

DUCT SIZING With ULTRA-ZONE

When laying out a duct system for a job that will include an EWC Controls zoning system, many people think that there needs to be drastic changes to accommodate the zoning feature, this is not so. The ducts still need to deliver an adequate amount of CFM to the zoned area as they would if it were not zoned. The square footage of the home or building is not changing. What will change is the amount of square footage that will need to be heated or cooled at the same time. With zoning allowing for setback thermostats and different temperature settings throughout the home or building during the day and night, the demand on the heating and cooling equipment should be a lot less than it would be without an EWC Controls zoning system. The demand is less because the amount of square footage will be less due to zoning off areas that will not need to be heated or cooled during certain times of the day.

Since the heating and cooling requirements are now going to be controlled through zones, the concern is the excess pressure or build up of pressure from closed zones. What this means is that when some zones are in setback mode, the airflow to those zones will be shut off. That airflow will cause a pressure build up in the duct system which will be dealt with by using a form of "Bypass" to alleviate that pressure build-up. There are several ways of dealing with this excess pressure and what works for one contractor may not work for another, but EWC has some long standing rules that should be followed. These rules are important to follow to insure proper airflow throughout the system and to insure proper operation of the EWC Controls zoning system.

- * 100% of the rated CFM must always move through the duct work when zoning with Heat Pumps and High cooling demand areas. (i.e. Florida)
- * Always assume the worst case scenario, which is the smallest zone will be the only one to call at any given time.
- * 65%-70% of the rated CFM should always move through the duct system with standard heating systems.

As stated previously, there are several ways to accomplish these rules. EWC Controls recommends two types of methods for two different types of applications. The first application is on 2 and some 3 zone jobs. On these jobs it is possible to oversize the supply ducts to handle the increased pressure of closed zones. For example, oversize each zone supply duct to handle 65%-70% of the CFM. This way when the other zones close, the one zone calling can handle the pressure safely. The supply ducts should never be oversized more than 20% of their intended capacity. (This method will reduce the velocity of the system so it is important to know your customer's expectations of the system).

Another possible method is the Bypass damper, this method will take the excess pressure



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air and running a duct back to the return air and mounting a bypass damper in that run. (See fig. 1)

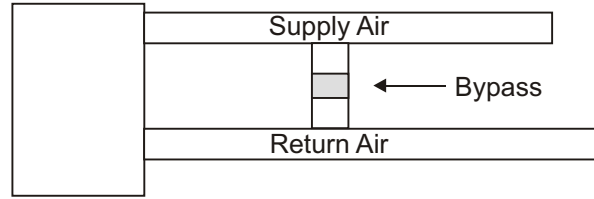


Fig. 1

When tapping back into the return duct the tap is recommended to be at least 6 ft. away from the equipment the farther the better. This is done to insure that the hot or cold air coming off of the plenum has time to mix with the return air before going across the coil again. Temperature sensors are mandatory when using the bypass method. The sensors will prevent any damage to the equipment from overheating or coil freeze-up. EWC recommends the use of the SAS (Supply Air Sensor) with the Ultra-Zone control panels.

If the bypass is used, it would be sized to handle the excess pressure build up under the worst case scenario rule. The reason we use the worst case scenario is that this is the worst possible condition for the airflow. This condition will cause the most excess pressure build up that is possible. The calculation is done by taking the total CFM capacity of the smallest zone, let's say 600 CFM, and subtract that from the total CFM of the system, let's say 2000 CFM.

| | |
|--------------------------|-------------|
| Total system CFM | 2000 |
| Less smallest zone's CFM | <u>-600</u> |
| Bypass amount | 1400 CFM |

The bypass duct would be sized to handle the 1400 CFM which would be the excess pressure when only that one zone calls. The bypass method must be used on zoning systems that will have unequal size zones, applications of 4 zones or more and might be needed on some jobs that will have a smaller number of zones. This will be determined by the contractor at the time of installation. For by-pass damper CFM capacities see the chart on the next page.

A third method, which is used quite frequently is called the "Dump Zone". This method will still use a bypass damper, but it will not go through the return duct. The dump zone will take the excess pressure build-up and dump it into a non critical area of the home. Non-critical can be interpreted many ways, what EWC Controls has seen most commonly used are basements, entrance foyers, work shops or mechanical rooms. These areas are considered non-critical because they are non-living areas where temperature control is not as important. This method should be used responsibly by the installer. Determining what is a non-critical area is not to be taken lightly, this should be a thought-out process keeping the homeowners needs and expectations in mind.

Using some method of bypass is the most effective way of zoning a home or building. Bypassing will accommodate the homeowners or occupants demand for a controlled environment. Some Zoning systems call for bypassing the air into a zoned area, this will NOT allow for maximum comfort. This method allows the bypassed air to over shoot the thermostats temperature set point. What this type of system does is it will leave the zone dampers partially open when they should be fully closed, allowing for the bypass air to flow into an already satisfied zone. This will negate the effect of zoning and drastically reduce the comfort level, and savings potential of the home.

Zoning is the control of the airflow from the HVAC equipment that allows for Individual Room Temperature Control. With proper installation there is no reason why an individual room can not

Duct design will be uniquely different from one zoning job to another and because of that, unfortunately there is no single way of laying out a zoning system. What EWC Controls has tried to do is to give you the critical information that is needed before a zoning system can be installed. We have also tried to show a few common techniques that are being used by others who are installing the EWC Controls zoning system. These are just a few suggestions, other methods and techniques can be used if they are more successful for your applications.

Bypass dampers and their CFM capacity

| Rectangular | | Round | |
|-------------|-----------|------------|-----------|
| 12"x8" PRD | 1,000 CFM | 8" PRD-RD | 400 CFM |
| 12"x10" PRD | 1,200 CFM | 10" PRD-RD | 750 CFM |
| 12"x12" PRD | 1,400 CFM | 12" PRD-RD | 1,200 CFM |
| 20"x8" PRD | 1,600 CFM | 14" PRD-RD | 1,800 CFM |
| 20"x10" PRD | 2,000 CFM | 16" PRD-RD | 2,400 CFM |
| 20"x12" PRD | 3,000 CFM | | |