



f) ● 53°31'6"N, 2°16'6"W ±13ft ▲



**EEM Design – PAS 2035:2019**

**Design Specification for 46 Richmond Avenue, M25  
OLW**

**IZEnergy-46 Richmond Avenue -Design-Rev1**

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## 1 References

1. 46 Richmond Avenue Manchester Intended Outcomes
2. 46 Richmond Avenue PAS 2035 Risk Assessment
3. 46 Richmond Avenue Condition Report
4. 46 Richmond Avenue Energy Report
5. 46 Richmond Avenue RdSAP Inputs
6. 46 Richmond Avenue Medium Term Improvement Plan
7. Specification for the installation of external wall insulation ensuring the safety and operation of fuel burning appliances v.1.0 31st March 2017
8. Solid Brick Wall with 90mm EPS Condensation Risk Analysis
9. Licata Thermal Bridging and Weathering Details
10. SWIGA External-wall-insulation-specification-for-weathering-and-thermal-bridge-control-Guide.-  
June-19

## 2 Introduction

This document is the Retrofit Design Specification for 46 Richmond Avenue, Manchester. It sets out the design for the energy efficiency measures planned to be installed as part of the Local Authority Delivery Phase 2 North West Hub retrofit project. The property is not situated in an area susceptible to flooding and therefore this document does not address mitigation of flood risk.

The Design Specification has been produced in accordance with the requirements of PAS 2035 and takes into account the scope of the project set out in the Intended Outcomes document [1].

The risk pathway for has been assessed as Path B, and therefore the design requirements for Path B have been applied [2].

## 3 Assessment and Pre-Existing Defects

The design specification has been produced following completion of a Retrofit Assessment [3,4 ,5]. The handover of the assessment included provision of the RdSAP data file and photographic records collected during the assessment survey.

There were no defects identified from the assessment which require rectification prior to the EEM installation works.

## 4 Design Scope

A medium-term improvement plan for the property has been prepared [6], aimed at achieving an EPC rating of B.

The intended outcome of this project targets the “Fabric first” approach promoted by PAS 2035 and is centered around the provision of External Wall Insulation.

| PAS 2035 Design Scope                                                                                                                                 | Project Design Scope                                                                                                                                                                                   |
|-------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Improve the insulation of the elements of the building fabric (exposed floors, walls, roofs, windows and external doors) and reduce thermal bridging; | External Wall Insulation (EWI), with appropriate detailing to reduce thermal bridging.<br><br>Solid Floor insulation is relevant to the dwelling archetype but is not within the scope of the project. |

|                                                                                                                                                                                                                                                |                                                                                                                                |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                                                                                                                                                | Loft insulation has been considered and whilst generally adequate, opportunities for improvement are identified in the design. |
| Improve the air-tightness of the building envelope;                                                                                                                                                                                            | EWI with appropriate detailing to improve air tightness of the building fabric                                                 |
| Establish a safe dynamic moisture equilibrium through each element of the building fabric;                                                                                                                                                     | EWI with appropriate detailing to address moisture                                                                             |
| Improve the resistance of the building envelope to water penetration in order to maintain the thermal properties of the building fabric and the capability of the building envelope to manage moisture in a manner suited to its construction; | EWI, together with appropriate detailing to improve resistance of the building envelope to water penetration.                  |
| Provide or upgrade ventilation to ensure good internal air quality and minimize the risk of condensation;                                                                                                                                      | Assessment of ventilation to confirm adequacy for the improved building fabric.                                                |
| Minimize the risks associated with vapour or other products, for example volatile organic compounds (VOCs), released within buildings subsequent to their air-tightness being improved;                                                        | Assessment of ventilation to confirm adequacy for the improved building fabric.                                                |
| Minimize the risks associated with overheating;                                                                                                                                                                                                | Dynamic modelling for worse-case properties of each property archetype to demonstrate mitigation of overheating risk.          |
| Provide efficient heating and cooling systems with responsive, intelligent or “smart” controls, including systems that use low or zero carbon (LZC) technologies;                                                                              | Not within the scope of the current project.                                                                                   |
| Provide efficient water heating systems with responsive controls, including systems that use LZC technologies;                                                                                                                                 | Not within the scope of the current project.                                                                                   |
| Provide efficient fixed lighting with appropriate controls;                                                                                                                                                                                    | Not within the scope of the current project.                                                                                   |
| Provide efficient appliances and equipment to reduce electricity use and minimize internal heat gains;                                                                                                                                         | Not within the scope of the current project.                                                                                   |
| Provide locally generated renewable electric power systems that use LZC technologies;                                                                                                                                                          | Not within the scope of the current project.                                                                                   |
| Provide on-site energy storage to improve the usefulness of energy generated by LZC technologies;                                                                                                                                              | Not within the scope of the current project.                                                                                   |
| Provide metering and monitoring systems to promote the efficient use of energy.                                                                                                                                                                | Not within the scope of the current project.                                                                                   |

## 5 Property Details

### 5.1 Property Address

The property is located at:

46 Richmond Avenue  
Manchester  
M25 0LW

### 5.2 Property Construction

The property is a 3-bedroom semi-detached dwelling. It is of solid brick construction and was built circa 1910. The property has UPVC double glazed windows and doors.

## 6 External Wall Insulation Design

### 6.1 Main Wall EWI

*IZ Energy will be acting as the installer of the EWI which is based upon the LICATATHERM EPS EXTERNAL WALL INSULATION SYSTEM. This section specifies design detail for the EWI installation, making reference to Licata and SWIGA standard details where applicable. Elevation drawings are provided to highlight the location of junctions and interfaces relevant to this property.*

The installation of EWI shall be compliant with the requirements of PAS2030 and shall conform to the Licata Thermal Bridging and Weathering Details [9].

EPS insulation of 90mm thickness shall be used to achieve an overall external wall U-value of 0.3 W/m<sup>2</sup>K.

A weatherproof finish shall be applied to the EWI in accordance with the end-client's aesthetic requirement.

The EWI shall extend from the underside of the roof soffit and verge to the level of the damp proof course (DPC), approximately 100mm from the ground floor level.

Verge and roof extensions will be required in order to accommodate the EWI.

## 6.2 Junction and Interface Detail

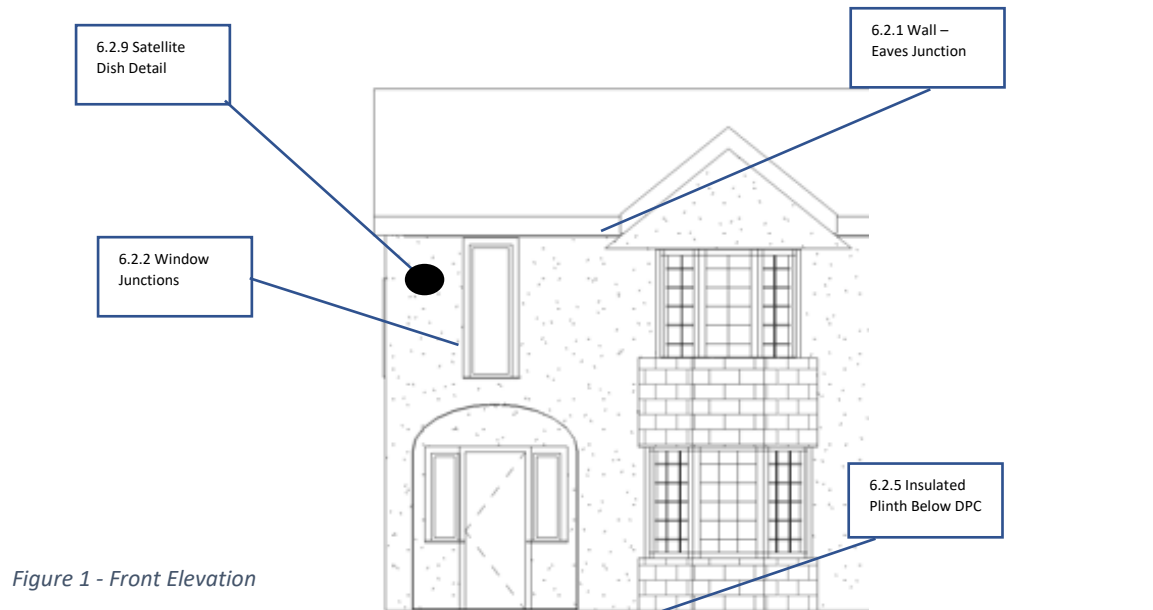


Figure 1 - Front Elevation

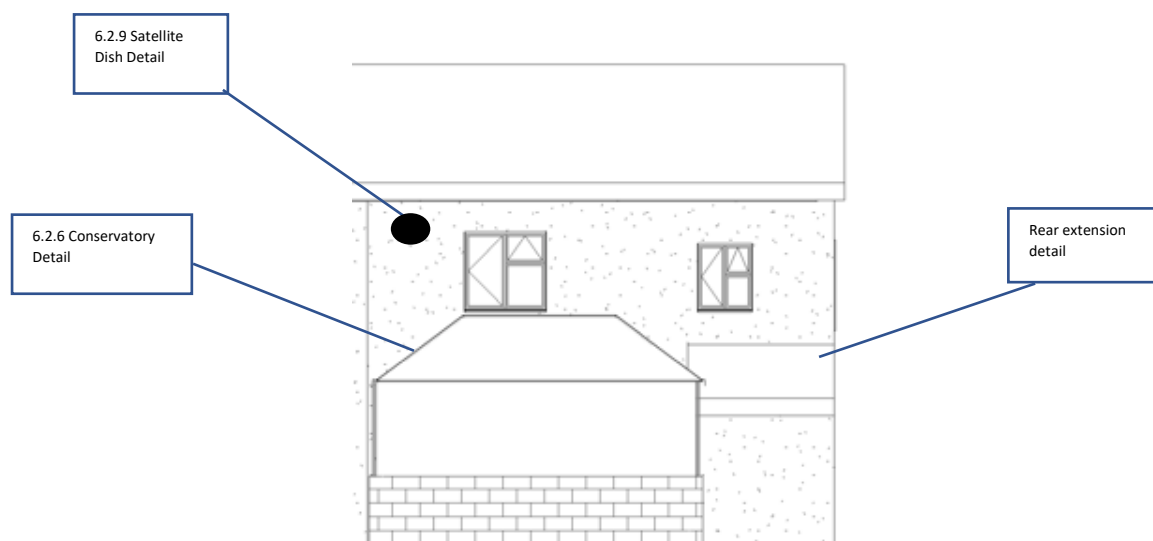
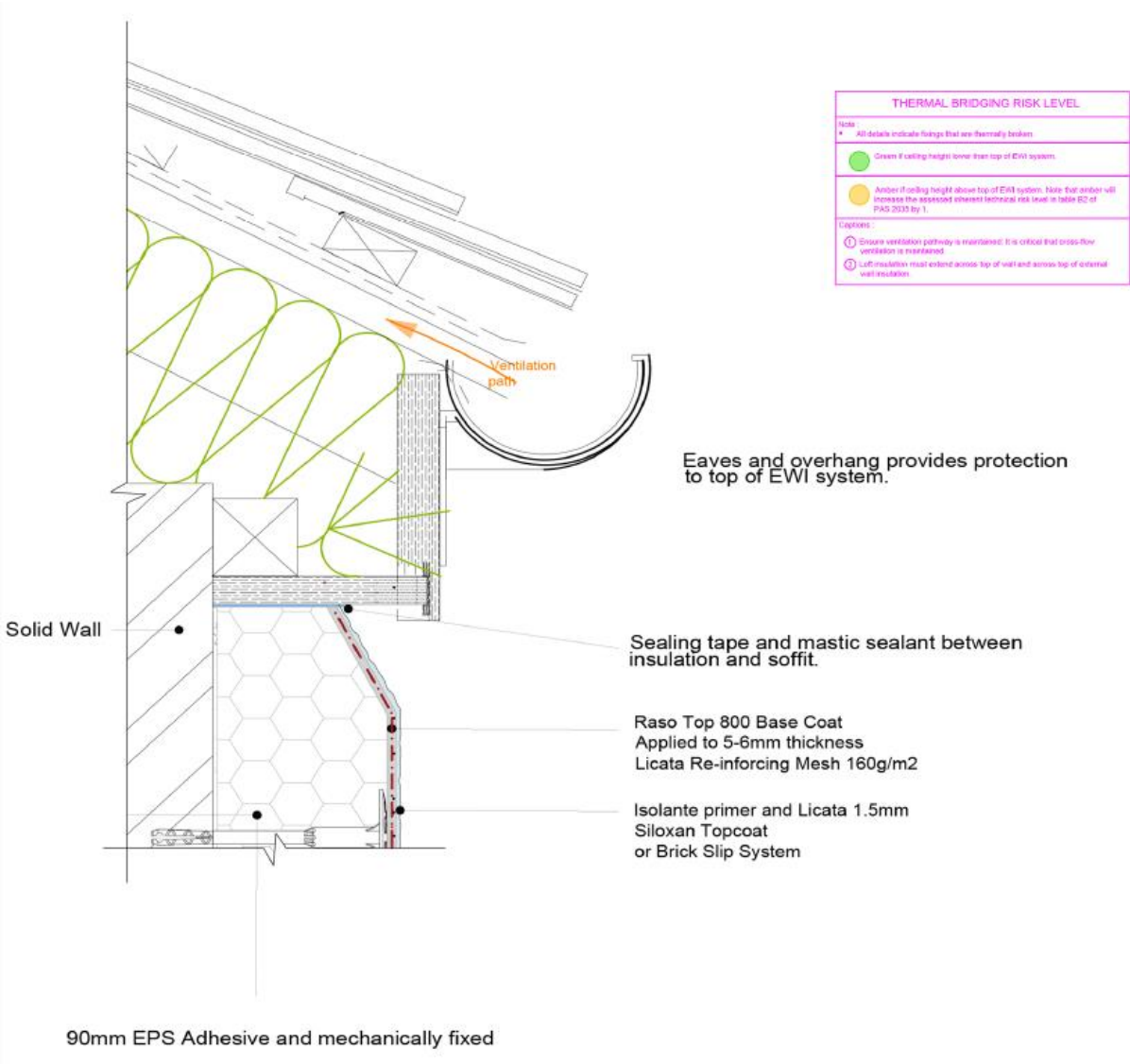


Figure 2- Side Elevation

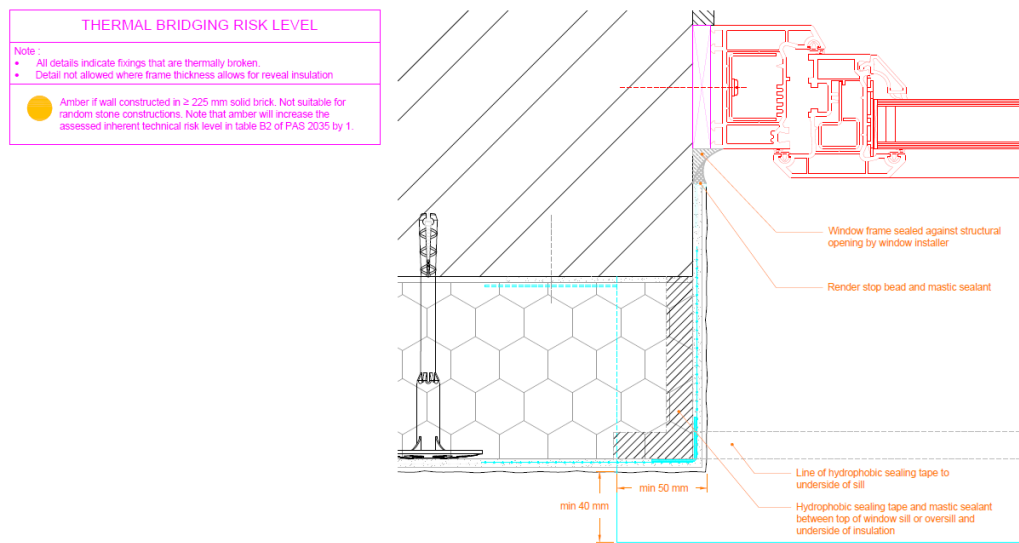
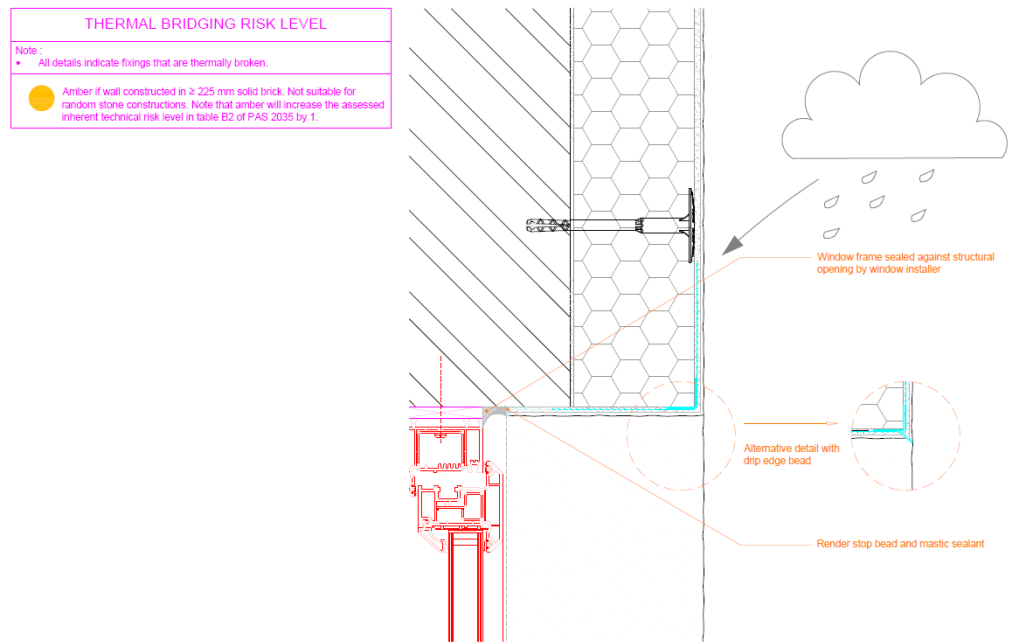
### 6.2.1 Wall – Eaves Junction

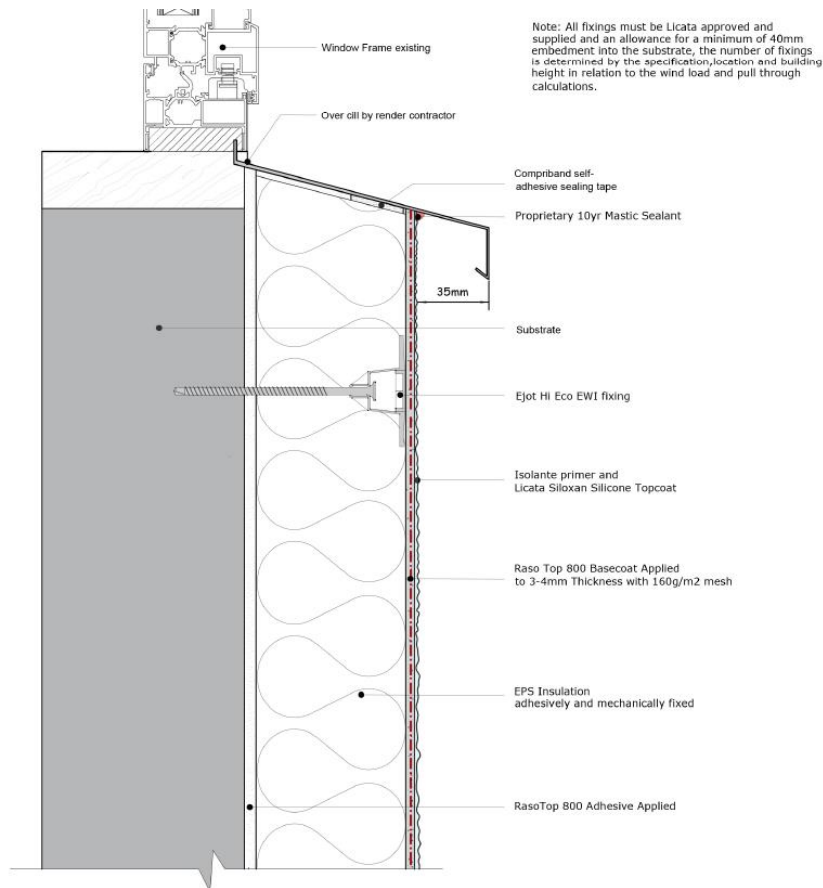
The wall – eaves junction shall be installed in accordance with detailing shown below:



6.2.2 Window and Door Junctions

The window/door head, cill and jamb to wall junctions shall be installed in accordance with detailing specified below:



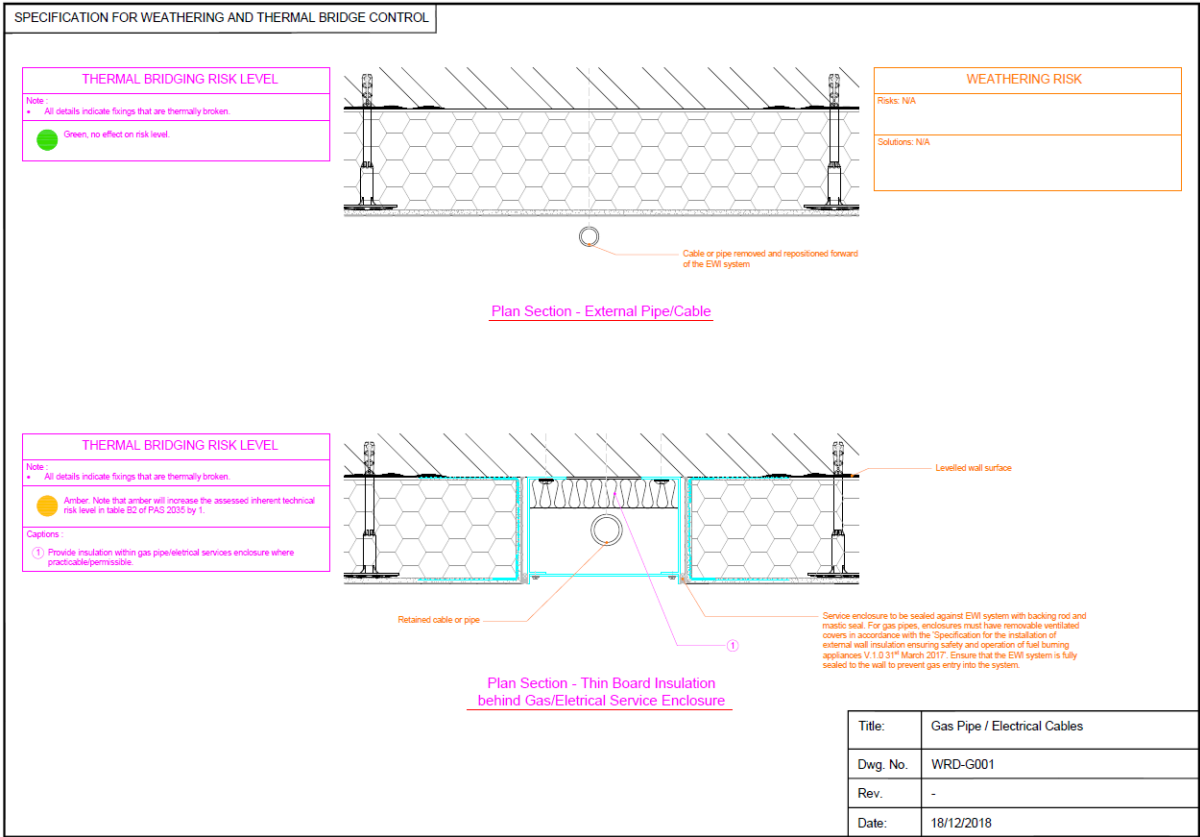


### 6.2.3 Porch Detail

The existing porch shall be removed and re-fixed to the face of the EWI using thermally broken fixings.

### 6.2.4 Pipe and Cable Detail

Pipes and cables shall be repositioned to the outside face of the EWI in accordance with detailing shown below. Where cables are of a low power type, such as aerial cables, and are below 7mm in diameter, these may be left in situ and buried within the EWI adhesive.



The insulated plinth will be terminated at the edges of the external door threshold as shown in the figure below.

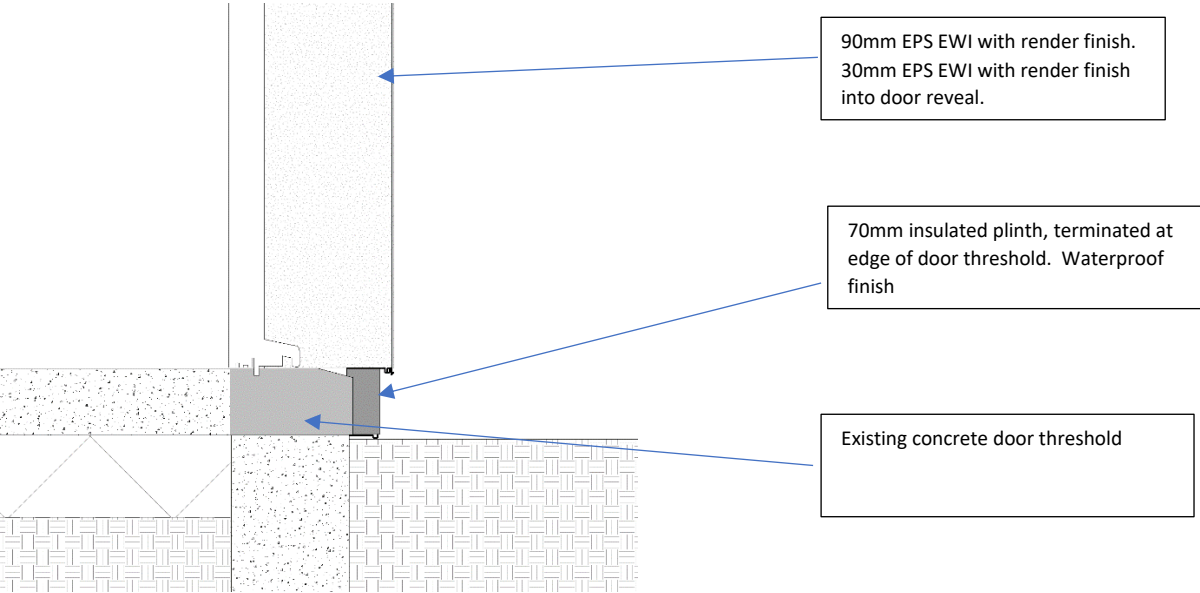
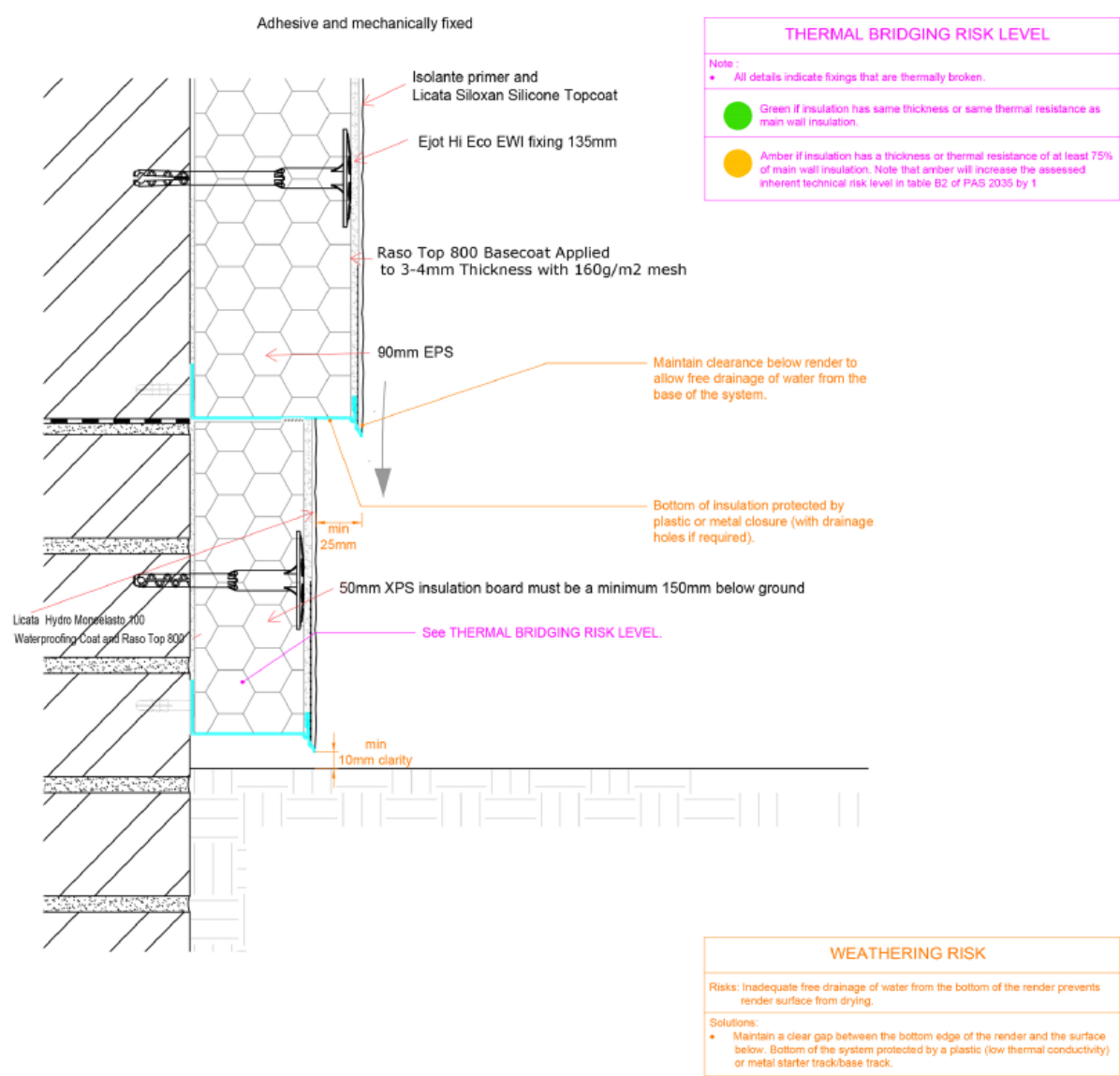


Figure 3 - Section through door threshold

6.2.5 Insulated Plinth Below DPC

The plinth below DPC shall be insulated with 50mm XPS insulation installed in accordance with detailing specified below.



Below DPC insulation will extend to the external ground level. Where there is less than 100mm between DPC and external ground level, and where ground conditions allow (for example, soil, gravel, slabs or decking), the ground should be excavated to allow 100mm depth of below DPC insulation to be installed.

6.2.6 Conservatory Detail

The main wall EWI shall be terminated above and around the rear conservatory. 30mm EPS EWI shall be installed to the main wall within the conservatory.

#### 6.2.7 Rear Extension Detail

The EWI shall terminate above the flashing to the rear extension roof. The rear extension is assumed to be of solid brick construction and therefore EWI shall be installed to the external walls of the extension.

#### 6.2.8 Vent Detail

The extract fan vent shall be extended with PVC ducting and a grille fixed to the external face of the EWI.

#### 6.2.9 Satellite Dish Detail

The Satellite Dish shall be removed from the substrate and reinstalled to the face of the EWI using thermally broken fixings.

#### 6.2.10 Wall Fixing Detail

Wall fixings, such as those for washing lines or hanging baskets, shall be repositioned to the outside face of the EWI using appropriate fixings. Where the fixing penetrates the EWI and the substrate to which the EWI is fixed, thermally broken fixings shall be used, such as those provided by Fischer (Fischer Thermax and FID fixings).

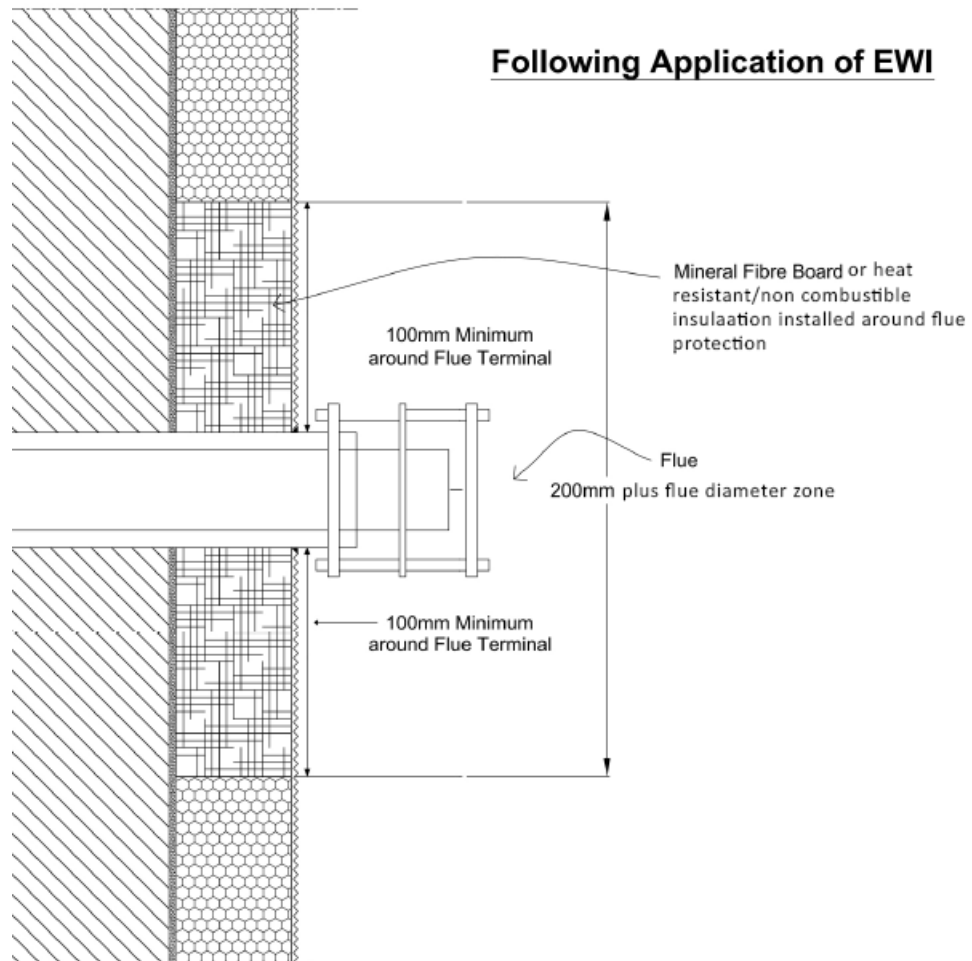
#### 6.2.11 Gas Riser Detail

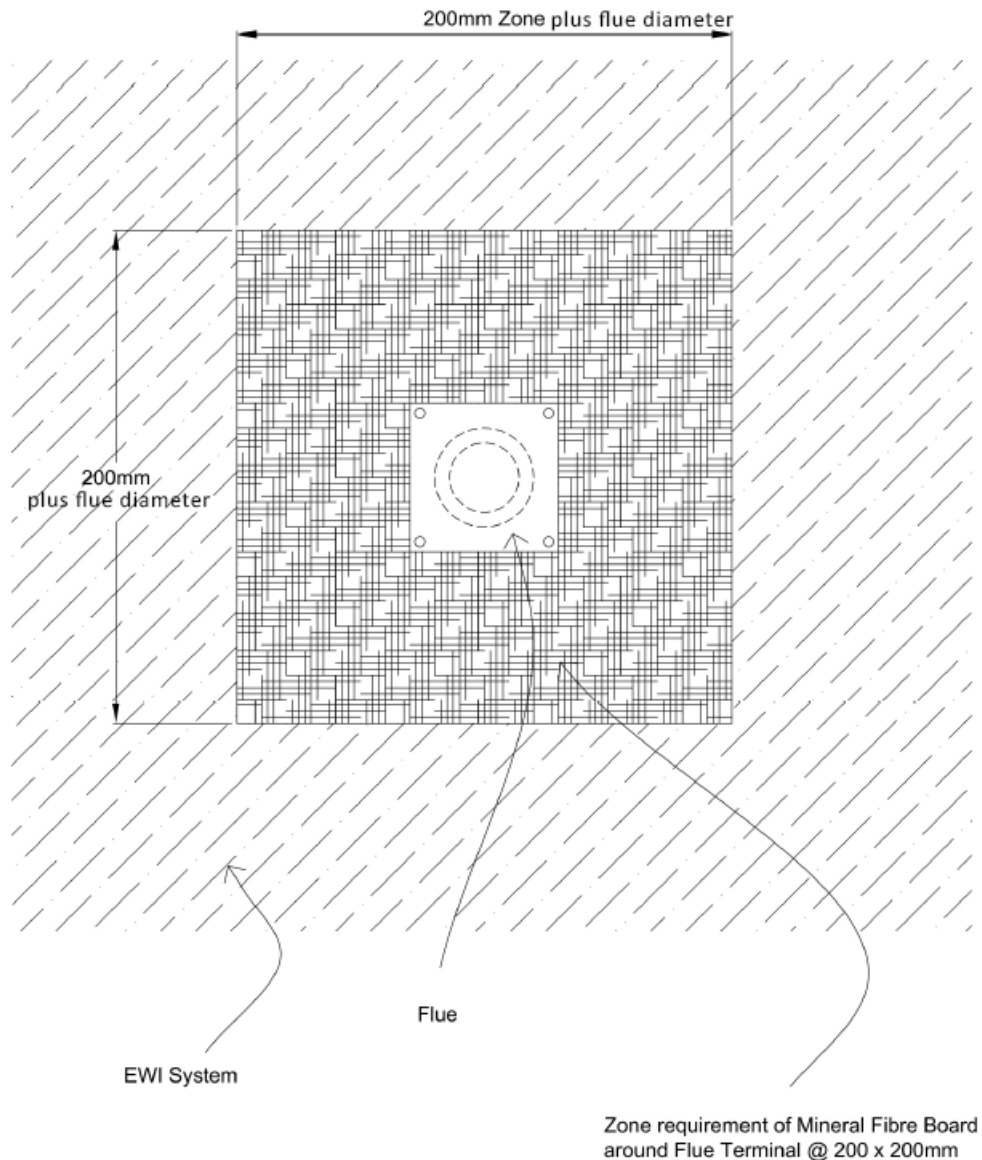
*The Medium-Term Improvement Plan [6] for these properties recommends the removal of gas supplies from these properties and a replacement of gas fired appliances with electrical appliances at the earliest opportunity. Given this, it is not proposed to move any gas risers to edge of the EWI as part of the EWI scheme. It is acknowledged that this gives rise to a risk of cold bridging around the un-insulated areas surrounding the gas riser.*

The EWI installation shall leave sufficient clearance around the gas riser to allow for maintenance of the gas supply.

#### 6.2.12 Boiler Flue Detail

The boiler flue shall be extended to clear the surface of the EWI in accordance with the appliance manufacturer's instructions. Flue extensions shall only be undertaken by a Gas Safe registered engineer (or OFTEC registered technician). If any part of the flue in contact with the EWI system can exceed 70°C then a collar of mineral fibre insulation is required around the flue to protect the EWI as shown below [7].





#### 6.2.13 Outside Tap Detail

The outside tap shall be repositioned to the outside face of the EWI by suitably qualified engineers.

#### 6.2.14 Drainage Detail

Rainwater and soil, vent and waste pipework, shall be temporarily disconnected and removed from the substrate, by the Contractor and reconnected to maintain services. Extend any pipework or sleeves to accommodate additional width of insulation plus rendering and reconnect on completion of the Works.

Where gullies are positioned too close to the wall below DPC level to accommodate 50mm below DPC insulation they must be repositioned to suit the new location of the downpipe.

Where drain positions are close to the existing substrate such that it is not possible to accommodate the full 70mm below DPC insulation behind repositioned External Soil Vent Pipes, thinner 30mm insulation may be used. A swan neck fitting may be used to connect to the repositioned SVP. The swan neck fitting must be arranged so that there is no break in continuity of the main wall EWI and starter track.

### 6.3 Condensation Risk Analysis

The outcome of the condensation risk analysis for the proposed EWI design was acceptable. Details may be found in [8].

## 7 Ventilation

### 7.1 Internal Air Quality

| Room        | Trickle Vents | Undercuts | Exhaust | Mould and Damp | Comments            |
|-------------|---------------|-----------|---------|----------------|---------------------|
| Hall        | n/a           | Y         | n/a     | N              | OK                  |
| Living Room | N             | Y         | Y       | N              | Trickle vent needed |
| Kitchen     | N             | Y         | n/a     | N              | Trickle vent needed |
| Landing     | N             | Y         | n/a     | N              | Trickle vent needed |
| Bed 1       | N             | Y         | n/a     | N              | Trickle vent needed |
| Bed 2       | N             | Y         | n/a     | N              | Trickle vent needed |
| Bed 3       | N             | Y         | n/a     | N              | Trickle vent needed |
| Bathroom    | N             | Y         | Y       | N              | Trickle vent needed |

The inadequacies in ventilation detailed in the table above must be rectified as part of the EEM installation works.

### 7.2 Safe Operation of Combustion Appliances

Provided detailing specified in sections 6.2.12 is followed, the scope of the retrofit design has no impact on the safe operation of combustion appliances.

## 8 Overheating

The overheating risk is judged to be low given the property archetype and the potential for cross ventilation. Provided ventilation inadequacies listed in section 7.1 are addressed, no further specific design measures are proposed to address overheating.

## 9 EEM Measures Interaction

The scope of this retrofit design is for a single EEM measure and no adverse EEM interactions have been identified.

## 10 Testing, Commissioning and Handover

Handover documentation meeting the requirements of PAS 2030 B4-I7 shall be provided and explained to the client at handover.