

CPD APPROVED

**GD 31 PRE-LAMINATED MEMBRANE AND FACTORY ASSEMBLED INSULATED
PRE-LAMINATED MEMBRANE GUTTERS**

1.0 INTRODUCTION

Met Office data shows that the climate in the UK has changed during the period 1961-2017. The weather is getting warmer and wetter, and the UK is experiencing longer wet spells and fewer dry spells. Owners and operators of industrial, commercial and warehouse buildings have a duty to ensure that water ingress is minimised or eliminated through the specification of appropriate rainwater management systems.

The purpose of this guidance document is to provide best practice advice on the specification of industrial pre-laminated membrane gutters and factory assembled insulated pre-laminated membrane gutters associated with metal-based roofing systems for the industrial, commercial and warehouse sector.

2.0 SCOPE

This guidance document defines the terminology used and provides a product and system description for the two systems under consideration. In addition, the guidance document provides advice about structural design, design capacity and thermal performance. It also deals with the thermal welding of the polymeric membrane and the importance of carrying out sample QA peel tests to set welding parameters during the installation process.

2.1 Definitions

- **Pre-laminated membrane gutters**

Single skin pre-laminated membrane gutters comprise of a structural galvanised steel section with a factory adhered polymeric membrane on the weather side of the gutter section.

- **Factory assembled insulated pre-laminated membrane gutters**

Factory assembled insulated pre-laminated membrane gutters are based on a pre-laminated membrane gutter, as defined above, with the addition of thermal insulation material on the inner warm side of the structural galvanised steel gutter section.

In some cases, the assembly will also include an aesthetic internal surface which covers the insulation. The whole assembly is produced in the factory and delivered to site as a complete unit.

3.0 PRODUCT AND SYSTEM DESCRIPTION

Pre-laminated membrane gutters and factory assembled insulated pre-laminated membrane gutters are regarded as the system of choice for industrial, commercial and warehouse applications. Pre-laminated membrane gutters have in many cases substituted the use of traditional bolted gutter systems primarily due to the reduction in risk relating to water ingress at or about the gutter position. They also avoid the need to apply an on-site liquid coating to the weather side of the gutter, following installation, to provide additional corrosion protection to the substrate.

Modern single skin pre-laminated membrane gutters and factory assembled insulated pre-laminated membrane gutters are manufactured from galvanised steel substrate which is pre-laminated in the factory with the polymeric membrane which acts as the weather skin. The manufacturers of the pre-laminated polymeric membrane offer a range of products, however MCRMA members recommend that the pre-laminated polymeric membrane should be 1.2mm thick 'Class A' material as a minimum specification.

The guarantee period for 'Class A' material is a minimum 10 years and a maximum 25 years in accordance with manufacturers' terms and conditions.

When the functional life of the product is exceeded there is an option of over-laying with a new separately installed membrane.

Product characteristics, durability and guarantee periods may vary depending upon specification and manufacturer. Clarification from MCRMA members should be sought for these characteristics.

4.0 DESIGN

4.1 Structural design

The galvanised steel substrate should be a minimum thickness of 1.2mm but depending on the structural requirements for the application the thickness of the substrate may be increased up to 1.5mm or greater. In each case, gutters should be designed to be fully walkable and in accordance with BS 9101:2017.

Specifiers should also ensure that the gutter design complies with the Advisory Committee for Roofsafety (ACR) 'Red Book' ACR (M) 001-2019 [sixth edition] '*Test for non-fragility of Large Element Roofing Assemblies*' This publication describes a test standard which can be applied to any product which will form a roof or part of a roof and is intended to provide information about whether it can support the instantaneous loads imposed on it by a person stumbling or falling on it.

Gutters should be designed to withstand all anticipated loads in accordance with appropriate standards in regard to structural loading, wind loading and non-fragility.

All applications including boundary wall and valley gutters should be checked with the manufacturer for compliance with the appropriate structural performance, non-fragility and design loads. However, additional structural supports may be required to suit specific applications and performance criteria.

Temporary fixed and fully fixed gutters should also follow HSE guidance during and following the construction phase.

To comply with CDM regulations some designers specify walkway grids in the gutters for access to roof mounted plant on profiled metal and composite roofs. The walkway grids can reduce the effective design capacity of the gutter. In addition, if badly designed the walkway feet may cut into membrane. The design of the walkway should be considered as any other type of load bearing component on a roof.

4.2 Design capacity

The design capacity of the gutter system should be in accordance with BS EN 12056-3:2000 Gravity drainage systems inside buildings. Roof drainage, layout and calculation. When designing and specifying a gutter system it should be noted that outlet positions can limit capacity e.g. an outlet positioned close to stop end can have approximately 50% of the capacity of the same outlet spaced equally along the main length of the gutter.

The inclusion of siphonic outlets within the gutter system requires a balanced flow along the gutter to the outlets. This may limit the cross-sectional dimensions of gutter sole plates or depth. Reference should be made to BS 8490:2007. *Guide to siphonic roof drainage systems.*

4.3 Thermal performance

Factory assembled insulated pre-laminated membrane gutters incorporate a bonded insulation usually manufactured from a high-density rock fibre or polyisocyanurate (PIR) foam. The specification for the insulation chosen for the gutter should align with the specification of the insulation specified for the surrounding roof system.

The thermal performance of the insulated gutter system is generally specified to have a higher (worse) U values than the thermal performance of the surrounding roof system. This is to alleviate the problem of ponding water freezing during cold weather.

To improve the aesthetics of the internal surface of the gutter and to provide a level of protection to the insulation a bright white pre-coated steel lining is usually specified for the internal surface.

5.0 MEMBRANE JOINTS

Membrane joints between adjacent lengths of pre-laminated membrane or factory assembled insulated pre-laminated membrane gutters incorporate an additional 1.2mm polymeric membrane cover strip or butt strap measuring between 200 – 250mm wide.

The cover strip or butt strap should extend for the full girth of the gutter and be positioned on the weather side of the joint and in the case of a butt strap extend equally either side of the joint.

The cover strip or butt strap is thermally welded on site to the pre-laminated polymeric membrane to form a water and weather tight seal.

Thermal welding of the polymeric membrane cover strip or butt strap at intersections of the pre-laminated membrane gutter is critical to ensure water and weather tight seals are achieved. The installer must be able to provide evidence / certification of training to prove that they have the appropriate level of skill and training.

Before commencing to thermally weld the cover strip or butt strap at the points of intersection, the installer must adjust the temperature setting for the heat gun to suit the environmental conditions. In addition, the operator must also check that the settings are appropriate by performing a thermal weld on sample material which is subsequently checked by conducting a peel test.

6.0 QA PEEL TEST

A Quality Assured (QA) peel test on a sample section of material which has been produced using the appropriate thermal settings for the environment conditions is a vital stage within the overall QA process and should be recorded as such. The physical peel test must only be carried out on the **'test sample'** after the sample has reached the surrounding environmental conditions, or it has been artificially cooled to the surrounding environmental conditions. The peel test on a cooled sample should be conducted at the start of each work period and also if the environmental conditions change during the thermal welding period.

Details of the operating parameters and characteristics of the polymeric membrane should be provided by reference to the system fabricator or the manufacturer of the specific polymeric membrane. Failure of the thermal weld resulting in tearing or delamination within the welded section below the distance specified is unacceptable.

If this occurs, the operator must adjust the thermal welding parameters for a new test sample and the QA peel test must be repeated until the thermal weld successfully complies with the QA method statement. As part of the QA process a probe tester may also be used to check the weld at the edge of the joint between the overlap strip and the main membrane material.

The operating parameters for a successful QA peel test on a cooled sample should be recorded and the sample retained for future inspection. Compliance with the QA peel test on a cooled sample defines the conditions required to commence thermal welding of the cover strip or butt straps at the joint intersections.

NOTE

- 1 The reference to 'test sample' relates to separate and independent material and welding sample or samples to enable the welder to accurately set the hot air welding gun and his welding technique to the environmental conditions at the time and point of welding. It does NOT mean that the peel test should be done on the actual installed product or system following the act of welding.
- 2 The 'Probe Tester' reference relates to a pointed tool similar to a bradawl or needle point tool. Following welding of the joint the point of the probe is lightly run down the edges of the overlap strip to check that the edges of the welded strap at the overlap positions are bonded down correctly i.e. without intermittent gaps. If during the checking process the edges of the overlap strip are not fully welded, then heat should be reapplied at the relevant positions to ensure a true, continuous and effective bond.

Thermal welding of the joint intersections should be fully completed and water and weather tight sealed prior to the installation of the roof covering.

Further advice and guidance are available from any MCRMA member company whose details can be found on the MCRMA web site at www.mcrma.co.uk

MCRMA ONLINE CPD PROGRAMME



This guidance document is available as an online CPD and is accredited by the CPD Certification Service. MCRMA's online CPD programme is open to anyone seeking to develop their knowledge and skills within the metal building envelope sector. Each module also offers members of professional institutions an opportunity to earn credit toward their annual CPD requirement.

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To take the CPD associated with this document go to www.mcrma.co.uk/online-cpds/

REFERENCES

ACR (M) 001-2019 [sixth edition] *Test for non-fragility of Large Element Roofing Assemblies* (Red Book)

BS 9101:2017 *Steel and aluminium rainwater system - Specification*

BS EN 12056-3:2000 *Gravity drainage systems inside buildings. Roof drainage, layout and calculation*

BS 8490:2007 *Guide to siphonic roof drainage systems*

MGMA Guidance Document GD06 *Siphonic Roof Drainage*

MGMA Guidance Document GD17 *Guidance on industrial membrane gutters*

Useful web sites:

Advisory Committee for Roofsafety (ACR) www.the-acr.org

Health and Safety Executive (HSE) www.hse.gov.uk

Metal Gutter Manufacturers Association (MGMA) www.mgma.co.uk

NOTE:

The content of this document supersedes the information given in MCRMA Guidance Document *GD31 Pre-laminated membrane and factory assembled insulated pre-laminated membrane gutters* (June and August 2019)

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