Installation Assurance Authority

Right first time

Guidance on Extending the Roof Line on Domestic Properties to Ensure Sufficient Overhang to Accommodate External Wall Insulation

Best Practice Guide:

Roof Line Extension Guide

Version: 1.0 – December 2022

The Installation Assurance Authority, 3 Vimy Court, Vimy Road, Leighton Buzzard, Bedfordshire, LU7 1FG

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1. Preface

This guide provides information relating to best practices for roof line extensions for domestic properties to accommodate the addition of external wall insulation (EWI) as an effective energy efficiency measure.

The guidance offers practical guidance and procedures to be carried out by competent and skilled operatives.

The guide should be followed and used in conjunction with the required standards of technical competence requirements and recommended training programmes.

The intention of this guide is to provide a common understanding of the requirements for extending the roof line safely and effectively, to assist installation technicians, installing contractors, supervisory staff, and technical monitoring inspectors.

The consensus for EWI is that where there is insufficient roof overhang the roofline should be extended to accommodate the insulation beneath the roof and avoid the additional risks involved where the uppermost EWI is exposed to the elements.

Currently, this Best Practice Guide is an interim user guide to aid and guidance where roof line extensions are required but is **not** intended to provide confirmation of structural stability or wind loading requirements or used as a designed proposal.
All guidance notes and illustrations are therefore reference points only and any works involved to extend a roof line must be completed by the relevantly skilled and quailfied professional tradespersons.

With special thanks to Trustmark, CoreLogic, The Installation Assurance Authority (IAA) and relevant System Designers, The National Federation of Roofing Contractors Ltd (NFRC) and the National Insulation Association (NIA) for their input and support during the production of this guide.

2. Existing Warranties

Prior to any works, existing warranties covering other previous remediation, maintenance or building products, should be checked, and confirmed that roof line extension work does not impact on their ongoing validity.

3. Adjoining Properties / Party Walls

Prior to any works, consideration needs to be given to adjoining properties and the impact the works may have on their building (this could also include access to carry out the works). Party Wall Survey and notice may need to be put in place before works can commence.

4. Introduction

This Guidance on Extending the Roof Line on domestic properties is to ensure sufficient overhang to accommodate external wall insulation document quires that an overhang of at least 40mm from the face of the finished render to the outer edge of the roof structure is required.

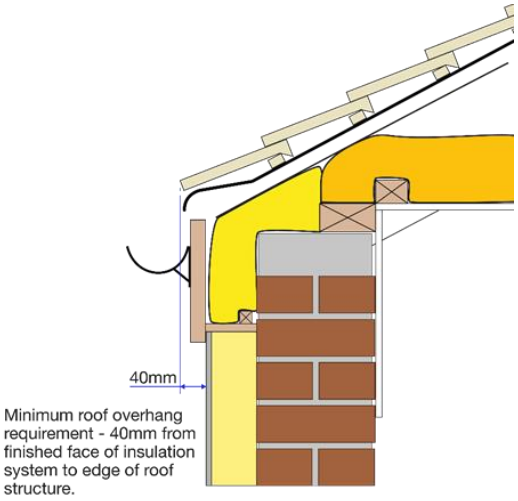

Figure 1 Minimum overhang from roof structure to the finished face of EWI system

5. General Considerations

- With numerous different scenarios of roof detail, it would not be possible to provide guidance covering every type or style, however, there are several items of consideration that will be applicable to most roof line extensions.

- **Minimum Overhang**
  Following EWI industry best practices any modification to rooflines whether for gable ends, eaves, or flat roofs, should be designed to ensure that there is a minimum overhang of 40mm between the face of the finished render and the outer edge of the modified roof structure.

- **Rainwater goods**
  In every instance rainwater guttering and downpipes will require re-positioning when a roof line is to be extended, and this must consider whether pre-existing rainwater goods are fit for purpose and can be relatively easily adapted and re-fitted to remain fully operational.

  Pre-existing cast iron rainwater guttering, and downpipes are highly unlikely to be removed and re-positioned without damage and the additional weight of this style of rainwater drainage to a roof line extension does also present further risk of weight overloading. It is also likely that the fitment of EWI would be enhanced with modern, plastic lightweight guttering which is much easier to fit and position and highly likely that the entire pre-existing cast iron rainwater system would need to be replaced during EWI and roof line extension works. If this is the case then consideration also needs to be given to any adjoining buildings with shared rainwater guttering, ensuring the works do not impact their functionality and where re-connection is required between different materials and styles a robust solution / product is available to do this.

  Where the roofline has been extended on a dwelling sharing a party wall to an untreated property, the extended guttering shall be connected to the guttering on the neighbouring property by means of a stepped connection, using two 90° bends as illustrated in the plan view - figure 2 below.

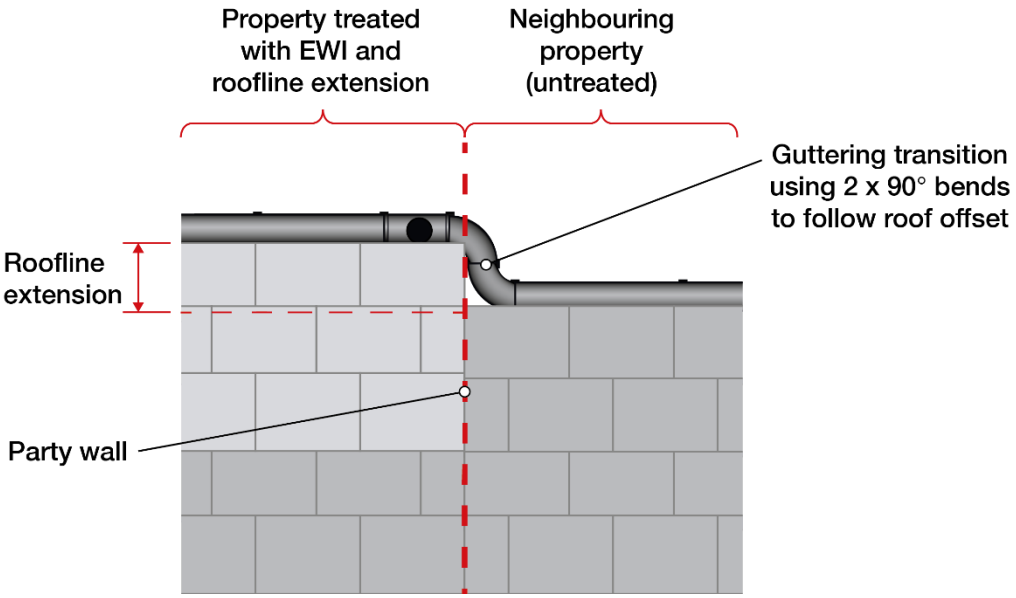

Figure 2 Gutter works required for a terraced property.

- **Compatibility**
  Extending a roof line will require additional tiles, shingles, slates or leading along with new fascia and soffit boards and it is vital that all additional component parts are sourced to match as closely as possible to the existing roof design, construction, textures, and colours.

- **Loft Cross Flow Ventilation**
  Where loft ventilation is being provided by soffit ventilation points, care should be taken where extending the roofline to ensure sufficient ventilation is provided by the extended construction, with vents being positioned as close to the outer edge of the soffit board as possible to ensure a continuous flow of air to every rafter line.

  Where loft insulations required to be extended over EWI to prevent thermal bridges an air gap of at least 25mm should be provided between the top of the insulation and the roof underlay. This can be achieved by installing ventilation trays or baffles, please refer to Figure 6 for an overview of this.

- **Restrictions and limitations**
  Buildings of architectural significance or listed building are highly unlikely to gain approval for EWI on front-facing facades but may be suitable for EWI on other elevations. In these circumstances a Hybrid EWI/IWI would be a sensible approach, meaning that roof line extensions would only be required for the EWI treated elevations.

  Terrace rows where pedestrian pathways are directly adjacent to the front elevation may not always be suitable for EWI at least on the front elevation but once again these may be suitable for a Hybrid installation process.

- **Wind loading and roofline design**
  This aspect of a roof line extension must be appropriately assessed by a qualified professional with consideration of orientation, exposure, roof detail, adjoining building etc to ensure a robust design with appropriate fixing method is fully adopted.

- **Flat roof**
  Where there is a requirement to extend the roof line on a flat roof, this should be completed in a manner similar to that explained for verge roofline extensions, detailed in this document. Rainwater guttering and fixings will need to be considered along with an extension of the existing weather-protective flat roof outer layer.

- **Thermal bridges**
  With every additional thermal efficiency measure installed, cold or thermal bridges become more susceptible to condensation and mould spore development, and it is vital that these are considered, and risks mitigated.

  Continuity of insulation from loft insulation to EWI is essential and where possible insulation compacted into all areas of the uppermost masonry, to ensure cool external air cannot penetrate below the insulation.

- **Gable ends and ridges**
  Depending on the age of the property, by exposing timber rafters and steel trusses (in the instance of a steel-trussed roof), there may be timber or steel deterioration to the uppermost edges, which would not have been visible from inside the roof space and usually identified where the chimney exits the roof space.

  Should this be the case, it is essential that moisture levels are assessed and confirmed to be at an acceptable level (i.e., ideally less than 18% and existing roof timbers are in appropriate and suitable conditions for roof line extension timbers to be firmly anchored and securely fixed.

  Once again depending on age and construction, it may be necessary to remove roof line bricks at regular intervals for the positioning of right-angled bracing timbers along the entire roof line through the gable wall.

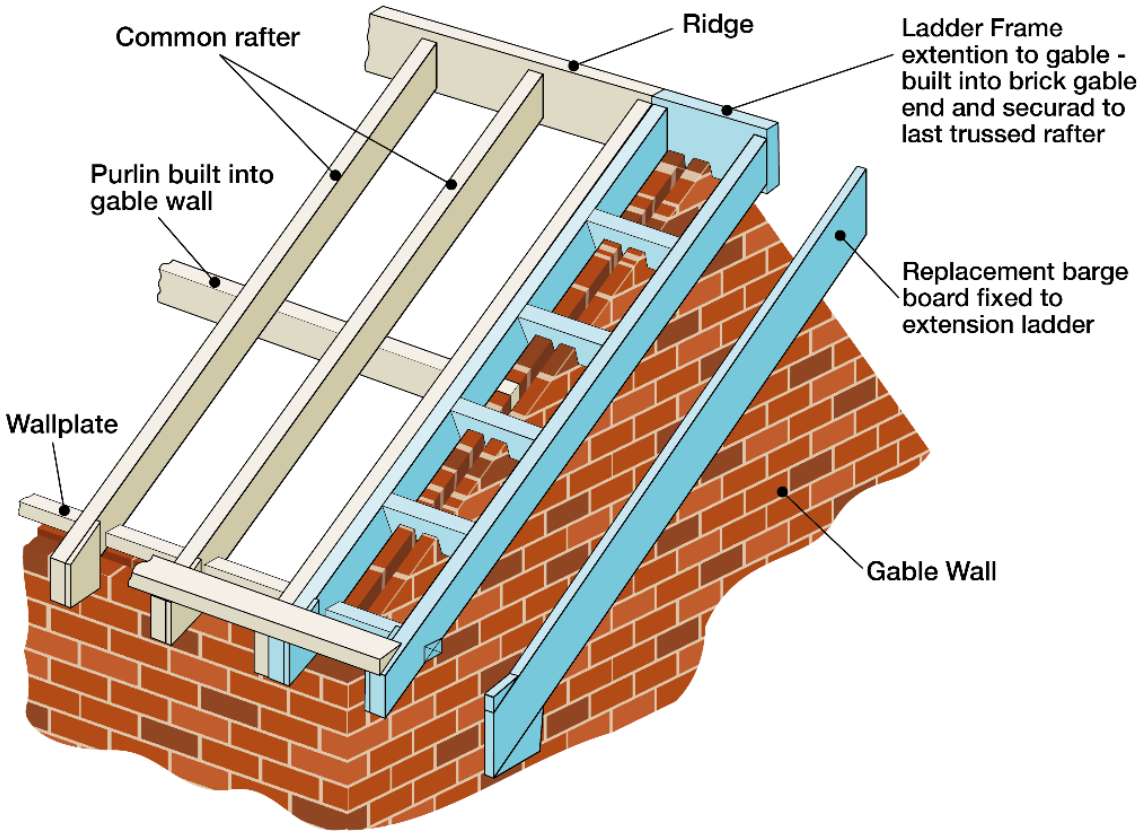

Figure 3 Example of Gable End Roofline Extension Using a Ladder Frame

- **Fixed ventilation spacer / tray**
  Loft insulation once unrolled from its compressed and transportable condition will recover to its design thickness and beyond.

  With extended eaves ventilation and roofline, it would be entirely likely that loft insulation would recover rapidly to completely block eaves ventilation if there is no permanent fixture to ensure the ventilation gap remains unobstructed.

  A fixed ventilation spacer or tray above the insulation is therefore essential to provide a minimum gap of 25mm between the insulation and roofing felt when extending a roof line to ensure adequate loft ventilation is maintained.

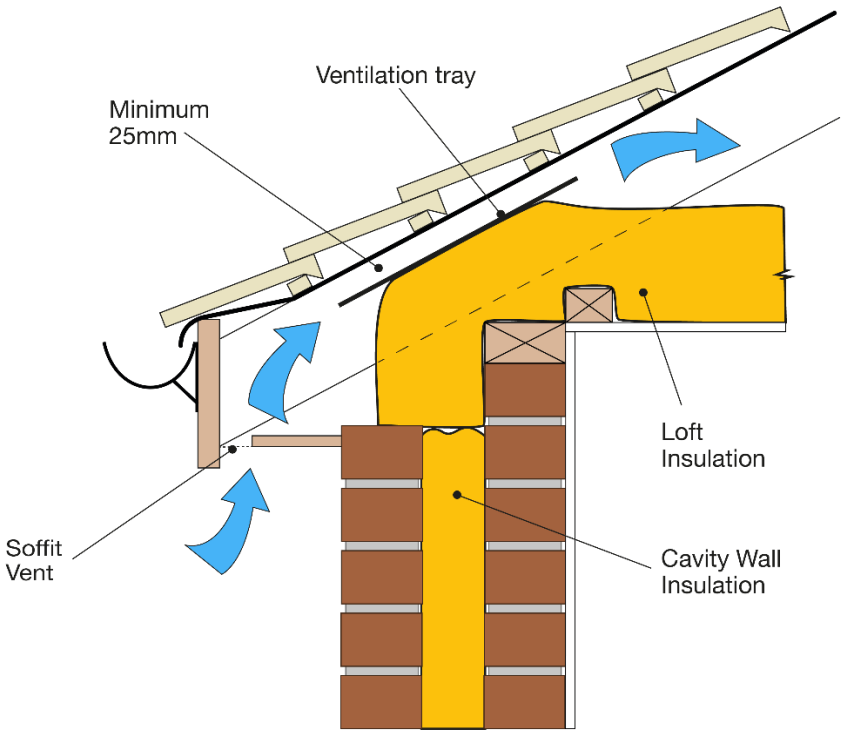

Figure 4 Loft ventilation maintained using a ventilation tray

- **Hipped roof**
  This style of roof construction may present additional challenges at corner junctions, particularly if there are rainwater valleys draining into guttering or directly into downpipes.

  Should there be a scenario where existing rainwater drainage from a valley drains directly into a downpipe and this limits re-positioning of rainwater goods, the property may not be suitable for EWI alone and may require a Hybrid solution.

- **Extending roofing felt**
  Depending on weather conditions, from time to time most loft spaces will allow condensation droplets to form on the underside of roofing felt in localised areas, and then the slightest ventilation and moving air, sufficient to evaporate moisture droplets. However, extended periods of still air and frosty conditions through winter months may exacerbate these conditions to the point where there is sufficient moisture accumulation to begin to drain down roofing felt inside the roof space and into the soffit area where the roof line extension terminates.

  Without adequate provision to also extend the roofing felt beyond the outer edge of EWI, there is always a possibility of moisture droplets draining behind the EWI with the likely consequences of internal dampness and failed EWI.

  The following image shows a support tray terminating on the outer edge of the roof line where EWI would also terminate.

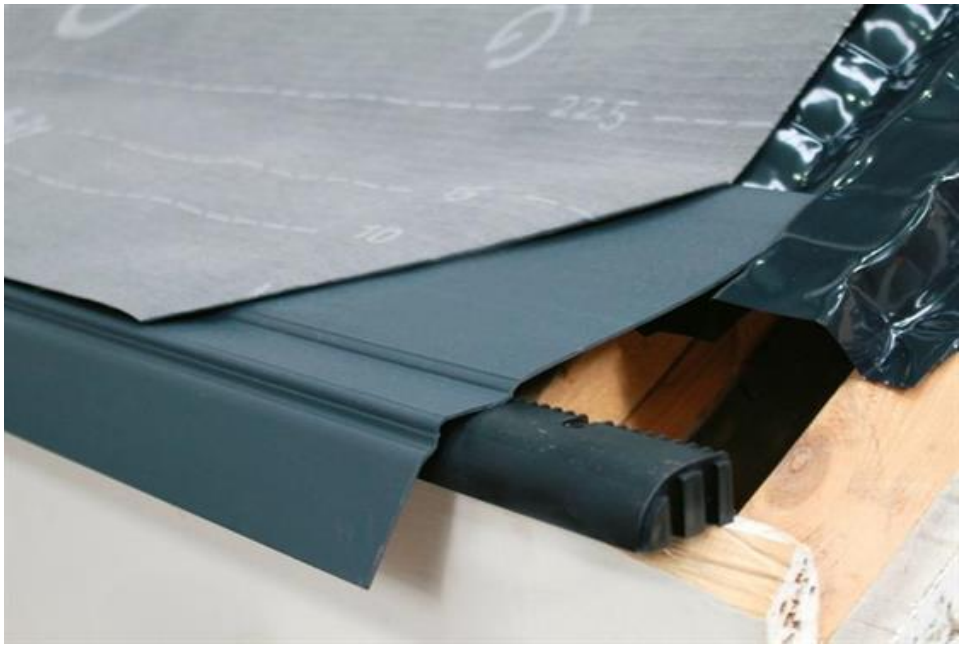

Figure 5 Extending Roofing Felt

6. Roof Line Extension

EWI provides a significant thermal upgrade and weather protects the outer wall surface, and an extended roof line ensures the insulation remains beneath the roof protection, avoiding water ingress and the inevitable failure of the EWI system.

Roof line extension at eaves level, and for hipped roofs, will be relatively straight forward once the lower edges of roof timbers are exposed, with the first two or three runs of roof tiles removed and roofing felt peeled back. However, gable ridges present far more difficult challenges to overcome, and at the same time needing to confirm the roof extension is secure to wind loading and is sufficiently robust to withstand weathering for the lifetime of the building.

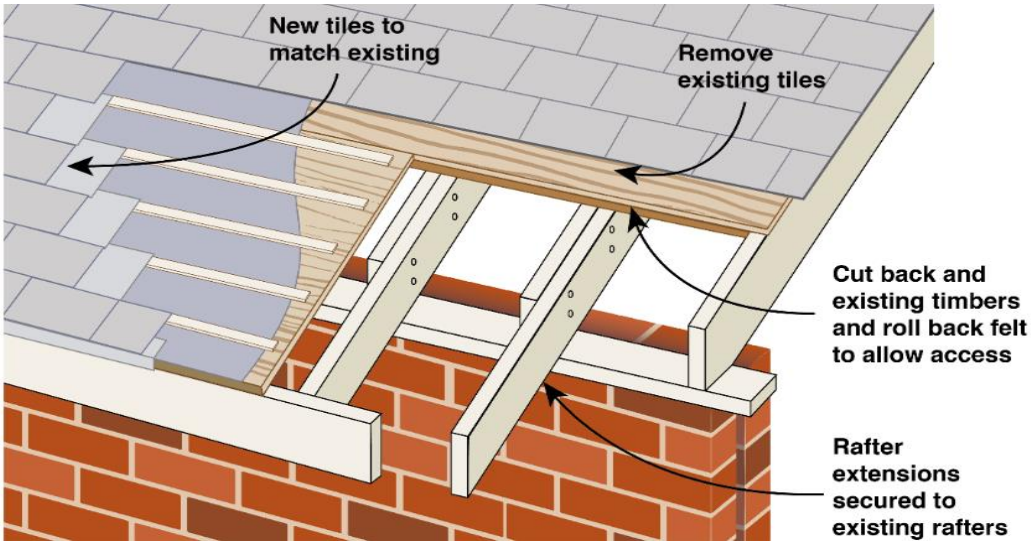

Figure 6 Eaves Roofline Extension Example

Figure 7 Roof eaves being extended example (Ref BRE External Wall Insulation (EWI) Report P107357-1000)

Standard Eaves Extension Detail on Cavity Wall

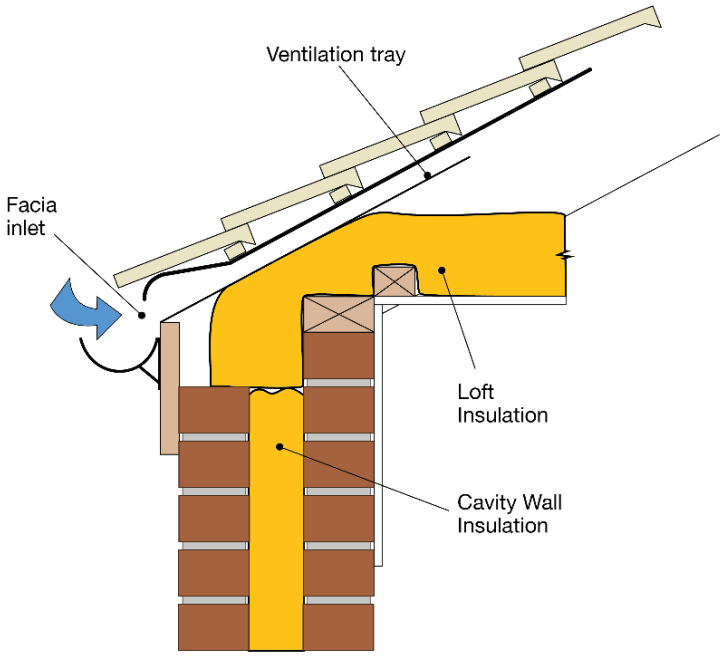

Figure 8 Standard Eaves Detail on a cavity wall construction without external wall insulation (EWI)

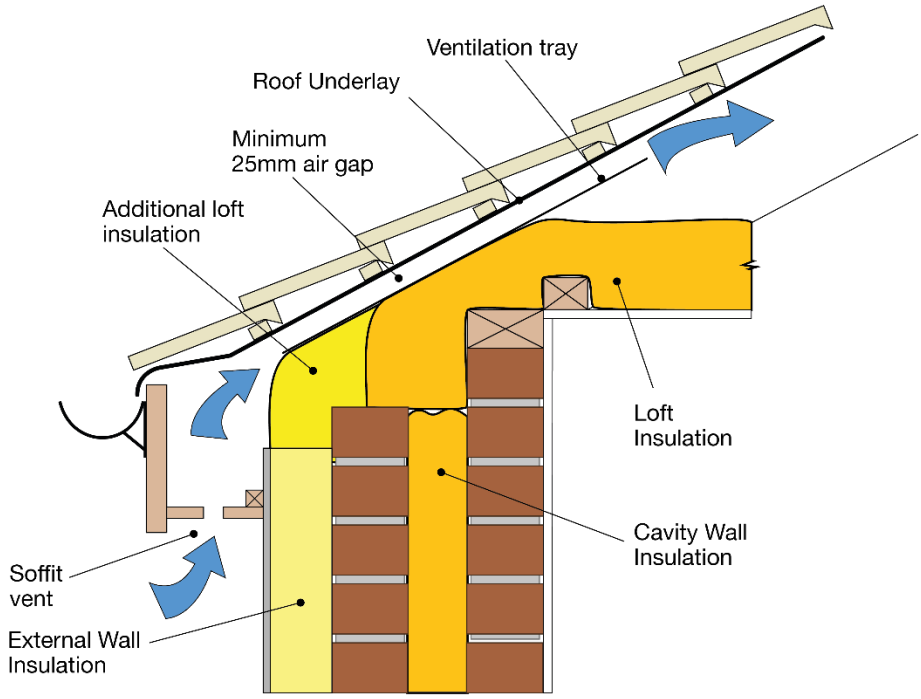

Figure 9 Standard Eaves with Roofline Extension to provide suitable overhang whilst maintaining adequate loft ventilation with additional loft insulation added to mitigate the thermal bridge on the outer brick leaf.

Additional loft insulation should be added in the eaves, connecting the existing loft insulation to the external wall insulation to prevent any potential thermal bridges.

Standard Eaves Extension Detail on Solid Wall

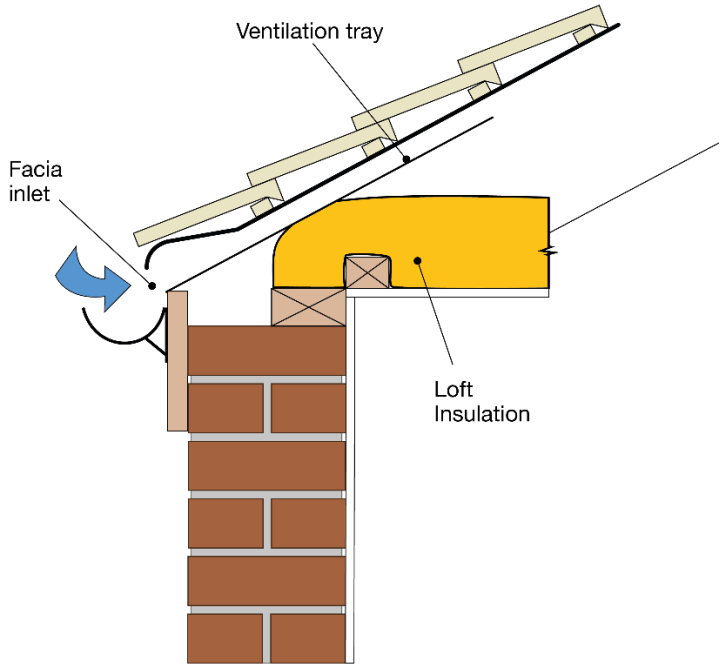

Figure 10 Standard Eaves Detail on a solid wall construction without external wall insulation (EWI)

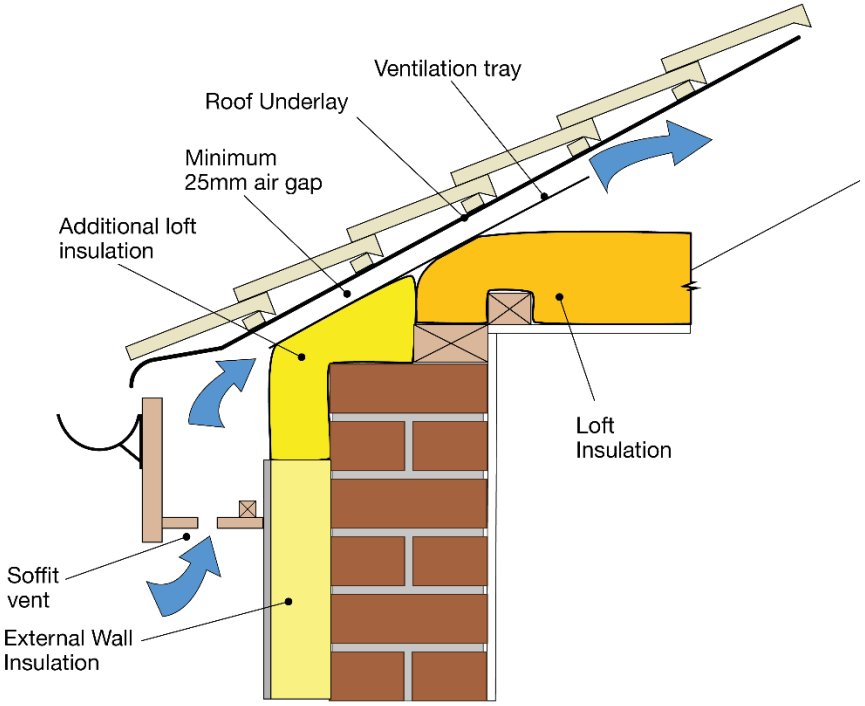

Figure 11 Standard Eaves on a sold wall with Roofline Extension to provide suitable overhang whilst maintaining adequate loft ventilation with additional loft insulation added to mitigate the thermal bridge.

- **Internally constructed chimneys**
  The digital image in Figure 12 shows an internally constructed chimney at the gable end, with external brickwork extending above the roof line, and in this regular scenario EWI would have previously terminated horizontally at roof level with the use of a verge trim.

  This scenario will now require the roofline to be extended around the chimney (illustrated in green) effectively creating a small ridge section on the outer face of the chimney to allow the EWI to butt up against. Horizontal lead flashing should be fully embedded into the chimney brickwork, compacted, and sufficiently overlapped to ensure a watertight finish to be fully weather protected on the exposed chimney section, eliminating the risk of water ingress behind the EWI.

  It is vital that during the works to fit lead flashing to the chimney surround, any mortar joint or brickwork deterioration is fully and completely rectified to ensure there is sufficient water drainage from the chimney itself.

  Depending on exposure and orientation it may also be appropriate to treat the exposed chimney brickwork with a weather protective coating as a secondary measure.

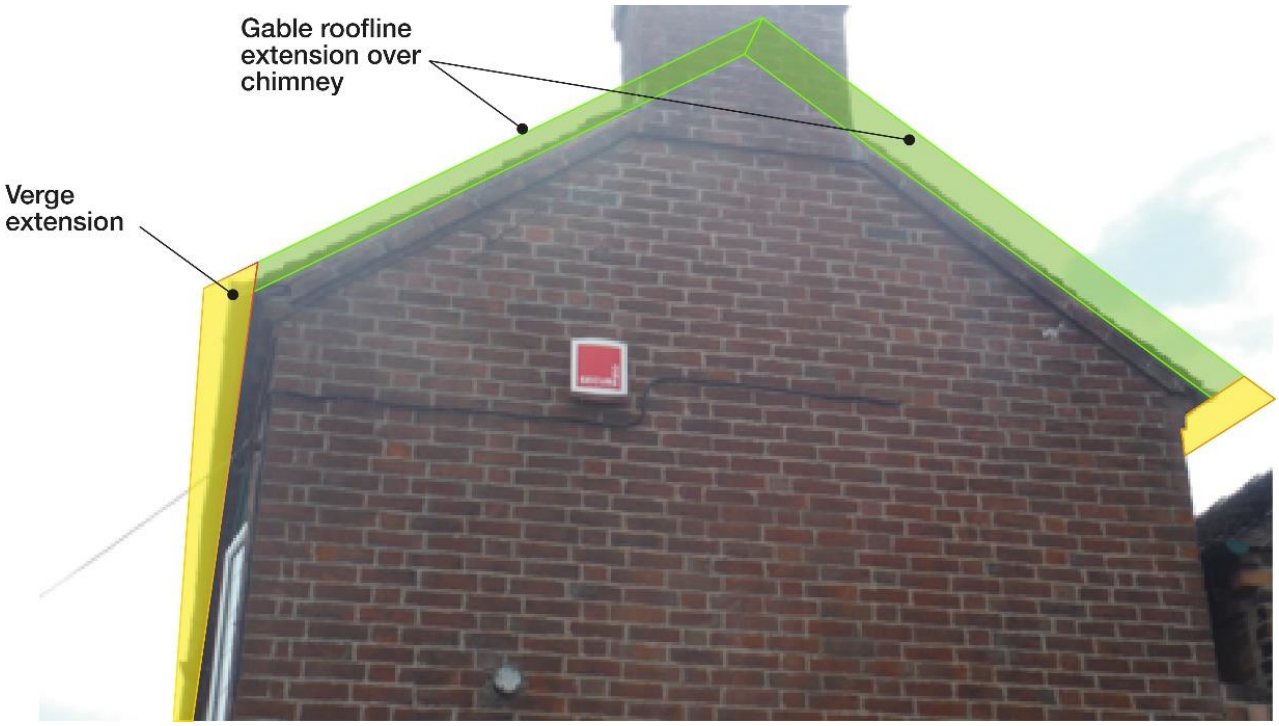

Figure 12 Gable End Roofline Extension Encasing Chimney

- **Extending the eaves on dwellings with casement windows**
  A casement window is a window that is attached to its frame by one or more hinges at the side. They are used singly or in pairs within a common frame, in which case they are hinged on the outside.

  When extending the roofline on a property with casement windows, care must be taken to ensure that the extended (and potentially lowered) eaves do not interfere with the opening of the window.

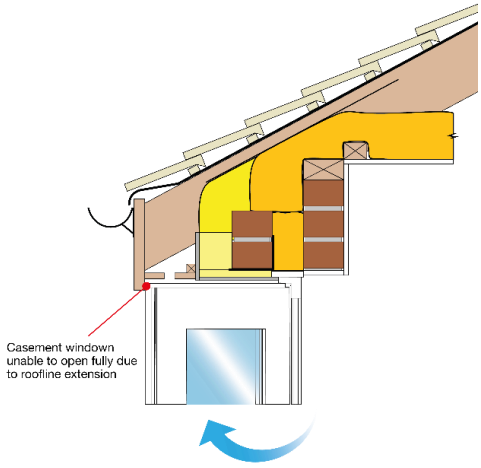

Figure 13 Extended eaves prevent window from opening

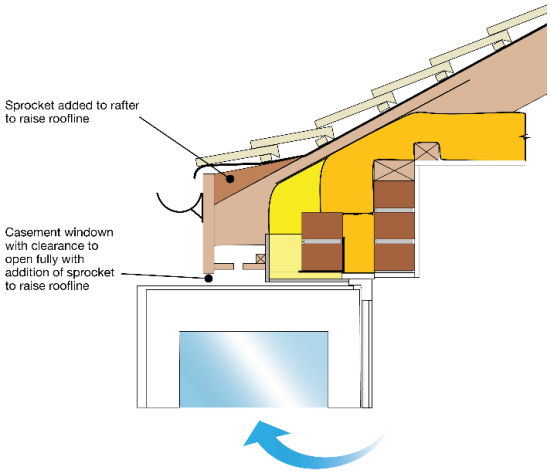

Figure 14 Sprocket added to rafter to raise the position of the eaves to allow clearance for the window

In some cases, it may be necessary to raise the eaves by fitting sprockets on the upper edge of the rafters (figure 14) along the length of the extended roofline. This will enable the eaves to be raised to provide the clearance required for the casement windows.

- **New build roofs**

New build roofs are always constructed to sufficiently overhang, protecting the building from water damage below the roof line, with reinforced timber noggins at right angles for strength and stability for gable end walls.

Figure 15 New build roof structure

With so many scenarios and differing challenges to overcome with regards to existing buildings and features, the following images simply show a standard fixing method for roof line extension with horizontal bracing boards in a ladder effect, either embedded into the masonry roof line, alternatively, if there is available space laid directly above the masonry roof line.

- Rafters not to exceed 600mm centres
- Horizontal bracing (ladder) at 600mm centres
- Roofing felt to extend up to and draped down to the inside of the bargeboard
- Guttering to be extended to the end of the extended roof line

Figure 16 Roof ladder construction

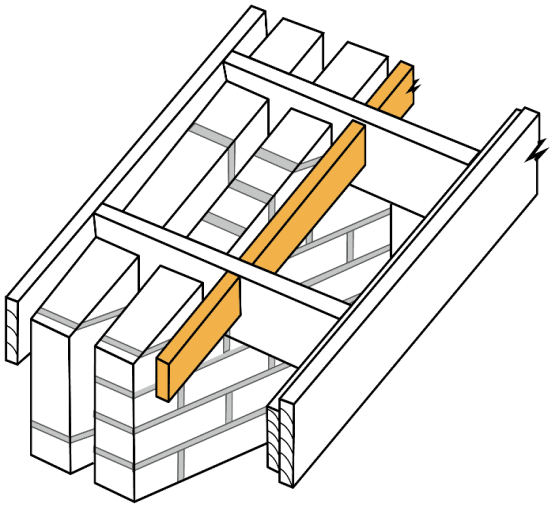

Figure 17 Roof ladder construction illustration

Where gable ridges require a roof extension and there are no barge boards and the roof line terminates with a minimal overhang, as the following **examples 1 & 2** show, the roof line must be extended to a minimum 40mm overhang beyond the proposed EWI.

By removing the first two or three lines of roof tiles and peeling back roofing felt to expose the timber rafters, timber battens can be placed and extended to overhang beyond the gable wall by a minimum 140mm, allowing sufficient overhang to accommodate EWI with a 40mm overhang beyond the insulation.

Should the proposed method of embedding the horizontal ladder bracing timbers through the masonry not be an appropriate or practical, metal brackets could be mechanically fixed to the outer roof line masonry and battens extended from the existing roof detail. However, with so many scenarios, obstructions, roof detailing and existing features to overcome, every roof line extension will inevitably be different and will require a full assessment by a relevantly qualified professional prior to any works to ensure the roof line extension is fit for purpose.

Example 1

Figure 18 Gable end with flat parapet roof section

Example 2

Figure 19 Gable end with insufficient overhang for EWI

Example 1 does also show a flat roof section with the masonry outer wall capped with ridge roofing tiles, but with clear water ingress below the roof line due to a poor weather protective seal.

In this scenario the parapet section of masonry must be treated as part of the flat roof and totally weather protected along with a fixing method to accommodate EWI at the uppermost edge and a top layer of weather protective covering across the entire parapet wall and EWI.

7. Ventilation

Extending a roof line at eaves level to accommodate EWI will inevitably affect ventilation to the roof space, and it is essential that any works make adequate provision to maintain permanent cross flow eaves ventilation.

Positive air pressure through eaves ventilation on one side of a property generates negative pressure on the opposite side of the property inside the roof space, forcing moist stale air to be regularly and continually replaced with dry air, and this process is sufficient to remove any build-up of moisture droplets inside the roof space.

With ever increasing thicknesses of loft insulation, roof spaces are less likely to allow warm air to escape from the living area into the roof void and moisture droplets less likely to form. However, the vast majority of roof spaces rely solely on eaves ventilation, and it may be necessary to make further provision for roof space ventilation by fitting either tile vents or lap vents and in some circumstances ridge vents may be necessary, alternatively, simple easi-vents may be a solution to permanently hold roofing felt slightly open.

Retrofit works must also consider thermal bridges and ensure there is continuity with insulation measures whilst maintaining cross flow ventilation.

Insufficient provision to eliminate thermal bridging at eaves level will inevitably increase the risk of décor discoloration and possibly condensation and mould growth, and despite the limited ventilation gap at eaves level, high density rigid insulation allows a reduced thickness to maintain a consistent thermal performance throughout, avoiding thermal imbalances.

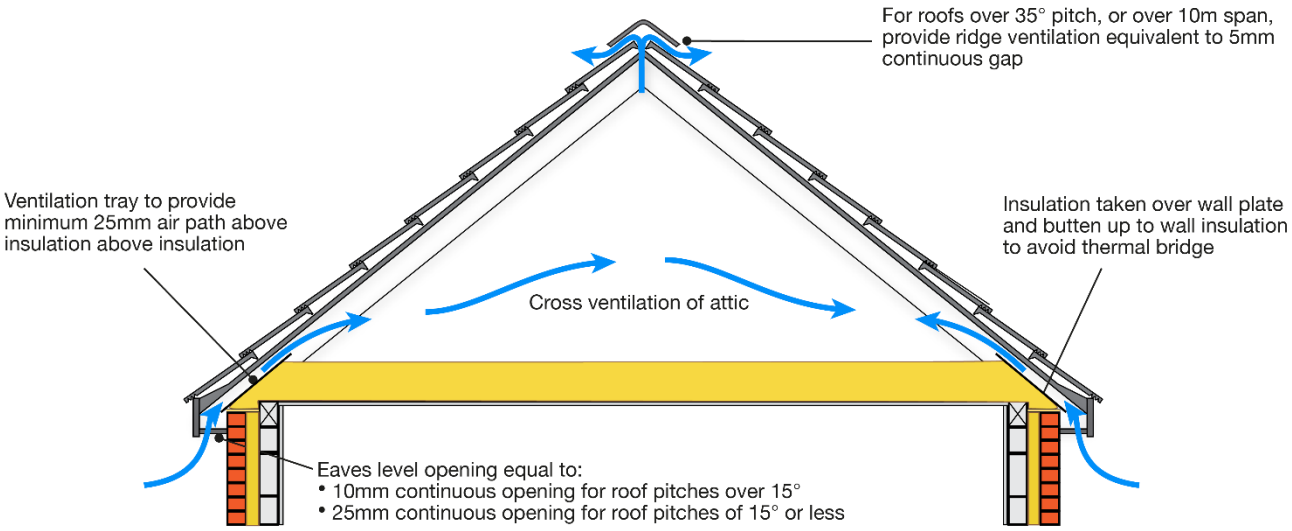

Figure 10 Summary of loft ventilation requirements in accordance with BS5250:2021

8. Health & Safety

Any modifications to the roof of a property will present a number of significant hazards, including working at heights. The installer must liaise with a suitable qualified Health and Safety Officer to ensure consideration is given to the following as a minimum:

- Working at height is assessed and planned, paying due consideration to:
  - Safe access and egress to roofs
  - Roof edges and openings
  - Fragile surfaces
- Planning safe systems of work
- Contractor/employee competency
- Preparation of Site-Specific Risk Assessments, Method Statements and Construction Phase Plans
- Suitable PPE/RPE
- Electrical Safety
- Emergency arrangements

9. Building Regulations

The following renovation works are subject to Building Regulations.

When applying a new layer (e.g., cladding) or rendering the external surface of the thermal element, or where the external appearance of the building changes.

In the case of walls, the thermal element refers to a wall that separates the heated part of the building from the external environment. This means that all external wall insulation is therefore notifiable with Building Control

Example: Building Control Notice

(See planning portal for correct application / notification document for EWI)

External wall insulation must adhere to building regulations.

For pitched or flat roofline extensions, approval under the Building Regulations is likely to be needed to ensure the roof will be adequate in terms of structural stability.

Detailed information must be sought from the local authority planning office before commencing the planned works.

When solid wall insulation is installed on the external walls of the building/dwelling, it must adhere to current building regulations.

In this case, it is referring to the thermal performance of the insulation; the solid wall insulation must achieve a U-value of 0.30 watts/m^2K

10. References

The following documents have been referred to in the preparation of this guidance and should be considered for further reference.

- BS 5250:2021 Management of moisture in buildings Code of practice
- The Building Regulations 2010 Conservation of Fuel and Power Approved Document L, Volume 1: Dwellings
- BRE BR262 Thermal insulation: avoiding risks
- INCA Best Practice Guide External Wall Insulation 2015
- The Work at Height Regulations 2005
- Provision and Use of Work Equipment Regulations 1998 (PUWER)
- The Personal Protective Equipment at Work (Amendment) Regulations 2022
- The Electricity at Work Regulations 1989
- Provision and Use of Work Equipment Regulations 1998
- Electrical Equipment (Safety) Regulations 1994
- PAS2035
- BS 5534:2014 + A2 2018
- BS 8612
- BS 8000-6:2013

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