

Domestic New-build, Jack Llewellyn 1811703

Introduction

This document illustrates drawing, pros and cons as well as going in-depth upon condensation and ventilation within the following described building:

It is a single, two storey detached domestic building with a loft room that is built on a greenfield site. The buildings' external wall is proposed to be block and block with partial fill cavity insulation with the addition of smooth render externally.

There is also to be a suspended timber ground floor and upper floors are proposed traditional solid timber with tongue and groove softwood flooring as well as the roof structure to consist of trussed rafters at a 40 degree pitch with a natural slate covering.

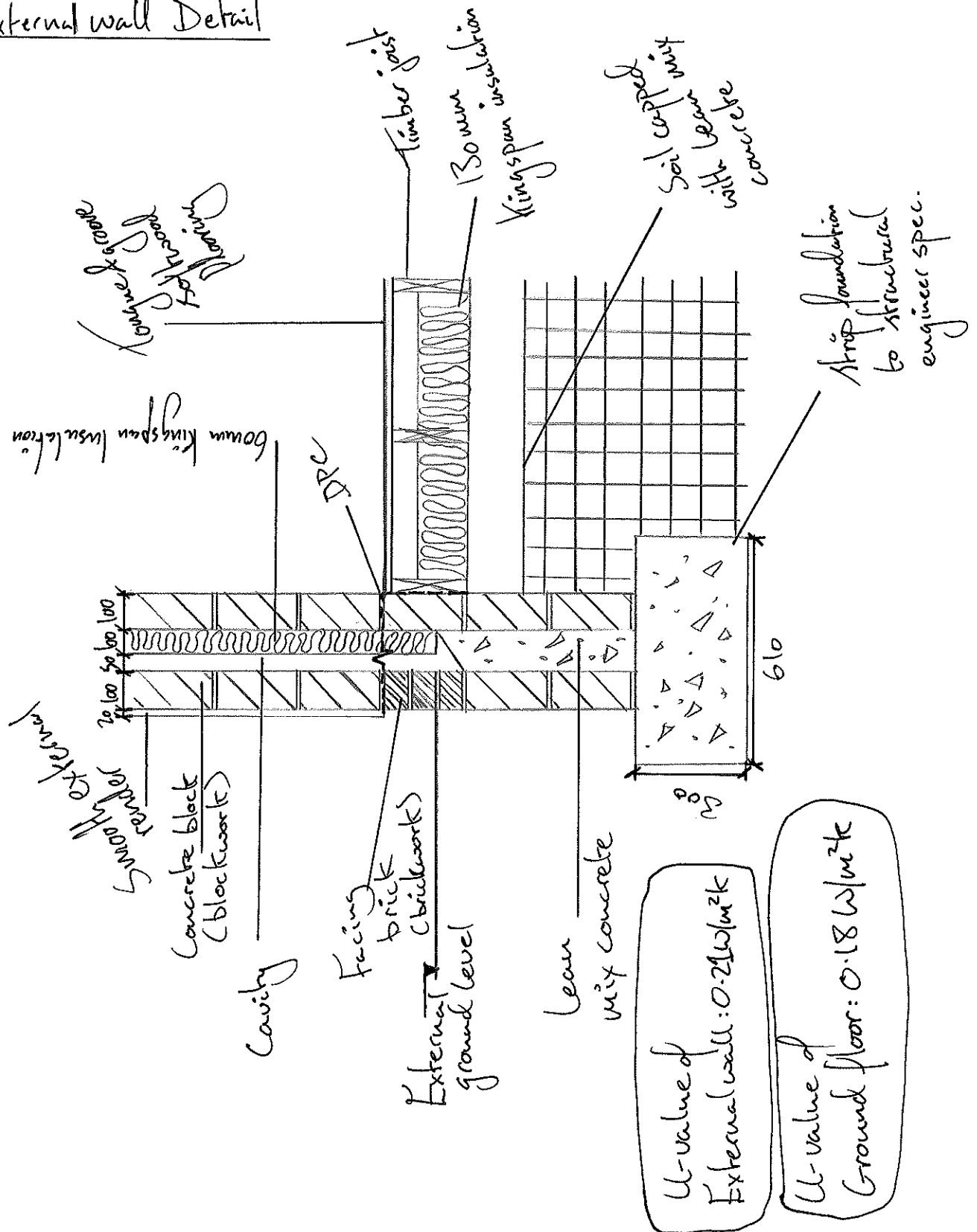
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Ground Floor Construction detail Scale 1:16

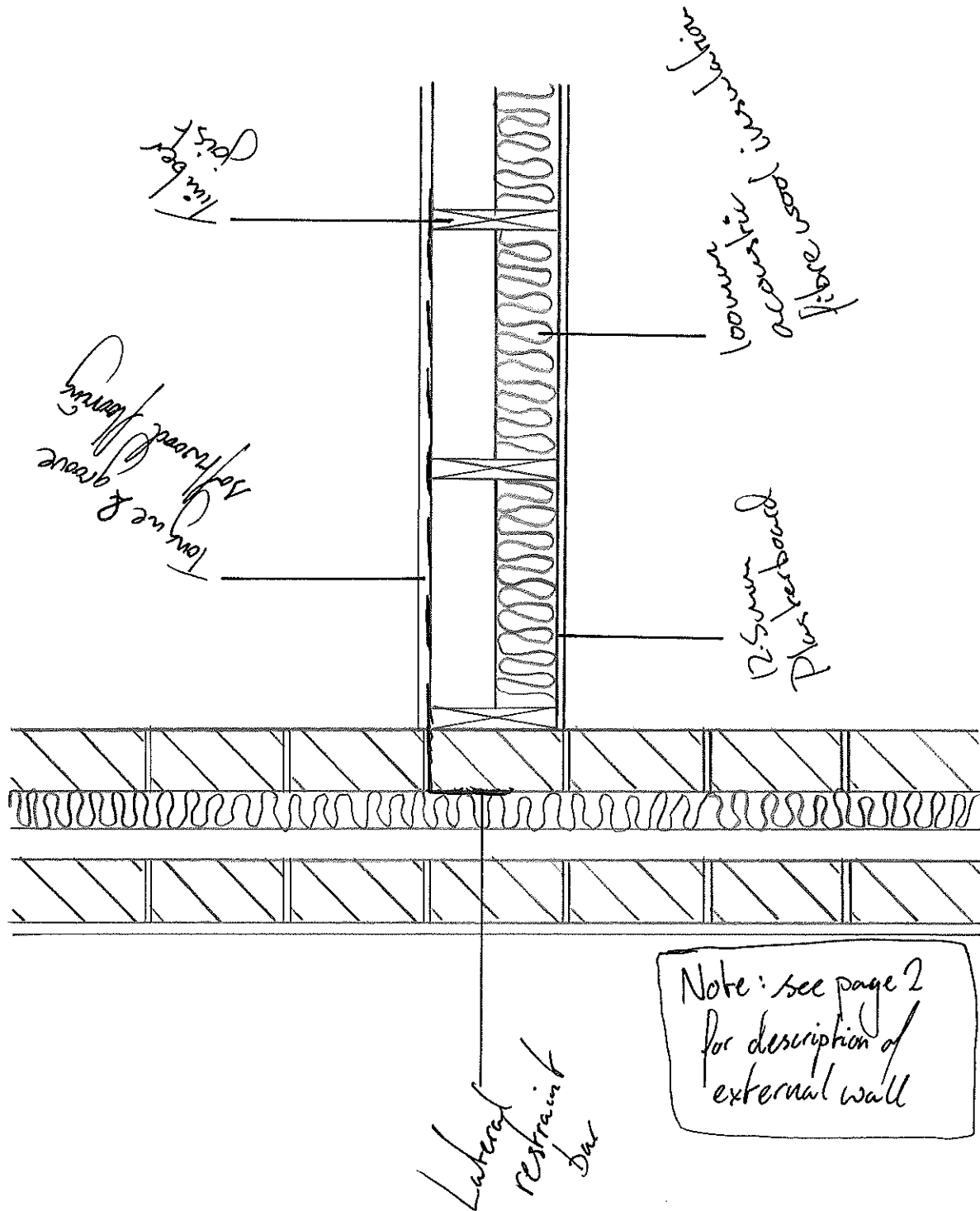
Sub-structure Detail

External wall Detail

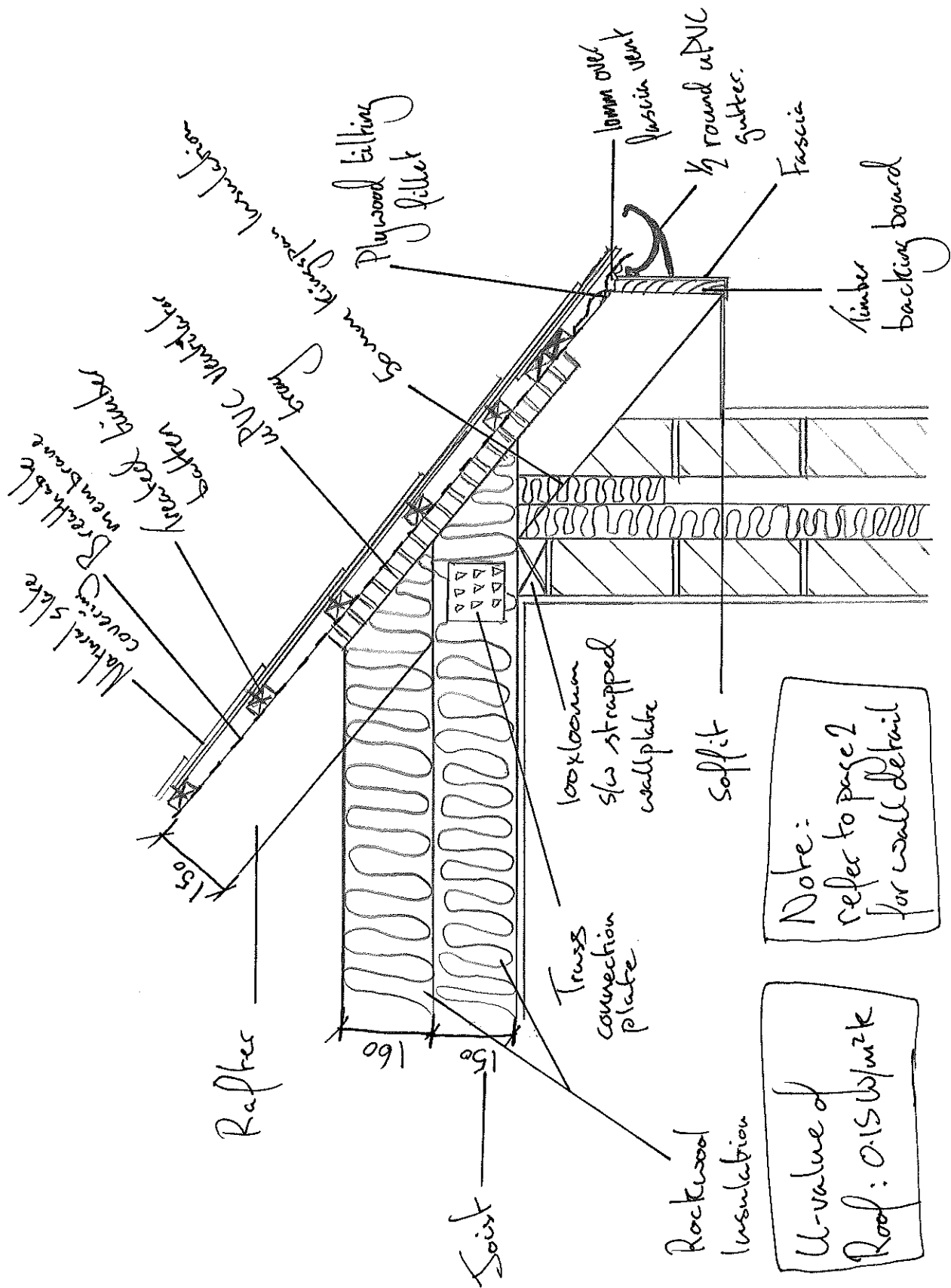


First Floor Detail

Scale 1:10



Roof Structure & Eaves Detail Scale 1:10



Drawing Notes

The U- values illustrated on the drawings above are equal to The Building Regulations U-values.

The amount of insulation was calculated via the Kingspan and Rockwool websites to find the minimum insulation needed to reach the required U-values.

Refer to the references listed below:

Kingspan. (2019)- for the amount of insulation needed for the wall

Rockwool.co.uk. (2019)- for the amount of insulation needed for the roof

Welsh Government (2010a)- for the length of the lateral bar and structure of the components

Welsh Government (2010b)- for the U-values that need to be achieved

2. Pros & Cons of The Roof Structure

The roof structure proposed in the new build is a trussed rafter roof with a 40 degree pitch and with a natural slate covering.

I will be comparing the proposed roof with a cut-roof that is made on-site. With trussed roofs, there are many advantages with few disadvantages. Firstly there is the fact that they are made off-site, this allows for no need of storage space for wood to make them on-site. And with them being made off-site, they can be quality controlled and depending on manufacturers, could have a guarantee and/ or warranty of the trusses ordered.

Trussed rafter roofs are also easy to erect/install as they would only need to be lifted onto the frame. Whereas a cut-roof is made on site and then lifted onto the frame.

The cost for trussed roof are fairly cheap compared to alternatives and allow for storage space on-site for other materials. But, with a cut-off roof you would need to pay for the timber and labour costs in producing the roof as well as diminishing storage space on the site.

There is also a decrease in Health and Safety risk and hazards when buying trusses compared to producing them on-site as with trussed roofs you would only need to worry about the erection of them but with cut-off roofs you would have to take this worry into account as well as the deposit of the timber to site, the use of equipment with manufacturing on site, saw dust and many other hazards and risks.

Although they both have different pros and cons, both products are renewable and recyclable. And both can be flammable and possibly affected by rot.

3. Condensation & Ventilation

Condensation types

Condensation can occur in a property for various and multiple reasons. Firstly there are different types of condensation that can occur in a property, these are listed below:

- Cold-bridge condensation
- Warm-front condensation
- Interstitial condensation

Cold-bridge condensation is produced when warm, high-moisture air comes into contact with surfaces at or below its dew point. This type of condensation can occur at the base of external walls and on windows. It may cause sills/cills and the underside of the roof to rot.

Warm-front condensation is not the opposite of cold-bridge condensation but it is produced when warm, moist air enters a cold building, that tends to be unoccupied. This causes water to run down surfaces of internal walls and windows and again causes wet and/or dry rot. It can also lead to deterioration of the internal finishes and fungal growth.

The final type of condensation that can be commonly found in any building, occupied or not. This is interstitial condensation. Interstitial condensation can form when warm, moisture-rich air diffuses through a permeable membrane e.g. fibrous insulation (Rockwool in our case that is annotated in the drawings shown). Interstitial condensation can occur if one side of the insulation is warm on one side and cold on the other side, the moisture will continue to pass through until reaching the colder side of the insulation and then start to condense.

This type of condensation is a degenerative defect meaning it will carry on to expand through the property until it is treated. This form of condensation can also cause mould growth and this is mainly found heavily insulated properties and air-conditioned buildings.

All these forms of condensations are due to warm moist air and all can be treated, prevented and combated.

Causes, preventions and combatting condensation

There are numerous causes of condensation within the building fabric. All of which can be treated or prevented in one form or another.

To prevent or combat these deficiencies in a building you could install trickle vents in windows, a heat-recovery ventilation unit, an extractor fan, a ventilation tray or perhaps a positive input ventilation (PIV).

A common cause of condensation within a property is a lack of ventilation and a lack of air movement. These deficiencies in a property can cause condensation as damp, stale air within a property can become trapped within the building and thus cause warm-front condensation in that property.

Trickle vents are a more common use in preventing and treating condensation in a building as these vents allow fresh air and the stale air in the property to move freely in and out of the building. Vents would allow a current to flow freely in the property which would increase the amount of stale air leaving the building and fresh air to enter to massively reduce the chances or increase in condensation.

Moisture and humidity within a building can be caused due to stale air and/or dampness. Having a hot shower or bath or just general cooking within the building. To prevent this again you could use what is described in the previous paragraph or perhaps using a dehumidifier or an extractor fan

A dehumidifier is only a temporary way to combat and remove humidity and moisture within a building. A dehumidifier's job is to take in all the surrounding atmosphere's water content to a certain percentage. You would use this only to treat a building that is already damp due to foreseeable and/or unforeseeable causes. This method can reduce the growth of mould in the building also.

An extractor fan is typically found in bathrooms to try and help push out the steam from a hot bath or hot shower because if that steam was to condense then there would be water running down internal finishes and can cause wet and/or dry rot.

Single-glazed windows can increase the condensation in a building as they are more susceptible to cold-bridge condensation. To prevent this you can either do what is listed above or replace the windows with double or triple-glazed windows.

Insulation whether there is too much or none, this can cause damp and condensation to occur in a building. If there is fibrous insulation then a form of condensation called interstitial condensation.

To prevent this, you can either replace or place insulation into the roof or cavity or use systems such as ventilation trays or positive input ventilation.

Ventilation trays act as trickle vents but are found in the roof as shown in the eaves detail. Whilst PIV or positive input ventilation encourages air movement through introducing fresh air into the dwelling at a continuous flow. These are usually found in loft spaces.

4. References

Kingspan. (2019). *U-value calculations*.

[online] Available at:

<https://www.kingspan.com/gb/en-gb/products/insulation/services/u-value-calculations>

[Accessed 30 Mar. 2019].

Rockwool.co.uk. (2019). *Online Insulation U Value Calculator App | Calculate Thermal Performance*.

[online] Available at:

<https://www.rockwool.co.uk/technical-resources/tools/u-value-calculator/>

[Accessed 30 Mar. 2019].

Welsh Government (2010a). *The Building Regulations Part A- Structure. Approved Document. 2014 Edition*.

Welsh Government (2010b). *The Building Regulations Part L1A- Conservation of fuel and power in New dwellings. Approved Document. 2014 Edition*.

5. Bibliography

Welsh Government (2010c). *Approved Documents and technical guidance. Approved Document. 2014 Edition*

Welsh Government (2010d). *The Building Regulations Part C- Resistance to contaminants and moisture. Approved Document. 2014 Edition*

Labc.co.uk. (2019). *The Building Regulations Part F- Means of ventilation. Approved Document. 2014 Edition*

Wales, P. (2019). *Approved Documents - Planning Portal - Wales*. [online] Planningportal.co.uk.

Available at:

https://www.planningportal.co.uk/wales/en/info/7/building_control/54/approved_documents

[Accessed 28 Mar. 2019].

6. Appendix

Dew point- dew is produced by the condensation of the atmosphere on a thin surface that is cooler than the atmosphere. A dew point is the atmospheric temperature, that varies on pressure and humidity of the atmosphere, and if a surface is below the atmospheric temperature then the water molecules in the air will condense onto that surfaces.

Permeable- meaning that something allows liquids or gases to pass through

Fibrous- fibres collected together within a material in this case.