Energy Tax Savers, Inc.
The EPAct 179D Experts

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The EPAct Tax Aspects of Chilled Beam Technology

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Chilled beams present an excellent opportunity for reducing energy costs.

A highly efficient HVAC technology that has been around for over 40 years in Europe has been adopted in the U.S. within the past few years. Chilled beams, also known as induction diffusers, present an excellent opportunity for reducing energy costs, earning LEED certification and qualifying for the EPAct tax deduction. Chilled beams are the new alternative to the traditional VAV (variable air volume) systems. This cooling system uses re-circulated water to cool hot air that has risen to the beam. Once cool, the air falls back to the floor and the cycle begins again, known as the induction effect. Unlike VAV systems, reheat occurs minimally with the use of a chilled beam. Chilled beams are optimal for spaces like laboratories that need to maintain high cooling loads and spaces that demand a high comfort level.

EPAct 179D Tax Incentives

Under U.S. Code Sec. 179D, as enacted by the Energy Policy Act of 2005 (EPAct), building owners who make qualifying energy-reducing investments can obtain immediate tax deductions of up to $1.80 per square foot. If the building project doesn't qualify for the maximum of $1.80 per square foot immediate tax deduction, there are tax deductions of up to $0.60 per square foot for each of the three major building subsystems:

1) Lighting
2) HVAC
3) Building envelope (The building envelope is every part of the building's exterior that touches the outside world, including: roof, walls, doors, windows and foundation.)

Types of Chilled Beams

There are two types of chilled beams, passive and active. Both types consist of a box with a small coil which can be either hung or recessed in the ceiling. Since they do not have any motors or fans, chilled beams create little noise. Passive chilled beams are dependent upon natural convection, whereas active chilled beams consist of air nozzles or holes and have an outside air supply generated from an air handling unit (AHU). A drawback, however, is that there is no ventilation for air therefore requiring a separate ventilation system.

A key aspect of using passive chilled beams is finding the appropriate locations. They produce a constant flow of cool air which can be uncomfortable for individuals working near the beams. In addition, passive chilled beams should not be placed directly above equipment generating large amounts of heat as it will interrupt the flow of cool air coming from the beam.

Active chilled beams are the third generation of chilled beams. They are effective for sensible and latent heat loads and they can be used to heat and cool the space. The active introduction of airflow creates a much faster rate of the natural induction effect compared to the passive chilled beam.

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Best Spaces for Chilled Beams

While chilled beams have lower capacities than standard air diffusers and require more ceiling space, these systems improve energy efficiency if used in the appropriate space.

In Europe, chilled beams are commonly found in office buildings. This is due to their ability to reduce duct space therefore allowing lower floor-to-floor heights and less building skin. Chilled beams are appropriate for buildings where floor-to-slab height is minimal since they are easily adaptable.

In the U.S., chilled beams are increasingly popular for laboratories. For safety purposes, laboratories must have a fixed amount of ventilation air. Through the use of active chilled beams, laboratories can see a significant reduction in air system usage since ventilation air is the only source of air necessary. Most labs use VAV systems which supply air from the AHU at the same temperature for all rooms. This leads to reheating each space that requires more heat, therefore expending a great deal of energy. Chilled beams avoid doing so by adjusting the flow of chilled/hot water across the beams in each individual space. In labs where there is a high use of fume hoods, chilled beams should not be used.

It is important to note that in spaces where equipment loads are high, chilled beams are not effective because too many would be required to cool the space. Condensation also reduces the efficiency of active chilled beams. If the humidity level of the primary air supply cannot be controlled, chilled beams are not recommended.

Cost Efficiency

In comparison to VAV systems, initial costs can be up to 15 percent more for chilled beams because they have recently been introduced into the U.S. market. The large savings in energy costs offsets high initial costs however. Overall costs are lower when considering the reduction in fan, duct, heat exchanger and boiler elements. Chilled beams also have lower maintenance costs which includes, at most, vacuuming the beam coils every three years. Unlike other systems, they do not require an equipment room therefore increasing the amount of space available for other activities. Chilled beams also use less ductwork than other systems. There may even be a reduction in electrical power being that active chilled beams greatly reduce fan usage.

Conclusion

There are many advantages to incorporating chilled beams into a building. Additionally, it increases the likelihood of qualifying for EPAct 179D tax deductions.