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**713.3.1.2 Through-penetration firestop system.** *Through penetrations* shall be protected by an *approved* penetration firestop system installed as tested in accordance with ASTM E 814 or UL 1479, with a minimum positive pressure differential of 0.01 inch (2.49 Pa) of water and shall have an F rating of not less than the required *fire-resistance rating* of the wall penetrated.

In order to maintain effective compartmentation of a building to restrict the spread of fire, all penetrations through fire-resistance-rated assemblies must be protected. In recent history, there have been several examples of buildings where extensive fire damage and loss of life was attributed, at least in part, to lack of or improper installation of penetration protection. In the absence of a through-penetration firestop system to protect penetrations of fire-resistance-rated assemblies, the potential exists for fire to spread beyond the initial area of fire origin. One report on the source of origin of fires in buildings indicated that 23 percent of all building fires originate from electrical systems. This fact, coupled with the number of penetrations through walls and floors created by electrical distribution piping, helps to underscore the necessity for the protection of all penetrations through rated assemblies. It must be noted that penetrations are not limited to electrical systems only, but that openings to accommodate plumbing and mechanical systems also contribute to the number of penetrations through any given assembly.

Through-penetration firestop system consist of specific materials or an assembly of materials that are designed to restrict the passage of fire and hot gases for a prescribed period of time through openings made in fire-resistance-rated walls or horizontal assemblies. In certain instances, the through-penetration firestop system is also required to limit the transfer of heat from the fire side to the unexposed side. In order to determine the effectiveness of a through-penetration firestop system in restricting the passage of fire and the transfer of heat, firestop systems are required to be subjected to fire testing. ASTM E 814 or UL 1479 are the test methods developed specifically for the evaluation of a firestop system's ability to resist the passage of flame and hot gases, withstand thermal stresses and restrict transfer of heat through the penetrated assembly.

The basic provisions of ASTM E 814 and UL 1479 require that a test assembly consisting of a specific wall or floor construction, containing through penetrations of various types and sizes,

provides a cooling of the penetration and retards heat transfer through the penetration. Endothermic materials tend to be superlatively resistant to heat transfer and have higher T ratings, but do not expand to fill voids left by combustible penetrating items that burn away during a fire. Endothermic materials are, therefore, typically used with noncombustible penetrating items and where a higher T rating is required.

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