



Automatic Sprinklers: Copper Sprinkler Pipe Joints

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Learning Objective: The student shall be able to explain how copper sprinkler pipe is joined.

Long used for domestic water service, Types K, L, and M copper are durable and reliable products for fire sprinkler systems. Copper is allowed by the major sprinkler design standards, but it is important to note the prescriptive design specifications of International Residential Code Standard P2904 are based solely on Type M. Pipe sizes generally range from 3/4 to 2 inches (19 to 51 mm) in outside diameter, depending on system design.

Copper can be used for wet-pipe, dry-pipe, or preaction systems, and can accommodate antifreeze solutions where allowed by the water purveyor. The pipe does not have to be listed for fire protection service if it meets specific American Society of Testing and Materials (ASTM) material and dimension standards that are outlined in the sprinkler design standards.

The most common method of joining copper tube is with the use of a socket-type copper or copper alloy fitting into which the tube sections are inserted and fastened by means of a filler metal, using either a **soldering** or **brazing** process.

This type of joint (as shown) is known as a capillary or lap joint because the socket of the fitting overlaps the tube end and a space is formed between the tube and the fitting. This space is called the capillary space. The surfaces of the fitting and tube that overlap to form the joint are known as the faying surfaces. Tube and fitting are then solidly joined using a filler metal that is melted into the capillary space and adheres to these surfaces.

The filler metal is a metal alloy that has a melting temperature below that of either the tube or fitting. The melting point of copper (Cu) alloy Unified Numbering System (UNS) C12200 is 1,981 °F (1,083 °C). As such, the filler metals for soldering and brazing copper and copper alloy tube and fittings must have melting temperatures below this temperature.

The basic difference between soldering and brazing is the temperature necessary to melt the filler metal. That temperature is defined to be 842 °F (450 °C) by the American Welding Society (AWS) but is often rounded to 840 °F. If the filler metal melts below 840 °F, the process being performed is soldering. Above that temperature, the process is brazing.

For more information, go to www.copper.org



Copper sprinkler pipe and fittings in commercial or residential applications are joined by a process known as soldering or brazing.

