MECHANICAL CODE DISCUSSION

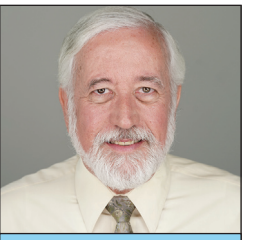
I CHOSE TO WRITE on IMC 602 Plenums, because once or twice a year, I get a call from someone working on a first tenant improvement project who was required to tear out installed materials. This can be a painful, costly experience. Hopefully, this introduction to ceiling plenums, common in large commercial building, will prevent some of you from having to learn the hard way.

I was introduced to the word *plenum* in June 1972, during my first few days working for Bonneville Heating and Cooling. I was assigned to work with another young guy with a year or two of experience, working on 'diggers,' installing underground duct systems at a new apartment project. The plenum was a section of duct placed at the future furnace locations, with collars tapped into the sides, connecting to transite asbestos-cement (AC) pipe. When completed, we encased the sheet metal plenum, collars, tees, elbows, and boots in concrete. A few weeks later, I learned the main duct installed on top of up-flow furnaces was also identified as a plenum. Sometime in the next year, I was assigned to assist a more experienced installer working in a downtown office building where I learned the cavity above a lay-in T-bar ceiling might also be known as a return plenum, eliminating the need to fully duct return air from each inlet.

2021 IMC Chapter 2 - Definition: ***PLENUM***. An enclosed portion of the building structure, other than an occupiable space being conditioned, that is designed to allow air movement, and thereby serves as part of an air distribution system.

Building, fire, and mechanical codes address many concerns created by using the full ceiling cavity as a return plenum, most related to combustible materials within the plenum and the resulting fire and smoke hazards. *Please review IMC Section 602 Plenums and 603 Duct Construction and Installation.*

IMC 602 Plenums


BRENT URSENBACH

BRENT URSENBACH
HVAC EDUCATOR/ EXPERT WITNESS
bursenbach@gmail.com
801-381-1449

Materials: Materials used in plenums must be noncombustible or limited combustible, and have a ***flame spread index* of no more than 25 and a *smoke developed index* of no more than 50.** This includes flex duct, plastic pipes and fitting, tubing, pipe insulation, non-metallic conduits, and everything exposed within the plenum. Look for this information on labels and in specs.

Code Compliance & Approvals
Listed & Labeled Underwriters Laboratories, Inc. File # MH11637
UL-181 Class 1 Air Duct
Flame Spread 25 or Less
Smoke Developed 50 or Less.
Meets the requirements of NFPA 90A & 90B
UMC & IMC and most model codes.
California Insulation Manufacturer #TD-1092.

Electrical wires and cables: Combustible electrical wires and cables must be installed in metal raceways or metal sheathed cable or listed and labeled as meeting the flame spread and smoke developed requirements. Such cables are typically listed as *plenum rated.* Standard thermostat wire is typically NOT *plenum rated.*

Nonmetallic cable ties used to secure cables must be compliant with the Flame Spread and Smoke Developed limits.

Sealing materials should be appropriate for the ductwork materials and the anticipated operating pressures. *Unlisted* pressure-sensitive tapes should not be used.

Gypsum Boards used to form plenums shall be limited to systems where the operating temperatures do not exceed 125° F.

Fire areas: Plenums must be limited to a single fire area to contain fire and smoke. (International Building Code [IBC] Section 707).

Fire dampers must be installed in transfer openings between return air ceiling plenums that are linked together.

Insulation: Mineral wool can be used to manage noise in plenum areas. Kraft paper, bubble foil, and other combustible products do not comply. Also applies to pipe and duct insulation.

Smoke detectors are required in virtually all ceiling return plenum; however, detectors that are part of the fire alarm system may also protect the plenums. See IMC Section 606.

Please consider this an introduction and limited summary of the subject. If you find yourself working in commercial offices buildings, you will encounter these systems. Use common sense, considering reasons for these requirements, while spending time studying the codes. Feel free to reach out with comments or questions.

As we are entering the Holiday Season, may each of you find joy and happiness with those dear to you —Brent. ■