GUIDANCE ON INDUSTRIAL MEMBRANE LINED GUTTERS

1.0 INTRODUCTION

Membrane gutters have been used in the roofing and cladding industry for over 30 years for single skin and insulated applications. Within the last 10-15 years the popularity of membrane gutters has overtaken that of traditional bolted gutter systems which is primarily due to the reduction in risk relating to water ingress at or about the gutter position.

When membrane gutters were first introduced, the membrane was originally manually bonded to the steel substrate; a method which could prove difficult in establishing leak points should a pin hole occur. Today, most if not all, membrane gutters are pre-laminated eliminating this issue and the associated problems with small scrapes, scuffs etc.

There are two types of insulated gutters available in today's market which are designed to be fully walkable; factory assembled insulated gutters and composite insulated gutters (detailed below). Both, including single skin gutters, are available in standard lengths up to 4 metres, but are also available up to 8.0 metres, which reduce the number of site welded joints. All welded joints are complete with 1.5mm thick PVC welding straps, approximately 200 - 250mm wide.

Single skin gutters

Manufactured to suit project specific requirements and performance criteria, typically using 1.2mm thick 'Class A' PVC membrane pre-laminated on to 1.2mm or 1.5mm thick pre-coated galvanised steel substrate.

Single skin gutters should be designed in accordance with BS 9101:2017.

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Factory assembled insulated gutters

Manufactured to suit project specific requirements and performance criteria, typically using 1.2mm thick 'Class A' PVC membrane pre-laminated on to 1.2mm or 1.5mm thick pre-coated galvanised steel substrate, incorporating factory bonded insulation, usually rock fibre or polyisocyanurate (PIR) foam, to suit thermal requirements, finished internally with a bright white pre-coated steel lining (contact MGMA manufacturers for available options).

Factory assembled insulated gutters should be designed in accordance with BS 9101:2017.

Composite insulated gutters

Manufactured to suit project specific requirements and performance criteria, typically using 0.6mm 'Class B' or 1.2mm thick 'Class A' PVC membrane pre-laminated on to 0.6mm or 1.2mm thick pre-coated galvanised steel substrate, incorporating a fully bonded PIR insulation core to suit project specific thermal requirements, finished internally with a bright white pre-coated steel lining (contact MGMA manufacturers for available options).

Gutter systems manufactured by MGMA members will offer other performance benefits and properties for single skin and insulated membrane gutters including, but not restricted to fire performance, non-fragility (when fully fixed in accordance with manufacturer's recommendations), durability and guarantee periods which may vary depending upon specification and manufacturer. Clarification from the MGMA members should be sought for these characteristics.

2.0 APPLICATIONS AND PERFORMANCE

Uninsulated single skin and insulated gutter systems in both new and refurbishment applications should comply with the following performance criteria and standards.

2.1 Requirements for large gutters

For all factory assembled and single skin membrane gutters should be designed in accordance with BS 9101:2017. MGMA members manufacture boundary wall and valley gutters with using minimum 1.2mm thick steel substrate, however, additional structural support may be required to suit project specific requirements and performance criteria.

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MGMA recommends continuous edge, side and/or base support which should be considered for (clarification can be provided by MGMA members);

- 1.2mm thick steel substrate with gutter sole > 400mm
- 1.5mm thick steel substrate with gutter sole > 500mm

Composite insulated gutters may span unsupported depending upon size, shape and application; advice should be sought from MGMA manufacturing members.

All applications should be checked with the manufacturer for compliance with non-fragility, and building design loads.

2.2 Performance standards

MEMBRANE CHARACTERISTIC	TEST METHOD	MACHINE LAMINATED	MANUALLY LAMINATED
Class A **Class B**	ECCA-T1	1.2mm min. 0.6mm min.	1.2mm min. Not recommended
Membrane adhesion	BS 3900/E2	100% adhesion flat cross hatch + Erickson	100% adhesion flat cross hatch + Erickson
Corrosion resistance – salt spray	ECCA-T8	1000 hours	1000 hours
Corrosion resistance – humidity	BS 3900/F2	1000 hours	1000 hours
Scratch resistance	EN 13523-12	Products must comply with the performance criteria detailed within the Standard	Products must comply with the performance criteria detailed within the Standard
Resistance to salt spray	EN 13523-8	Products must comply with the performance criteria detailed within the Standard	Products must comply with the performance criteria detailed within the Standard
Maximum continuous operating temperature	-	80^0C	80^0C
Minimum forming temperature	-	16^0C	16^0C
Formation of joints	-	Hot air welded	Hot air welded
Guarantee **Class A** Guarantee **Class B**	-	Min 10 yrs - max 25 yrs* Min 10 yrs - max 15 yrs*	Min 10 yrs - max 25 yrs* Not applicable*

** In accordance with manufacturer's terms and conditions*

Note: *The performance criteria listed in the table above are applicable to both the machine and manual lamination processes.*

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3.0 REQUIREMENTS FOR MEMBRANE WELDING

Prior to commencement of any membrane welding, whether during manufacture by an MGMA member or on site, the installer must ensure that they have the appropriate level of skill and training. The competent welder must also be able to provide evidence / certification of training, when requested. Every competent membrane welder should have a suitable toolkit, which should include but is not limited to;

- Heat gun / hot air tool, complete with;
  - adjustable temperature control
  - 20mm wide slot nozzle and wire brush to clean nozzle
- 40mm wide silicone rubber pressure roller
- Penny roller
- Probe tester
- Knife and scissors
- Combination or long nose pliers (for peel test)

The ambient air temperature and time of year will affect the temperature settings on the heat gun, therefore in advance of welding any gutter joints, the operative must set the temperature output of the heat gun to suit the environmental conditions to ensure the correct weld temperature. Once this has been set, a peel test must be done which is in line with standard industry practice for membrane roofing.

3.1 Peel tests and installation

A peel test **should be conducted on 'test samples'** and should be conducted at the start of every day and/or shift and/or break in shift, to ensure all environmental factors are eliminated. Membrane welding straps are typically 1.5mm thick supplied in cut to width coils and cut to length on site. A test weld should be in a similar location to the joint or detail to be welded, be minimum 200mm long and be welded in accordance with the manufacturer's recommendations, inclusive of the minimum weld distance. To test the welded joint, two cuts need to be made through the joint, typically 25-50mm apart (care should be taken not to damage the substrate), then pulled.

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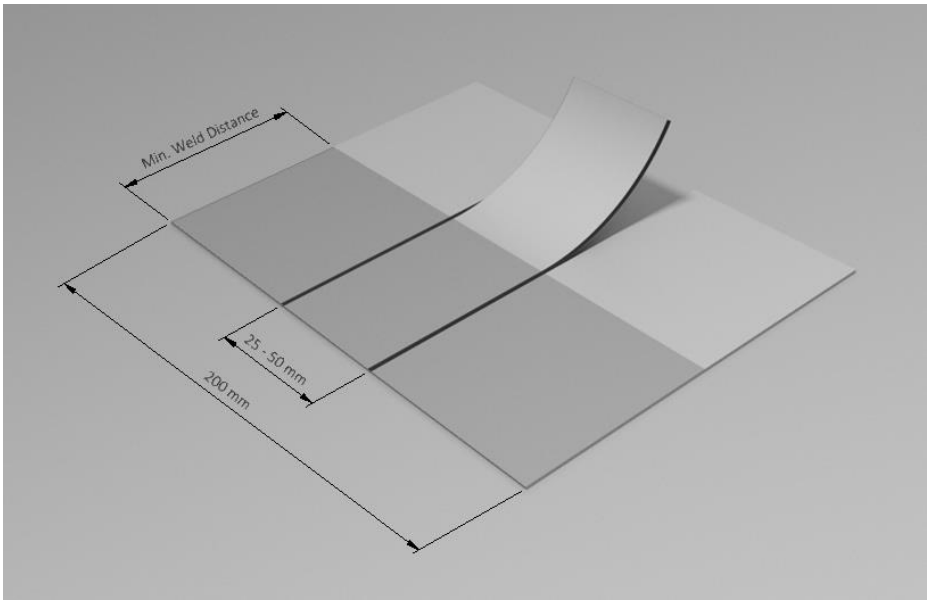

Peel test

If the membrane tears at the start of the welded section, maintaining the minimum weld distance required, this is deemed acceptable. If the membrane tears or delaminates within the welded section, below the minimum weld distance required, this is in an unacceptable weld and therefore the process must be repeated until a successful peel test is achieved.

Once a successful peel test is achieved as noted, the operative should sign and date the test sample. The sample must be retained for the duration of the project for quality inspection purposes. Only at this point, should the competent welder commence installation of the gutter joints in compliance with the manufacturer's published installation instructions and in-service maintenance guidance.

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 following the act of welding.

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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.

3 Membrane gutter joints are to be completed fully sealed prior to installation of the roof cladding system to ensure an effective weather/air seal is achieved with the roof and to prevent excess rainwater and detritus adversely affecting a successful weld.

4.0 DESIGN/ SYSTEM REQUIREMENTS

- Gutter capacity to be designed to BS EN 12056:3-2000, *'Gravity drainage systems inside buildings – Part 3: Roof drainage, layout and calculation'*
- Single skin and factory assembled insulated gutters must comply with BS 9101:2017 '*Steel and aluminium rainwater system - Specification'*.
- Gutter to be designed to withstand all anticipated loads in accordance with appropriate standards in regard to structural loading, wind loading and non-fragility
- Manufacturer factory production control: BS EN ISO 9001 accredited
- Manufacturer environmental management: BS EN ISO 14001 accredited

5.0 GUARANTEES

Generally, guarantees from individual manufacturers of gutter systems vary from 10 years to 25 years, depending upon the class of membrane specified, the manufacturing process and materials selected. It is important to note that these guarantees will be affected by the maintenance and inspection regime in place.

Gutters that are not cleaned regularly will degrade quickly due to a build-up of debris such as grit, bird carcasses, plastic bags and a myriad of varying plants and trees etc.

Further advice and guidance are available from any MGMA member company whose details can be found on the MGMA website at **www.mgma.co.uk**

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REFERENCES

BS 3900-E2:1992 (replaced by BS EN ISO 1518-1:2011) Paints and varnishes. Determination of scratch resistance. Constant-loading method

BS 3900-F2:1973 Methods of test for paint. Durability tests on paint films. Determination of resistance to humidity (cyclic condensation)

BS 9101:2017 'Steel and aluminium rainwater system - Specification'.

BS EN 12056:3-2000, 'Gravity drainage systems inside buildings – Part 3: Roof drainage, layout and calculation'

BS EN 13523-8:2017 Coil coated metals. Test methods. Resistance to salt spray (fog)

BS EN 13523-12:2017 Coil coated metals. Test methods. Resistance to scratching

ECCA-T1 (1995) Coating thickness

ECCA-T8 (1997) Resistance to salt spray fog

NOTE:

The content of this document supersedes the information given in MGMA Information Sheet No 7 (November 2011) and Guidance Document GD17 G*uidance on membrane gutter thickness* (September 2016 and March 2019).

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