



Active & Passive Beams

**price**®

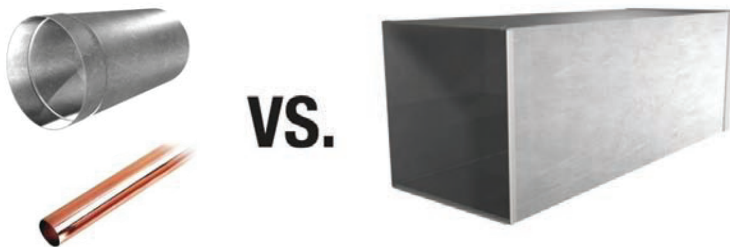
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# Introduction

Beam systems are an alternative to traditional “all-air” conditioning systems.

Beams use water to move energy through a building and service the building’s sensible (dry) cooling load, relying on the air-side simply to meet ventilation requirements and satisfy latent (wet) loads. This drastically reduces primary air volumes supplied to a space and leads to energy savings, improved comfort levels, and the ability to effectively integrate a dedicated outdoor air system (DOAS).

Beam systems result in energy savings since water is more efficient at transporting heat than air is.



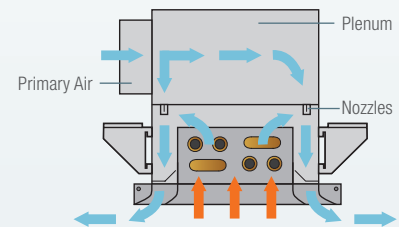
The smaller footprint of a beam system allows for a greater mechanical and architectural flexibility.

All-Air Systems	Beam Systems
Use air for both sensible and latent load	Use water for sensible load and air for latent load and ventilation
Generally re-circulate air	Generally supply up to 100% outside air

There are two types of beam products – Active Beams and Passive Beams.

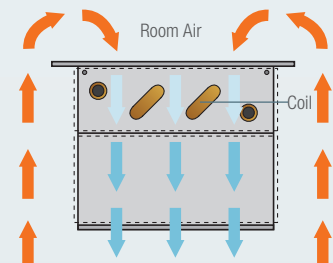
## Active Beams

- Supply primary air for ventilation and increased capacity.
- High velocity primary air induces room air across the coil.
- Inject combined primary and induced air into the room.
- Provide heating and cooling.



## Passive Beams

- Induce room air across a coil.
- Require a separate ventilation system to condition latent loads, as no primary air flow is supplied.



# Advantages

## Energy Efficiency

Active and passive beam systems can contribute to significant energy savings.



- Beams can contribute to energy savings in the building which can help achieve LEED credits.
- Relying on pumping power as opposed to fan power to transport energy through the building often results in energy savings.
- Increased use of wet-side economizer and a reduction in chiller lift contribute to plant efficiency.

## Quiet Operation

The reduction in air-side mechanical equipment inherent of a hydronic system results in less noise, producing a quieter, more comfortable occupant experience.

## Indoor Air Quality

Beams can reduce the total air volume requirement to a space, allowing the system to use 100% outside air. This reduces the amount of re-circulated air in the space, thereby improving indoor air quality.

## Customization

Price beams are available in a variety of configurations that allow the architect to integrate them seamlessly into a building's design. A variety of aesthetical face options and colors are available, including customized perforation.

## Reduced Mechanical Footprint

The lower supply air volume minimizes ductwork requirements, and results in reduced plenum heights. This allows beam systems to be installed in tight spaces, creating the potential for lower construction costs, higher ceilings, and more usable floor space. In addition, the air handling equipment can also be downsized.

## Lower Maintenance Costs

Due to the reduction in moving parts and mechanical equipment (fans, filters, drain pans, and condensate pumps) associated with beams, these systems typically have lower maintenance costs than all-air systems.



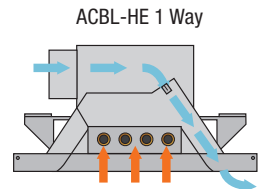
Active beam installed along the perimeter of a room.

# Products



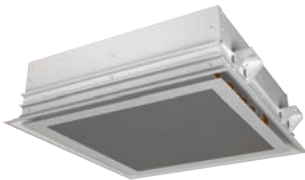
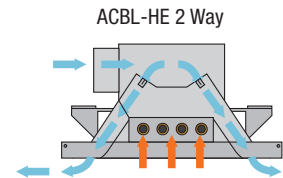
## ACBL-HE - Linear High Efficiency Active Beam

The Price ACBL-HE is a very versatile active beam. It is available in 1 or 2 way discharge modes. This model provides higher transfer efficiency and increased capacity when a space requires larger loads.



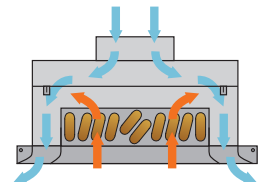
## ACBL-HE - Security Beam

The Price ACBL-HE Security Beam features a high gauge aluminum perforation and tamper proof fasteners, eliminating the risk posed to occupants and removing the ability to hide contraband. This beam complies with California Title 24.



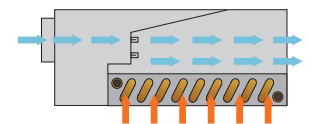
## ACBM-HE - Modular High Efficiency Active Beam

The Price ACBM-HE is used for both heating and cooling. This active beam provides 4 way discharge into the space and is ideal for internal installations in T-bar lay-in applications.



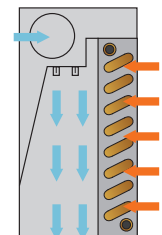
## ACBH - Horizontal Active Beam

The Price ACBH active beam is typically installed in bulkheads and discharges the mixed, primary and induced air horizontally. This beam is often coupled with a grille on the return side and slot diffuser or grille on the discharge. Ideal applications include bulkhead locations in hotel rooms, patient rooms, and offices.



## ACBV - Vertical Active Beam

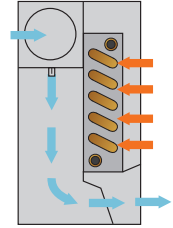
Similar to the ACBH, the Price ACBV discharges the mixed, primary and induced air in a vertical orientation, either upwards or downwards. This active beam is ideal for retrofitting induction units in existing spaces, and is typically placed along the perimeter under or above windows.





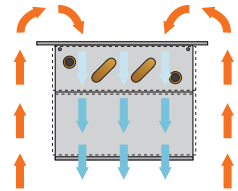
### ACBC - Floor Mounted Active Beam

The Price ACBC is an exposed perimeter active beam suitable for offices, schools, hotels, and lobbies. It can be used as a standalone product or can be connected in series with other ACBC units to create a continuous look.



### PCBL - Linear Passive Beam

The Price PCBL is a high capacity passive beam. This unit operates without an air supply, solely through free convection, to cool the occupied zone. It is best coupled with an active beam, displacement or UFAD system. The PCBL can accommodate various installation options, such as above perforated ceilings, mounted in suspended ceilings, or exposed applications. It is typically installed along aisles and the perimeter.



## Controls & Accessories



### PIC-HP - Price Intelligent Controller for Radiant Products

The Price PIC-HP is the ideal control solution for managing the control requirements of hydronic systems in both heating and cooling. It includes BACnet networking as standard with various sensor and thermostat options available. Typical control strategies include modulating waterflow, modulating airflow, demand control ventilation and occupancy detection. Thermostat options: Dial, LCD with Motion Sensor, Wireless.



### Radkits and Piping Packages

The Price Radkits provide complete piping packages that range from a basic setup with hoses to a deluxe setup that includes hoses, automatic temperature control valve, and automatic balancing valve.

## Desiccant Dehumidification with Energy Recovery



### Dedicated Outdoor Air Unit

Price desiccant dehumidifiers offer highly efficient dedicated outside air supply at low dewpoints for optimization of active beam systems. They also recover energy that would otherwise be expelled. The benefits of this system include a reduction in primary air volume, which lowers fan power consumption, and an increase in beam efficiency.

### Applications

- Energy efficient commercial construction
- K-12 schools
- Post secondary education
- Humid climates

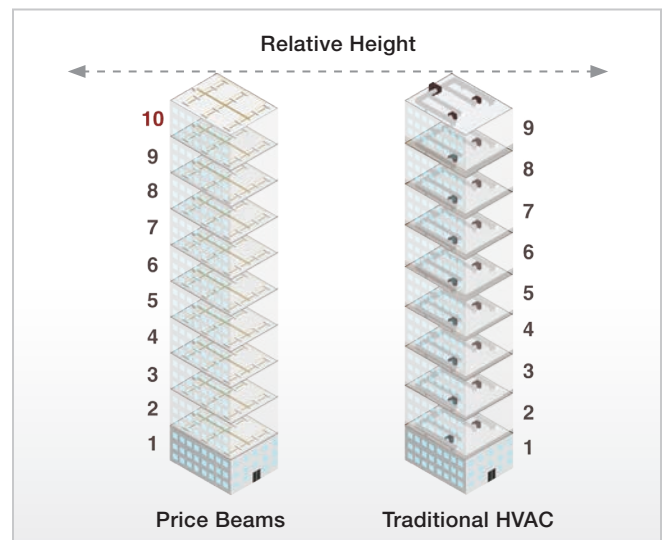


## Commercial Office Buildings

Energy efficiency is a major design criterion in commercial construction, particularly owner-occupied buildings. Beam systems can improve the energy efficiency of these buildings through significantly reduced fan power and reheat requirements, while also improving occupant comfort and reducing noise levels. In addition, the lower ceiling height made possible by a beam systems can lead to lower floor to floor height and a lower first cost.

### Mechanical Flexibility

Price Beams have a smaller footprint than other HVAC systems, making them ideal for installations in tight spaces and for retrofit applications. The reduction in air-side mechanical equipment results in a quieter, more comfortable occupant experience and creates the potential for lower construction costs, higher ceilings and more usable floor space.



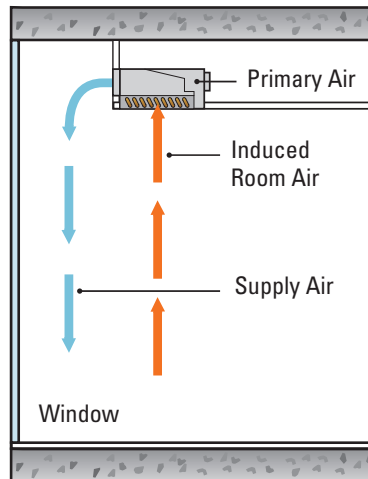
Active and passive beams can save space, resulting in lower floor to floor heights.

The ACBH and ACBV are highly customizable, providing high transfer efficiencies in a compact one way discharge design. The narrow, slim profile makes them ideal for tight spaces, while the horizontal and vertical throw configurations expand the range of installation types beyond ceiling mounted horizontal discharge.

### ACBH - Horizontal Active Beam

The ACBH is suitable for bulkhead or soffit installation, and discharges the primary and induced air horizontally. Exposed applications with a free-hanging and unfinished unit are suitable for sensible cooling within a terminal unit without fans.

- Ideally suited for curtain wall applications with discharge toward the perimeter.



ACBH air flow pattern.

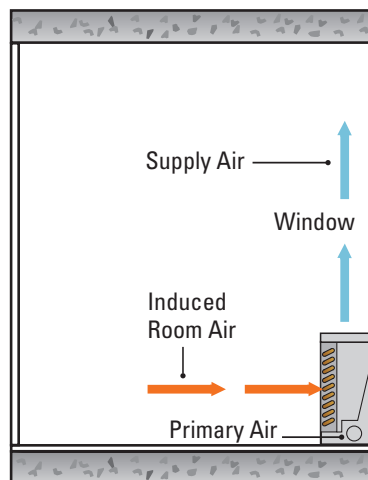


ACBH - Bulkhead installation with curtain wall.

### ACBV - Vertical Active Beam

The ACBV is suitable to be mounted in the ceiling or along walls, and discharges the primary and induced air in a vertical orientation. The vertical coil can accommodate a drain pan for condensation, though dry coil operation is strongly recommended.

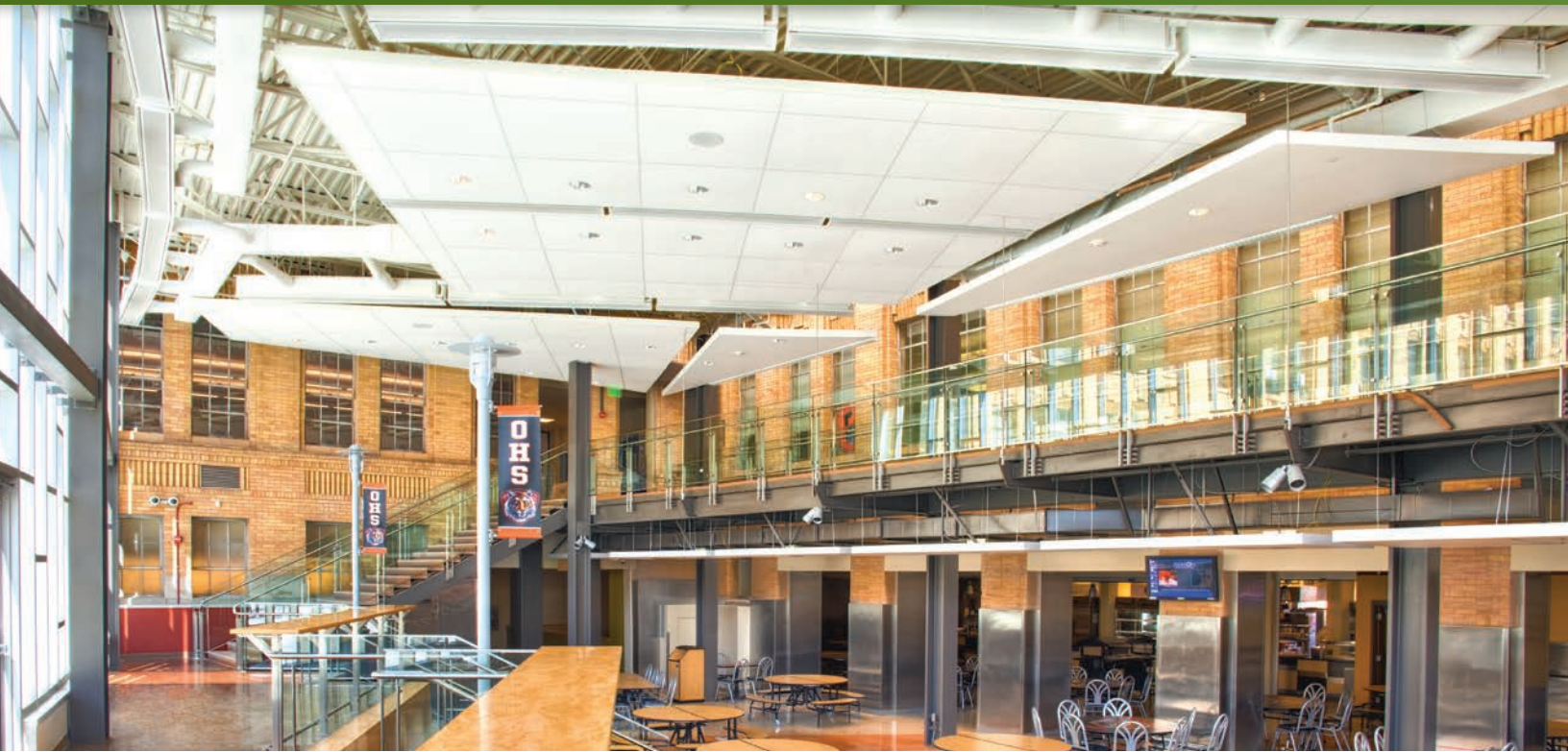
- The ceiling mounting is suitable for vertical downward discharge where the plenum can be used for return air and can be helpful in high ceiling or perimeter locations.
- The wall mounting with upwards discharge can be used to retrofit the core of cabinet induction units.



ACBV air flow pattern.



The ACBV is an ideal option for retrofitting existing induction units.



## Schools

Schools are another application that can benefit greatly from active and passive beam systems. Similar to office buildings, the benefits of a lower supply air volume to the space include lower fan power, shorter plenum height, reduced reheat requirements and lower noise levels.

Furthermore, energy savings, low noise levels, thermal comfort and high air quality are critical design criteria for schools, and beam systems provide all four. Reduced fan power leads to energy savings and reduced noise levels, and the potential for introduction of a DOAS improves air quality.

### ACBC - Floor Mounted Active Beam

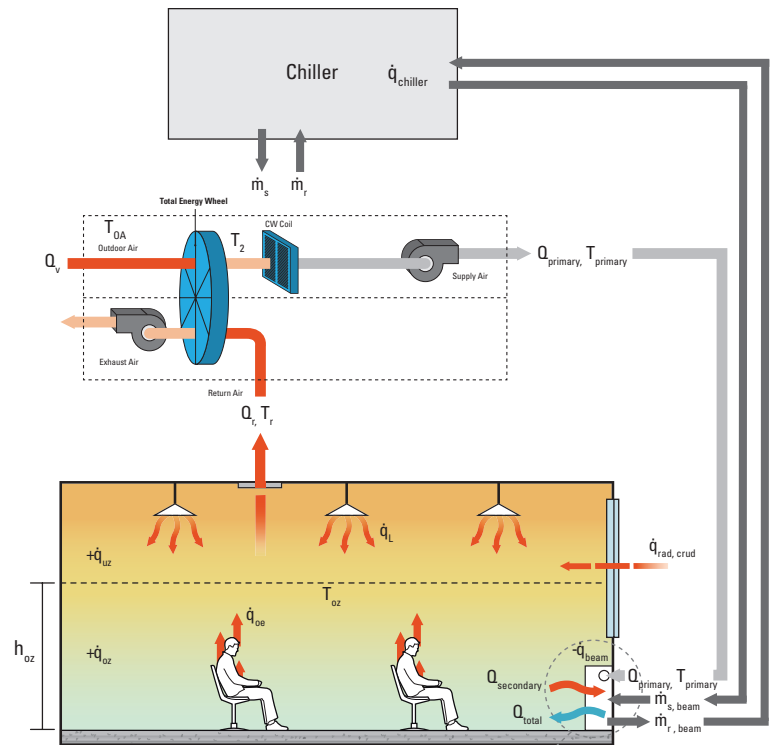
The ACBC's design makes it perfect for classroom applications. It supplies low velocity fresh air at ground level, and with no fan or motor, it reduces noise levels to create an ideal student learning environment.

- Discharges at low level and low velocity
- Easily removable face for maintenance
- 16 gauge heavy duty cabinet
- Vertical coil with drain pan and lint screen
- Integral piping and valves

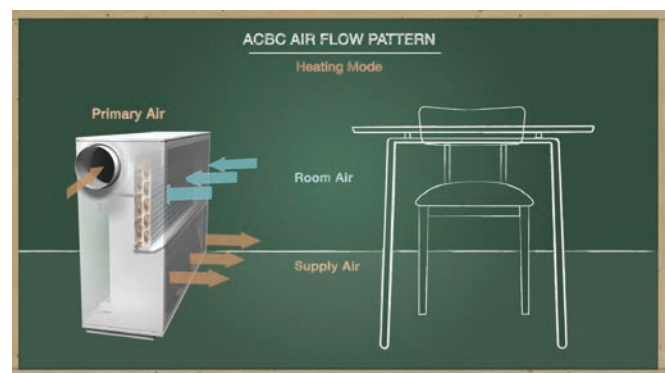
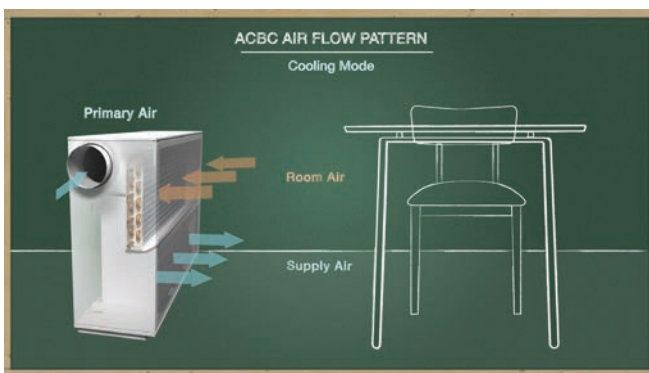


## Energy Savings

By supplying fresh air and inducing room air at low level, the ACBC promotes stratification. When used with a dedicated outdoor air system, all of the room loads positioned above the occupied zone are not seen by either the room coil, (because it is located below these loads) or the AHU coil (because the air is directly exhausted). In this fashion, the system serves to reduce the amount of room loads that are managed by the chiller. This translates into significant equipment and energy savings.



## Air Flow Strategies



In cooling mode, the ACBC operates similarly to other ceiling mounted active beams, using primary air to pressurize an internal plenum and force it through nozzles behind a water coil. This draws room air through the coil where it is conditioned and mixed with primary air before being delivered back to the room.

In heating mode, the ACBC supplies warm primary air through the bottom of the diffuser, delivering it to the perimeter of the room. It can also draw room air through the unit, where it is heated over a water coil.

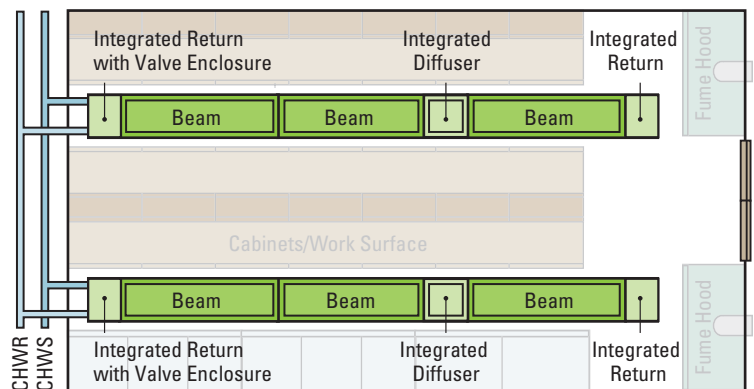


## Laboratories

The use of active beams in load driven laboratory spaces can offer significant energy and space savings. Using the example shown in the table, an all-air HVAC system is compared to an active beam system for a lab with a total load of 70 Btu/hft<sup>2</sup>. The all-air system has a sensible cooling capacity of ~20 Btu/hcfm, while the beam system is selected at 60-80. This increase in cooling capacity per cfm of supply air means that the space can be conditioned with significantly less air and the associated infrastructure (air handling units, ductwork, valves, etc). This infrastructure is replaced with a piping system which transports energy through the building more efficiently.

### Layout Considerations

When laying out active beams, distribution patterns and throw should be considered to avoid collisions that could result in drafts in the occupied space. Whenever possible, the beam should be placed directly above heat sources to increase capacity and provide optimal air distribution.



Beams are often located parallel to the benches allowing for more pleasing sightlines, ideal comfort considerations, and integration with other services such as lighting.



### **ACBL-HE**

Linear Appearance · High Capacity · Design Flexibility

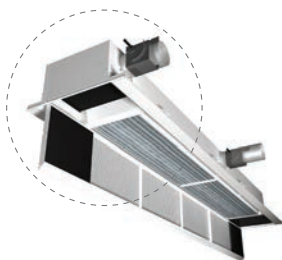
The most prevalent selection in load-driven laboratory spaces due to its linear appearance and design flexibility. Laboratories are often linear spaces with intense loads, dominated architecturally by the furniture and/or curtain wall module, making the use of a linear beam ideal.



### **Wings & Casings**

Exposed Installation · Hides Services · Improves Air Pattern

In cases where the beams are installed without a suspended ceiling, it is important to use wings or a casing to ensure that the horizontal air pattern from the beam is maintained. These additions may also be used to hide services such as plumbing, power and IT, and ductwork.



### **Integrated Diffusers**

Consistent Look · Make-up Air or Purge · Ideal Air Pattern

When different air change rates are used for occupied and unoccupied hours, it is advantageous to select beams for the lower air flow rate, maximizing their efficiency and using a separate air inlet to provide the additional air for the occupied hours or a purge mode. By using an integrated diffuser, the supply of make-up air and beam capacity are decoupled, while maintaining an integrated linear aesthetic.



### **Integrated Return and Valve Enclosure**

Ideal Location · Hidden Return · Convenient Access

The Price ACBL-HE linear beam discharges air horizontally while room air is drawn into the coil from below. The optimal location for an air return (or exhaust), from a ventilation effectiveness standpoint, is in line with this induced air path. The integrated return option allows for optimal placement for the return, and provides a continuous linear aesthetic. It is also common to integrate control or isolation valves for simplified access.



### **Slimline Coupling**

Continuous Appearance · Single Air Connection

The linear arrangement in labs makes end-to-end placement of the beams common. The slimline coupling option allows beams to be connected in series while appearing as a single ceiling element. This is especially important from an aesthetic standpoint. It is also possible to use a single air connection, configured so that the air path is in series.



### **Integrated Headers**

Quick Installation · Tidy Piping · Parallel Connection

When Price ACBL-HEs are located end-to-end, it is generally preferred to connect the coils in parallel to minimize the coil entry water temperature and maximize the coil capacity. The integrated header option provides the piping infrastructure for connected beams on the side of the previous beam, so that only quick flexible connections are required on site.



## Healthcare

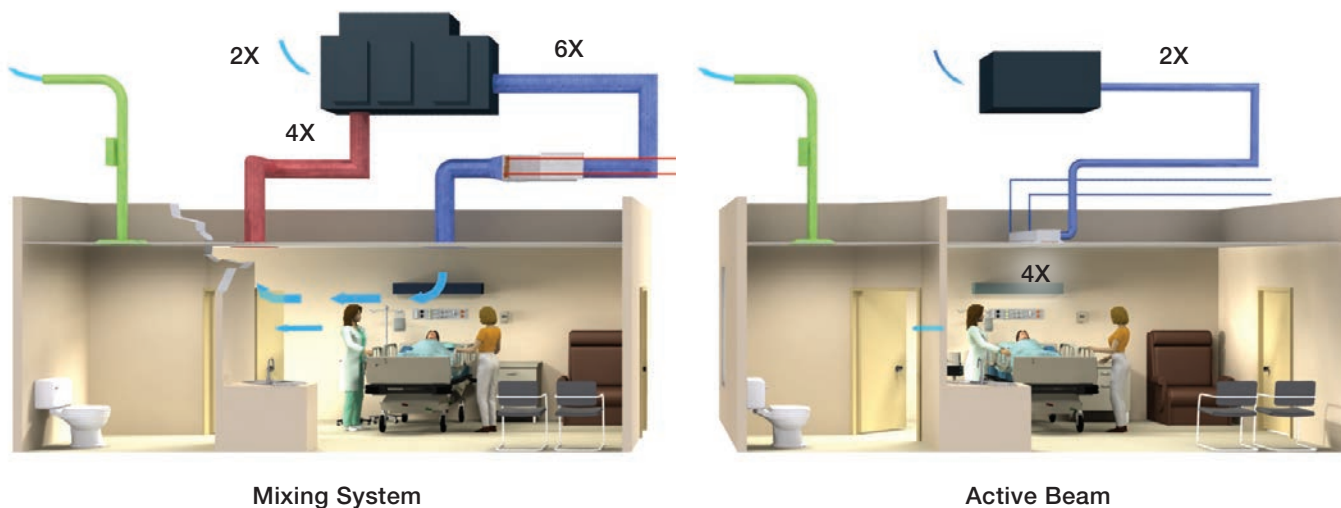
Hospitals are unique applications in that the supply air volume required by local codes for each space is often greater than the requirement of the cooling and heating load. In some jurisdictions, local code requires these higher air-change rates for all-air systems only. In these cases, the total air-change rate required is reduced if supplemental heating or cooling is used. This allows for a reduction in system air volume and yields energy savings.

Furthermore, because these systems are generally constant air volume with the potential to reduce the primary air-change rates, reheat and the cooling energy discarded as part of the reheat process is a significant energy savings opportunity. Depending on the application, a 100% outside air system may be used. These systems utilize no return air and therefore no mixing of return air between patient rooms occurs, potentially lowering the risk of hospital associated infections.

### Benefits of Active Beams

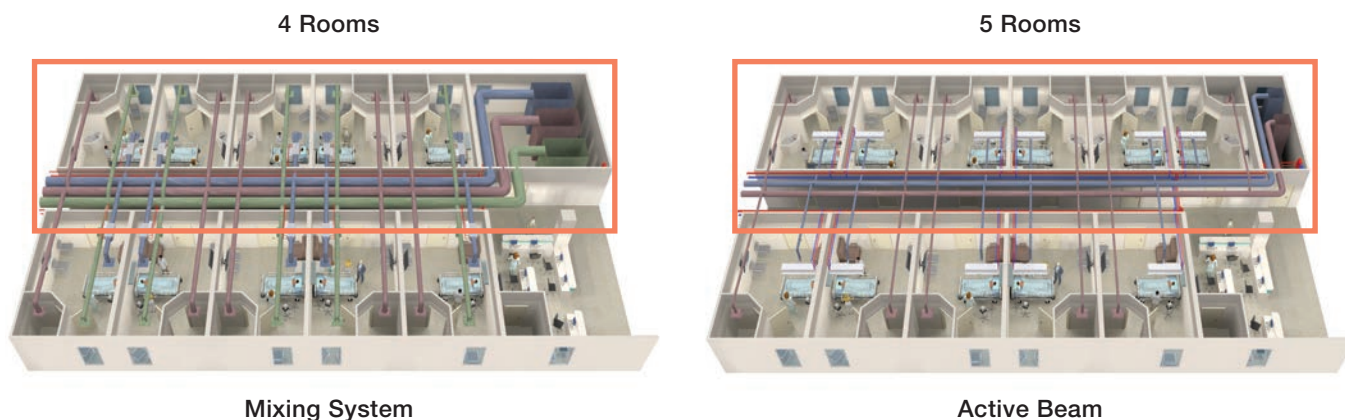
- Reduction in air handling equipment
- Minimization and elimination of ductwork
- Reduction in reheat
- Quiet operation
- Improved indoor air quality
- Reduced risk of cross contamination
- Reduced ductwork associated with beam systems results in fewer service interferences, often taking the mechanical system off the critical path to healthcare construction

## Energy Efficiency



A patient room typically requires six air changes per hour. When utilizing a traditional system these changes include roughly two parts fresh air and four parts recirculated air. When using active beam technology, the air change rate can be reduced to two, as the air induced over the coil replaces the four additional air changes.

## Space Savings



The lower air volume requirements allow beams systems to operate using smaller air handlers, as well as smaller ducting. Because less air is being transported around the building, return ductwork can be minimized and, in some cases, eliminated altogether. These space savings are especially important in a healthcare facility where building infrastructure is already quite crowded.

# Performance Data

## Active Beams

Active beams have integrated primary air for ventilation. This can be leveraged to increase capacity, as well as provide fresh air and a latent load sink.

Products Offered	Capacity (Btu/h.ft)		Transfer Efficiency (Btu/h.cfm)	
	Cooling	Heating	Cooling	Heating
ACBL 2-way 12" wide	375-1793	730-2086	39-103	33-256
ACBL 1-way 12" wide	400-1133	755-1722	44-92	53-223
ACBM	720-2596	890-2660	39-106	32-238
ACBL-HE 2-way 24" wide	660-2387	1090-2800	48-135	44-286
ACBL-HE 1-way 24" wide	620-1485	920-2142	58-108	65-203
ACBH / ACBV	850-1562	1630-2739	60-92	105-176

## Passive Beams

Passive beams increase capacity compared to radiant panels, and can be partnered with an existing ventilation system, such as UFAD or displacement to improve occupant comfort and air quality.

Products Offered	Cooling Performance (Btu/h.ft)
12" Linear Passive Beam	208
18" Linear Passive Beam	274
24" Linear Passive Beam	349

### NOTE:

Cooling based on 20°F ΔT between room and supplied air, 16°F ΔT between room and mean water, and 2 gpm of chilled water.

Heating based on 0°F ΔT between room and supplied air, 45°F ΔT between room and mean water, and 1 gpm of chilled water for heating.

## Transfer Efficiency

Price believes that beam system design should seek to minimize the air-side of the system and maximize the water-side, as this is much more efficient. As a result, Price considers **Transfer Efficiency** and **Air Diffusion Performance Index** the primary metric of beam performance. While other manufacturers emphasize beam capacity as the primary metrics of beam performance, attention must also be paid to air distribution in the space, as well as implications of the overall system cost.

**Transfer Efficiency:** The amount of sensible thermal energy moved per volume of primary air. Systems maximizing transfer efficiency use minimum primary air to condition a space. Transfer efficiency is measured in Btu/h.cfm or W/(L/s).

**Air Diffusion Performance Index:** An index that uses effective draft temperature and air velocity to quantify the comfort level of a space using a mixed air system for cooling.

Price tests to the only recognized standards for beams products.

	Capacity	Noise and Throw
Active Beams	EN15116	ASHRAE 70
Passive Beams	EN14518	N/A

# Resources & Support

## Computational Fluid Dynamics (CFD) Modeling

CFD provides a means to validate design before construction, giving the customer confidence that the system will perform as intended in the field. We encourage designers to work with us to validate their designs.

## Software Tools

Price All-In-One software features a unique ranking engine that automates the selection process, making it easier for an engineer to select the right beam based on the criteria that is important to them.

## PRCN: Price Research Center North

Price's state-of-the-art research laboratory, Price Research Center North, features the most advanced hydronics lab in North America.

This lab allows designers to simulate field conditions and evaluate system performance, providing them with the confidence that our products will perform as expected.

## Price Training Programs and Webinars

Price Training Programs (PTP) provides Consulting and Design Engineers with the training needed to specify and select air distribution equipment to best meet their design criteria. Our webinars are another excellent way to learn about specific topics while gaining professional development hours.

For a complete course calendar please visit:  
[www.price-hvac.com/ptp](http://www.price-hvac.com/ptp)

## Applications Support

Price is a service oriented company and has a dedicated beams applications team devoted to answering your questions quickly, completely, and correctly. Our applications team regularly provides support on:

- Model Selection
- Layout Assistance
- Calculation Assistance
- On-site Training
- On-site Performance Validation

## Mockups

The various combinations and considerations for active beam systems often lead the design team to consider mocking up a typical space. This allows the team to better understand the impact of design decisions, develop application-specific solutions and experiment with exceptional conditions.



Hydronic Test Chamber (Price Research Center North).



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