3.1 Membrane Installation

3.1.1 Membrane Installation - General

Firestone recommends for each system the following panel widths.

<table>
<thead>
<tr>
<th>System</th>
<th>Panel width (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fully Adhered</td>
<td>3.05 - 5.08 - 6.10</td>
</tr>
<tr>
<td>R.M.A.</td>
<td>5.08 - 6.10 - 9.15</td>
</tr>
<tr>
<td>B.I.S.</td>
<td>2.28 - 3.05</td>
</tr>
</tbody>
</table>

However, cold weather can affect the workability of the membrane. Specifically, the low talc coating and tight, firm packaging of the membrane may extend the time required for the membrane to relax during winter months.

For Fully Adhered systems, fold lines remaining in the membrane during cold weather installation will make smooth bonding to the substrate difficult. Firestone therefore recommends to utilize standard 3.05 m or 5.08 m wide fold-free panels.

R.M.A. systems also can be affected by cold weather, when using large panels that must be unfolded. Firestone recommends for cold weather applications the use of fold-free (up to 5.08 m wide) or one-fold panels (up to 9.15 m wide).

Prior to the installation of the roofing membrane, the contractor must check if the roof substrate complies with Firestone’s design instructions. Any defects in the substrate need to be corrected and the final surface has to be prepared to meet the requirements previously outlined. It is important that the substrate is free of any sharp objects and/or products that may damage the membrane. Wipe the substrate and install a protection fleece when required.

Place the EPDM roll as close as possible to its final position. It is easier to locate the roll in this position than to have to reposition the EPDM panels after they have been unrolled. The direction for unrolling the sheet is marked on the wrapper.

Inspect the wrapper and EPDM roll for damage before and during the installation. All membranes shall be unrolled, unfolded and positioned over the roof substrate without stretching. The panels can be moved sideways over the substrate by floating and allowing air underneath. Prior to any attachment, cutting or splicing, each panel shall be allowed to relax a minimum of 30 minutes. Bigger panels (12.20 – 15.25 m wide) or cold weather application require more time (45 min.) for relaxation. Cut a cross-shaped opening above every drain to evacuate excess of ponding water, in case of sudden rainfall.
The EPDM panels shall be installed in a fashion so that field and flashing splices are installed to shed water. Straight cuts are very important for a neat and easy application. Firestone recommends to use scissors, markers and chalklines to achieve this. Do not use cutters.

Allow ample material for splicing with the overlap of adjoining sheets determined by the type of seam and tie-ins. The tie-in material will be determined by the applicable detail. Provide an extra 150 mm of membrane at roof edges and wall terminations to facilitate final positioning.

Temporary ballasting during installation may be required to keep the membrane in place until it is secured to the substrate. Suggested temporary ballasting includes sand bags and other non-abrasive materials such as rubber tires, etc. Never leave the project without temporary ballasting the loose laid sheets.

### 3.1.2 Membrane Installation With Ballast

- **Applicability**
  This technique is applicable for ballasted and inverted systems.

- **Installation Instructions**
  Position adjoining sheets with a minimum overlap of 100 mm and allow to relax. Cover loosely laid roofing sections as soon as possible with:
  - Gravel, in the form of round, smooth, river washed aggregate without broken pieces of adequate size (nominal 16-32 mm). Make sure that the roofing membrane is completely covered. A ballast of minimum 50 kg/m² is required. However this may not always provide complete membrane coverage or meet local requirements.
  - Graduated, crushed gravel. This type of ballast contains broken pieces and may damage the EPDM membrane during installation. Firestone therefore recommends installing a geotextile (min. 200 gr/m²) between ballast and membrane.
  - Concrete pavers, with smooth trowel finish. Consult local regulations and/or paver supplier guidelines for maximum spacing between the pavers. Install a protection fleece or additional layer of EPDM membrane directly beneath the concrete pavers.
  - Other types of ballast may be used (poured concrete, etc.) for other types of applications (parking decks, etc.) but require a specific study. Consult local standards for type, adequate size, and minimum weight of ballast and consult Firestone’s Technical Department for appropriate detailing.
  - In case of re-roofing, existing gravel may be re-used on the new roofing system provided it is of adequate size and weight. It is recommended to install a geotextile (min. 200 gr/m²) between the EPDM membrane and the recovered gravel.

Do not stock pile ballast on the roof deck. Spread the ballast over the EPDM membrane as specified, using soft tools (rubber-tyre buggies, squeegees, etc.), avoid direct contact with the membrane when projected. Spread the ballast around details by hand/foot so as to not damage the freshly installed detail. Any ballast that is displaced by a walkway pad, should be distributed around the pad so as to maintain the specified average coverage rate.

On roofs with a flat edge, the installation of rubber walkway pads within 3 m of the roof edge is not allowed. Use concrete pavers.
3. Installation

For Inverted Systems, install the extruded polystyrene insulation directly over the EPDM membrane. The insulation boards shall be installed within 6 mm of all projections. Do not bond the insulation boards to the membrane or to each other. Unroll a protection mat over the insulation overlapping at side laps a minimum of 100 mm and at end laps a minimum of 150 mm. The mat shall extend up at all vertical penetrations 10 mm above the ballast.

3.1.3 Membrane Installation With Bonding Adhesive

- **Applicability**
  This technique is applicable for Fully Adhered systems and as an alternative to mechanical attachment in the perimeter zones of the mechanically attached systems: R.M.A., M.A.S. and B.I.S.

- **Installation Instructions**
  Position adjoining sheets with a minimum overlap of 100 mm and allow to relax. Fold the first membrane back, evenly onto itself so as to expose the underside and the substrate. The sheet fold should lay smooth so as to minimize the formation of wrinkles during and after installation. Before bonding, remove excess of dust or other contaminants. Wipe the substrate and the mating surface of the first sheet with a stiff broom.

The EPDM-sheets are to be fully adhered with Bonding Adhesive. Stir the Bonding Adhesive before and during application to achieve a uniform mix with no sediment at the bottom. Properly mixed adhesive is critical for desired performance and uniformity of the bond.
The Bonding Adhesive must be roller applied in a thin even coat on both mating surfaces. Firestone recommends a two-man operation to facilitate equal drying times. Avoid globs or puddles of adhesive during application. An excess of adhesive will prolong the drying time and reduce production. The use of Superspreader equipment can speed up production and increase coverage due to a better distribution of the adhesive. When applying the adhesive manually, use large solvent resistant rollers (200 to 250 mm wide) with short hairs to apply the adhesive evenly. Care must be taken not to apply Bonding Adhesive over an area that is to be cleaned later and spliced to another sheet or QuickSeam Reinforced Fastening Perimeter Strip. Use a chalkline to mark the splicing area that has to remain clean. See Technical Data sheet for information about recommended coverage rates.

Wait until the adhesive is tacky. Drying time will differ with various climatic conditions and coverage rate. Never use a hot air dryer to accelerate this process. Touch the surface with a clean, dry finger to check the adhesive for dryness. As you are touching the adhesive, push straight down to check the mass of adhesive under its surface for stringing.

Push forward on the adhesive at an angle to ensure that it is dry throughout its thickness. If either motion exposes wet or stringy adhesive when the finger is lifted then it is not ready for mating.

As the first sheet is flashing off, lay out the adjoining sheets and allow them to relax.

Bond the membrane, starting at the fold. Roll the previously coated portion of the sheet into the coated substrate, slowly and evenly to minimize wrinkles.
Compress the bonded half to the substrate with a stiff brush to ensure proper contact. Extra compression will strengthen the bond. Repeat the bonding procedure to complete the bonding of the sheet. Take special precautions when the outside temperature is below 10°C. Certain combinations of temperature and humidity may cause condensation on the surface of the Bonding Adhesive. If this condition occurs, do not mate the surfaces. Wait until the ambient air conditions no longer cause condensation, dry the surface with clean, dry rags, apply a thin additional layer of adhesive and proceed.

As an alternative to the contact adhesion application method, outlined above, Water Based Bonding Adhesive may also be mated while still wet directly over plywood or OSB substrates only. Apply Water Based Bonding Adhesive over plywood or OSB with a solvent resistant paint roller, taking care to completely cover the plywood or OSB substrate evenly to avoid globs and puddles of adhesive. The EPDM membrane shall be mated as soon as possible after the bonding adhesive is applied by rolling the membrane in place over the plywood or OSB. To ensure proper adhesion, compress the bonded portion of the sheet to the substrate with a stiff push broom. The optional Wet Mating Method is only applicable when membrane is not exposed to any wind stresses for 48 hours and not exposed to freezing temperatures for minimum 48 hours. See Technical Data Sheet for information about recommended coverage rates.

### 3.1.4 Membrane Installation - System R.M.A.

#### Applicability
This technique is applicable for mechanically anchored system R.M.A.

#### Installation Instructions
The QuickSeam R.M.A. strips are mechanically attached to the substrate using batten strips or approved plates and fasteners. The EPDM membrane is then adhered to these strips using conventional seaming techniques.

Consult the wind design calculation and QuickSeam R.M.A. strip layout for information about the position of the R.M.A. strips and the size of local wind zones (zones of high wind pressure, such as perimeter, ridge, base of roof step, base of penthouse, etc.).

On metal decks it is important that the R.M.A. strips run as much as possible perpendicular to the direction of the flutes of the deck, to avoid overloading of the structure. At perimeters and in zones of higher wind pressure, the EPDM membrane may be either fully adhered to the substrate following the technique previously described or mechanically attached using one or more additional rows of R.M.A. strip running parallel to the already installed strips. Crossing T-strips shall be installed along the inside edge of the perimeter zone where the additional batten strips run perpendicular to the parapet. Make sure that crossing R.M.A. strips are in contact with each other to provide a continuous framework for attachment of the EPDM membrane.

![Fig. 3.1.5](image-url)
Install the QuickSeam R.M.A. strips as required using approved plates and fasteners or batten strips and fasteners. When using plates, automatic fastening equipment can provide for a time-saving installation. For more information on the installation of batten strips, consult the section on the M.A.S. system hereafter.

Prior to seaming the EPDM membrane to the R.M.A. strips, make sure that the EPDM panels lay smoothly and without any wrinkles. The EPDM membrane will be adhered to the QuickSeam R.M.A. strips as outlined in the following chapter.

When working onto a continuous support (concrete, wood, ...), an alternative layout for R.M.A. strips may be used for practical reasons. In this layout, R.M.A. strips are laid parallel to the parapet. EPDM panels can be laid in the most practical direction.

![Fig. 3.1.6](image)

A continuous row of QuickSeam R.M.A. strips shall be installed along the inside edge of the perimeter sheets, to separate the perimeter zones from the central zone of the roof.

In the case of a fully adhered perimeter zone, care must be taken not to apply Bonding Adhesive onto the inside portion of the perimeter sheets located beyond the inside R.M.A. strip.

### 3.1.5. Membrane Installation - System M.A.S.

- **Applicability**
  
  This technique is applicable for the mechanically attached system M.A.S..

- **Installation Instructions**

  The membranes are mechanically attached to the substrate with batten strips running over the sheets and covered with cover strips.

  Consult the wind design calculation and batten strip layout for information about the position of the batten strips and the size of local wind zones (zones of high wind pressure, such as perimeter, ridge, base of roof step, base of penthouse, etc.).

  On metal decks it is important that the batten strips run as much as possible perpendicular to the direction of the flutes of the deck, to avoid overloading of the structure. To minimize the number of crossings between field splices and batten strips, the EPDM sheets are also unrolled perpendicular to the direction of the flutes of the deck. The operating crew starts at one end of the roof and continues working towards the opposite end. Position the EPDM sheets in accordance to the sheet layout with a minimum overlap of 100 mm and allow to relax.
At perimeters and in zones of higher wind pressure, the EPDM membrane may be either fully adhered to the substrate following the technique previously described or mechanically attached using one or more additional rows of batten strip running parallel to the already installed battens. Crossing T-trips shall be installed along the inside edge of the perimeter zone where the batten strips run perpendicular to the parapet.

Prior to installing the batten strips over the sheets, make sure that the EPDM panels lay smoothly without any wrinkles and remove excess dirt and moisture from the membrane. Use a chalkline to mark the correct position of the batten strips as per layout and make sure the strips are positioned in straight lines.

Pull the batten strip from its box and secure it with a fastener at the beginning. Never open the box, pull the strip out as required. Secure the batten strips only with fasteners that are accepted by Firestone. Place the first fastener maximum 10 mm in from the end of the batten strip. Extend the batten strip across the roof, pull it tight at the opposite end and install another fastener. Go back and install fasteners, using the pre-punched holes. If the spacing between the holes does not correspond to the spacing between the top of the corrugations, additional holes will need to be drilled.

Where batten strips must be cut on site, trim the end of the strip into a half moon shape to eliminate sharp edges. Assure that all sharp edges created by cutting are removed and install a round field cut corner pad (EPDM pad diameter 50 mm) between the batten strip and membrane at all ends. Use one fastener to anchor overlapping batten strips.
The fastener must be properly engaged in the deck. Use caution not to overdrive fasteners, as this will cause buckling of the batten strip between the fasteners and reduce the pull-out value of the fastener. If the strip kinks, loosen the screw slightly. An electric screw gun with an automatic clutch control or an automatic installation tool is recommended. Once the tools have been set, all fastener installation will be consistent.

Crossing strips should not overlap. Stop the strips at 250 mm away from each other so that cover strips can be installed without overlapping.

When working onto a continuous support (concrete, wood, ...), an alternative layout for EPDM sheets and batten strips may be used for practical reasons. In this layout, perimeter zone panels and batten strips are laid parallel to the parapet. Field zone panels can be laid in the most practical direction.

A continuous row of batten strips shall be installed along the inside edge of the perimeter sheets, to separate the perimeter zones from the central zone of the roof.
3.1.6 **Membrane Installation - System B.I.S.**

**Applicability**
This technique is applicable for the side laps in the mechanically attached systems B.I.S..

**Installation Instructions**
The field membranes are mechanically attached to the substrate with batten strips centred in the side seams of adjoining sheets.

Select the size of the panels in function of the spacing requirements for the batten strips. Consult the table below to identify the most appropriate panel width.

<table>
<thead>
<tr>
<th>Spacing between batten strips (m)</th>
<th>Panel width (m)</th>
<th>Panel width (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.94</td>
<td>1.14 (1/2 sheet)</td>
<td>3’9”</td>
</tr>
<tr>
<td>1.32</td>
<td>1.52 (1/2 sheet)</td>
<td>5”</td>
</tr>
<tr>
<td>2.08</td>
<td>2.28</td>
<td>7’6”</td>
</tr>
<tr>
<td>2.85</td>
<td>3.05</td>
<td>10’</td>
</tr>
</tbody>
</table>

Consult the wind design calculation and batten strip layout for information about the position of the batten strips and the size of local wind zones (zones of high wind pressure such as perimeter, ridge, base of roof step, base of penthouse, etc.)

On metal decks it is important that the membranes and batten strips run as much as possible perpendicular to the direction of the flutes of the deck, to avoid overloading of the structure. Position the EPDM sheets in accordance to the sheet layout with an overlap of minimum 200 mm for the side laps of adjoining sheets and minimum 100 mm for the end laps. Allow the sheets to relax prior to attachment.

In the central zone of the roof, the membrane should be mechanically attached with batten strips (or V-plates in case of a reinforced membrane) in the side laps of the membrane. At perimeters and in zones of higher wind pressure, the EPDM membrane may be either fully adhered to the substrate following the technique previously described or mechanically attached in the overlap. When wind calculations require a smaller spacing between the batten strips, an additional strip may also be installed on top of the membrane, as previously described in the M.A.S. installation method, or an R.M.A. strip may be installed underneath the membrane, as described in the R.M.A. installation method. Crossing T-strips shall be installed along the inside edge of the perimeter zone where the additional batten strips or R.M.A. strips run perpendicular to the parapet.
Prior to installing the batten strips within the side overlaps, make sure the EPDM panels lay smoothly without any wrinkles and remove excess dirt and moisture from the membrane. Use a measure and chalkline to install the batten strips correctly within the 200 mm side laps and make sure the strips are positioned in a straight line.

Install the batten strips as previously described and as per §3.2.3. Crossing batten strips should not overlap at corners or T-joints. Install the batten strips at intersecting splices as illustrated.
The end laps of adjoining sheets and the side laps with batten-in-the-seam should be spliced as outlined in the following section.

When working onto a continuous support (concrete, wood, ...), an alternative layout for EPDM sheets and batten strips may be used for practical reasons. In this layout, perimeter zone panels and batten strips are laid parallel to the parapet. Field zone panels can be laid in the most practical direction.

A continuous row of batten strips shall be installed along the inside edge of the perimeter sheets, to separate the perimeter zones from the central zone of the roof.