Guidance document GD 28 August 2016

MINERAL WOOL INSULATION INSTALLATION: BEST PRACTICE GUIDE

1.0 INTRODUCTION

All buildings whatever their use must provide protection from the external environment and the requirements of the internal environment will depend upon the intended use of the building. Insulating a building is one of the most cost-effective ways of saving energy and reducing heating and cooling bills.

The Metal Cladding and Roofing Manufacturers Association has produced this document to offer good practice guidance in the storage, handling and installation of mineral wool insulation in built-up metal roof and wall cladding systems.

The aim of the guidance is to promote good practice across the industry, leading to improvements in building envelope performance, efficiency and health and safety.

2.0 TYPES OF INSULATION USED AND RELEVANT APPLICATIONS

The most common form of insulation in built-up cladding systems is glass or rock mineral wool quilt, which is favoured due to its lightweight, low thermal conductivity, ease of handling and as a cost effective and sustainable solution. There are other built-up systems on the market which use denser slab products to achieve an improved acoustic or fire performance. Both glass and rock mineral wool insulation products achieve a European Reaction to Fire Rating Classification of A1 (equivalent to non-combustible) as defined in BS EN 13501–1.

The use of mineral wool insulation with its inherent acoustic absorption properties means an excellent sound reduction can be achieved with the correctly designed constructions.

2.1 Thermal calculations

The design lambda value (λ) represents the thermal conductivity of a material as installed in a building. This value needs to be selected by the designer, taking into account the specific internal and external design conditions, such as temperature and humidity, which can influence the performance of the material once installed. Depending on different installation conditions, one material can have several design lambda values, even within the same building.

Clearly the accurate calculation of U-values requires detailed knowledge of product characteristics, calculation methodologies and standards, and construction techniques. The accurate calculation of U-values is a fundamental requirement to meet Building Regulations and must be carried out at the design stage. In metal roofing and cladding, U-values are calculated to BS EN 10211-1 and take into account bridging effects caused by spacer systems.

3.0 SITE CONSIDERATIONS

3.1 Storage

Given the climate in the United Kingdom and the high level of rainfall experienced, it is recommended good building practice that insulation products should not be installed whilst wet or into constructions which have become wet. The insulation products recommended for metal built-up systems will be supplied compression-wrapped in polythene on pallets, protected by waterproof shrouding which allows the product to be stored outside for a limited period of time.

Where product is being stored for any length of time, the product must be protected from the elements and should be lifted clear of the ground.

3.2 Recovery to manufactured thickness

Mineral wool insulation products are generally compression wrapped in polythene and therefore will need air reintroduced into the wool in order to recover to the manufactured thickness. The EN standard for mineral wool, EN 13162 references EN 823 for determination of thickness and recognises that mineral wool (glass and rock) behaves this way. The method for testing recovered thickness includes the dropping of wool from a height of 450mm to encourage recovery.

Therefore, for horizontal (roof) applications, it is recommended that the quilt installation is gently lifted and shaken to create a wavelike motion through the products to allow air movement to promote recovery.

For vertical (wall) applications, the dropping of the roll on the vertical plane will automatically generate movement through the product.

3.3 Unpacking and installation

Remove external shrink-wrapped waterproof hooding and shrouding. Packaging should be collected and disposed of responsibly. Packaging discarded within the construction is not acceptable and will have a detrimental effect on performance. Once unpackaged the insulation rolls should not be left open to the elements.

4.0 ROOF INSTALLATION

Rolls of insulation should be distributed at each run starting at the ridge. Quilt insulation is normally provided at 1200mm widths as standard. The polythene packaging should be cut along its length and removed; it must not be discarded in the roof construction (nor should any other packaging, fixings, filler or mastics)

Mineral wool insulation is located between the profiled metal outer cladding sheets and inner lining sheets. The lining sheets are fixed on top of the supporting purlins. The inner and outer metal cladding sheets are separated by rail and bracket systems or preformed insulated spacer systems.

To maintain continuity of the insulation where rail and bracket systems are used, the insulation is tucked under the rails, with all quilt edges tightly butted. There is no continuous airspace in the construction other than that created by the cladding profiles. Gaps in the insulation must be minimised.

Gently agitate the roll to allow air movement through the product to promote recovery to the specified thickness.

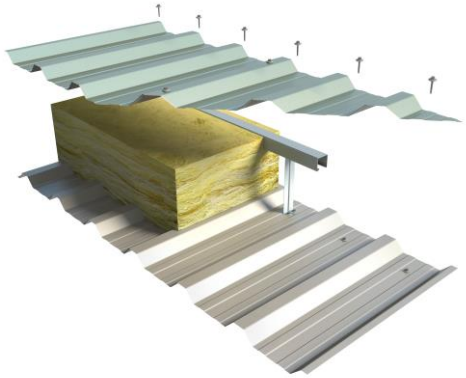

Fig 1 – Typical trapezoidal twin skin roof system

Care and consideration should be taken when laying insulation around roof lights. Ensure that a clean edge runs the length of the rooflight to maintain a continuous run of insulation

The rail and bracket system is used to create the space for the insulation and is then secured by the recommended fixings to the purlin.

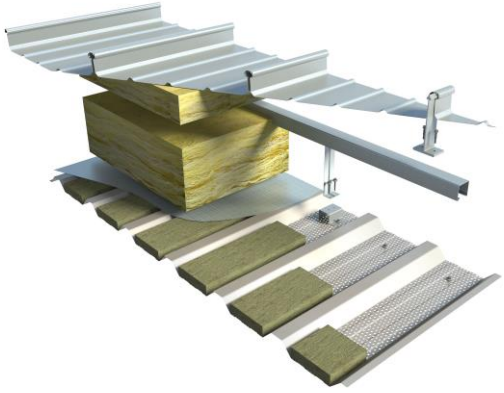

Fig 2 - Typical standing seam roof system with perforated liner for sound absorption

Closely butt all joints to ensure continuity of insulation and reduce the risk of gaps. Where a double layer insulation system is required, stagger joints where possible to minimise thermal bridging gaps.

Where fixings are already in place, the quilt insulation can be compressed and formed around the bracket and under the rails. There is no need to cut the insulation to suit, as the product will form a tight fit around protrusions thus minimising the potential for thermal bridges or gaps forming.

Insulation should be installed from boards or access platforms. Insulation should not be walked on or compressed as this will damage the fibres, and will result in a loss of thickness and thermal performance. If damage should occur then replacement material must be installed.

5.0 WALL INSTALLATION

Installation is usually carried out from scissor lifts. The polythene packaging should be cut along its length and removed; it must not be left in the wall construction, nor should any fixings, filler or mastics.

Products should be clamped across the full width at the head of the wall construction to avoid slump. The support rail and bracket system is used to clamp the insulation and is then secured by recommended fixings to the cladding rail - this helps to minimise the thermal bridging effect through the fixings. Allow the roll to drop down and secure the support rail at regular intervals.

To maintain continuity of the insulation the insulation is tucked under the rails, and all quilt edges must be tightly butted.

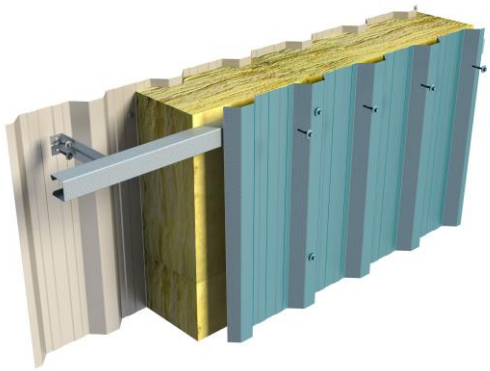

Fig 3 – Typical trapezoidal twin skin wall system

Stick pins and/or alternative methods of fixing can be used at regular intervals for additional support to the insulation. Insulation must be pushed onto the stick pins and secured using non-return washers. Care should be taken not to over compress the insulation with the washer. The insulation hangers (stick pins) need to be secured the day before they are loaded and can only be applied to dry surfaces. Mechanical fixing at rail positions is recommended. Where foil-faced products are used they should be placed with the foil facing to the inner liner sheet.

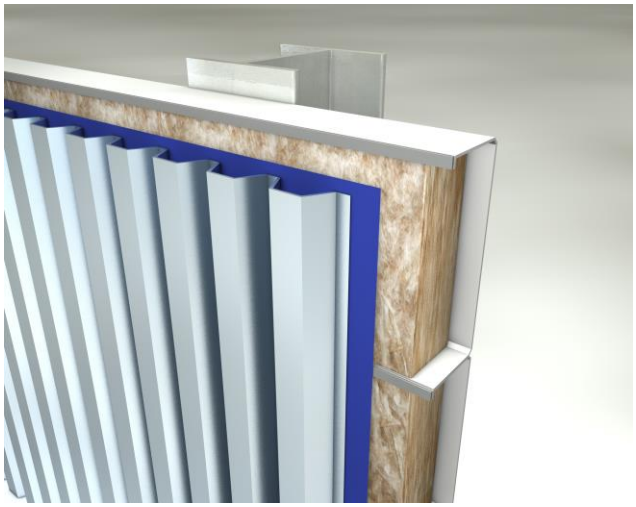

Fig 4 Built-up metal wall liner cassette tray system including an additional or secondary vapour check

Where brackets are already in place, the quilt insulation can be compressed and formed around the bracket and under the rails. There is no need to cut the insulation to suit, as the product will form a tight fit around protrusions thus minimising the potential for the thermal bridges or gaps forming. Tightly butt all joints to ensure continued continuity of insulation and reduce the formation of gaps. Each end of any joints should be pinned to prevent sagging.

6.0 STANDARD OF WORKMANSHIP

No matter which insulation is used, it is vital that the material is installed carefully throughout, ensuring junction and details such as apertures, ridges, eaves and corners are fully filled with no gaps.

Building regulations require that the building fabric should be constructed so that there are no significant thermal bridges or gaps in the insulation layer(s) within the various elements of the fabric, at the joints between elements and at the edges of elements, such as those around window and door openings. Thermal bridging within elements, such as at spacers, is taken into account when calculating U-values. Thermal bridges at junctions and openings must be calculated separately and the heat losses at these points included in the relevant SBEM calculations.

In relation to fire performance, when specifying twin skin metal cladding systems for commercial and industrial buildings, the materials specified should relate to the fire risk associated with the building. Using a non-combustible insulation will achieve the required fire resistance to meet requirements of boundary conditions. However, ensuring that no gaps are present and that a high standard of workmanship has been employed is essential to the performance of the system as a whole.

7.0 PROTECTION

Mineral wool insulation products (glass and rock) are open cell insulation products relying on entrapped air to provide their thermal performance. The vapour resistivity of mineral wool insulation is considered to be negligible and the same as that of air (5–5.9 MNs/gm). Mineral wool insulation products can therefore be used to reduce the risk of condensation as they allow natural drying out of the construction due to their ability to ‘breathe’.

It is good building practice to ensure that construction products are installed under the correct conditions and as such, the insulation products should be installed in a dry state.

Should mineral wool insulation become wet, the product will recover its original properties once fully dried, depending upon:

- Not having been significantly compressed or otherwise damaged whilst wet.
- Not having been contaminated or degraded by harmful chemicals borne by the water.

Drying out is, of course dependent upon the prevailing environmental conditions and the ability to free vent any subsequent water vapour build up.

CONCLUSION

Adoption by industry of the guidelines outlined in this document will lead to better and more consistent standards of metal roofing and cladding construction.

MCRMA member companies can advise on the suitability and performance of materials, systems and assemblies to ensure that insulation requirements are calculated properly and specified accordingly. In addition, design information can be obtained from any of the independent roofing and cladding inspectors featured on the MCRMA web site at www.mcrma.co.uk

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