3. Increased Efficiency and Project Speed**

Modular construction is engineered for efficiency, with each stage of production taking place in a streamlined, organised factory setting.

By eliminating weather-related delays and other common disruptions, modular construction helps accelerate project timelines by up to 50%. The Construction Industry Training Board (CITB) also reports that modular projects typically achieve an 80% reduction in on-site labour.

Additionally, factories can operate year-round, meaning projects can be planned with precise timelines, making the process more predictable for stakeholders and reducing downtime.

**4. Superior Quality Control**

One of the standout benefits of modular construction is the ability to perform rigorous quality checks throughout the manufacturing process. Each module undergoes a thorough inspection before leaving the factory, ensuring high-quality craftsmanship and reducing the likelihood of defects.

By maintaining strict control over materials, assembly methods, and build standards, modular factories produce units that meet or exceed industry quality standards.

Factory-built modules are delivered 70–80% complete, often including mechanical, electrical, and plumbing systems as well as fixtures and finishes.

**5. Cost Predictability and Financial Certainty**

More than ever, construction cost overruns are a common concern for both developers and clients, often resulting from unexpected delays, material shortages, or fluctuating prices.

Modular construction helps address this challenge by providing a controlled, cost-stabilised production environment. As material needs and timelines are more predictable, it’s easier to manage budgets and anticipate costs.

This method allows clients to lock in design specifications and pricing before manufacturing begins, giving them greater financial certainty. Additionally, faster project completion times mean that buildings can be occupied sooner, allowing investors and developers to realise returns on their investments faster.

[Benefits of Modular Construction | The Access Group]

**Manchester Public Schools Temporary Classroom Space**

**Project Overview:**

The Manchester School District in New Hampshire embarked on an ambitious $306 million facilities modernization project in 2024. As part of this initiative, the district implemented a strategic plan to utilize modular classrooms during the renovation and construction process. Triumph Modular won the contract to provide and install 72 modular units across six schools in Manchester. These units included 56 classrooms, encompassing 59,730 square feet and accommodating up to 910 students. Additionally, 16 units were designated for offices, meeting rooms, and other educational purposes.

[Manchester Public Schools Temporary Classroom Space - Modular Building Institute]


[TRIUMPH_MANCHESTER_Mclaughlin_1200x800.jpg (1200×800)]

**Typical costs of a 5x3 meter garden office:**

| Garden office size (metres) | Average cost (inc VAT) |
| --- | --- |
| 2m x 2m | £13,523 |
| 2.5m x 2.5m | £16,403 |
| 3m x 2.5m | £17,997 |
| 3m x 3m | £21,368 |
| 4m x 3m | £24,605 |
| 5m x 3m | £26,928 |
| 5m x 4m | £31,695 |
| 6m x 3m | £30,416 |
| 6m x 4m | £35,970 |

How much value does a garden office add to your house? | Unbiased

**What foundations are typically used to support the loads of a garden office?**

**Raft foundations**

**What is a raft foundation?**

A raft foundation is a reinforced concrete slab under the whole of a building or extension, 'floating' on the ground as a raft floats on water. This type of foundation spreads the load of the building over a larger area than other foundations, lowering the pressure on the ground.

This is an alternative if you can't use a traditional strip or trench fill foundations.

But it's important to note that raft foundations aren't suitable in all cases and usually need to be designed by a structural engineer.

**Here are important considerations if you're thinking about using a raft foundation:**

- The raft design usually has an 'edge beam' formed by a cage of steel reinforcement, which will need to be carefully assembled on site. Internal stiffening beams are sometimes needed too. These beams transfer the building loads through the rest of the slab and then evenly over the ground.
- A site investigation is usually needed for the engineer to understand what the ground is like. Very poor ground may mean you need a different solution such as piles.

- The raft design will normally need a hardcore sub-base to level the ground. This stone should be mechanically compacted.
- You must ensure steel reinforcement is lapped at least 450mm (for both mesh and mild steel bars) and provided with 40mm concrete cover. 'Treading in' the reinforcement during the concrete pour isn't a suitable means of placing reinforcement - use the special 'chairs' or 'soldiers' to support the mesh.
- The edge of the raft must be carefully detailed for the damp course and membrane position, which may need a 'step' forming in the concrete at the raft edge.
- Insulation is usually placed over the top of the raft - take care to avoid cold bridging at the junctions with external walls.

Raft foundation basics | LABC

**HASAWA 1974 considerations when working in and around foundations and installing insulation:**

**Legislations:**

**Should PPE be considered?**

**What PPE is**

PPE is defined in the PPER 1992 as 'all equipment (including clothing affording protection against the weather) which is intended to be worn or held by a person at work and which protects the person against one or more risks to that person's health or safety, and any addition or accessory designed to meet that objective'.

Where an employer finds PPE to be necessary after a risk assessment, using the hierarchy of controls explained below, they have a duty to provide it free of charge.

**Hierarchy of controls**

PPE should be regarded as the last resort to protect against risks to health and safety. Engineering controls and safe systems of work should be considered first.

Consider controls in the following order, with elimination being the most effective and PPE being the least effective:

- **Elimination** – physically remove the hazard
- **Substitution** – replace the hazard
- **Engineering controls** – isolate people from the hazard
- **Administrative controls** – change the way people work
- **PPE** – protect the worker with personal protective equipment

**Employers with both employees and limb (b) workers**

From 6 April 2022, you need to ensure that there is no difference in the way PPE is provided to your workers, as defined by PPER 2022. This means assessing the risk and ensuring suitable PPE is provided, when needed, to all people that fall under the definition of worker.

The PPE provided must be compatible, maintained and correctly stored. All workers must use the PPE properly following training and instruction in its use from their employer. If the PPE you provide is lost or becomes defective, your worker should report that to you.

**Employers with only limb (b) workers**

You need to ensure that your workers are provided with PPE free of charge, where required, from 6 April 2022. This means assessing the residual risk once all other measures (such as engineering controls) have been taken.

You then need to ensure suitable PPE is:

- provided
- compatible
- maintained
- correctly stored
- used properly

You also need to provide training and instruction in its use to all your workers. You cannot charge workers for PPE they require to carry out their work.

**How this legislation is enforced**

HSE inspectors already include assessment of PPE as part of their routine inspections. Enforcement action can range from verbal or written advice to enforcement notices and, in the most serious cases, prosecution of duty holders.

Personal protective equipment (PPE) at work regulations from 6 April 2022

**Whan must be considered when handling hazardous substances?**

**Control Of Substances Hazardous to Health (COSHH 2002)**

**What COSHH is**

The law requires you to adequately control exposure to materials in the workplace that cause ill health. This is the Control of Substances Hazardous to Health Regulations (COSHH).

**Harmful substances**

Many materials or substances used or created at work could harm your health. These substances could be dusts, gases or fumes that you breathe in, or liquids, gels or powders that come into contact with your eyes or skin. There could also be harmful micro-organisms present that can cause infection, an allergic reaction or are toxic.

Harmful substances can be present in anything from paints and cleaners to flour dust, solder fume, blood or waste. Ill health caused by these substances used at work is preventable. Many substances can harm health but, used properly, they almost never do.

**Substances not covered by COSHH**

COSHH does not cover the following substances as they have their own specific regulations:

- lead

- asbestos
- radioactive substances

**The hazards**

Some substances can cause asthma or other diseases, including cancer. Many can damage the skin, and some can cause serious long-term damage to the lungs.

The effect can be immediate, such as dizziness or stinging eyes, or can take many years to develop, such as lung disease. Many of the long-term or chronic effects cannot be cured once they develop.

**What you have to do**

You can prevent or reduce workers exposure to hazardous substances by:

- finding out what the health hazards are
- deciding how to prevent harm to health (risk assessment)
- providing control measures to reduce harm to health
- making sure they are used
- keeping all control measures in good working order
- providing information, instruction and training for workers and others
- providing monitoring and health surveillance in appropriate cases
- planning for emergencies

COSHH basics - COSHH

**What should be considered when working at height?**

**Working at Heigh Regulations 2005**

Working at height remains one of the biggest causes of fatalities and major injuries. Common cases include falls from ladders and through fragile surfaces. 'Work at height' means work in any place where, if there were no precautions in place, a person could fall a distance liable to cause personal injury (for example a fall through a fragile roof).

Employers can take simple, practical measures to reduce the risk of any of their workers falling while working at height.

**What you have to do**

You must make sure work is properly planned, supervised and carried out by competent people with the skills, knowledge and experience to do the job. You must use the right type of equipment for working at height.

Take a sensible approach when considering precautions. Low-risk, relatively straightforward tasks will require less effort when it comes to planning and there may be some low-risk situations where common sense tells you no particular precautions are necessary.

**Assessing and controlling the risks**

First assess the risks, considering the:

- height of the task
- duration and frequency
- condition of the surface being worked on

Before working at height follow these simple steps:

- **avoid** work at height where it's reasonably practicable to do so
- where work at height cannot be easily avoided, **prevent** falls using either an existing place of work that is already safe or the right type of equipment
- **where the risk cannot be eliminated, minimise** the distance and consequences of a fall by using the right type of equipment

For each step, consider measures that protect everyone at risk (collective protection) before measures that only protect the individual (personal protection).

Find out more in our step-by-step guide

**Collective protection**

Collective protection is equipment that does not require the person working at height to act for it to be effective. Examples are:

- permanent or temporary guardrails
- scissor lifts
- tower scaffolds

**Personal protection**

Personal protection is equipment that requires the individual to act for it to be effective. An example is putting on a safety harness correctly and connecting it, with an energy-absorbing lanyard, to a suitable anchor point.

**What to do and not do when working at height:**

**When working at height you should:**

- do as much work as possible from the ground
- ensure workers can get safely to and from where they work at height
- ensure equipment is suitable, stable and strong enough for the job, maintained and checked regularly
- take precautions when working on or near fragile surfaces
- provide protection from falling objects
- consider emergency evacuation and rescue procedures

**To prevent accidents and injuries do not:**

- overload ladders – consider the equipment or materials workers are carrying before working at height. Check the pictogram or label on the ladder for information
- overreach on ladders or stepladders
- rest a ladder against weak upper surfaces, for example glazing or plastic gutters
- use ladders or stepladders for strenuous or heavy tasks, only use them for light work of short duration (a maximum of 30 minutes at a time)
- let anyone who is not competent (who doesn't have the skills, knowledge and experience to do the job) work at height

Introduction to working at height safely - HSE

**What must be considered when working in loft spaces?**

The Confined Spaces Regulations 1997
Apply where the assessment identifies risks of serious injury from work in confined spaces.

These regulations contain the following key duties:

- avoid entry to confined spaces, e.g. by doing the work from the outside;
- if entry to a confined space is unavoidable, follow a safe system of work; and
- put in place adequate emergency arrangements before the work start

**The Management of Health and Safety at Work Regulations 1999**
Require employers and self-employed people to carry out a suitable and sufficient assessment of the risks for all work activities for the purpose of deciding what measures are necessary for safety. For work in confined spaces this means identifying the hazards present, assessing the risks and determining what precautions to take.

Confined spaces - HSE

**What procedure should be undertaken if an accident does occur on site?**

**Reporting Injuries, Disease and Dangerous Occurrences Regulations (RIDDOR) 2013**

**What RIDDOR is**

RIDDOR is the law that requires employers, and other people in charge of work premises to report and keep records of all:

- work-related fatalities
- work-related injuries
- diagnosed cases of reportable occupational diseases
- certain dangerous occurrences (incidents with the potential to cause harm)

The purpose of RIDDOR is to inform the relevant enforcing authority that a work-related accident or incident has happened.

This is so either HSE or the local authority can respond to ensure compliance with health and safety law.

You can find the correct enforcing authority for you.

**Who should report**

Reports should only be submitted by the 'responsible person' with duties under RIDDOR, such as:

- employers (in relation to workers)
- some self-employed people
- those in control of work premises when a reportable work-related accident or event has occurred

There is more information on who should report under RIDDOR.

**Who should not report**

Do not use this reporting system if you are:

- an injured person (unless you are self-employed)
- a member of the public, or
- others who do not have duties under RIDDOR

**Raising a concern with HSE**

You can tell HSE about a work-related accident or an ongoing risk to health and safety in the workplace if you are:

1. a worker
2. acting on behalf of an employee, or
3. a member of the public

**Reportable injuries**

The following injuries are reportable under the RIDDOR Regulations when they result from a work-related accident:

1. the death of any person (regulation 6)
2. specified injuries to workers (regulation 4)
3. injuries to workers which result in them being incapacitated for more than 7 consecutive days immediately following the day of the accident (Regulation 4)
4. non-fatal injuries to people other than workers (such as customers or volunteers) which result in them being taken directly to hospital for treatment, or specified injuries to non-workers which occur on hospital premises (regulation 5)

There is more information on specified injuries in our page on types of reportable incidents.

**What a reportable accident is**

Under RIDDOR, an accident is a type of incident which is separate, identifiable, unintended and causes physical injury.

This specifically includes acts of non-consensual violence to people at work.

Injuries themselves, for example 'feeling a sharp pain', are not accidents. There must be an identifiable external incident that causes the injury, for example a falling object striking someone.

Gradual, cumulative exposures to hazards, which eventually cause injury (such as repetitive lifting), are not classed as 'accidents' under RIDDOR.

There is more information on reportable incidents under RIDDOR.

**What work related means**

A work-related accident means an accident 'arising out of or in connection with work'.

Deciding if an accident is reportable under RIDDOR does not depend on finding blame. The term 'arising out of or in connection with work' means an accident may still be reportable even if there had been no breach of health and safety law and no one was clearly to blame.

When deciding if a report needs to be made, think about the circumstances of the accident and the factors involved.

Examples might be:

- What work was going on at the time?
- What was the injured person doing?
- What were others doing?
- Where did the accident happen?
- Were factors such as structures, equipment or substances involved?

An accident taking place at work premises does not, in itself, mean that it is work related – the work activity itself must cause the accident.

An accident is work related if any of the following played a role:

- how the work was carried out, including how the work was organised, supervised or performed by an employer or any of their employees, or by a self-employed person
- any machinery, plant, substances or equipment used in connection with the workplace or work processes carried out there
- the condition of the workplace where the accident happened, including:
    - the state of the structure or fabric of a building or outside area forming part of the workplace
    - the state and design of floors, paving, stairs, lighting etc

RIDDOR explained - HSE

**Safety signage implantation of the workplace:**

Employers must provide safety signs if there is a significant risk that can't be avoided or controlled in any other way, such as through safe systems of work or engineering controls.

There is no need to provide safety signs if they don't help reduce the risk or if the risk isn't significant. This applies to all places and activities where people are employed.

Employers must, where necessary:

- use road traffic signs in workplaces to regulate road traffic
- maintain the safety signs they provide
- explain unfamiliar signs to their employees and tell them what they need to do when they see safety signs

Safety signs - HSE

**Task 1.1 Principal Examiner Commentary**

The candidate has produced a comprehensive body of research covering insulation methods, sustainability, regulations, U-values/R-values, thermal bridging, and modern methods of construction. Information is wide-ranging, well referenced, and applied to the project context. Technical detail such as regulatory requirements and health and safety considerations is included, showing strong subject knowledge. The work exceeds the minimum standard for an A grade by going beyond basic research, presenting extensive technical depth and multiple credible sources, which enabled later tasks to be completed with accuracy and confidence.

# Task 1.2 Report

| | |
|---|---|
| **Assessment number (eg 1234-033)** | 8711-033 |
| **Assessment title** | Employer-Set Project |

| | |
|---|---|
| **Candidate name** | <first name> <surname> |
| **City & Guilds candidate No.** | ABC1234 |

| | |
|---|---|
| **Provider name** | <provider name> |
| **City & Guilds provider No.** | 999999a |

| | |
|---|---|
| **Task(s)** | 1.2 |
| **Evidence title / description** | Report |
| **Date submitted by candidate** | DD/MM/YY |

## Executive Summary

Insulating a building is vital to reduce thermal bridging and energy loss in a building; however, opting for a viable insulation type is a mine field and choosing the right type can decrease U-Values and energy usage. Opting for an insulation type with high R-Values is vital to decrease your Energy Performance Certificate rating to be more sustainable. Although installing the best insulation correctly is essential, without installing it correctly thermal bridging will occur, resulting in almost a waste of money. Complying with Part L is legally binding and approved codes of practices (ACoP) can help assist binding the legislation. There are multiple methods of insulating the walls of a low-rise residential dwelling, these include the following: blown insulation, internal insulation and external insulation. For insulating a roof, the two commonly used insulation methods are between the joists/ceiling ties and between the rafters. Like mentioned earlier, determining the type of insulation is vital for compatibility with where the insulation is being installed, the following list contains the insulation types: rigid foam insulation, foil insulation, wood fibre insulation, mineral wool insulation, fibreglass insulation, sheep wool insulation, recycled cellulose insulation. The most viable option for insulating a loft is sheep wool insulation due to its slow settling properties, and environmentally friendly sourcing. In the 1970's semi-detached dwelling, it is not feasible to remove the brickwork to access the cavity and install insulation batts, therefore, blown recycles cellulose insulation should be installed to minimise energy loss. In addition to the recessed porch being externally insulated. The cost to insulate the 1970s semi-detached home amounts to a total of £3201.10, significantly less than the proposed budget, increasing CHA's profits.

When garden offices modules are erected, the loads must be distributed to a foundation to prevent subsidence of the structure, the foundation compatible with freestanding garden offices are raft, keeping the moisture from bridging into the garden office prevents issues such as rot and mould leading to respiratory health issues of occupants.

Ensuring health and safety of workers and the general public is vital, complying to legislations is mandatory for employers, Personal protective equipment should also be supplied by the employer as a last resort of protecting workers if other measures have not prevented the hazard from occurring. Complying with HASAWA 1974 prevents accidents from occurring, legal costs are avoided, and workers stay productive which will assist with completing the project within the projected timeframe

## Introduction

The project brief requires us to conduct research and conclude the most viable options to insulate an existing semi-detached 1970s dwelling with an uninsulated roof and external cavity walls. This report will include my recommendation to complete this while sustaining an energy efficient home. Towards the end of the report, I will describe the options of constructing the garden office, benefits of my justified option and what foundations should be installed to support the loads of the structure. When choosing an option of installing insulation, I will ensure that the cost of insulation does not exceed the budges of £13000 per home. Health and safety requirements must also be considered in detail to maintain high productivity of workers, resulting in quality and efficient work.

## Approved Document Part L

Part L Conservation of Fuel and Power is an approved document. All approved documents are legally binding and include information of how to comply with the Building Regulations 2010. The information in approved documents contains the information on how buildings should be constructed to ensure safety of occupants and the general public.

Part L Volume 1 includes vital data gathered from all aspects of conserving fuel and power within a dwelling to maximise occupants' comfort, minimise thermal energy loss out of a dwelling and sustainable methods of generating thermal energy (ground and air source heat pumps). Volume 2 of Part L covers buildings other than dwellings, which is not necessary for conserving energy in a 1970s semi-detached home.

Approved Document L: Conservation of fuel and power, Volume 1: Dwellings

Conservation of fuel and power: Approved Document L - GOV.UK

## Energy Performance Certificates (EPCs)

An EPC assessor (costing around £43) can be hired to assess a home's energy efficiency. The assessor will rate the efficiency of a home on a scale of A (best) to G (worst) basses on an number of criteria including the following: efficiency of appliances in your home, your homes energy loss (depending on insulation in ground floors, roofs insulation, insulation of external and party walls between properties, glazing (single- worst insulator, double, triple and even quadruple- best insulator), insulation of heating pipe and ducts -prevents heat loss out of pipe and condensation, forms from cold air in contact with hot pipes- and the efficiency of heating systems (including boilers and radiators). An EPC is valid for 10 years before it needs to be renewed.

EPCs are only mandatory if you are selling a property, renting out a property or building a new property; however, even if a property isn't undergoing sale or being rented out, it is recommended to get an EPC rating since it includes guidance on how to improve homes energy efficiency, potentially saving, long term, on energy bills.

Selling a home: Energy Performance Certificates - GOV.UK

## Climate Change Act 2008

In 2008 the government set out targes of carbon emission reductions. The construction industry and heating of buildings is one of the leading carbon emission contributors, contributing to almost 40 percent of carbon emissions (leading material of concrete production), plans were set to reduce these numbers drastically. In 2008 these targets were an 80 percent reduction in carbon emissions by 2050. However, since predictions of exceeding this target, in 2019 a new target was introduced to become net zero by the year 2050. Net zero means any carbon emissions are cancelled down to zero.

## U-Values and R-Values

An R-value indicates a materials resistance to conductive heat flow. The higher the R-value, the better the thermal performance of that material. The modern-day imperial R-Values are measured in Ft2×°F×h/Btu. The desired R-Value of a specific material depends on a range of factors, named flowing: thickness of a given material, the type of material, density of a given material, the moisture content of a given material and the temperature of a given material. Having low R-Value materials may have a high initial investment; however, energy cost saving over time will save you money. To calculate the savings over time the Life- Cycle Assessment should be considered.

A U-Value is not a specific material but the thermal conductivity of an assemble (roofs, walls, and floors). The lower a U-Value the better the thermal performance of the assemble, the u value is primarily influenced/determined by the R-Values of the materials installed into that part of the structure. Maximum U-Values include walls: 0.35 W/m2K, Roofs: 0.20 W/m2K, Floors: 0.25 W/m2K.

Mastering U-Value & R-Value for Insulation – Insulation & More

Mastering U-Value & R-Value for Insulation – Insulation & More

## Thermal Bridging in Existing Dwellings

Thermal bridges occur when an area of a building has significantly higher heat transfer than the surrounding parts this can include: breaks in insulation, reduced insulation or more conductive materials (more conductive materials are considered to be denser, with significantly less air to prevent heat transfer, an example of more conductive materials are timber and metal, whereas less conductive materials are aerogel, where particle are not close together, preventing heat from passing). The building fabric should be constructed so that thermal bridging, including at the party wall, is limited.

There are multiple precautions to take to limit thermal bridging, some are included in the following:

Airtightness is essential to limit airflow in a building, sealant around doors frames, window frames and glazing prevent draughts within a dwelling that could reduce the occupant's comfort and increase reheating energy bills.

Using insulated cavity closure over returning brickwork prevents moisture and thermal energy from bridging through one surface to another. Cavity closure can come in an array of sizes depending on the thickness of the cavity.

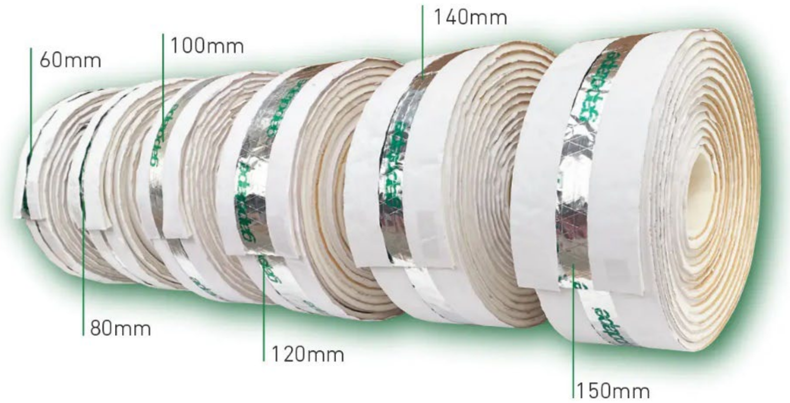
Staggering Studs separates internal and external walls with an air gap, this air cap may be filed with insulation to trap air, increasing U-Values of the wall, studs are a thermal conductor, connecting both surfaces of a wall allows heat to bridge from one area to another. The same principle is found with cavity walls, dividing two leaf's with a minimum of a 100mm cavity prevent not only moisture from bridging to the interior but thermal energy from bridging, this can be strengthened with thermalite blocks which have higher R-Values than dense 7N concrete bocks due to their air structure.

Where staggered joist can not be utilised, an insulated stud may be used, this is solid insulation 'sandwiched' between 2 timber laths to provide a fixing for dry wall or cladding, insulated studs should not be used for load bearing even if timber is stress graded, this is due to the low load bearing properties. For load bearing walls, a webbed stud may be utilised. With a void between the stud, thermal energy can only bridge via the steel or timber web, limiting thermal bridging.

In attic spaces, where the minimum of 270mm of insulation must be installed, the rafters may not be thick enough to house enough insulation to comply with regulations. The feasibility of upgrading the rafters to thicker dimensions is low due to the implications such as load bearing of the foundations and cost. To overcome this issue, solid insulation backed plasterboard should be used to increase the thickness of the rafter insulation, due to the increased weight of the bords to traditional boards, larger fixings with washers should be used to support the dead load (the standard size of plasterboard is 2400x1200mm to fix on stud and rafter centres).

Foil insulation tape can be installed over studs to reflect heat back into a room, this tape is compatible with foil backed insulation and foil bubble insulation and should also be put to use between insulation to seal gaps.

An example of a company that makes a product to limit thermal bridging between rigid board insulation is Gapotape. Coming in a range of different sizes, Gapotape is a compressible foam, foil covered tape that is wrapped around insulation to produce tight joints between insulation boards, rafters and studs.




This image provided shows Gapotapes size range.

Approved Document L: Conservation of fuel and power, Volume 1: Dwellings

Quality Insulation Tape- Gapogroup

66e0438ab7b5b_Gapotape-Roll-Image-1.jpg (1250×789)

**Insulation Installation Methods in Hip-Ended Pitched Roofs:**

*Between the joist/ceiling tie beams insulation compared to between rafter insulation.*

Heat rises, this is the instigator of why more thermal energy produced by heating systems is lost through roofs than any of part of the superstructure in a dwelling, or any building. To reduce energy loss through a roof, insulation can be installed, an efficient method of installing insulation in a loft space is installing it between the floor joists/ceiling tie beams. This method of installing insulation displays more positives than negatives when the attic space is not already or going to be a habitable room. Positives for installing insulation above the first-floor ceiling in 2-storey homes: reduced insulation installation and material costs- less insulation is used installing insulation above the ceiling rather than the rafters since the surface area of the pitch is significantly larger than the span; ease of installation- installing insulation on the ceiling from the loft prevents the need to work with insulation above head height, reducing fibres from falling and gravity working against the worker. Insulation is required to be 270mm within loft spaces, ceiling tie beams are not deep enough to house the insulation, this is not an issue unless the loft space is utilised for storage, when the loft space requires board to be installed, feet must be installed on the ceiling tie beams to raise the boarding above the insulation. this compromise prevents insulation from being compressed reducing the materials its R-Value. Additionally, the loft space must have airflow to prevent sweating from occurring, sweating may rot timber in roofs, compromising its structural integrity. To limit sweating, event in the soffit boards/eves should be installed along with breathable membrane to promote airflow.

Typically insulating a loft space can save £270 annually.

What Are the Roof Insulation Building Regs in the UK (2025)

**Insulation Installation Methods for External Load Bearing Walls**

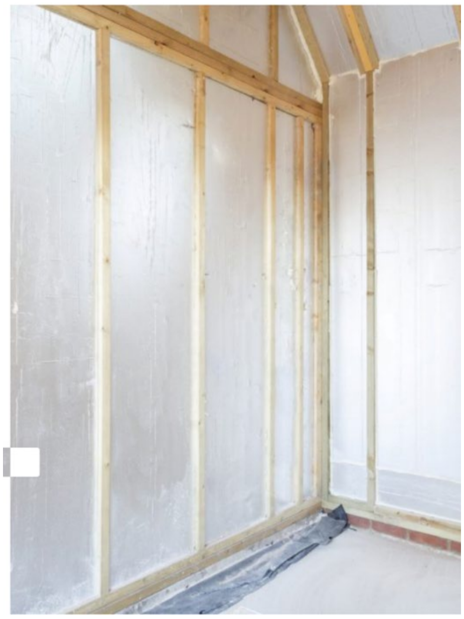
*Exterior Insulation*

External wall insulation, also known as EWI, is an installation method where insulation is attached to the outside of your walls. Two layers of material are used - one to offer insulation, and an outer layer of mineral, synthetic render, cladding or brick slips to protect against weather and provide a decorative finish. This method is preferred when there is no cavity wall available, it offers many benefits such as increased property value, and reduction in energy bills as a reducing of energy costs; however, many downfalls arise such as: high initial cost compared to other installation methods (scaffold costs, exterior finishing costs); installing exterior insulation can be time consuming from the potential to needing planning permission in conservation areas and grade listed buildings to installation; exterior insulation may not be feasible where the is little overhang on gable ends and little overhang of eves.

The image provided shows exterior insulation being installed before exterior finishing have been applied.

*Interior Insulation*

Internal wall insulation is done by fitting rigid insulation boards to the wall, or by building a stud wall filled in with insulation material. This method is opted for when there is no cavity on the exterior wall and the properties exterior characteristics should be maintained. although interior insulation is an effective method of retaining heat energy it can come with some immense downfalls, these include: disruption to residents- to overcome this issue the insulation can be installed room by room, reducing effect on residents; high material and installation costs, the installation of new drywall, finishings, window sills and skirting board may not be compatible with budgets; reduced roof size may decrease a property value and reduce occupants comfort (room sizes may be decreased by over 200mm in length and width.



The image provided displays interior insulation after installation, but before finishings.

*Cavity Wall Insulation*

Between a 100mm outer skin and 100mm inner skin or an external wall is the minimum of a 50mm void, known as a cavity, The cavity in this 1970s dwelling is 100mm in width (300mm total). In the cavity, insulation could be installed. This insulation is known as blown insulation. Access points are created in the exterior of the wall to blow material into the cavity to trap air resulting in reduce energy loss. Blown insulation is a fast method of installation; however, is only most effective when perps on the brickwork are fully filled with mortar to reduce moisture from contacting the insulation, limiting the thermal resistance R-Values. After installation, access points should be pointed by competent bricklayers. Although blown insulation is a fast method of installation, over time it can settle excessive amounts compared to other insulation methods, this compaction of material may create voids in the wall allowing thermal energy to bridge in addition to reducing U-Values of the walls. Additionally, to gain maximum potential out of this method, lintels should also either be pre-insulated or removed and replaced with insulated lintels before the insulation is blown in -this is completed at this stage to prevent insulation falling out the cavity. Blown insulation is always installed after a dwelling has been constructed to prevent the elements from damaging the insulation reducing its thermal resisting properties.

The image provided show insulation being blown into a cavity.

Typically insulating exterior cavity walls can save £280 annually.

External Wall Insulation – A Simple Guide | YES Energy Solutions

Advice on insulating your solid walls - Energy Saving Trust

Advice on insulating your solid walls - Energy Saving Trust

Advice on insulating your solid walls - Energy Saving Trust

blown-cavity-insulation-768x384.jpg (768×384)

House insulation costs in the UK - 2025

**Insulation Material Options**

Insulating materials can be divided into two categories, sustainable material options and non-sustainable material options.

Sustainable material options include recycled cellulose fibre, sheep wool insulation, wood fibre insulation and mineral wool insulation. Recycled cellulose fibre and sheep wool insulation is most used to insulate homes in the UK. Increasing in popularity is sheep wool insulation, utilising sheep wool as insulation is an option to reduce thermal loss in a household. Sheep are no longer farmed for their wool; however, they still must be clipped annually for health reasons. Wool insulation is made from sheep wool fibres that are either mechanically held together or bonded to form insulating batts and rolls, excellent for use in all applications. Wool insulation can be cut to size and used in the same way as other forms of insulation. Some manufacturers offer 100 per cent sheep's wool insulation. Although sustainable and a great insulator, sheep wool insulation is susceptible to fire and combustible and moisture which damage its thermal R-Values when exposed to these elements. Cellulose fibre insulation (CFI) is Comprising mostly of recycled paper fibres, cellulose is rapidly increasing in popularity regarding its eco-friendly nature and favourable thermal and acoustic properties. Even amongst other insulation materials CFI presents some of the lowest embodied energy per kg of material, due to not having to source raw materials Some factors such as its high potential for combustibility and for fungal growth can limit CFI from having a more widespread usage in construction and renovation projects. Other factors such as settlement can increase U-Values, due to the increase of density, this results in the method to be replaced more frequently than other insulation options or topped up regularly to remove voids in the cavity.

Non-Sustainable material options include Rigid foam board, fibreglass and spray foam insulation. Most compatible with cavity walls, between studs, rafters and below screed in solid floors is rigid board insulation. In addition to its wide range of applications, rigid foam insulation comes in many different thicknesses to house the needs of cavity thickness (leaving a 25mm air void), floor height and thickness of rafters and joists, rigid foam insulations standard 2.4-meter by 1.2-meter sheet size is essential for minimising waste since it can be cut down to standard joist, rafter and stud wall sizes. Fibreglass, coming in roll and bat form can be easily installed by not trained individuals. Even with its fire-retardant properties, ease of installation and wide range of applications, fibreglass can propose a huge threat to health and is unsustainable. A less preferred insulation material is spray foam insulation. Spray foam insulation is an easy and fast method of installing insulation; however, its negatives offset its positives. Spray foam insulation can damage tight spaces and is virtually impossible to remove after installation. Spray foam insulation must expand fully to reach maximum potential R-Values, if compresses little air will be trapped. In addition, excess and protruding foam must be cut off for installation of finishes and cladding producing hazardous waste that must be disposed of appropriately, increasing costs and timescales.

[The pros and cons of sheep's wool insulation for your home | Local Surveyors Direct]

[A review on the properties of cellulose fibre insulation - ScienceDirect]

[A Complete Guide to Fibreglass Insulation - Pros, Cons & Cost]

[Spray foam insulation explained - Energy Saving Trust]

**Recommended Installation and Material Options**

The favoured choice by most installers in loft insulation is between the ceiling tie beams, reducing cost of quality and decreasing time of installation, therefore reducing labour costs. Sheep's wool insulation should be the preferred insulation material in the loft space with its high R-Values. This insulation should be a minimum of 270mm to comply with current building regulations. It should also be installed in the eves with out touching the overhanging rafters to promote airflow from the soffit vents.

On the 1970s property, there is 100mm cavity in external walls, this should be utilised and filled with blown recycled cellulose insulation since it would not be feasible to demolish brickwork to install batt or rigid foam insulation, removing wall ties, install insulation clips and reconstruct brickwork. The expense of installing internal or external insulation would not be recommended if a cavity is available.

External wall insulation may be favoured for the recessed porch, where a cavity wall is not situated, this should be finished with pebbledash render to comply with the theme for 1970 dwellings, this amounts to the same cost as blown insulation.

My options are the most efficient, material saving and sustainable compared to other options that may have been viable bout did not outweigh the pros of my choices.

**Costing**

*Walls (cavity)*

Surface area of external walls from DPC height to wall plate height – total surface area of all newly installed double-glazing windows and doors:

200.75m^2 -19.5444m^2 = 181.2056m^2

Surface area X cost per meter square of recycled cellulose insulation including labour

181.2056m^2 x £12 = £2174.47 (rounded up)

*Loft (ceiling tie beam)*

Width of dwelling X depth of dwelling

6.1m X 7.65m = 46.665m^2

Surface area of loft space including loft hatch X cost per square meter of sheep wool insulation including labour

46.665 X £22 =  £1026.63

*Total Cost*

Cost of exterior wall insulation + cost of loft insulation

£2174.47 + £1026.63 = £3201.10

Is this within budget?

Total budget of each home – total cost of insulation for each home

£13000 - £3201.1 = £9798.90

Yes, it is within budget.

Grants are available for properties from the government to help assist installation of insulation and meet targets of net zero by 2050 or the UK government would face prosecution.

House insulation costs in the UK - 2025

## Garden Office Construction

The typical cost of constructing a 5x5 meter single storey garden office including foundations is £26928; however, this can vary depending on specifications such as material choice.

How much value does a garden office add to your house? | Unbiased

## Modular Construction

Modular construction is an increasingly popular option for construction garden offices. By constructing whole 3-dimensional modules in a factory rather than on site many benefits can arise, these benefits include: reduced waste from using efficient methods, increasing sustainability; reduced health and safety risks due to the controlled environment; faster production time from no time affected work form extreme weather conditions and reduced injury and increased quality control, satisfying clients. Modules are transported to sites and large plant, positions them, reducing on-site labour to a minimum.

The image provides an example of modular construction being utilised in a secondary school in Manchester.

[Benefits of Modular Construction | The Access Group]

[TRIUMPH_MANCHESTER_Mclaughlin_1200x800.jpg (1200×800)]

[Manchester Public Schools Temporary Classroom Space - Modular Building Institute]

## Raft Foundations

A raft foundation is a reinforced concrete slab under the whole of a building or extension, concrete is typically poured into timber formwork after the base has been prepared. There are 11 stages to installing raft foundations, they include (in chronological order): marking out the foundation perimeter, clear and level site, excavate foundation, lay hardcore subbase, compact hardcore, lay sand blinding, install damp proof membrane (DPM), construct formwork, pour concrete, float concrete and finally remove formwork once concrete has set. The load of the structure is distributed over the large surface area of concrete; however, this creates a larger surface area for moisture to rise into a building, this is why a DPM is installed to prevent moisture rising from the ground, to the concrete and into a building, moisture could create rot and mould which may compromise the structural integrity of a building or result in respiratory health issues for occupants.

[Raft foundation basics | LABC]

## Health and Safety Legislation and Considerations

Health and Safety legislation is a non-avoidable procedure for all workplaces to follow for the protection of employees and the general public, failure to follow legislation can result in Health and Safety Executive (HSE) visits, temporary closure of workplaces or prosecution. The listed regulations must be followed when installing insulation, constructing foundations and erecting modules: PPE must be supplied and funded by employers for employees as a last resort of protection (Personal Protective Equipment Regulations 1992), guidance on how to handle and dispose of hazardous materials (Control of Substances Hazardous to Health 2002), when working on access ladders and scaffolding (Working at Height Regulations 2005), when working in tight loft spaces (The Confined Spaces Regulations 1997), when an accident occurs on site it should be reported to the HSE for documentation and inspection (Reporting Injuries, Disease and Dangerous Occurrences Regulation 2013). Other considerations must also be taken into account such as appropriate and visible workplace signage to remind employees of risks and precautions to take when on that specific site, in addition to training on what the signage advocates and task appropriate risk assessments should be written to identify a hazard, the severity and likelihood of the hazard occurring before any precautions that should be taken. First aid boxes should be accessible and a competent first aider should be assigned to perform medical procedures (1 for every 25 employees) This first aid box should not contain medicines or painkillers.

Personal protective equipment (PPE) at work regulations from 6 April 2022

COSHH basics - COSHH

Introduction to working at height safely - HSE

Confined spaces - HSE

RIDDOR explained - HSE

Safety signs - HSE

## Conclusion

This report demonstrates the options for installation and materials use to insulate a dwelling, in cohesion to adhering with current building regulations and standards such as Part L. Opting for a good source of insulation can increase EPC ratings and assist with the Climate Change Act 2008s targets for becoming net zero by 2050, this is influenced by a materials R-Values and precautions taken to reduce thermal bridging. Following this, I conducted further research on modular construction methods and how they are favoured for sustainability over traditional on-site construction methods, for the garden office structure which is to be supported by a raft foundation slab. Over the course of installing insulation and erecting the garden offices foundations and structure, employers should advocate and comply with HASAWA 1974s rules and regulations. In conclusion, the installation of insulation influences building a more sustainable future for our construction and heating industry.

### Task 1.2 Principal Examiner Commentary

The candidate has produced a detailed and well-structured report, addressing insulation methods, costings, compliance with Part L, and sustainability considerations. Technical knowledge is strong, with accurate calculations, appropriate material recommendations, and clear justification of choices within budget. Health and safety legislation is thoroughly applied to the project context. The work demonstrates depth, accuracy, and evaluative judgement.

# Task 1.3 Project plan

| | |
|---|---|
| **Assessment number (eg 1234-033)** | 8711-033 |
| **Assessment title** | Employer-Set Project |

| | |
|---|---|
| **Candidate name** | <first name> <surname> |
| **City & Guilds candidate No.** | ABC1234 |

| | |
|---|---|
| **Provider name** | <provider name> |
| **City & Guilds provider No.** | 999999a |

| | |
|---|---|
| **Task(s)** | 1.3 |
| **Evidence title / description** | Programme of works<br><br>Supporting statement |
| **Date submitted by candidate** | DD/MM/YY |

Gantt Chart to Show Projected Timescale of CHA Constructing Raft Foundations For Garden Office Moduole

| | Task | Start Date | End Date | Duratiuon | Week 1 | | | | | Week 2 | | | | | Week 3 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Mon | Tue | Wed | Thu | Fri | Mon | Tue | Wed | Thu | Fri | Mon | Tue | Wed | Thu | Fri |
| 1 | Preperation (Tempoary access) | 15/04/2025 | 15/04/2025 | 1 Day | | | | | | | | | | | | | | | |
| 2 | Preperation (Erecting tempoary fencing and safety signage) | 15/04/2025 | 15/04/2025 | 1 Day | | | | | | | | | | | | | | | |
| 3 | Clear and level site | 16/04/2025 | 16/04/2025 | 1 Day | | | | | | | | | | | | | | | |
| 4 | Mark out foundation perimeter | 17/04/2025 | 17/04/2025 | 1 Day | | | | | | | | | | | | | | | |
| 5 | Excavate foundation | 18/04/2025 | 22/04/2025 | 3 Days | | | | | | | | | | | | | | | |
| 6 | Lay Hardcore Sub-base | 23/04/2025 | 23/04/2025 | 1 Day | | | | | | | | | | | | | | | |
| 7 | Compact hardcore | 24/04/2025 | 24/04/2025 | 1 Day | | | | | | | | | | | | | | | |
| 8 | Lay blinding sand | 25/04/2025 | 25/04/2025 | 1 Day | | | | | | | | | | | | | | | |
| 9 | Install damp proof membrane (DPM) | 25/04/2025 | 25/04/2025 | 1 Day | | | | | | | | | | | | | | | |
| 10 | Construct formwork | 26/04/2025 | 29/04/2025 | 2 Days | | | | | | | | | | | | | | | |
| 11 | Poor concrete | 30/04/2025 | 30/04/2025 | 1 Day | | | | | | | | | | | | | | | |
| 12 | Float concrete | 30/04/2025 | 30/04/2025 | 1 Day | | | | | | | | | | | | | | | |
| 13 | Remove formwork | 01/05/2025 | 01/05/2025 | 1 Day | | | | | | | | | | | | | | | |
| 14 | Prepare site for erection of the prefabricated garden office | 01/05/2025 | 01/05/2025 | 1 Day | | | | | | | | | | | | | | | |

Key:

- Non-Skilled Operative
- Groundsworker and Banksman
- Formworker/Carpenter
- Concrete Finisher

This Gantt Chart/Programme of Works provides a sequence of work in chronological order to assist the management department with time management of the construction of 5x3 meter raft foundations to support the loads of the prefabricated garden office module. In this chart I have taken into to account any delays such as receiving material deliveries building control officer visits, scheduled and potential visits from a HSE body. Some delays are unavoidable; however, it is vital to adhere to the projected timescales to ensure work is completed by deadlines to prevent addition costs from arising resulting in decreased profits and unsatisfied clients.

Communication between trades is vital to ensure the projected time scales are complied with. Once trades have completed their task they must professionally communicate with the next trade on site. Working in unison with other trades on site is not feasible since work must be completed in a chronological order; therefore, each trade must use BIM to access Programme of Works to understand what trade needs to be notified to begin work, prior to work being completed, this allows workers to prepare for their specific task.

Although it is vital for work to be successfully completed within projected timescales/as soon as possible, workers are entitled to a number or rights complying with the Employment act and Employment Rights Act. These rights include the following: workers should not work over 40 hours per week, workers should not be subjected to dangerous conditions without taking necessary precautions to reduce risks of harm or injury and workers are entitled to lunch breaks and facility breaks. For this specific job work commences at 08:30 before finishing at 16:30, keeping to a maximum of an eight-hour workday, this continues through weekdays amounting the maximum of 40 hours per week. Work is not permitted on weekends since the working hours is minimised due to noise regulations on weekends becoming a minimum. Allowing workers to rest over weekends ensures quality work following the next week, this can increase CHA's credible reputation which may result in securing potential work in the future.

In regard to health and safety, temporary 6-foot fencing panels must be erected around the property to prevent unauthorised personnel accessing the site with potential risks of causing harm to themselves or others, theft, or damage. This temporary fencing must be erected perpendicular to the ground with weighted rubber feet to support the temporary fencing, in addition to providing lockable access points. It is vital employees are provided with appropriate information of heath and safety on the site, this can be highlighted using safety signs. Mandatory, warning and other safety signs must be provided at all access points to the site with the following pictograms and information: Personal Protective Equipment that must be worn beyond this point. (hard hat, safety boots with steel soles to prevent penetration from beneath and toecaps, hi-visibility clothing, safety glasses, non-rip, non-entangling tight gloves and ear protection); that children are not permitted to play on the site, no authorised users beyond this point and heavy machinery in operation. Personal Protective Equipment must be supplied and funded by employers and only used as a last resort if risks can not be mitigated to prevent harm to workers at risk. Exposure to vibration from machinery should be reduced, this could be through using anti-vibration gloves or multiple workers distributing the exposure evenly, as much as reasonably practical. Soft land and landscaping are susceptible to damage due to heavy plant and machinery, to mitigate this, temporary matting should be laid for access of mini excavators, dumpers and transportation vehicles, an appropriate access route should be decided which reduces effects on residents. It should take no more than 1 day to implement health and safety precautions. Before any work can commence employers must erect temporary facilities if not already provided by the client, this includes a place for sanitisation, a restroom and eating facilities.

Before work can commence a Health and Safety Executive (HSE) must be notified to inspect safety measures and procedures put into place. The HSE will provide employers with information on how to mitigate risks and improve their measures. If a HSE believes the site is unsafe to complete work, they will close the site, preventing work to be continued until employers eliminate any hazards. After construction, an inspection will be undertaken to ensure the construction work complies with current health and safety regulations, such as tolerances, steps, handrails and access.

Due to the simplicity of the raft foundations, little preparation work and setting out is required. Taking no more than one day, the groundworker is required to use string lines and corner stakes to set the foundations in the desired positions, string lines should be hi-visibility and tight (not sagging, preventing movement in winds) to ensure easy visibility and accurate setting out before excavations commence.

To house the depth of hardcore, blinding and DPM an excavator is required to excavate topsoil and inert from the ground, operating the excavator must be a trained groundworker, and a banksman with knowledge on how to avoid pipes and use theodolite and measuring staff/total station to ensure the correct depth throughout the excavation- using regular measuring and levelling equipment is not feasible for this construction work due to land topography and vast areas. Due to the small load of the prefabricated garden office, it is unnecessary to excavate an edge beam. This process should take 3 days, taking the project into the beginning of the second week.

After each stage of construction, an external stakeholder known as a Building Control Officer must be informed, the Building Control Officer will inspect the work completed at this stage. Feedback from the Building Control Officer will ensure if work complies with current building regulations, in this case approved document Part A, if the construction work does not comply with current regulations, the officer will provide advice on how to overcome this issue. Additionally, the Building Control Officer will provide guidance on how to undertake the next stage of the project. Ensure a building control officer inspects work at each stage ensures work does not need to be dismantled further down the construction process or further completed incorrectly, identifying issues fast. A Building Control Officer can have a full schedule resulting in project delays and being unable to commence onto the following stage.

Installing hardcore should be completed over the course of 2 days, utilising the theodolite to ensure horizontal grounds before compaction using a vibrating compactor plate -this is to reduce settlement and subsidence of the concrete raft. Uneven hardcore may result in an excess of concrete being used, increasing costs of installation. Using recycled hardcore can help decrease project costs, in addition to reducing the emissions due to extraction of raw dolomite material. This task may be completed by a groundworker, who can utilise plant machinery to increase speeds and reduce project timescales.

For the protection of damp proof membrane (DPM), a blinding sand must be laid over the hardcore. This sand is a fine aggregate known as sharp sand. Sharp sand prevents large, sharp rocks in the hardcore from penetrating the thin polythene damp proof membrane. To ensure the blinding sand is level, a screeding rake must be used. The damp proof membrane must be sealed with no damage, covering the vast surface of the excavation. Although a fast installation, if installed incorrectly damp may ride from the ground, bridging into the garden office. Damp may be the cause of mould and rot within the garden office, leading to respiratory health issues and optimisation of the structural integrity. This should take a groundworker a maximum of one day to install.

The erection of timber formwork is vital to ensure the concrete forms in a slab. Wet concrete is flowing and would not hold the shape of a raft without mouldings/support. A category of carpenters who install timber formwork, are known as form workers. The workers should work over the course of two days to erect formwork to the desired height of the raft, their method includes inserting stakes into the perimeter of the foundations, before using nails to clad panels.

All concrete must be installed within one day, if concrete is installed in 2 or more sections, the potential of cracking is high along the joint. Concrete should be vibrated with either a vibrating poker or vibrating tamper almost immediately after installation to relieve air gaps, compromising the concretes strength, this should not be done excessively since it will cause aggregate to settle; in addition, when formwork is removed it will provide a smooth finish along the edges. Before concrete has fully cured, it must be floated, bull nose floats and edging floats should be used to provide an edged, smooth and level finish. Concrete should be left 24 hours before foot traffic is enabled and before concrete formwork can be removed, which is a small task.

**Task 1.3 Principal Examiner Commentary**

The candidate has produced a highly detailed programme of works supported by a clear method statement. The sequencing of tasks is accurate, with consideration of delays, inspections, and communication between trades. Health and safety requirements are comprehensively addressed, including PPE, signage, welfare, and regulatory compliance. Roles of stakeholders such as building control and HSE are applied effectively, and technical explanations of each stage (excavation, hardcore, blinding, DPM, formwork, and concrete) show strong subject knowledge. The work demonstrates depth, precision, and evaluative judgement.

# Task 1.4 Presentation

| | |
|---|---|
| **Assessment number (eg 1234-033)** | 8711-033 |
| **Assessment title** | Employer-Set Project |

| | |
|---|---|
| **Candidate name** | <first name> <surname> |
| **City & Guilds candidate No.** | ABC1234 |

| | |
|---|---|
| **Provider name** | <provider name> |
| **City & Guilds provider No.** | 999999a |

| | |
|---|---|
| **Task(s)** | 1.4 |
| **Evidence title / description** | Presentation slides<br>Note: Presentation recording is not included with this document. Please refer to the Observation Record below the presentation slides for commentary |
| **Date submitted by candidate** | DD/MM/YY |


CHA Insulation of Existing
1970s Detached Home

# Table of Contents

# What is insulation?

Almost 40% of energy is lost through uninsulated roofs and 30% through uninsulated walls, providing insulation retains rising energy, insulation traps air, which is a bad insulator of thermal energy, this prevents thermal energy from bridging from the interior to the exterior.
CHA requires a 2 storey uninsulated 1970s semidetached dwelling to be insulated to reduce energy loss, in addition to increase the EPC rating to make the home more desirable and increase the property value.

# Recommendation For Insulation of Roof

*Roofs can be insulated in an array of methods and materials. These may include:*

- Between 600mm spaced rafters or Between the 600mm spaced ceiling tie beams
- Insulation materials may be loose fill, mineral wool batts or rolls, sheep wool rolls, fibreglass batts or rolls, rigid foam board, or spray foam insulation

*Desired Method:*

Although all these methods display advantages, I opted to insulate the roof between the ceiling tie beams due to cost savings and the space is no habitable, this must be a minimum of 270mm thick and not compressed to comply with building regulations and mainimalise thermal energy loss

My opted material choice is sheep wool insulation due to its high R-Value properties in addition to its sustainable sourcing compared to other materials

# Recommendation For Insulation of External Walls

*External Walls can be insulated in an array of methods and materials. These may include:*

- External insulation cladding, Internal Insulation cladding, cavity wall insulation batts or boards and blown cavity fibre insulation
- Rigid foam 2.4x1.2, mineral wool batts, fibreglass batts, or blown cellulose insulation fibres.

*Desired Method:*

Although all these methods display advantages, I opted to insulate the full 100mm cavity with blown insulation, this eliminates the need of re cladding the property in brick slips or render, or drywalling the interior of the property, installing skirting, architrave or windowsills. However, where the recessed porch is located there is no cavity wall, and this should be exteriorly insulated and finished with pebbledash to match other existing 1970s designs.

My opted material choice is recycled cellulose insulation. Since it is not feasible to remove brickwork, install insulation batts or boards, install new wall ties with insulation retaining clips and reconstruct the brickwork, access points should be drilled, and insulation should be blown in the cavity before repointing to prevent moisture from damaging the insulation.

# Compliance With Part L

When insulating existing dwellings, the government has an approved document which is a legal guide to ensure homes are insulated to conserve fuel and power

- There are two volumes:

Volume 1: Dwellings

Volume 2: Buildings Other Than Dwellings

- Failure to follow legislation may result in fines or prosecution leading to the bad reputation of the business.

(All points to be expanded, up on presentation)

# R-Values and U-Values

- Essentially an R-value indicates a materials resistance to conductive heat flow. The higher the R-value, the better the thermal performance of that material. The modern-day imperial R-Values are measured in Ft2×°F×h/Btu. The desired R-Value of a specific material depends on a range of factors, named flowing: thickness of a given material, the type of material, density of a given material, the moisture content of a given material and the temperature of a given material. Having low R-Value materials may have a high initial investment; however, energy cost saving over time will save you money. To calculate the savings over time the Life- Cycle Assessment should be considered.
- A U-Value is not a specific material but the thermal conductivity of an assemble (roofs, walls, and floors). The lower a U-Value the better the thermal performance of the assemble, the u value is primarily influenced/determined by the R-Values of the materials installed into that part of the structure.

| Material | R-value per Inch Thickness |
|---|---|
| Polyisocyanurate Foam | 8.0 |
| Extruded Polystyrene | 5.0 |
| Expanded Polystyrene | 4.0 |
| Fiberglass Batt | 3.0 - 4.0 |
| Mineral Wool Batt | 3.0 - 4.0 |
| Cellulose | 3.5 - 4.0 |

| Assembly | Typical U-value |
|---|---|
| Wall with R-20 insulation | 0.05 W/m2K |
| Roof with R-30 insulation | 0.03 W/m2K |
| Triple Glazed Low-E Argon Filled Window | 1.0 W/m2K |
| Slab-on-Grade Floor | 0.15 W/m2K |

# Thermal Bridging

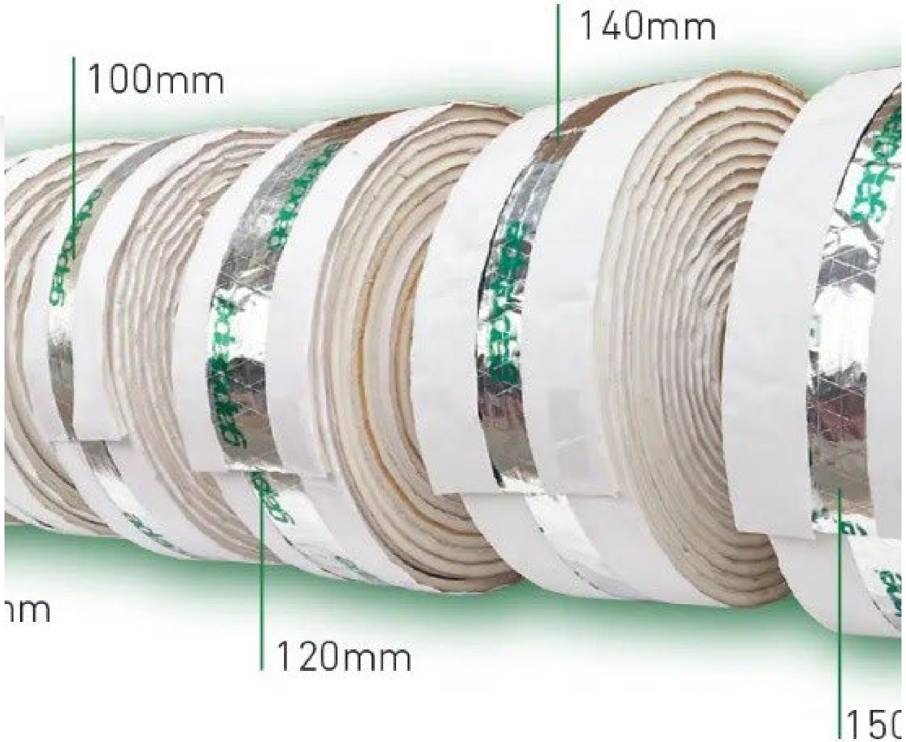
*What is thermal bridging?*

- Thermal bridging occurs in areas where insulation has breaks, there is limited insulation or more conductive materials are used to retain thermal energy.

*Thermal bridging must be reduced to ensure low U-Values, this can be done through:*

- Staggering stud walls
- Insulated Studs
- Using cavity closures over returning brickwork
- Insulation backed plasterboard
- Foil insulation tape
- Double, triple and even quadruple glazing with large airgaps
- Sealing gaps in around windows and doors with silicone and expanding foam
- Materials with high R-Values
- Using thermalite blocks in exterior and partition walls (to create zones)

# Gapotape




*Uses and Benefits:*

- Used with all thicknesses of solid rigid foam boards
- Compressible foam with high R-Value
- Reduces gaps
- Used between boards
- Used between rafters, joists, and studs

# Sustainability

- Reduces thermal energy loss out of a home, limiting the need to reheat using energy.
- Insulating a home helps with the government's targets of the Climate Change act 2008 to reach carbon net zero by 2050
- Using sustainably sourced materials (finite sheep's wool and recycled cellulose fibres, reduces the desire to source raw materials)

*Legislations to abide by:*

- *PPE must be supplied and funded by employers for employees as a last resort of protection (Personal Protective Equipment Regulations 1992)*
- *Guidance on how to handle and dispose of hazardous materials (Control of Substances Hazardous to Health 2002)*
- *When working on access ladders and scaffolding (Working at Height Regulations 2005) (ladder positioning, scaffolding requirements such as toe boards, gates handrail heights)*
- *When working in tight loft spaces (The Confined Spaces Regulations 1997) (gasses and evacuation)*
- *When an accident occurs on site it should be reported to the HSE for documentation and inspection (Reporting Injuries, Disease and Dangerous Occurrences Regulation 2013).*
- *Vibration regulations*

*Other Considerations:*

- Risk assessments
- HSE visits
- Securing of site
- Task appropriate hazard, mandatory and warning safety signs must be displayed
- Weekly inspection and tagging of scaffolding

# Key Health and Safety Requirements:

*Legislations to abide by:*

- *PPE must be supplied and funded by employers for employees as a last resort of protection (Personal Protective Equipment Regulations 1992)*
- *Guidance on how to handle and dispose of hazardous materials (Control of Substances Hazardous to Health 2002)*
- *When working on access ladders and scaffolding (Working at Height Regulations 2005) (ladder positioning, scaffolding requirements such as toe boards, gates handrail heights)*
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- *Vibration regulations*

*Other Considerations:*

- Risk assessments
- HSE visits
- Securing of site
- Task appropriate hazard, mandatory and warning safety signs must be displayed
- Weekly inspection and tagging of scaffolding

# Logistics

Considering how materials are delivered and stored is vital to minimalize damage and reduce environmental effects.

Delivery of Insulation:

Storage of Insulation:

# Trades Involves

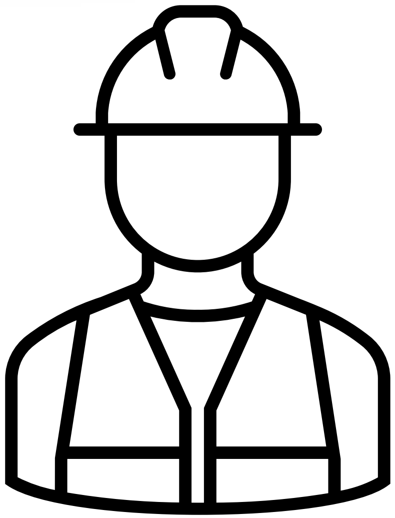
There is an array of trades and stakeholders on and off site, without them construction work would not be completed, here are the trades and stakeholders that affect our project:

*Operatives:*

- Non-skilled Operative
- Insulation Installer
- Bricklayer
- Scaffolder

*Other Stakeholders:*

- Site Manager
- Quantity Surveyor and Estimator
- Manufacturers and Suppliers
- Building Control Officer
- Snagging Officer
- Health and Safety Executive (HSE)
- Local Council



# Pricing of Insulation:

<u>**Costing**</u>

*Walls (cavity)*

Surface area of external walls from DPC height to wall plate height – total surface area of all newly installed double-glazing windows and doors:

200.75m^2 -19.5444m^2 = 181.2056m^2

Surface area X cost per meter square of recycled cellulose insulation including labor

181.2056m^2 x £12 = £2174.47 (rounded up)

*Loft (ceiling tie beam)*

Width of dwelling X depth of dwelling

6.1m X 7.65m = 46.665m^2

Surface area of loft space including loft hatch X cost per square meter of sheep wool insulation including labour

46.665 X £22 = £1026.63

*Total Cost*

Cost of exterior wall insulation + cost of loft insulation

£2174.47 + £1026.63 = £3201.10

Is this within budget?

Total budget of each home – total cost of insulation for each home

£13000 - £3201.1 = £9798.90

Yes, it is within the budget of £13,000.

Grants are available for properties from the government to help assist installation of insulation and meet targets of net zero by 2050 or the UK government would face prosecution.

# Programme of Works For Construction Of Raft Foundations For Garden Office Module


Gantt Chart to Show Projected Timescale of CHA Constructing Raft Foundations For Garden Office Moduole

Week 1: Mon Tue Wed Thu Fri | Week 2: Mon Tue Wed Thu Fri | Week 3: Mon Tue Wed Thu Fri

| | Task | Start Date | End Date | Duratiuon |
|---|---|---|---|---|
| 1 | Preperation (Tempoary access) | 15/04/2025 | 15/04/2025 | 1 Day |
| 2 | Preperation (Erecting tempoary fencing and safety signage) | 15/04/2025 | 15/04/2025 | 1 Day |
| 3 | Clear and level site | 16/04/2025 | 16/04/2025 | 1 Day |
| 4 | Mark out foundation perimeter | 17/04/2025 | 17/04/2025 | 1 Day |
| 5 | Excavate foundation | 18/04/2025 | 22/04/2025 | 3 Days |
| 6 | Lay Hardcore Sub-base | 23/04/2025 | 23/04/2025 | 1 Day |
| 7 | Compact hardcore | 24/04/2025 | 24/04/2025 | 1 Day |
| 8 | Lay blinding sand | 25/04/2025 | 25/04/2025 | 1 Day |
| 9 | Install damp proof membrane (DPM) | 25/04/2025 | 25/04/2025 | 1 Day |
| 10 | Construct formwork | 26/04/2025 | 29/04/2025 | 2 Days |
| 11 | Poor concrete | 30/04/2025 | 30/04/2025 | 1 Day |
| 12 | Float concrete | 30/04/2025 | 30/04/2025 | 1 Day |
| 13 | Remove formwork | 01/05/2025 | 01/05/2025 | 1 Day |
| 14 | Prepare site for erection of the prefabricated garden office | 01/05/2025 | 01/05/2025 | 1 Day |

Key:

- Non-Skilled Operative
- Groundsworker and Banksman
- Formworker/Carpenter
- Concrete Finisher

*Other factors such as Building Control Officer, Scaffold tagging and HSE visits must be scheduled in to help abide current building and health and safety legislation*

# Thank You

I aspire you take into consideration my research and results of how the matter of the uninsulated home should be tackled to reduce the effects of climate change and assist the government in exceeding their targets. If you require any additional information don't be reluctant to request!

## Employer-Set Project – Observation Record (Task 1.4 Presentation)

**8711-30 T Level Technical Qualification in Onsite Construction**

**8711-033 Core: Employer-Set Project (Summer 2025)**

| | |
|---|---|
| **Candidate name** | <first name> <surname> |
| **City & Guilds candidate No.** | ABC1234 |
| **Date** | DD/MM/YY |

| | |
|---|---|
| **Provider name** | <provider name> |
| **City & Guilds Provider No.** | 999999a |

Record observation notes below to inform external marking. **Notes must be detailed, accurate and differentiating. They should identify areas of strength and weakness to distinguish different levels of performance quality for each of the prompts below.**

| **Structure/detail** |
|---|
| Good introduction to provide context. Very good overview of potential solutions of insulators. Legalities of parts that are required to be followed. A good sequence of information in a logical order. Good range of resolutions including mitigating thermal bridging, excellent official expectations, government initiatives and parts/acts discussed including sustainability requirements. Very good health and safety, with all relevant legislation with all examples of PPE requirements for various scenarios. HSE understanding thorough and detailed and comprehensive. Site requirements outlined and specified on how to manage site situation safely. Logistics impact on the job. All various trades and operatives highlighted for site structure and safety elements, including other stakeholders, however a little off specific topic. |

| **Terminology** |
|---|
| Very professional and appropriate to scenario. Clear and concise and correct tone. |

| **Theories and concepts** |
|---|
| Loft insulation ceiling beam ties using sheep's wool insulation, for sustainability, possible range of insulation provided external cladding for less internal impact. Excellent recall on statistical information relating to the science of the materials and u/r value explanations. A range of options and suggestions to meet brief requirements to prevent thermal bridging and increase thermal efficiency. |

| Communication |
| --- |
| Good communication, a little nervous, good use of slides with picture examples, charts, detailed and easy to follow. Clear and confident, however, a little nervous and took a while to settle into the presentation. Carts, pictures, headings and sequence all efficient and practical to understanding. |

| Tutor questions to candidate | Candidate responses |
| --- | --- |
| Do you think it is important to upgrade and insulate older properties instead of knocking down and rebuilding? | yes, if you insulate less impact on the environment, its less costly, good methods to install, reduces sources of raw materials, |
| What key sustainable considerations could you implement into the design process and why would they be important? | If you use sustainable materials (sheep's wool) reduces ,material going to landfill. |
| Are there any other factors that you have found out within your research that you feel are important to mention relating to the issue? | Installation of doors is vital to heat loss, the ground floor should be insulated as you get a lot of heat |

| Any other aspects |
| --- |
| |

| Tutor signature | Date |
| --- | --- |
| X ____________________ | |

If completing electronically, double click next to the 'X' to add an electronic signature once the record is **finalised.**

### Task 1.4 Principal Examiner Commentary

The candidate delivered a well-prepared presentation supported by clear prompts and structured content. Subject knowledge was demonstrated with reference to technical detail, health and safety, and calculations was clear and easy to follow how the budget was compared to. Delivery was confident and communication effective, with active contributions to the discussion. This reflects strong understanding and presentation skills.

# Task 2.1 Collaborative problem-solving

| | |
|---|---|
| **Assessment number (eg 1234-033)** | 8711-033 |
| **Assessment title** | Employer-Set Project |

| | |
|---|---|
| **Candidate name** | <first name> <surname> |
| **City & Guilds candidate No.** | ABC1234 |

| | |
|---|---|
| **Provider name** | <provider name> |
| **City & Guilds provider No.** | 999999a |

| | |
|---|---|
| **Task(s)** | 2.1 |
| **Evidence title / description** | Collaborative problem-solving group discussion notes<br>Draft email<br>Note: Collaborative discussion recording is not included with this document. Please refer to the Observation Record below for commentary |
| **Date submitted by candidate** | DD/MM/YY |

2.1 - Collaborative Problem-Solving

Initial Notes:

Lean Construction - AI to increase efficiency + Reduce Waste

Recycling any waste / reusing it

Waste Management - site plans

Segrigation - Insulation goes in general waste

Waste carriers application liscence - Lower tier no flytipping responsible

Using quantity surveyors to calculate exact quantitys of materials for the insulation of external walls and loft space DPC - Wall Plate

EPC rating A-G How to improve sustainability Government over estimators for exact accurate

Cosh 2002 fibres for respitory issues cellulose

Notes from Collaboration:

Climate change Act 2008 80% 2050 in 2019 changed to net zero safety

- LEAD - 3rd party guidence to ensure goals are met
- Accurate cutting offcuts and measurement
- Reuse on other jobs
- Clean site - Prevents waste from the environment finite resource
- maximmising use implement use of accurate measurement

corperat social responsibility material choice

contribution to carbon emmisions and damage of had landscape

Dear Colin's Housing Association (CHA),

I am reaching out to you to highlight the viable steps of reducing, reusing and recycling to minimalise waste, align with legislation and ensure the project is sustainable regarding insulating the 1970s, uninsulated, semi-detached home.

When installing insulation into the loft of the home and from damp proof course to wall plate height of the external walls, the amount of waste being produced should be reduced. Lean construction should be considered before the installation of insulation, this is increasing efficiency along with reducing waste. The matter of implementing accurate measurement instruments, reduces error and AI may be utilised to find efficient methods, reducing the amount of raw material to be sourced. Using quantity surveyors over estimators, accurate quantities of materials can be calculated, this reduces over ordering in addition to underordering resulting in increased delivery costs fuel consumption and project delays. As far as reasonably practical, waste/offcut material should be reused in other construction projects undertaken by CHA, reducing materials being disposed of also reducing the sheer number of raw materials sourced in addition to decreasing costs. As a last resort before landfill, waste material should be recycled. Although recycling waste material has higher carbon emissions than reusing, its affect on the environment is significantly less than incineration. There are factors to consider when recycling waste materials which include that site waste management plans should be implemented to ensure responsible disposal of waste material, overseen by the appointed manager; waste should be segregated, this includes insulating materials being segregated into general waste skips; anyone transporting waste material requires a waste carriers' licence to ensure material is responsibly disposed of; any personnel handling substances hazardous to health should follow the Control Of Substances Hazardous to Health (COSHH) 2002, for example when handling materials that produce fibres, respiratory equipment should be utilised to prevent ill health.

This email should provide you with vital information regarding minimalising waste and reducing environmental impacts, in cohesion to meeting the governments targets to reach net zero by 2050 (Climate Change Act 2008). Although not legally binding the use of sustainable materials should be considered, for example sheep's wool can be used since it is a finite resource, or recycled cellulose insulation, this is apart of a business's corporate social responsibility, resulting in a positive reputation. Complying with legislation and increasing sustainability can be a hard task; however, receiving an EPC (a legally binding rating from A (best) to G (worst) on the efficiency of your home when selling, renting or constructing a new property) can provide guidance on how to make the dwelling/structure more efficient. Additionally, LEAD construction could be utilised where a third-party inspector ensures construction work complies with legislation (similar to a building control officer).

I hope I hear a response from you promptly so we can implement these plans.

Kind Regards, <first name> <surname>

# Employer-Set Project - Observation Record (Task 2.1 Collaborative problem-solving)

**8711-30 T Level Technical Qualification in Onsite Construction**

**8711-033 Core: Employer-Set Project (Summer 2025)**

| | |
|---|---|
| **Candidate name** | <first name> <surname> |
| **City & Guilds candidate No.** | ABC1234 |
| **Date** | DD/MM/YY |

| | |
|---|---|
| **Provider name** | <provider name> |
| **City & Guilds Provider No.** | 999999a |

Record observation notes below to inform external marking. **Notes must be detailed, accurate and differentiating. They should identify areas of strength and weakness to distinguish different levels of performance quality for each of the prompts below.**

| **Communication skills** |
|---|
| Very good communication throughout, engaging others in conversation, asking opinions, good body language, respectful, and considerate, with a professional tone throughout. |

| **Collaboration/contribution** |
|---|
| Engaged communication well with others, posed question to stimulate conversation and provide avenues for thought. Very supportive manner throughout, brought others into the conversation who were less involved and asked opinions. |

| Methods to solve the problem |
|---|
| Segregate waste into different bins for recycling, ensure any waste that is disposed of has a waste carriers license to ensure appropriate waste is disposed of. Use a quantity surveyor instead of an estimator to ensure accurate allocation of materials. Ensure materials used are as environmentally friendly as possible. Use AI in the support of planning and choices to make sure the processes are being carried efficiently, implement governing bodies that align with sustainability, E.G LEAN construction guidelines and expectations to improve efficiency. Align with government policies, that promote sustainability and environmental considerations, 2008 climate change act, ensure that we follow EPC guidelines and achieve highest rating. Use materials that are non-finite which in turn will boost the reputation and last longer. |

| Any other aspects |
|---|
| A very good process of conversation and solution identification, the learner recalled lots of relevant information relating to the brief directly and indirectly demonstrating their scope of understanding in relation to waste management. Very clear and articulate throughout, with considerate approaches to discussion with others. Engaging and positive in their communication methods. |

| Tutor signature | Date |
|---|---|
| X ______________________ | |

If completing electronically, double click next to the ‘X’ to add an electronic signature once the record is **finalised**.

**Task 2.1 Principal Examiner Commentary**

The candidate has produced a professional and formal email that clearly outlines strategies for reducing, reusing, and recycling waste. There is strong reference to lean construction, accurate ordering, reuse of offcuts, and recycling, supported by legislative links such as COSHH, waste carriers' licences, and the Climate Change Act. The content is thorough, technically accurate, and framed in a way that shows awareness of sustainability, compliance, and corporate responsibility. This demonstrates both depth of knowledge and effective communication, fully consistent with an A grade.

# Task 2.2 Evaluation

| | |
|---|---|
| **Assessment number (eg 1234-033)** | 8711-033 |
| **Assessment title** | Employer-Set Project |

| | |
|---|---|
| **Candidate name** | <first name> <surname> |
| **City & Guilds candidate No.** | ABC1234 |

| | |
|---|---|
| **Provider name** | <provider name> |
| **City & Guilds provider No.** | 999999a |

| | |
|---|---|
| **Task(s)** | 2.2 |
| **Evidence title / description** | Evaluation |
| **Date submitted by candidate** | DD/MM/YY |

**Introduction**

Excessive amounts of preparation have set me up to hopefully achieve the grade I want to receive in this ESP. I have completed all work to support CHA with decisions on insulating the 1970s semi-detached property and erection of the prefabricated garden office. This reflects my work completed.

1. **Research**

Researching information regarding the project brief supplies me with knowledge which is essential to completing further tasks with accurate data and information.

When conducting research, I successfully included key information regarding insulation types, installation methods of insulation, factors that affect the choice of insulation materials and installation methods and information regarding the erection of prefabricated garden offices, in addition to the raft foundations supporting the load. Supporting my research I embedded credible citations.

My research may have included excessive amounts of information which may have been considered irrelevant; however, this additional information supported me in developing a detailed response to task 2.2- Report.

Overall, I consider task 1.1 a success, completing all work to the best of my ability in exam conditions.

2. **Report**

Writing a report displayed all information gathered in task 1.1- Research, this is essential to having a detailed path of how issues should be undertaken and all factors that should be considered.

When writing my report, I successfully achieved a structured response with appropriate headings and subheadings this assisted with informing CHA on all information in an easy way of understanding.

Although I ensured to keep my report detailed throughout, after reflection I may have included an excessive amount, this was influenced by my excessive loads of research in task 1.1- Research, this could be off putting for the reader since there is lots of information for the reader to interpret and consider.

This task displayed my ability to organise information and showed my understanding and knowledge of the project brief and requirements which may potentially increase my marks due to my detail supplied.

3. **Project Plan**

Creating a project plan is vital to ensure projects are completed withing projected timescales. Organisation of work ensures that the deadlines are met, decreasing the risk of additional costs and unstratified customers, I created a programme of works and supporting method statement.

Due to my existing knowledge of creating Gantt Charts, I could successfully use the software to develop a programme of works that included tasks in chronological order, starts and end dates, duration, and a graph to display the projected timescale with week numbers and days, this chart showed what trades were working on specific days.

I could have dug even deeper and provided additional detail in the supporting method statement; however, this was not required and would have been too time consuming.

Overall, completing this task was successful and I believe my standards of work should achieve high marks, influenced my existing knowledge on completing programme of works.

4. **Presentation**

Developing a presentation was a great way to share my findings with CHA, its an essential way of interesting CHA and displaying vital information on how the projects should be tackled with supporting slides.

In my presentation I presented confidence with my tone of voice and body language, expanding upon the slides to demonstrate my knowledge within the subject of insulating homes, this showed CHA that I was knowledgeable with my findings building a trustworthy relationship.

Although I portrayed confidence through my presentation, I could have included a more desirable design for the slides, this would further interest and engage CHA with my presentation.  In addition to this I could have included further images on my presentation to support my findings, pictures speak for themselves.

Presenting my findings was an overall success; however, there is vast room for improvement within this task which could have been implemented if I managed my time successfully.

## 2.1- Collaborative Problem-Solving

Collaborating and communicating with others, ensures all perspectives are shared. Sharing knowledge from people of different skill sets is vital to ensure all points are considered in detail.

Throughout our discussion, I successfully attempted to take lead, whilst promoting equal communication, my viewpoints were successfully shared amongst the group. Additionally, I took time to consider points from other participants which contributed to concluding how waste should be reduced and disposed of responsibly.

Although drafting a concise and informing email to CHA was successful, I should have included a draft subject of what the matter is based around to avoid confusion. The name of this subject would be Steps Regarding Waste Management and Reduction

This task was my most successful task so far due to my knowledge presented and communication sills displayed throughout. I am confident that I have the potential to gain full marks in task 2.1. Even with my great communication skills, I have further developed them within this task.

## Conclusion

Taking time to review all tasks completed helps me understand areas of improvement for next time I complete a task of this kind. This ESP has been a success since I have managed to complete all work required to the best of my ability. After further, in depth, reflection, my overall most successful task was 2.1- Collaborative Problem-Solving which was completed to high standards, meeting the requirements. I will focus more on my presentation of slides in the future to develop more engaging presentations upon further reflection of task 1.4- Presentation.

### Task 2.2 Principal Examiner Commentary

The candidate provides a detailed and structured evaluation of each task, highlighting both strengths and areas for improvement. Reflections are specific, covering research depth, report structure, project planning, presentation delivery, and collaborative problem-solving. They demonstrate self-awareness by acknowledging where excessive detail may have been less effective, and where presentation design could be improved. This goes beyond the minimum standard for an A grade by showing balance between recognising success and critically analysing weaknesses, with clear strategies for improvement. The evaluation demonstrates maturity, depth, and evaluative skill consistent with high A grade performance.

## Get in touch

The City & Guilds Quality team are here to answer any queries you may have regarding your T Level Technical Qualification delivery.

Should you require assistance, please contact us using the details below:

Monday - Friday | 08:30 - 17:00 GMT

T: 0300 303 53 52

E: **technicals.quality@cityandguilds.com**

W: **http://www.cityandguilds.com/tlevels**

Web chat available **here**.