

# Arzel Zoning Technology, Inc.

## Bypass Sizing Chart

### What determines bypass need and size ?

If the smallest zone moves less than 40% of the total cfm at design static, you might need a bypass duct

### Dynamics of Air Flow and Zoning

To maintain maximum heat transfer and peak effectiveness with the smallest zone calling, we attempt to deliver 200% of design cfm. To deliver 200% of design cfm, we must increase static pressure by approximately 400 to 500% .  
 In most applications the smallest zone can deliver twice the design cfm without air noise issues.  
 Blower performance (cfm output) decreases up to 25% as the static pressure increases.  
 Bypass air does not provide BTU exchange at equipment and is used solely to eliminate air noise caused by elevated static and velocity.  
 Velocity increases at the open branch runs and decreases at the main trunk and equipment.

### Variables that influence Bypass Sizing

**If Equipment Size** is larger than 5 tons , the blower has the capacity to deliver higher static pressure. (use 400 cfm/ton in step #1)

**If Location of smallest zone** is very close to equipment and has minimal friction, next size larger bypass might be appropriate  
 If the smallest zone is far from equipment and has significant friction, you might need to decrease bypass size

**If the Size of the smallest zone (sq ft)** compared to cfm output at 200% increase is out of balance, it may require larger bypass  
 Excessive cfm into a small area might cause overshooting of thermostat set-point

**When Trunk Dampening** static pressures in open supply duct will increase at a higher rate ( use 400 cfm/ton for total in step #1)

**In Flex Duct Applications**, it might require higher static to deliver max cfm to the small zone.  
 (downsizing bypass might be appropriate)

### When in doubt, call for application assistance

1-800-611-8312 / 216-831-6068

- (1) Determine Total CFM @ max static pressure
- (2) Subtract CFM of smallest zone @ max static pressure
- (3) Size bypass for remaining cfm per chart

#### (1) Approx CFM @ max static pressure

A/C Tonnage	Adjusted CFM
2	600
2.5	750
3	900
3.5	1050
4	1200
5	1500
Over 5 Ton	400 cfm / Ton

#### (2) Max CFM of smallest zone

5" Round	140 CFM
6" Round	200 CFM
7" Round	280 CFM
8" Round	340 CFM
10" Round or 8" X 10"	550 CFM
8" X 12"	600 CFM
8" X 14" or 10" X 12"	700 CFM
12" Round or 8" X 16"	800 CFM
8" X 20"	1000 CFM
10" X 20"	1260 CFM

### Subtract (2) from (1) to find required bypass CFM (3)

#### (3) Size Bypass per chart below

(3) CFM @ 1500 to 2000 fpm	Round Metal pipe	Rectangle Metal duct
300 - 400	6"	3.25" X 10"
400 - 550	7"	3.25" X 12"
550 - 750	8"	8" X 6"
750 - 1150	10"	8" X 10"
1150 - 1600	12"	8" X 16" or 10" X 12"
1600 - 2100	14"	8" X 20" or 10" X 16"

### When bypassing over 2100 cfm, use two bypass ducts

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