



**DADANCO[®]
EUROPE**

... Breathing Life Into Your Building ...[®]



**CLASSROOM SOLUTION
USING ACTIVE CHILLED BEAMS**

Classroom HVAC Problems

Many people outside of the HVAC industry judge an HVAC system's ability to provide a comfortable environment based solely on its ability to control temperature. Most often ignore or place less importance on other aspects affecting comfort such as noise, humidity and ventilation levels.

Noise - Studies have shown that noise levels can significantly affect the learning environment. ANSI standard S12.60 for classroom acoustics requires a maximum background noise level of 35 dBa (about NC-27). With the conventional HVAC systems typically used in schools today (fan-powered VAV, fan coils, unit ventilators) these noise level requirements can be difficult if not impractical to attain.

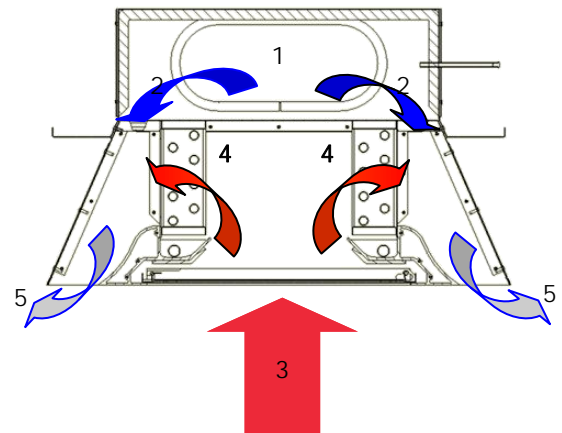
Humidity - Studies have also shown that mental performance is affected by humidity levels. Most classrooms are fully occupied for much of the day and as such are most often at their full design latent cooling load. Because classrooms are most typically perimeter zones, their sensible cooling demand will vary from the full cooling design load to no cooling load at all such as in the spring and fall. With conventional HVAC systems (VAV, fan coils, unit ventilators) this often leads to a loss of humidity control in the classroom.

Ventilation - The issue of ventilation air rates and compliance with the requirements of ASHRAE 62 can also be an issue with the more conventional systems. With a conventional VAV system, the ventilation air requirement will likely not be met at part load conditions unless the air-side system is operating on a full economizer mode (much in doubt on temperate, yet humid days).

Active Chilled Beam Solution

Active chilled beams are continuously supplied with primary air by the central air handling system. This primary air can be often be as low as the ventilation air requirement, which is supplied to the active chilled beams at a constant flow and pressure.

Primary air is cooled or heated to handle a portion of the temperature-driven room sensible loads, while in the summer it is cooled and dehumidified sufficiently to handle all of the internally generated moisture-driven room latent loads.



Primary air (1) is introduced into the active chilled beam through a series of nozzles (2). Due to the fluid dynamic properties of nozzles, room air (3) is drawn into the active chilled beam through a secondary water coil (4) by an induction process.

Induced room air is cooled or heated by the active chilled beam's water coil to the extent needed to control the room temperature. Induced room air (now cooled or heated) is then mixed with the primary air and the mixed (supply) air (5) is then discharged into the room.

Benefits

Benefits of an active chilled beam system in a classroom application are numerous.

- A constant volume of primary air provides the full ventilation air required and humidity control at all times and at all sensible load conditions.
- Draft-free uniform temperatures are achieved throughout the classroom due to the thorough mixing of the primary and temperate induced room air.
- Very low noise levels.
- The energy consumption is significantly reduced as the primary airflow is much lower than other conventional “all air” HVAC systems (typically about 60-70% less in a classroom application).
- There is an opportunity to reduce heating plant energy consumption as the use of high efficiency boilers and water source/ geothermal heat pumps are optimized by the lower hot water temperatures .

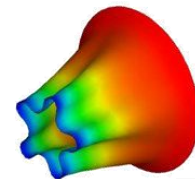


- There is also an opportunity to reduce the chiller plant energy consumption as the use of water-side economizers and higher COP chillers are optimized by the higher chilled water temperatures.
- School maintenance is reduced as Active Chilled Beams have no moving parts.

(For a thorough review on the use of Active Chilled Beams in classrooms, refer the technical paper which can be found on our website.)

DADANCO Technology and Advantages

DADANCO Active Chilled Beams utilize unique nozzle and unit fluid dynamics technology. This patented technology provides very high air entrainment ratios at low operating static pressures.



Due to the new nozzle design and increased entrainment ratios, DADANCO is able to utilize more heat transfer surface. This dramatically increases cooling and heating output of the DADANCO units for the same primary airflows.



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