

## Sprayed Foam Insulation

Inspection Protocol for building professionals who are asked to consider spray polyurethane foam that has been applied to the pitched elevations of domestic roofs.

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## CONTENTS

Introduction .....	3
Recording observations .....	3
Knowledge .....	6
Assumptions .....	6
Evidence .....	7
Opinions / Conclusions .....	10
Appendix – Process flow charts .....	11
Disclaimer.....	13

## INTRODUCTION

This document provides a framework to assist property professionals and residential surveyors undertaking non-invasive visual inspections of spray foam applications to the inside of pitched roofs.

The document is not designed to be prescriptive but can be used to guide and inform building professionals, institutional bodies, and trade organisations.

Building professionals should only report on issues commensurate with their experience, skill, and knowledge. Those whose primary discipline is not building assessment, will either need to seek additional training or recommend the services of a trained and competent specialist. This is particularly applicable where detailed and intrusive inspection and evaluation are considered necessary.

**There are five stages of the framework.**

## RECORDING OBSERVATIONS

### Assessment of the construction of the roof

The surveyor should record the visual factual information relating to the roof. This should include:

- The nature of construction and condition of the roof and its principal water-resistant coverings and underlays. Residential surveyors may want to include their condition rating systems during recording.
- The approximate age of the roof and details of intersecting structures.
- Evidence of repairs, renewals, or additions.
- Construction features of the pitched roof, roof void and room below including, but not limited to, pitches, parapets, valleys, gutters, hips, ridges, dormers, and the orientation of all elevations.
- The materials and condition of the supporting structures (wood or steel).
- The condition of the roof, flashings, leadwork, flaunching, and associated rainwater management systems. The surveyor should take account of all visible evidence of defects in the roofs design, orientation or condition, stating any limitations of access to view.
- Any internal evidence of defects in the roof, roof void or rooms below, or rainwater management systems such as signs of water ingress, staining, salt deposition, mould growth, wood destroying fungi or wood destroying insects.
- The moisture content of significant roof timbers.

### Establish the basic nature and characteristics of the spray foam

- Record, where reasonably evident, whether the foam is considered open or closed cell.
- Record if the foam is applied to an underlay / sarking boards / spacer cards or directly to the primary weather proofing layer (slate/ tile / etc). Surveyors should not make an assumption, but state if they are unable to clarify this information.

- Where underlays or spacer cards are present can the vapour permeability characteristics of these materials be established? If not, then the surveyor must record this in the assumptions section or provide the evidence of how this observation has been reached.
- Where spacer cards are installed the vapour permeability characteristics of the cards should be established, as should their ability to withstand wetting. The provision for ventilation between the cards and the outside environment should also be apparent.
- Is the foam applied to all pitches of the roof and other features e.g. gable and party walls, valley bords and ridges?
- Has the foam been applied uniformly and evenly to industry acceptable standard? This can be recorded in the opinion section depending on the surveyor's level of experience.
- Record any known workmanship issues such as inconsistent finishes, flaking, overspray or poor application around features such as flues and chimneys.
- Record if roof timbers are fully covered or encapsulated by the foam. The average depth of the foam should also be recorded.
- Examine if the sprayed foam is well bonded to the substrate. Record cracks, gaps, inconsistencies in colour and texture and other defects known to affect performance.



**Image: Tile stabilising closed cell spray foam**

## Nature of the enclosed roof void

- Record if the roof void is a ventilated space (cold roof). The surveyor should only report the ventilation as adequate if it can be established during the inspection as fact, otherwise this should be recorded as an assumption or opinion.
- Establish if the roof void is an unventilated space (warm roof).
- Record if the roof void is insulated at ceiling level.
- Record if there is a form of vapour control layer at ceiling level.
- Record the presence of ventilation systems that draw air from within the roof void (PIV) or exhaust into it (extract fans or passive stack).
- Record the presence of ceiling penetrations (downlighters and spotlights).
- Record any instance of foam that encapsulates electrical cables, plastic pipework, or ducting.
- Record the presence of water tanks and expansion tanks, noting if these are uncovered.



Image: Insulating open cell spray foam

## Occupation

- Does sufficient evidence exist to suggest that the occupied space directly below the roof space is adequately ventilated?

## KNOWLEDGE

The surveyor is strongly advised to read widely on the topic. Members of the cross-party panel have, or will, produce knowledge-based materials focused on their particular members or contractors.

Contact details of those providing training or training materials can be found in the Appendix.

It should be noted that the level and scope of knowledge to undertake a visual inspection prior to purchase is different to that of someone offering themselves out as a specialist, capable of analysing the systems to their full extent, including sampling, opening-up and calculations.

The building professional undertaking works to evaluate the risks associated with spray foam applied directly to the pitches of traditional timber framed roofs in domestic buildings, should have the following knowledge:

- Be able to differentiate between different types of sprayed polyurethane foams.
- Understand the normal mechanisms that can result in water ingress and the mechanisms for failure of roofs.
- Understand the basic mechanisms for water vapour transfer and the significance of surface water activity.
- Understand the applied principles of relative humidity, dew point and vapour pressure and their relationship to moisture production, thermal performance, and ventilation.
- Understand and apply the relevant operational and technical details from product approval documents and contractor hand-over files to the inspected property.

To carry out further investigations, the property professional should also be able to demonstrate learning in the following:

- Skills and knowledge to evaluate the vapour performance characteristics of various types of underfelts, sarking, and vapour control layers.
- Be familiar with the requirements of BS5250:2021 where this relates to hygrothermal evaluation or suitable condensation risk assessment.
- Be able to undertake invasive and non-invasive investigations to roofing timbers to evaluate moisture content and understand the implications of elevated moisture contents.
- Be able to identify poor installation, workmanship, or design of the Polyurethane Foam installation.

## ASSUMPTIONS

**Surveyors who carry out visual inspections and create reports for domestic properties must record their informed assumptions if relevant and state any limitations of the inspection.**

Assumptions should be reasonable, measured, and justifiable.

Examples of assumptions that may be appropriate where the surveyor is aware that PU foam has been applied within the roof of a domestic property may include, but are by no means limited to:

- That the roof underlay is consistent and uniform in type and coverage throughout the roof.
- That all the PU foam used within the roof space is the same product applied by the same contractor.
- That the PU foam within the roof space is the product that has been detailed in any documentation that is available (third party accreditation certificate).
- That where documentation exists, the contractor who supplied the handover pack is responsible for the work that has been undertaken.
- That when Hygrothermal evaluations or condensation risk assessments have been supplied by suitably trained and qualified practitioners, these accurately reflect the ongoing condensation risk.
- That any encapsulated timbers are of a uniform and consistent material, quality, and condition throughout.
- That, unless otherwise identified, all documentation associated with the installation have been supplied by the original contractor at the time of the installation.
- That verifiable evidence of membership of an approved installer scheme is sufficient demonstration that the installation meets industry and material manufacturer standards.
- Where the roof covering is undamaged, and no leaks are present.
- Where valleys and flashings are visibly intact (when inspected in normal conditions), and no leaks are present.
- Where foams have been applied directly to the primary roof coverings as a means of improving thermal performance or to stabilise failing roof coverings or have been applied directly to underlays that are considered to be of high vapour resistance, an assumption may be made that such installations are high risk.

**Note:** Assumptions should only be made when there is no written or observed information to call them into doubt.

## EVIDENCE

**The surveyor needs to clarify what they were looking for in order to establish a balanced and reasoned conclusion. This methodology sets out the processes that can be used and the documentation that may be relied upon when carrying out the inspection.**

**This stage of the process may be described as part of the scope of the inspection stated at the start of the report.**

For example:

**The Methodology** might include:

- Visual inspection of the readily accessible parts of the roof.
- Photographic record of condition for future review.
- Inspection by ladder.
- Inspection by pole camera or drone.
- Use of industry standard damp meters to take comparative readings.
- Questions asked of the vendor.
- Review of documentation provided.



The methodology must have reference to the surveyors' duty of care that may be set out by accredited bodies.

**Evidence sought** might include:

- Evidence of defects such as ongoing progressive rain penetration, condensation, mould, or adverse overstressing of structural components.
- Evidence of poor workmanship or materials that might reasonably impact on the forward performance of the roof.
- Evidence of seasonal factors present at the time of inspection that might affect the reasoned conclusion.

Documentation sought might include:

### **Handover pack**

Check that the installation hand-over pack is comprehensive and contemporaneous to the time of the work. The pack should include but may not be limited to:

- A pre-installation evaluation of the roof. This should detail the condition of the principal roof coverings, the nature, composition, and condition of the underlay or sarking and the condition and moisture content of the roofing timbers.
- A hygrothermal evaluation or condensation risk assessment that provides a clear indication of the modelled condensation risk that accurately corresponds to the materials observed and detailed in the pre-installation condition report.
- A copy of the third-party product accreditation document (BBA or KIWA) that is both complete, contemporaneous to the date of the product installation and representative of the material used within the roof.
- Information confirming details of the installer and their credentials together with copies of guarantees, warranties or insurance backed guarantees that were issued to the commissioning client and are assigned to the subject property.
- Undertaken strictly in accordance with the requirements of the independently awarded product approval certificate (BBA / KIWA).

Can it be confirmed that work was completed in accordance with the available independent product accreditation certificate.

- If the above can be verified this should be recorded, documented, and reported.
- In the event that the surveyor discovers that the handover pack is incomplete, the information available is not contemporaneous, requirements of the product approval certificates have been overlooked in the handover pack or that the installation deviates from either the original specification or the requirements set out within the product approval certificate, then this should be recorded, documented, and reported.

Evidence for further investigations might include:

- Sample readings taken at different points within the roof sufficient for analysis. Attention should be paid to timbers adjacent to any evidence of wetting or staining, to wall plates, ridge and valley boards, purlin ends and rafters. Areas of the roof that are shaded or north facing should be prioritised when considering timber MCs.
- Establish the presence and nature of any underlay. If underfelt is not present this should be noted, as should the presence of any underlay that is not vapour permeable (bituminous felt membranes and plastics).

If the surveyor can establish that the underfelt is vapour permeable, this should also be recorded, documented, and reported. Evidence to support this observation should be included.

The surveyor should be aware that moisture contents will naturally fluctuate and may change considerably between the summer and the winter months. In the event that the moisture content of the timbers has increased above the levels recorded in the pre installation evaluation (within the handover pack), this should be recorded, documented, and reported.

- Evidence to conclude if the roof void is a ventilated (cold roof) or an unventilated space (warm roof).
- Opening up to determine to the presence of vapour control layers at ceiling level or in front of the PU foam insulation. Where these exist their completeness, condition and effectiveness should be fully concluded.
- Taking specific measurements to determine the presence, type, thickness, and continuity of any insulation present at ceiling level.
- Take photographs and make drawings of the roof components for the purpose of carrying out calculations to establish the reasonable forward performance of the roof and all its components, including the sprayed foam.

## OPINIONS / CONCLUSIONS

The surveyor should provide a reasoned conclusion sufficient to guide the client to an acceptable course of action. The conclusion can be supplemented by the surveyor's own opinion as long as this is clearly stated as such.

Examples of three categories of conclusion:

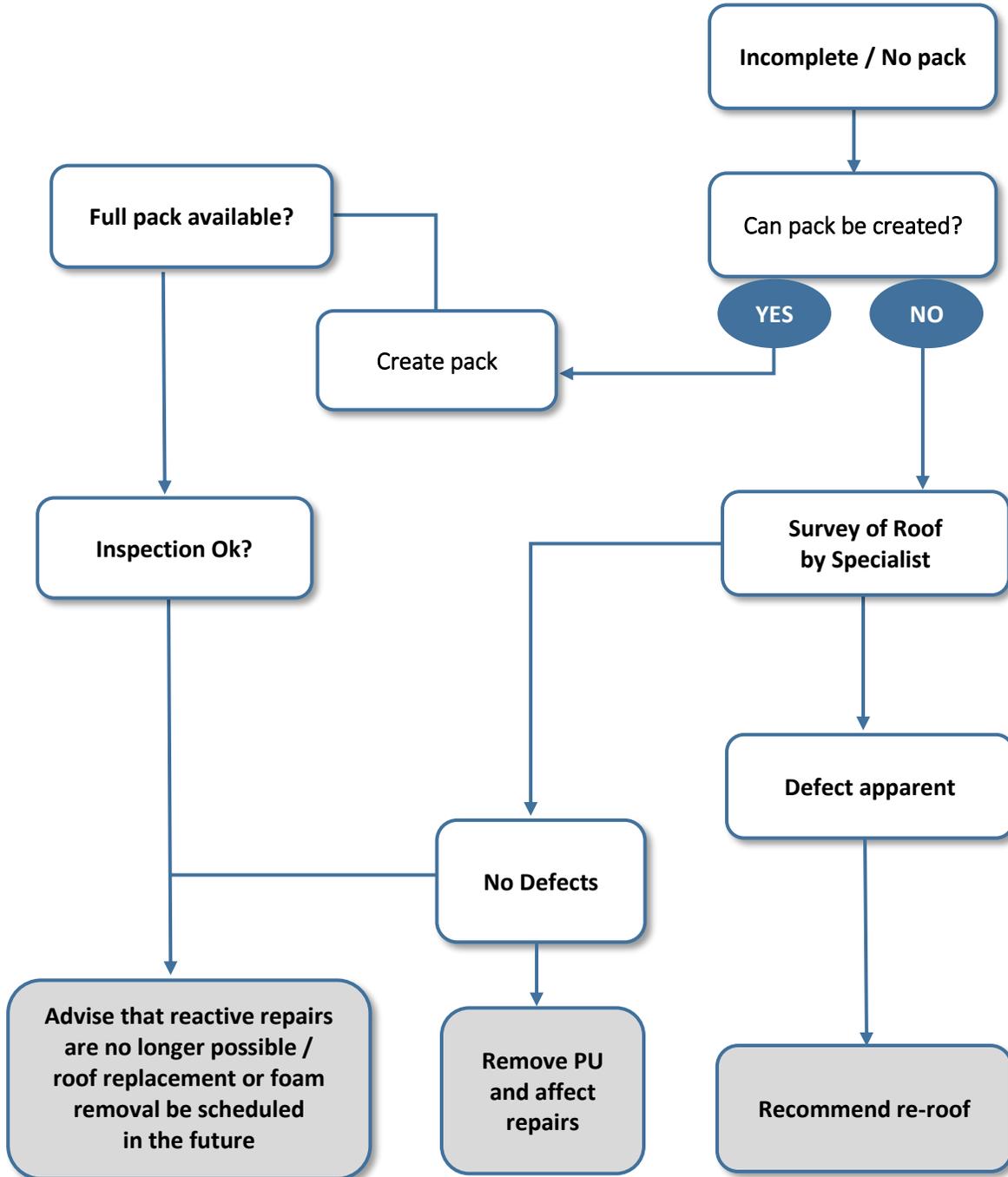
- That the risk of defects to the property is not significantly increased by the presence of sprayed foam and no action is needed at this time.
- That the risk of defects to the property is increased by the presence of spray foam and it is reasonable that further advice be sought in order to assign measures that will mitigate these risks.
- That insufficient information is available to allow the surveyor to draw a conclusion and that further investigations and information is needed before a conclusion can be offered.

Recommendations that follow the provision of a professional opinion / conclusion should be provided by a suitably trained and competent professional. This may be the surveyor or some other person or company that can demonstrate the appropriate levels of skill and competency to do so.

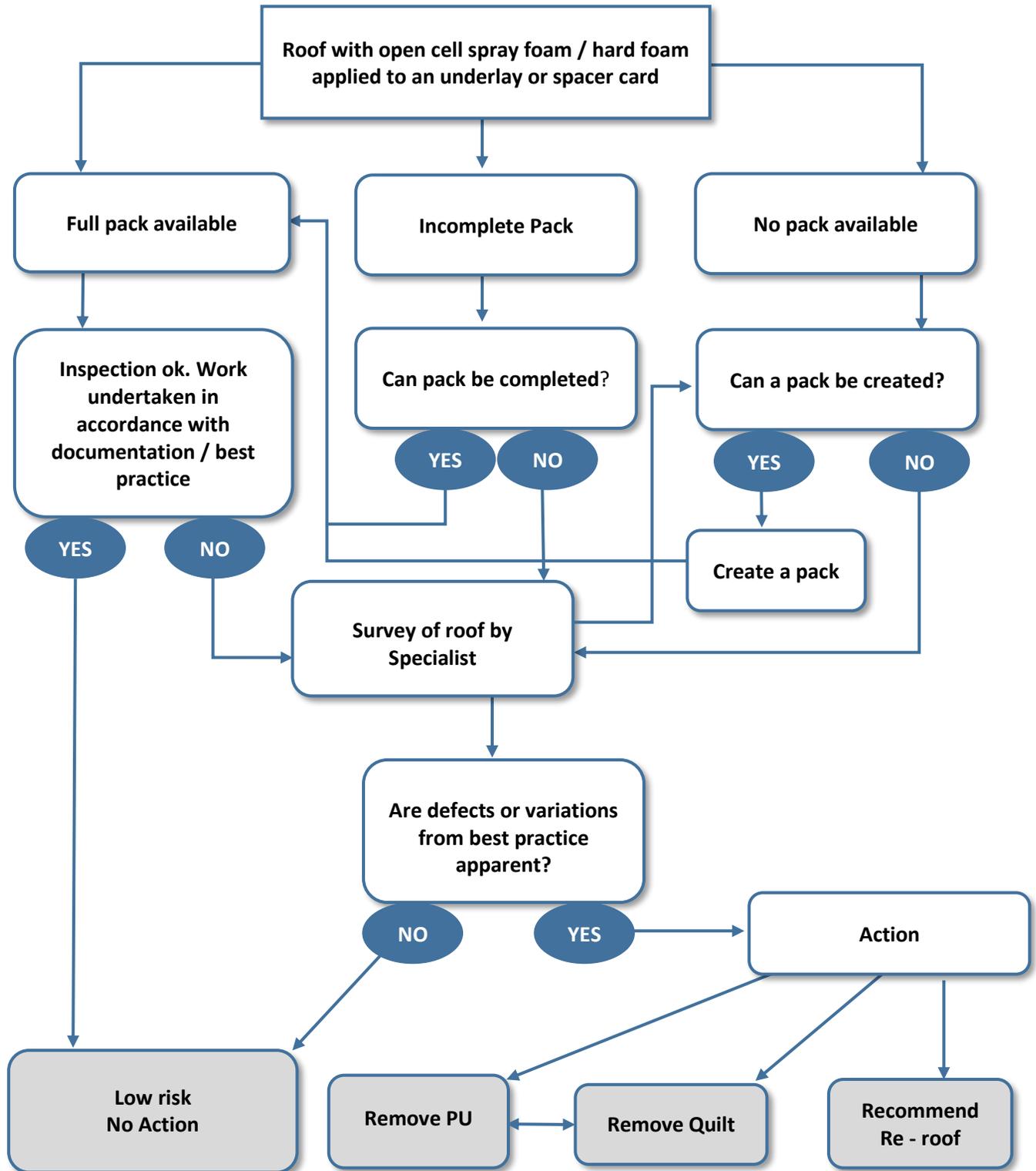
APPENDIX

Process flow charts

# Sprayed polyurethane foam applied directly to primary roof coverings where no underlay/roofing felt is present



## Sprayed polyurethane foam applied to a roof that incorporates an underlay / roofing felt



## DISCLAIMER

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