Plenums

602.1 General. Supply, return, exhaust, relief and ventilation air plenums shall be limited to uninhabited crawl spaces, areas above a ceiling or below the floor, attic spaces, mechanical equipment rooms and the framing cavities addressed in Section 602.3. Plenums shall be limited to one fire area. Air systems shall be ducted from the boundary of the fire area served directly to the air-handling equipment. Fuel-fired appliances shall not be installed within a plenum.

ICC 602.1 Commentary

The definition of the term “Plenum” in Section 202 states that a plenum is not an occupiable space being conditioned. In other words, a room or space that is occupied by humans is not a plenum, with the exception of a mechanical equipment room. For example, having a unit heater suspended in a space does not make that space a plenum. This section addresses the use of plenums as part of air distribution systems in buildings. A plenum is an unoccupiable enclosed portion (cavity) of the building structure that is utilized for the movement of air, thereby forming part of an air distribution system. Plenums can be used for supply, return, exhaust, relief and ventilation air, and can occur in ceiling, attic or under-floor spaces, mechanical equipment rooms (air handler rooms) and in stud and joist cavities. Note that Section 602.1 also refers to stud and joist space plenums as a type of plenum; they are addressed in Section 602.3, which is under the plenum Section 602. Note that in other codes, standards and technical documents, a plenum is defined as a “box” (compartment) that is part of a ductwork system. Such “box” is typically installed on the supply or return side of an air handler or furnace and facilitates the connection of multiple ducts...

One scenario that creates confusion is the use of a furnace closet as what appears to be a plenum because the return side of the furnace is open to the closet and is not ducted. The closet has return air grilles in the closet walls or door, and return air is drawn through the closet interior into the furnace. This design is cheap to build and has been common practice in many regions. First, consider that Section 618.6 of the IFGC prohibits this installation for gas-fired furnaces, and Section 918.4 of this code prohibits this installation for oil-fired furnaces. Second, consider that a furnace closet is not any of the spaces listed in Section 602.1. A mechanical equipment room is defined as a room without fuel-fired appliances; therefore, the furnace closet is not mentioned as a plenum in this section, even though it is being utilized like a plenum. This raises questions as to combustible materials exposed within the closet, and the closet is technically not a plenum and thus, not subject to Section 602.2.1. For gas and oil appliances, the practice of using the closet for return air is prohibited, but for electric furnaces and heat pump air handlers, only Section 601.5, Item 7 applies, and Item 7 does not allow return air to be taken from any closet. A similar hazard exists where fuel-fired water heaters are installed in closets.

601.5 Return air openings. Return air openings for heating, ventilation and air-conditioning systems shall comply with all of the following:

7. Return air shall not be taken from a closet, bathroom, toilet room, kitchen, garage, boiler room, furnace room or unconditioned attic.

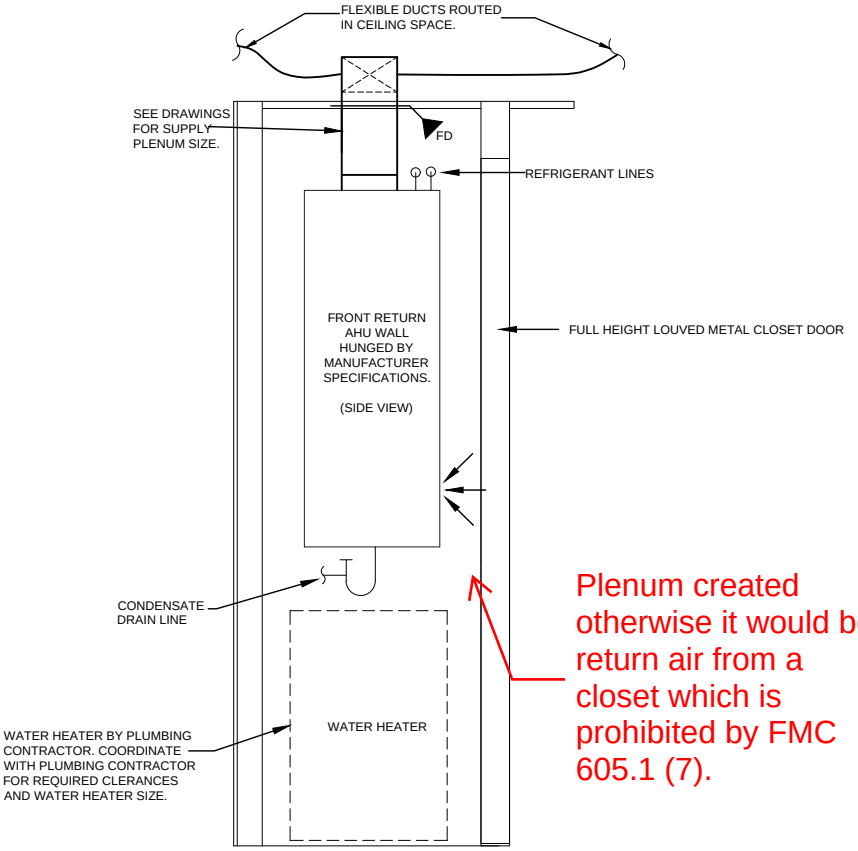
602.2 Construction. Plenum enclosure construction materials that are exposed to the airflow shall comply with the requirements of Section 703.5 of the International Building Code or such materials shall have a flame spread index of not more than 25 and a smoke-developed index of not more than 50 when tested in accordance with ASTM E84 or UL 723.

602.2.1 Materials within plenums. Except as required by Sections 602.2.1.1 through 602.2.1.8, materials within plenums shall be noncombustible or shall be listed and labeled as having a flame spread index of not more than 25 and a smoke-developed index of not more than 50 when tested in accordance with ASTM E84 or UL 723.

Exceptions:
1. Rigid and flexible ducts and connectors shall conform to Section 603.
2. Duct coverings, linings, tape and connectors shall conform to Sections 603 and 604.
3. This section shall not apply to materials exposed within plenums in one- and two-family dwellings.
4. This section shall not apply to smoke detectors.
5. Combustible materials fully enclosed within one of the following:
5.1. Continuous noncombustible raceways or enclosures.
5.2. Approved gypsum board assemblies.
5.3. Materials listed and labeled for installation within a plenum and listed for the application.
6. Materials in Group H, Division 5 fabrication areas and the areas above and below the fabrication area that share a common air recirculation path with the fabrication area.

ICC 602.2.1 Commentary
Previous editions of the code used the term “exposed within plenums” where addressing this issue. However, some designers and installers used that language to install plastic pipe and other combustible material with some insulation wrapped around it, claiming that the material was no longer exposed. If the wrapping material were to become damaged, loosened or destroyed in a fire, the combustible material could be exposed to the fire and produce hazardous smoke that would be spread to other parts of the building through the plenum. The word “exposed” was deleted in the 2006 edition of the code to close this loophole. Note that Exception 5 still allows electrical wiring and cable to be installed in a plenum when enclosed in noncombustible conduit.

Exception 3 exempts one- and two-family dwellings from the requirements of this section. It is important to note that the definition of a dwelling is a building or portion thereof that contains not more two dwelling units. The intention of this exception is to exempt one and two unit dwellings from this section. If a building has more than two attached dwelling units, materials that are exposed in plenums will have to be noncombustible or have a flame spread index of not more than 25 and a smoke-developed index of not more than 50 when tested in accordance with ASTM E84. It should be noted that the construction of a plenum must comply with Section 602.2.



Plenum created otherwise it would be return air from a closet which is prohibited by FMC 605.1 (7).

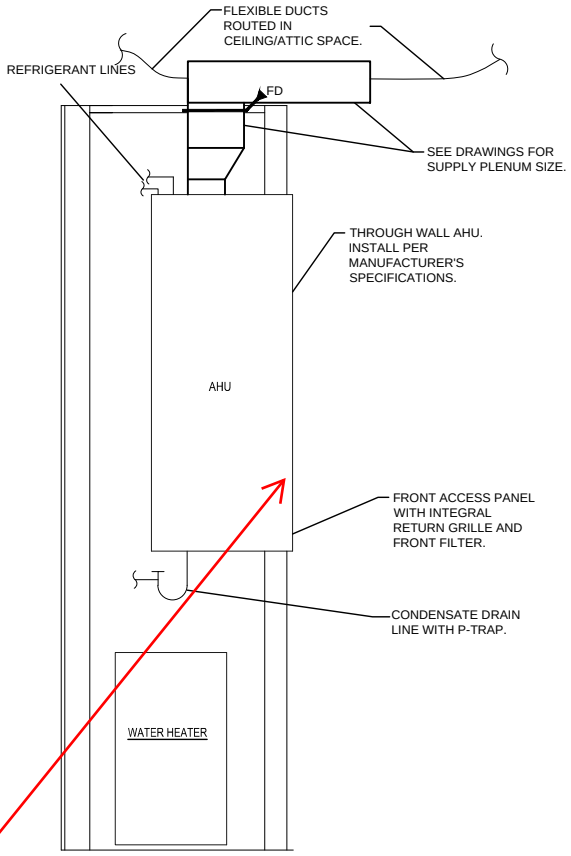
NOTE:

1. ALL MATERIALS WITHIN THE RETURN-AIR OPEN-PLENUM OF THE MECHANICAL CLOSET SPACE SHALL BE NONCOMBUSTIBLE OR AS OTHERWISE ALLOWED BY CODE. THIS INCLUDES, BUT NOT LIMITED TO, THE USE OF COPPER PIPE FOR CONDENSATE DRAIN LINE AND PLENUM APPROVED ELECTRICAL WIRES. PVC WRAPPED WITH ARMAFLEX INSULATION MAY BE USED FOR THE EXPOSED CONDENSATE DRAIN LINE AND CONNECTED TO NON-WRAPPED PVC WITHIN WALLS AND FLOORS.
2. INSTALL PER MANUFACTURER'S RECOMMENDATIONS AND PROVIDE MANUFACTURER'S RECOMMENDED CLEARANCES FOR SERVICE.

Prohibited

AHU MOUNTING DETAIL

NOT TO SCALE



NOTE:

1. INSTALL PER MANUFACTURER'S RECOMMENDATIONS AND PROVIDE MANUFACTURER'S RECOMMENDED CLEARANCES FOR SERVICE.

THRU WALL AHU MOUNTING DETAIL

NTS

Not a plenum because return grille is on the unit face at wall penetration,