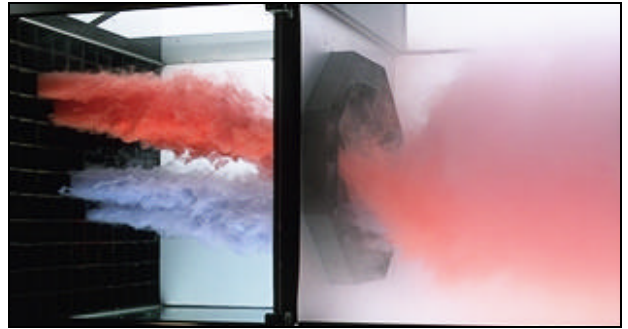


HVAC MIXING UPDATE



Comparing the Alternatives to Combating Air Stratification

During the winter months, stratification results in a variety of problems. Perhaps the most widely recognized problems are frozen coils and low temperature limit controller (freezestat) trips. In many cases, air handling units are unable to operate when the outside air temperature falls below 25-30° Fahrenheit. Unfortunately, the solution to this problem has often been to close outside air dampers. Other problems associated with winter stratification are poor mixed air temperature control, and uncertainty relative to the distribution of fresh air to occupied spaces. CHART 1 below details various alternatives used to combat stratification and whether these alternatives have an impact on the primary problems created by air stratification. As can be seen in this chart, the Air Blender® mixer is the only alternative/method that has a known positive effect on all the problems associated with stratification.

Method	Freeze Protection	Control Accuracy	OA Distribution
Glycol	Known	No Effect	No Effect
Baffles	Unknown	Unknown	Unknown
Dampers	Unknown	Unknown	Unknown
Heat Recovery	Known	Known	No Effect
Averaging Bulb	No Effect	Known	No Effect
Air Blender® Mixer	Known	Known	Known

CHART 1: Details the **effectiveness** of the various methods in combating the primary problems associated with air stratification.

Glycol and Antifreeze Additives

Many solutions have been proposed for stratification found in HVAC systems. For winter stratification, designers often use some type of antifreeze solution to prevent frozen coils. While this solution does prevent frozen coils, it does not address the problem of control inaccuracies, coil inefficiencies, or poor outside air distribution throughout the return air stream. In addition, glycol additives serve to increase pump horsepower and decrease cooling capacity.

Damper Mixing

Others have used very small dampers and high velocity jets to mix the air streams. This solution may provide mixing, but there is no way to predict how much mixing will be achieved and the small dampers may not provide the correct control of the system or may increase the pressure drop of the mixing box to unacceptable levels.

Field-Built Baffles

Still others suggest the use of baffles to help mix. This method may provide mixing, but there is no way to know how much mixing will be achieved or the pressure requirements of the arrangement. In addition, the rapid changes in velocity often result in uneven velocity profiles that affect the performance of any components located downstream of the baffle plates.

Averaging Bulbs

The controls industry devised the Averaging Bulb Thermostat in an attempt to control stratification. However, this device does not eliminate stratification it only averages the temperature variations to improve sensor accuracy. Recently, heat recovery has been proposed as a solution to stratification. Like the other methods, this solution can help prevent frozen coils, but it does not address such issues as outside air distribution. The chart above summarizes the various approaches to solving stratification problems and their affect on several different aspects of stratification.

Static Air Mixer Solution

The Series IV Air Blender® mixer and its related mixing systems address all of the areas affected by stratification and mixing. The mixing provided by the static mixer helps eliminate the freeze potential and control inaccuracies created by stratification. It also helps insure that the outside air is thoroughly distributed throughout the supply air stream. Additionally, the velocity profile downstream of the mixer has a minimal effect upon the components located downstream of the mixer. Furthermore, the pressure drop is a known, predictable amount. By including the Series IV in the original equipment design, costly modifications and complaints after startup can be eliminated. CHART 2 below details the performance benefits of this alternative compared to the alternative methods described above.

Method	Pressure Drop	Mixing Effectiveness	Velocity Profile
Glycol	No Effect	No Effect	No Effect
Baffles	Unknown	Unknown	Unknown
Dampers	Unknown	Unknown	Unknown
Heat Recovery	Known	No Effect	No Effect
Averaging Bulb	No Effect	No Effect	No Effect
Air Blender® Mixer	Known	Known	Known

CHART 2: Details the **performance benefits** of the various methods