

1. Introduction

The application and performance of adhesives is vitally important in ensuring the working life of system build-ups in the flat roof waterproofing industry. This Guidance Note highlights some of the issues that need to be taken into consideration when undertaking this type of work.

2. Liquid Applied Adhesive Technology

The roofing market uses a wide range of cold applied liquid adhesive technologies, including solvent-free moisture-curing polyurethane (MCPU) adhesives, solvent-based MCPU adhesives, solvent-free two-component PU adhesives, tacky two-component PU adhesives, gel PU adhesives, solvated contact adhesives and water-based adhesives.

Benefits of Polyurethane (PU) Adhesive Technology for Warm Roofs

Polyurethane (PU) adhesives are the most proven and effective cold applied solutions for most warm roof applications. Contractors are able to meet industry challenges and regulations by using polyurethane adhesives as part of liquid warm roof systems. PU adhesives are suitable for all project types including refurbishment, new build, domestic and commercial. Polyurethane adhesives allow contractors to install liquid warm roof systems quickly and cost effectively, regardless of the type of flat roof or project.

Solvent-free adhesives provide non-flammable and low-odour solutions. This ensures that you are meeting a number of green industry initiatives and also mitigating risks onsite. Solvent-free adhesives can be used on a wide range of buildings, including odour-sensitive environments (such as hospitals and schools) and are more pleasant for the contractor to work with.

PU adhesives offer many benefits. They are simple to apply and allow the installing contractor to move from one task to the other quickly because the adhesives will cure rapidly at a wide range of temperatures (typically 5-30°C) thus reducing project duration.

3. Substrate Assessment

Survey

A full roof survey will establish any problems that exist within an existing flat roof that is to be upgraded. Precautions for access should be taken in line with current regulations and HSE Guidance.

There are many factors regarding existing flat roofs that need to be established; knowledge of the actual flat roof structure is required when it comes to decision-making about the type of membrane, insulation board and detailing on the project.

Preparation

New flat roofs: Make sure the flat roof is clean, dry and that all nail heads are flush with the deck. Ensure that vapour control layers are installed as required and that they are compatible with the chosen adhesive.

Existing flat roofs: Remove all loose or defective materials – make sure that the deck is sound, dry and free from projections. If the deck is wet or rotten, allow it to dry out and repair as appropriate. When overlaying existing waterproofing, ensure that it is securely attached and that it will adequately perform as a vapour control layer if required.

4. Wind Uplift

Adhesives that have been fully wind uplift tested are considered as the industry benchmark. In order to attain best practice, it is advantageous to specify flat roof adhesives that have been independently tested for resistance to wind uplift pressure. Wind uplift is always a concern, which is why it is preferable that flat roof adhesives are subjected to rigorous and independent testing methods specified in EOTA TR005.

For wind loads up to 2.4 kPa, it is considered good roofing practice to design the roof construction allowing for a safety factor of 2. For wind loads greater than 2.4 kPa, additional measures such as mechanical fixing or ballasting may be required.

5. Training

Installers must be properly trained in the application of specific adhesives whether supplied by the system supplier or independently. Competence in one manufacturer's products does not necessarily qualify individuals to install other suppliers' products. The specialist contractor should ensure that the installers are appropriately trained.

6. Applying Adhesives

Vapour Control Layer/Carrier Membrane Adhesives:

Self-adhesive vapour control layers or carrier membranes are commonly used, but where adhesive bonded membranes are required, they must be bonded in adhesive specifically designed for the application. It is important that the vapour control layer/carrier membrane processes are efficient. To gain a temporary watertight roof as quickly as possible; fast adhesive drying-times are essential. Unlike traditional 'hot works' applied systems, the risk of fire is negligible due to the cold-applied technology and simple application methods.

Typical Guidelines for Use:

1. Ensure the substrate is clean, dry and free from contaminants and is structurally sound. Prime in accordance with manufacturer's guidelines.
2. The adhesive should be applied evenly over the entire surface by brush or roller. Avoid excessive consumption of the adhesive as this will typically cause uneven drying. Ensure it is applied into corners and detail areas.
3. If the adhesive layer becomes contaminated or left more than the designated drying time before applying the membrane, then it should be re-applied to a cleaned surface.

Insulation Adhesives:

To meet industry demands, Insulation Adhesives must be able to bond most common types of the insulation boards, including PIR (tissue and foil-faced), PUR, EPS and XPS to different flat roof decks and existing roof coverings, including VCL, Plywood, Concrete, Felt or Asphalt.

Typical characteristics include high-strength properties to ensure a secure bond of the insulation board facing to the deck or vapour control layer (VCL). PU insulation adhesives have been used on flat roofing systems to help exceed rigorous ETOA TR005 standards for resistance to wind suction pressure. In addition, PU insulation adhesives eliminate 'hot works', which is essential in today's industry amid concerns over safety and rising insurance premiums. Ultimately, PU adhesives are a proven, long-lasting solution for the flat roof insulation bonding and exhibit excellent chemical and water resistance. Using PU adhesives also reduces the need for intrusive and damaging mechanical fixings/fasteners (which penetrate roof layers).

It is always good practice to apply a trial patch of adhesive prior to the commencement of works.

The common types of PU adhesives used are detailed as follows:

Traditional Poured/Bead-Applied Adhesives (1-component PU)

Traditional Poured/Bead-Applied Adhesives 'from the tin' are used for a wide range of insulation boards, including EPS, XPS and PIR insulation board (both tissue and foil-faced). It also gives the contractor the option of bonding board straight to deck or vapour control layer (VCL).

An advantage of this type of adhesive is that it eliminates investing in application equipment/machinery. Poured/Bead-Applied Adhesives are applied straight from the tin in beads/ribbons and are typically 1-component products. The adhesives will cure rapidly at a wide range of temperatures and are extremely economical to use.

Typical Guidelines for Use:

1. If bonding to the original deck, clean and prime in accordance with manufacturer's guidelines. Ensure the deck is clean, dry and free from contaminants and is structurally sound. If bonding to VCL, ensure it is securely fixed/adhered in accordance with manufacturer's guidelines.
2. Apply the adhesive directly on to the substrate (deck/VCL) in beads in accordance with the manufacturer's instructions.
3. Immediately place the insulation board directly onto the adhesive beads.
4. Apply pressure to the insulation board to ensure full contact with the adhesive.
5. Allow to cure in accordance with manufacturer's guidelines.

Twin-Pack Cartridge-Applied Adhesives (2-component PU)

Benefits of Twin-Pack Cartridge Insulation Adhesives over Poured (Standard Poured/Bead-Applied) Adhesives include ease-of-use application, preventing the bending and stooping for the operative when applying the adhesive. Cartridge-applied adhesives are easy to handle and promote consistent coverage/application. Standard Poured/Bead-Applied adhesives supplied in tins can be difficult to apply in a consistent bead size and pattern. In addition, the cure time can be faster than standard Poured/Bead-Applied adhesives. The nozzle and gun application ensures an even application rate in order to ensure a secure bond and fast cure time. This method of application also eliminates spillage and mitigates wastage as the unmixed components remain in their separate cartridges.

Typical Guidelines for Use:

1. If bonding to the original deck, clean and prime in accordance with manufacturer's guidelines. Ensure the deck is clean, dry and free from contaminants and is structurally sound. If bonding to VCL, ensure it is securely fixed/adhered in accordance with manufacturer's guidelines.
2. Remove the thread-head on the cartridge using a screwdriver and securely screw on the mixing nozzle.
3. Place the cartridge into the gun-applicator.
4. Before applying the adhesive, ensure complete mixing has occurred by applying a small amount on a test surface.
5. Apply the adhesive in beads using a cartridge gun in accordance with the manufacturer's instructions.
6. Insulation boards should be applied immediately after application and pressure applied to consolidate the bond.
7. Leave the adhesive to achieve a workable strength in accordance with manufacturer's guidelines and further work may continue.

Spray-Applied Adhesives (1-component PU)

Innovative pre-pressurised Moisture-Curing Polyurethane (MCPU) Canister Adhesives are available in large canisters or smaller hand held canisters. The spray-applied adhesives are suitable for bonding insulation, membrane and detail work quickly, simply and professionally. With the benefits and compatibility of traditional MCPU adhesives, including strong weatherproof bonds, the pressurised canister systems offer significant advantages over standard Poured/Bead-Applied Adhesives.

The spray-applied method ensures a professional and precise application; it reduces risk of poor application and expensive re-work of the flat roof. In addition, the cure time can be faster than standard Poured/Bead-Applied adhesives.

Typical Guidelines for Use:

1. If bonding to the original deck, clean and prime in accordance with manufacturer's guidelines. Ensure the deck is clean, dry and free from contaminants and is structurally sound. If bonding to VCL, ensure it is securely fixed/adhered in accordance with manufacturer's guidelines.
2. Set the canister up per manufacturer guidelines.
3. Apply beads in accordance with the manufacturer's instructions.
4. Immediately place the insulation board directly into the applied adhesive.
5. Apply pressure to the insulation board to ensure full contact with the applied adhesive.
6. Allow to cure before weatherproofing the insulation board.

6. Disposal

It is recommended that contact should be made with a local waste contractor for possible disposal options. Typically, the disposal company will visit the site to give their opinion on how best to treat the packaging; this would be dictated by quantity, type and state of containers, how clean they are etc.

LRWA was founded in 1979, and consists of the UK's leading manufacturers of liquid roof coatings and related material suppliers. It aims to raise awareness about the technical and financial benefits of specifying liquid applied roofing systems and to establish both product and installation standard to ensure optimum performance is achieved; to this end LRWA has been involved in the writing of European Technical Approvals as the official body in conjunction with the BBA and EOTA.

Whilst every effort has been made to ensure the accuracy of the information contained in this publication, it must be emphasised that the Association has itself not verified the information by independent testing: for this reason and because the Association has no control over the precise circumstances in which it will be used the Association, its officers, employees and members can accept no liability arising out of its use, whether by members of the Association or otherwise. The publication is of a technical nature only and makes no attempt to state or conform to building regulations or other legal requirements; compliance with these must be the individual user's own responsibility.