



Guidelines for the Fabrication of Seams of Thermoplastic Roofing Membranes Using Hot Air Welding Procedures

Approved October 2010

PRECAUTIONARY NOTE:

Chemicals used as cleaners or for surface preparation may contain petroleum distillates, and as such may be extremely flammable. Do not breathe vapors. Do not use near heat, spark or flame. Do not smoke while applying. Avoid contact with eyes and skin by using safety glasses and protective clothing. Contact the manufacturer for additional material safety information and comply with all OSHA and other applicable safety standards.

I. SCOPE

This document is applicable to thermoplastic roofing membranes. Refer to ASTM standards D4434, D5019 and D6754 for additional information.

II. HEAT WELDING EQUIPMENT ("WELDER") REQUIREMENTS

- A. Check that the welder is set up to the manufacturer's recommendations. Ensure proper alignment of the heating nozzle, airdam apparatus, pressure wheels, or moving parts to ensure they move or otherwise operate properly.
- B. Make sure the air intake is open. Clean out the air intake for the blower unit at each start-up.
- C. Check the welder for worn or broken parts which are in need of replacement. Take care to protect the pressure wheel from notches or cuts to prevent interrupted welding of the seam overlap.
- D. Frequently clean the heat nozzle with a wire brush to remove any build-up of melted or charred membrane.
- E. Follow all recommended procedures for use of automatic hot air welders.
- F. The facility's power supply may not provide an adequate amount of power to provide consistent welding. To provide adequate power, the use of a portable generator is strongly recommended. This should be a minimum 7500 watt generator, 240 volt, 30 amps. The generator should have low harmonic distortion and be well grounded to earth. During operation, all power-saving switches should be disabled to provide a constant supply of power to the hot air welder. Use only one welder per generator. Do not run any other electrical equipment, such as screw guns, lights, etc., with that generator when the welder is in operation.
 1. Power cords used with the hot air welder should be a minimum #10 cord, no longer than 100 feet (30 meters) with 240 volt/30 amp twist-lock connectors to match the receptacle on the generator and the connection on the hot air welder. Longer or lighter gauge cords cause a loss of power which can prevent the welding of proper seams.
 2. Use of step-up/step-down transformers is recommended in order to regulate the power and to protect the welding units from damage caused by power fluctuations.

Disclaimer

SPRI has prepared these generic specifications for use only as a guideline. The guide is not intended to be used verbatim as an actual specification. Specific installation instructions and procedures for each particular job must be obtained from the manufacturer supplying the materials. SPRI, its members and employees do not warrant that this standard is proper and applicable under all conditions.

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- G. Follow all care and maintenance instructions for hand-held and self-propelled hot air welders.
- H. Eliminate possible power drops and electrical shorts. Extension cords #14 and heavier gauge power cords are recommended for operating all electric hand tools. Lighter cords will cause power drops that will shorten the life of power tools. Ground-fault interrupters are recommended and may be required to comply with safety requirements.
- I. Ensure that all hot air welding equipment is grounded in accordance with OSHA regulations.
- J. Before the machine is connected to the power source, make sure it is switched off to prevent a power surge that could damage the unit. Turn on the unit and allow the blower/heater unit to warm up for approximately 5 to 10 minutes to reach operating temperature.
- K. Examine equipment to assure its operation is up to performance levels necessary to perform a proper welding operation to the membrane on the rooftop.
- L. Always perform a test seam for each start-up. A seam test consists of hot air welding a section (10-15 feet (3-5 meters) minimum length) of membrane at the equipment settings to be used to construct the splice. After the membrane has cooled the ambient temperature, cut a 1-inch (25 mm) width across the seam overlap and slowly pull membrane tabs to open the welded area up. A proper seam will show evidence of the membrane tabs being torn or by delamination of the fabric.

III. HEAT-WELDING PROCEDURE FOR NEW MATERIALS

- A. Have available and in proper working order specified tools (drill, rollers, and seam probe tools) for seam construction and inspection.
- B. Unroll and position the membrane sheets.
- C. Allow sheets to relax for a minimum of 30 minutes or as required by the membrane manufacturer or supplier.
- D. Verify a minimum overlap of 2 inches (50 mm) for adhered and ballasted applications and 5 inches (125 mm) for mechanically fastened systems. Use the overlap requirements required by the membrane manufacturer or supplier. Reposition the membrane if necessary. Measure the overlap width from the outermost edge of the top membrane.
- E. Wherever possible, the seam should be overlapped so as not to restrict water flow.
- F. All seams must be typically 18 inches (450 mm) from drains, as well as extreme contour changes (such as tapered insulation areas). Where this is not possible, install a target panel of membrane over the drain that is large enough to extend beyond the tapered area and onto the generally level area of the roofing membrane.
- G. Clean the seam overlap to remove dirt and dust. If necessary and recommended by the manufacturer/supplier, scrub the seam overlap with a mild soap, soap or detergent cleanser (such as 409 ® or Fantastic ®) and clean water to remove other contaminants. Do not wet the substrate. Dry the seam overlap thoroughly.
- H. If required by the membrane manufacturer/ supplier, wipe the splice area with a limited amount of manufacturer-specified solvent using a clean, cotton cloth. Do not scrub the solvent into the membrane. Allow the solvent to dry completely. Follow the manufacturer's instructions for the use of solvent or seam cleaner.

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- I. Cloths used to apply the solvent should be of an absorptive material (such as white cotton) and shall not contain oil, silicone wax, dye, etc., that could contaminate the splice area. Cloths should be turned to expose a clean surface and should be replaced frequently to achieve a surface free of dirt. Cloths should be approved by the system supplier. Sponges, sponge mops, squeegees, brushes, rollers, etc., are typically not permitted.
- J. Weld the sheets together using a hot air welding machine or a hot air hand welder following the procedures recommended by the membrane supplier. The welding operation for the seam are must produce a bonded (fused) area of 1 inch (25 mm) wide or more, unless otherwise specified by the membrane manufacturer/supplier.
- K. By use of seam tests, recalibrate or check all equipment settings often. A test weld should be performed after any work stoppages (i.e. breaks). In addition to the seam tests as described above, check for consistency by probing finished seams with seam probe tool as recommended by the membrane manufacturer/supplier.
- L. The probing of seams must be done on the weld after it has thoroughly cooled (the length of cooling time will vary by product). Seams must be probed in accordance with the manufacturer's requirements. Do not probe hot or warm (above ambient or surrounding membrane temperature) seams. Premature probing can open warm seams. Check with the membrane manufacturer for further requirements for acceptability of the weld.
- M. Draw the probing tool tip along the edge of the hot air welded seam. Apply firm pressure to probe the edge of the seam overlap, but not into the bottom membrane. The tool will not penetrate into the lap area of a properly welded seam without damaging the membrane itself.
- N. If the seam probing tool penetrates into the lap area, mark the seam using a water soluble marker at the beginning and end of the voids (or wrinkles) in the seam edge.
- O. Repair seam deficiencies as soon as possible. Seam areas should be clean and free of debris. If required by the system supplier, wipe the seam overlap area with a limited amount of manufacturer-specified solvent using a clean cloth. Do not scrub the solvent into the membrane. Allow solvent to dry completely. Follow the manufacturer's instructions for the use of solvent or seam cleaner. Re-weld or patch seam area using hand-held welder.
- P. Probe repaired seams after they have cooled as described above. If the repair passes the seam probe test, wipe off the water soluble marker lines. If not acceptable, follow repair procedures again and weld a membrane patch over the area.
- Q. If required by the manufacturer, seal all exposed fabric edges by applying a ¼ inch (6 mm) bead of seam sealant in a manner described by the manufacturer.
- R. Pay special attention to the "T" lap seams formed when multiple membrane sheets intersect. To ensure proper seaming, immediately follow the automatic welder with a hand roller to solidly seal the membrane at the step-down (a crease in the membrane should be visible). If required by the manufacturer for thicker membranes, patch T-joints with thinner membrane.

IV. REPAIRS WEATHERED THERMOPLASTIC MEMBRANES

- A. Clean the seam area to remove dirt and dust. If necessary, scrub the repair area with mild soap or detergent cleaner (for example 409 ® or Fantastic ®) and clean water to remove dust, dirt, or other contaminants. Allow the repair area to dry.
- B. If required by the system supplier, wipe the splice area with a limited amount of manufacturer-identified solvent using a clean cloth. Do not scrub the solvent into the sheet. Allow solvent to dry completely. Follow the manufacturer's instructions for the use of solvent or seam cleaner.

- C. Cloths used to apply the solvent should be of an absorptive material (such as white cotton) and should not contain oil, silicone wax, dye, etc., that could contaminate the splice area. Cloths should be turned to expose a clean surface and be replaced frequently to achieve a surface free of dirt. Cloths should be approved by the system supplier. Sponges, sponge mops, squeegees, brushes, rollers, etc., are not permitted for this procedure.
- D. Weld the sheets together using a hot air welding machine or a hot air welder following the procedures recommended by the system supplier. The welding operation for the seam area must produce a bonded (fused) area a minimum of 1 inch (25 mm) wide or a width specified by the system supplier.
- E. Probe all seams after they have cooled completely. If the repair is acceptable, move on; if not, follow repair procedures again, using a larger area as the targeted repair area.
- F. Pay special attention to the “T” lap seams formed when multiple membrane sheets intersect. To ensure proper seaming, immediately follow the automatic welder with a hand roller or seam probe tool to solidly seal the warm membrane at the step-down area (a crease in the membrane should be visible). Check with the system supplier for the preferred method.

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