3.2 Membrane Welding

**General Requirements**

All lap splices need to be hot air welded. Wherever possible, all field splices on the horizontal surface (including flashing) should be completed using an automatic heat welder that has been designed for hot air welding of thermoplastic membranes. Handheld welders should only be used on vertical welds or where an automatic is not practical or can not be used.

Set-up of the welding equipment is the responsibility of the installer. The air intake, temperature and speed of the machine must be adjusted to provide proper seam strength. Practice welds should be made and tested to insure proper set-up of the automatic welder.

Typical welding conditions on a 10°C day in the sun are as follows: 565 - 621°C at 3.7 m/min. with 2 weights added at 80 - 100% air flow. For these typical equipment settings the ambient temperature should be from -6°C to 33°C.

When weather conditions vary, adjustments to the welding machine must be made. It is recommended that this be done using spare material. In addition, there must be destructive tests performed at the beginning of each working day and every time there is an interruption in the welding process (i.e. power failure, welder shut down, job site conditions change and after lunch). There should be periodic checks to verify good peel strength. A proper weld will always delaminate at the scrim when peeled open.

An ample power supply must be provided to all heat welding equipment. A generator, which is dedicated to the heat welding equipment, is recommended on all installations. Using generator equipment eliminates power surges or lapses that would occur if the particular building electrical services were used. Minimum power requirements are 220 volts, 30 amp, 7500 watts or greater if the equipment manufacturer recommends so. It is recommended that each piece of automatic welding equipment has its own generator. More than one piece of welding equipment can be run of a generator providing the proper increase in generator output is provided. In most cases an increase from 7500 watts to 10000 watts is sufficient.

**Installation Instructions**

Position the sheets at the splice area with an overlap as described in table hereafter.

<table>
<thead>
<tr>
<th>System</th>
<th>Min. membrane overlap</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ballasted, Inverted, Adhered</td>
<td>75 mm</td>
</tr>
<tr>
<td>M.A.S</td>
<td>up to 150 mm (laps with mechanical anchoring)</td>
</tr>
</tbody>
</table>

Use a clean white cotton rag dampened with Firestone Splice Wash (Acetone or Xylene may be used alternatively) to thoroughly clean an area on both sheets at least 150 mm wide if the seam area has become heavily contaminated with dirt, debris, mud, etc..

Set up the welding equipment as per the general instructions above. When welding, if the material becomes liquid, the welder is too hot. When making an automatic weld, very slight amount of the dark gray material will be visible at the seam edge.

Seams made with an automatic welder must be a minimum of 38 mm wide. Seams made with hand welders must be a minimum of 50 mm wide.

Probe all completed welds using a slotted screwdriver or dull cotter pin puller type tool to verify seam integrity daily. Do not probe welds until they have had time to cool. Any welds found to be insufficiently welded need to be repaired.
**Special Considerations**

T-joint patches are recommended if probing reveals the presence of voids or cold welds and are required at all intersections of field seams if a membrane thicker than 1.2 mm is used. T-joint patches can be cut from unsupported TPO Flashing.

Orient TPO panels so that any exposed (cut) edges of a panel are used as the bottom panel in splices whenever possible. If cut edges are exposed, they must be sealed with Firestone Cut Edge Sealant or TPO General Purpose Sealant.

In case of a mechanically attached system, the inside edges of the membranes are mechanically attached to the substrate with approved plates and fasteners. The plates need to be positioned at least 20 mm in from the edge of the membrane. Spacing between fasteners should not exceed 250 mm.