

Using Supply Diffusers for Return/Exhaust Air Applications

Supply air diffusers can most certainly be used for return air applications, rather than using the more traditional return air grilles such as eggcrate (90% free area), fixed deflection louvered face (50-75% free area typical) and perforated face (51% free area). The reason for doing so is mainly aesthetics, where the building owner or architect desire a uniform appearance for all ceiling mounted air devices. Architectural Plaque Type Diffusers, such as the UNI2 are therefore very popular. Most standard return air grilles also have a potential shortcoming in that they permit sight view directly into the ceiling plenum from some angles.



Architectural Plaque
Diffuser (UNI2)

However, there are a few caveats to consider. Standard return grilles are designed to be economical and handle a higher air volume, due to a higher free area than supply diffusers. An adjustment for pressure drop and sound is also required when using a supply diffuser as a return, as return air is now entering the smaller face area rather than the larger neck area, which results in an increased static pressure drop and therefore an increased sound level. This usually requires more return diffusers than return grilles to handle the same air volume at a given acceptable room NC level.



Stamped Square Louvered
Face Diffuser (RNS3)

Performance Correction for Return Air Diffuser Applications:

Return Air Negative Static Pressure Drop (-SP) = Supply Air Total Pressure Drop (TP)

Return Air NC Level = Supply Air NC Level + 4.

Example. UNI2 24x24 ceiling module with a 10" round neck at 490 cfm:

Supply TP = 0.155" wg and NC = 25

Return -SP = 0.155" wg and NC = 29 (25+4)

The largest neck size available should also be considered for ductless return applications to increase capacity and reduce the number required (diffuser cost is the same). For example, a UNI2 24x24 ceiling module with a 15" round neck at the same 490 cfm as above, has a -SP of only 0.065" and an NC level less than 20.

At the same 0.155" -SP drop as above, air capacity is increased to approximately 760 cfm and NC is 21.

At a similar NC 29 as above, air capacity is increased to approximately 935 cfm and 0.235" wg -SP.

Julian Rochester, VP Marketing