# MECHANICAL ROOMS AS RETURN AIR PLENUMS

*by*
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## *Introduction*

Using mechanical rooms as return air plenums can be detrimental to the function of a building. Mechanical rooms are designed to draw air through louvered doors, however, they also draw air from communicating floor, wall, ceiling and attic cavities. If attics and/or crawl spaces are ventilated, unwanted moisture can be introduced to the air conditioning system reducing its ability to cool the space properly while increasing its energy consumption. The moisture drawn in can also lead to mold and mildew growth.

## *Louvered Doors*

A standard louvered door, 30 inches wide by 80 inches high, is capable of returning 1200 cubic feet per minute (CFM) of air which equates to a three-ton air handler. Equipment larger, in the four and five ton sizes, will be starved for air through the louver due to its inadequate size and will draw the remaining air in through unwanted cavities and spaces. In any case, mechanical rooms used as return air plenums are negatively pressurized that may draw in moisture.

## *Mechanical Room Construction*

Seldom is a mechanical room constructed to the same quality as other rooms in a building. The mechanical code requires that the room be constructed of materials approved for use as ductwork. Code also requires that all ductwork be sealed. It is rare to find mechanical rooms built this way. It is for these reasons that the negatively pressurized mechanical rooms tend to draw in air through the unsealed rooms in lieu of through the louvered doors.

## *Introducing Outside Air*

When outside air is introduced into a mechanical room that acts as a return air plenum, it will cause the equipment and ductwork to sweat. The ideal way to introduce outside air is to first duct the return air to the air handler. Then duct the outside air into the return duct. Therefore, all moisture brought in with the outside air will be treated in the air handler. In addition, it is also a good idea to air condition the room, once the return and outside air are ducted. This will keep the room cool and dry.

## *Characteristics of Negatively Pressurized Rooms*

With the air handler fan running, the door will be difficult to open. The caulking around door jambs, baseboards, crown molding, etc. near the mechanical room may be cracked and dust may have accumulated in the cracks. Dust may also have accumulated in or around light switches, receptacles or any other devices mounted in the walls or ceilings.

Indoor relative humidities will be elevated and will tend to fluctuate. Thermostats set with the fans in the “ON” position will continuously create negative pressures. Switch the fan setting to the “AUTO” position so the fan is only on when cooling or heating is required.

## *Solutions*

The best solution is to locate return air grilles throughout the building and duct them back to the air handler. At the air handler, make a sealed connection to the return air duct. This will alleviate the chances of bringing in unwanted moisture from other locations.

Attics and crawl spaces should be sealed. By sealing these areas, moisture levels will be reduced. See Technical Bulletins Numbers 2 and 9 for additional information.

Seal the mechanical room. Install drywall to the walls and ceilings and seal all the joints. Provide a floor that is also sealed at all joints.