

# Products Used in Air Handling Spaces



An objective in model mechanical and electrical codes and HVAC standards is to protect life and property from fire and smoke resulting from fires. One of the protection methods used to accomplish this objective involves restricting the spread of smoke within a building by minimizing the ignition sources and combustibility of the elements within the air handling systems.

**Model codes and standards**

Model codes and standards address combustibility of elements in air handling systems, and define terms such as ducts, plenums and air handling systems in similar ways. While there are slight differences throughout the Codes and Standards on the terminology of ducts, plenums or other spaces used for environmental air, they

fundamentally seek to achieve the same end result in the regulation of the construction and materials used in air handling spaces.

Depending on whether the ventilation compartment is a duct, plenum, or other defined area, the codes may require materials to be noncombustible or constructed of specific materials with identified surface burning and smoke characteristics.

For example, NFPA 90A Section 4.3.10.2 requires materials exposed to the airflow in ceiling cavity plenums used for supply, return or exhaust air from the occupied area to be noncombustible, limited combustible, or have a flame spread index not exceeding 25 and a smoke-developed index not exceeding 50. Similarly, IMC Section 602.2.1 requires materials exposed within plenums

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to be noncombustible or to have a flame spread index not more than 25 and a smoke-developed index not more than 50. NFPA 90A, the NEC, the IMC, and the UMC all include specific requirements for various products used within plenums and other air handling spaces, such as wiring, fire sprinkler piping, pneumatic tubing, combustible electrical equipment, light diffusers, optical fibers and raceways, loudspeakers, and/or recessed lighting fixtures. Refer to the code or standard in question for specific requirements.

### Testing for fire and smoke characteristics

Many materials used in plenums are required to have a maximum flame spread index of 25 and a maximum smoke developed index of 50 when tested to UL 723 Test for Surface Burning Characteristics of Building Materials (ASTM E84). Using the Steiner Tunnel test apparatus, test specimens measuring a nominal 2-ft wide by 24-ft long are subjected to a 4-1/2 foot long flame. The time for flame progression is measured and calculated as a flame spread index. Also smoke obscuration is measured and calculated as a smoke developed index. Due to the test specimen size, this standard could not be used to test small discrete objects, such as fluorescent ballasts and speakers.

A family of standards was developed to test for flame spread and smoke density for other products used in air handling spaces such as wire and cable, fire sprinkler pipe, and pneumatic tubing. These methods use the same Steiner Tunnel test apparatus as UL723, but the sample mounting and testing criteria differ. These standards are NFPA 262, Test Method For Fire and Smoke Characteristics of Electrical and Optical-Fiber Cables Used in Air-Handling spaces; UL 1887, Fire Test of Plastic Sprinkler Pipe for Visible Flame and Smoke Characteristics; and UL 1820, Fire Test of Pneumatic Tubing for Flame and Smoke Characteristics. Materials tested to these standards are required to exhibit a maximum flame spread distance of 5 ft, a maximum peak optical density of 0.5, and a maximum average optical density of 0.15.

The Standard used to evaluate fire performance and smoke-production characteristics of smaller discrete objects is UL 2043, "Fire Test for Heat and Visible Smoke Release for Discrete Products and Their Accessories Installed in Air-Handling Spaces". Products are subjected to a 60 kW ignition source, and all products of combustion are arrested by a calorimeter hood. Heat energy is determined using oxygen consumption techniques and equipment in the air stream determines smoke density. To be acceptable, products are required to exhibit a peak heat release rate of 100 kW or less, a maximum normalized peak optical density of 0.5, and an average normalized optical density of 0.15 or less.

These standards allow the fire performance and smoke characteristics of these various components to be determined and quantified, and as a result, they have been adopted by reference into IAPMO, ICC, and NFPA model codes.

### Products certified for use in plenums

UL certifies a number of products for use in plenums, ducts and other space used for environmental air. These certifications can be found in the UL Online Certifications Directory at [www.ul.com/database/](http://www.ul.com/database/).

**Building materials** — Material, such as acoustical panels, pipe insulation and coverings, duct coverings, insulation, vapor retarder facings, adhesives, and ducts have been Classified by UL in accordance with UL 723 for flame spread and smoke developed indices. These products, or their packaging, are marked with the specific indices, or are marked "FHC 25/50".

**Wiring** — Electrical cables and raceways that comply with NFPA 262 are identified with a suffix "P" on the cable designation (such as CMP, CL2P, or FPLP). These cable and raceway categories include DUZX, DVCS, HNIR, QAYK, and QPTZ.

**Fire sprinkler piping** — All UL Listed CPVC sprinkler pipe and fittings (VIWT) comply with UL 1887. These products are not required to be marked for use in plenums. However, Listed support devices for the sprinkler piping (VIXH) and cover systems for the sprinkler piping (VIXO) have not been evaluated to UL 1887, unless specifically marked for plenum use.

**Pneumatic tubing** — UL Classified pneumatic tubing (QNVT) that has been tested and found to comply with UL 1820 is required to be marked "NFPA 90A". (This should be suitable for use in either a NFPA 90A, UMC or IMC application.)

**Combustible electrical equipment** — Most products tested and found to comply with UL 2043, such as ballasts, loudspeakers, recessed luminaires, information technology equipment, wire positioning devices, germicidal lamps, and other air duct accessories, are provided with a marking or installation instruction which states "Suitable for Air Handling Spaces", "Suitable for Use in Other Environmental Air Space in Accordance with Section 300.22(c) of the National Electrical Code," or similar wording.

Some recessed air handling luminaires (HYXT) are restricted to certain air handling applications, and include markings that identify the intended application.