



TechTip I6 – SPF over Wiring and Plastic Pipe

Background

The chemical reaction that takes place during the application and curing of SPF will generate exothermic temperatures above the 120-130°F setpoint temperatures of the proportioner and hoses. Peak temperatures at the mid-thickness of a pass can exceed 200°F for several minutes and reach peak temperatures 250-275°F for a minute or two, especially for closed-cell SPF, when applied at the maximum pass thickness¹. At the substrate and free surface of the rising foam, the exothermic temperatures will be lower. An example of measured exothermic temperatures for a closed-cell SPF product using an HFC blowing agent applied to a heated sheet metal substrate is shown in Figure 1. It should be noted that newer closed-cell SPF formulations using HFO blowing agents may use different catalysts, which, in some foams, can increase the peak temperatures during curing to as high as 325°F for short periods and can delay the time to reach the peak temperature. Check with your foam manufacturer regarding exothermic temperature profiles.

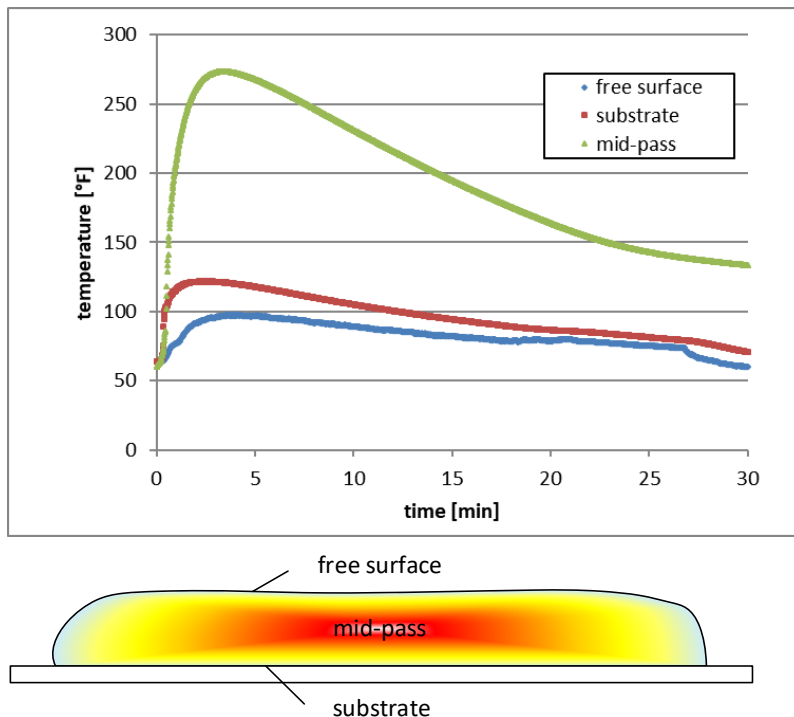


Figure 1 - Temperature versus time measured for a 2" lift of closed-cell SPF at the free surface, substrate and mid-pass. SPF applied to sheet metal substrate.

¹ Exothermic temperatures dependent on SPF product



Building assemblies typically include wiring and plastic piping made from thermoplastic materials which can soften and melt at elevated temperatures. Electrical wiring such as NM-B (Romex) as well as low-voltage wiring for LAN cables, TV cables and speaker wires use thermoplastic PVC jacketing and insulation. Plastic piping and conduit are made from thermoplastic materials such as PVC, polyethylene (PEX) and ABS.

These plastic materials can withstand continuous elevated temperatures. Most wiring is rated at 90°C (194°F) for continuous use but are tested to withstand sustained temperatures of 250°F for several days². The continuous use operating temperature of PEX varies with service pressure, as shown in Table 1³.

Table 1 – Pressure vs Temperature Rating for PEX

Continuous Operating Temperature (F)	Maximum Pressure Rating (psi)
200	80
180	100
120	130 (1/2" only)
73.4	160

It is important to understand that the short-term exothermic temperatures at the center of a SPF pass may exceed the maximum rated temperatures of wiring and plastic pipe, depending on the foam.

To avoid thermal damage to wiring and plastic piping, the installer should

1. Never exceed the maximum pass thickness defined in the manufacturer's installation instructions. Maximum pass thicknesses are provided by the manufacturer to control exothermic temperatures and assure that the cured foam has the material properties published in the technical data sheets.
2. For plastic water piping, it is best to have it filled with water if possible and de-pressurize the lines. The water helps to absorb the exothermic heat, and de-pressurization reduces the load on the pipe, greatly reducing the chance of damage if the exothermic temperatures soften the piping
3. Apply SPF so that wiring and piping is not positioned in the mid-thickness of the pass. Figure 2 shows an example.

² UL1581 - Reference Standard for Electrical Wires, Cables, and Flexible Cords

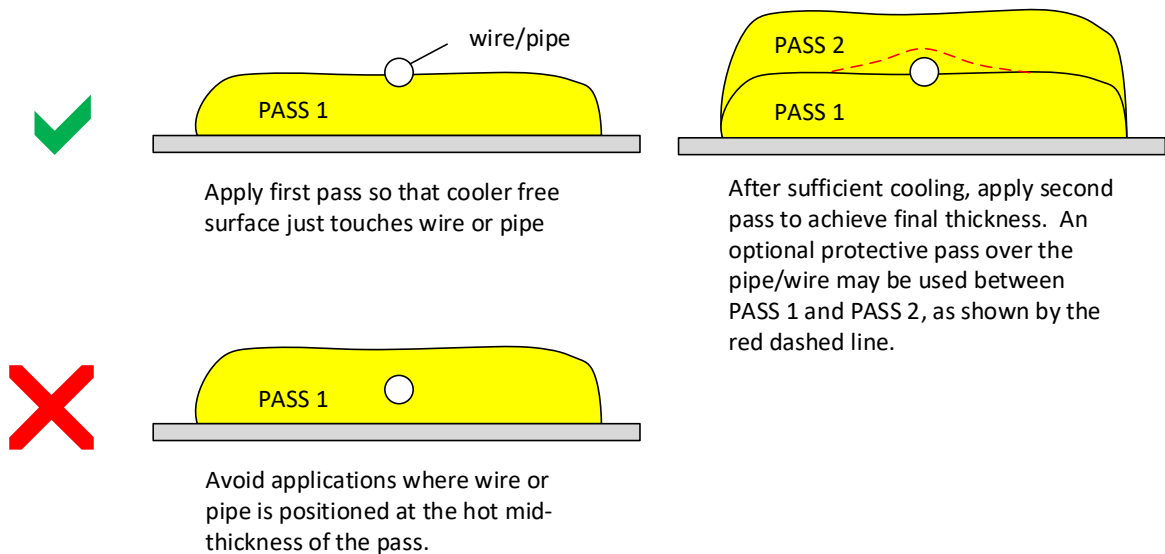
³ Uponor hydrostatic pressure ratings for PEX <https://www.uponor-usa.com/commercial-plumbing/engineer/fags.aspx>

4. Pipes may contain air but must not be pressurized during the SPF application. Ensure all plastic pipes are not pressurized.

NOTE 1: Some plastic pipe manufacturers PROHIBIT the application of SPF over certain pipe fittings. The SPF can be applied to the pipe but the fittings must not be in direct contact with the foam. The SPF contractor needs to check on this prior to spraying foam around any plastic pipes. To avoid SPF chemical contact with fittings, the installer can wrap the fittings in aluminum foil prior to foam application to provide a chemical barrier.

NOTE 2: If any of the liquid A or B side is spilled on plastic pipes, the liquid must be cleaned off immediately. All of the liquid must be removed, until the pipe is clean and dry. Do not spray over a plastic pipe that has spilled chemical systems liquid on it.

NOTE 3: Water supply piping should not be located either outside or within the insulation inside exterior walls, especially in colder climates (e.g., ICC Climate Zones 5-8). These pipes may freeze during extreme cold temperatures. As a insulation contractor you should caution builders about location of any water piping positioned inside thermal insulation in exterior walls and suggest placing all water lines completely inside the thermal envelope of the building.



Customer callbacks to repair damaged wiring and piping can be very expensive. While exothermic damage to wiring and piping is not common for a properly installed SPF product, the precautions above can help to eliminate any possibility of damage to wiring and plastic piping.



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DOCUMENT HISTORY

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