

# Trane Series Twenty-four IV Active Chilled Beam

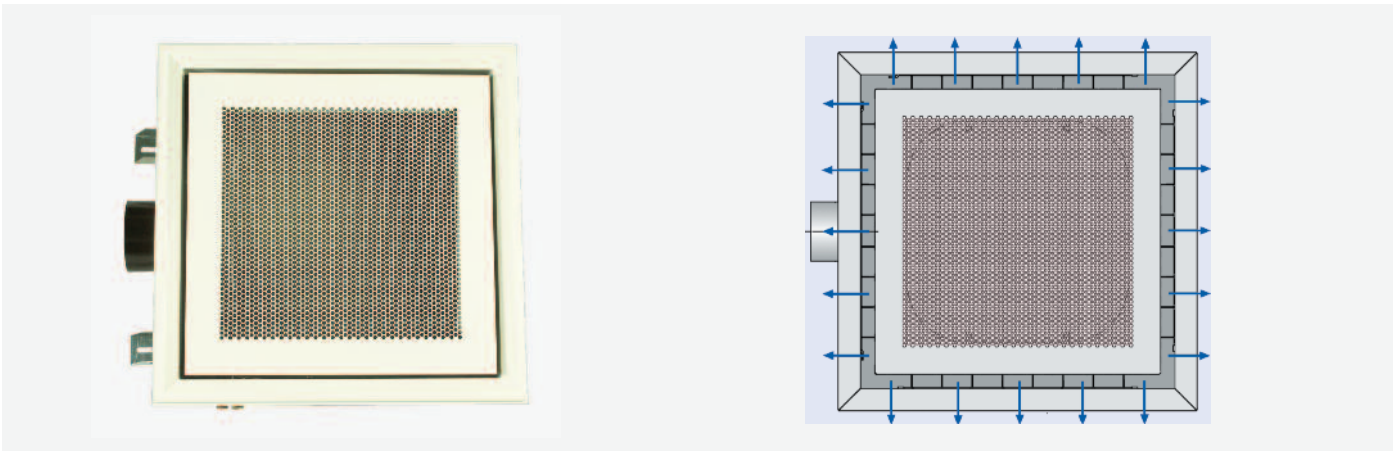


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### Description

Trane Twenty-four IV active chilled beams use a combination of primary air and chilled water (above the room dew point) to provide sensible cooling to the space. They combine the airflow characteristics of ceiling diffusers with the energy saving benefits of heat absorption using chilled water.

The four-way blow design means the Twenty-four IV is ideal for individual offices, applications where ceiling space is congested or where a four-way appearance is required.

Trane Twenty-four IV chilled beams are designed to fit into suspended T-bar ceilings (size 2ft x 2ft). They can also be free-mounted (size 3ft x 3ft).

### Special features

- 4-way throw air pattern
- 2-pipe (cooling) or 4-pipe (heating and cooling) configurations
- Vertically mounted heat exchanger coil with condensate tray
- Adjustable air control blades
- Choice of three nozzle size
- Selection software featuring detailed comfort data

### Benefits

- Can reduce main AHU air requirement by up to 70% compared to VAV systems
- Low noise
- Fan energy savings over traditional HVAC systems

Active chilled beams contain a primary air chamber with induction nozzles, vertical heat exchangers with condensate drip tray and a side-inlet (standard) for the connection of the conditioned primary air.

# Functional description

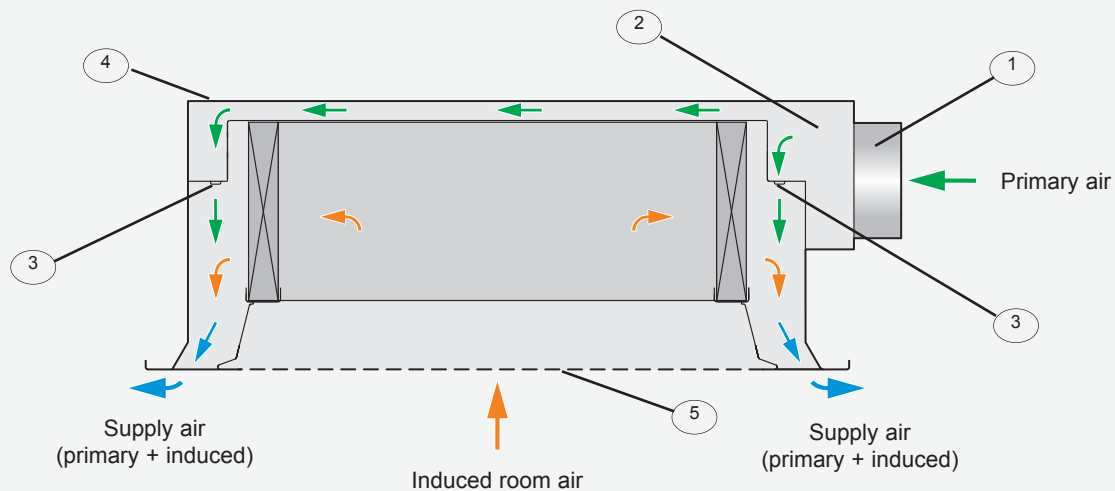
Active chilled beams supply conditioned fresh air (primary air) to the space from a central plant room to maintain indoor air quality while providing additional cooling and/or heating with their integral heat exchangers.

Primary air is ducted to the upper air chamber via a side or top inlet. The primary air is then discharged via nozzles to a lower section containing a heat exchanger coil. This causes room air to be induced, via the central perforated face panel, up and through the heat exchanger coil. The cooled (or heated) room air is then blended with the primary air before the mixed air is delivered into the room.

Three nozzle options allow the selection to be optimized to meet fresh airflow rates and thermal capacity requirements while exhibiting low differential pressures and sound power level characteristics.

There are two types of heat exchanger available — a 2-pipe system for cooling and a 4-pipe system for cooling and heating.

For maintenance, the induction grille can be removed completely by releasing four bolts to gain access to the heat exchanger coils. Lanyard wires attached to the induction grille provide additional safety.



- ① Primary air connection
- ② Primary air chamber
- ③ Induction nozzle plate
- ④ Casing
- ⑤ Induction grille



# Dimensional data

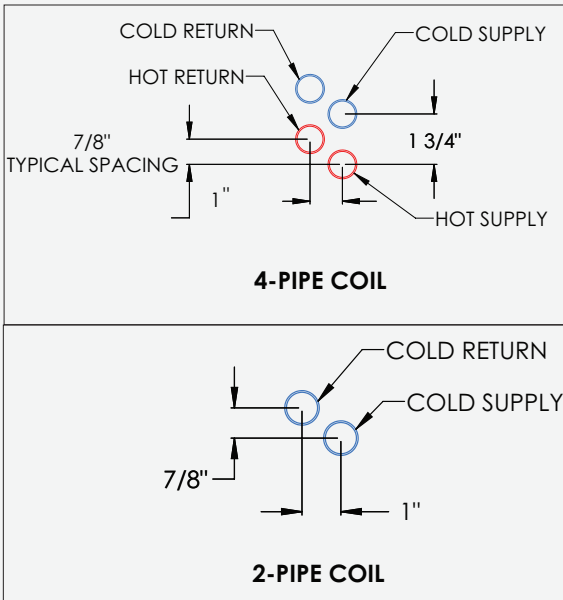
## Characteristics

- Fresh air range 15 to 75 cfm
- For clear room heights from approximately 8 to 14 ft.
- Flush ceiling installation or exposed mounting
- Side or top-entry primary air connection
- Nozzles in three sizes to optimise induction performance
- Heat exchangers for two- or four-pipe systems
- Maximum operating pressure: 90 psi
- Maximum operating temperature: 165°F
- (other operating pressures and temperatures upon request)

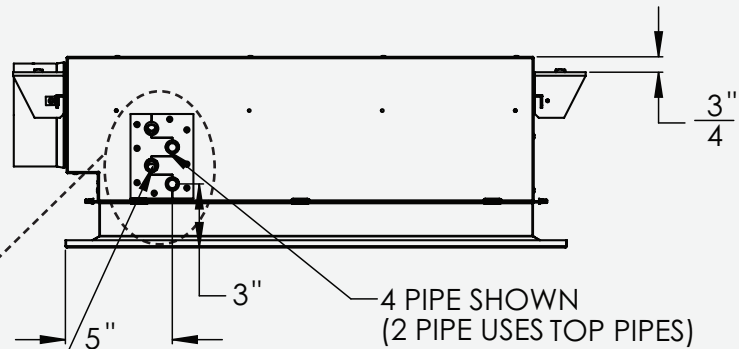
## Construction Features

- Primary air connections suitable for circular connecting ducts
- 4 sliding hanging brackets for on-site installation (brackets can be mechanically locked in position)
- Safety wires to support the induction grille
- Water connections (½" male NPT) on the side
- Side-entry primary air connection (standard)
- Top-entry primary air connection (cost option)

## Dimensions



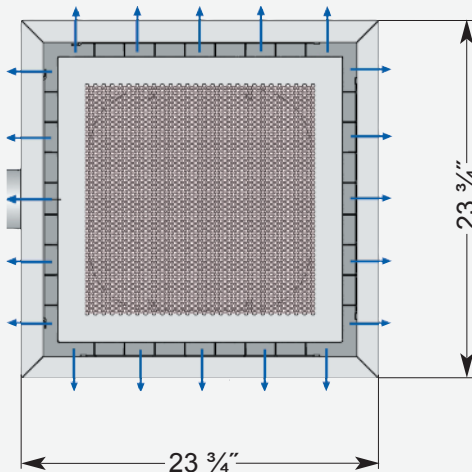
## Beam shown: CBCA224ZR5WN



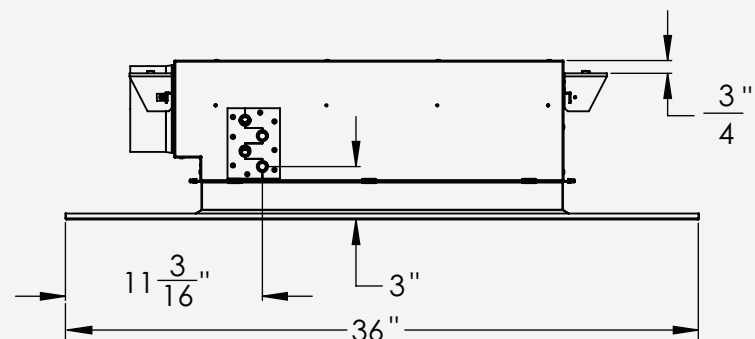
## COIL CONNECTIONS

- 1 = 2 PIPE WITHOUT FITTINGS
- 2 = 2 PIPE WITH 1/2" NPT FITTINGS
- 5 = 4 PIPE WITHOUT FITTINGS
- 6 = 4 PIPE WITH 1/2" NPT FITTINGS

## Dimensions - Twenty-four IV CBCA (for integration into ceiling grid)



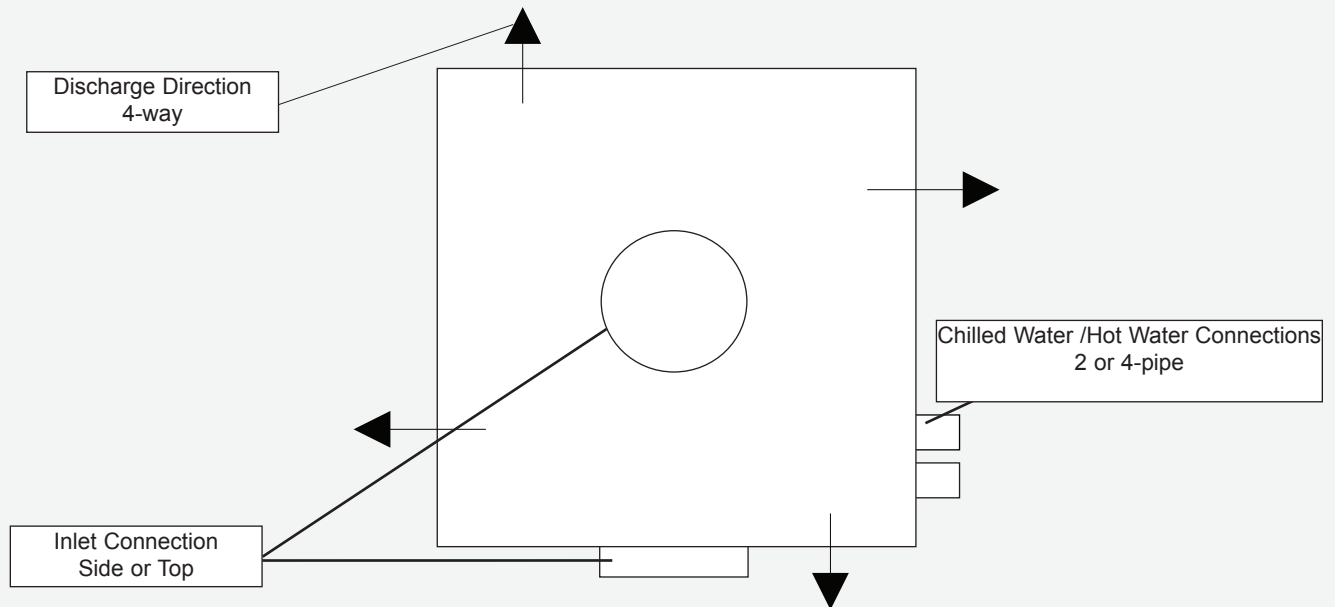
## Dimensions - Twenty-four IV CBWA (for exposed installation)



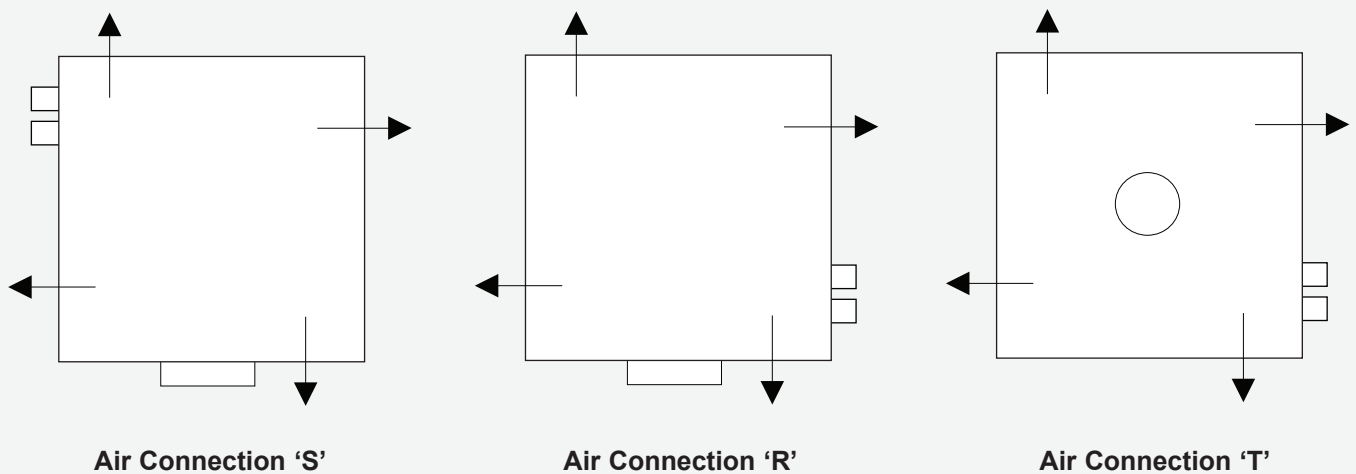
# Casing arrangements

## Trane Twenty-four IV Model

### Arrangement of diffuser face and active section



### Coil configuration / Connection handings: 4-Way Air Connection options (top view)



- All water connections are 1/2" plain ends as standard
- Male NPT fittings are an available option

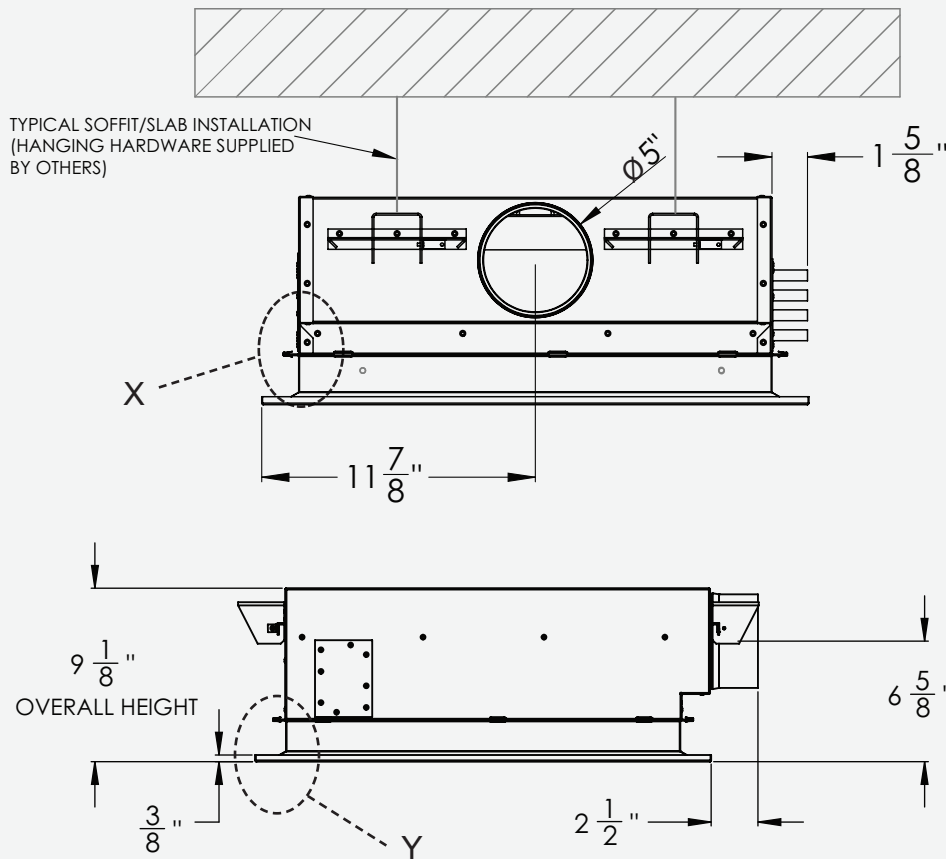
# Installation

## Mounting considerations

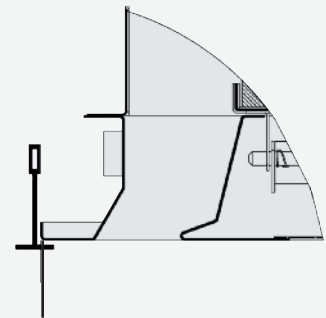
Trane Twenty-four IV active chilled beams should be separately suspended from the structure above by means of building code approved wire or metal rods (provided by others) that allow the beam's position to be vertically adjusted. Beams are usually mounted and connected prior to the installation of the ceiling grid. The Trane Twenty-four IV is provided with four hanging brackets allowing attachment of mounting hardware (not provided).

## Air and water connections

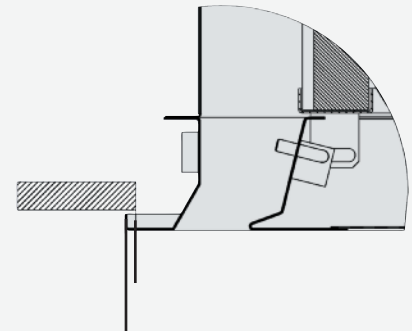
The Trane Twenty-four IV coil connections are plain ends appropriate for field soldering or Male NPT fittings (recommended option). Using NPT fittings and flexible hoses allows for minor misalignment of beam and its supply/return pipe work, for movement of the beam to align with a modular ceiling and also avoiding the need to flush through the coil (essential when direct soldered). Each coil is factory tested for leakage and provided clean and capped. Trane offers high-quality stainless steel braided flexible hoses in 12", 18" or 24" lengths with NPT fixed and swivel joints.



**Installation in T-bar ceiling  
Detail X**



**Installation in drywall ceiling  
Detail Y**



## Induction grille fixing bolts



Four fixing bolts hold the induction grille in place



To remove the grille completely, pull-back and release all four fixing bolts



The beam's coil can now be accessed easily for maintenance

Depending on the quality of the room air, there is the possibility of dust deposits as with all room air induction units. If necessary, the unit can be cleaned with ordinary, non-abrasive household cleaners. The coil can be cleaned with an industrial vacuum cleaner.

# Nomenclature · Performance notes

$\dot{Q}_{SEN}$	in	Btu/h: Space sensible load
$\dot{Q}_{LAT}$	in	Btu/h: Space latent load
$\dot{V}_{Pr}$	in	cfm: Primary airflow rate
$\dot{V}_{HW}$	in	gpm: Water volume flow rate, heating
$\dot{V}_{CW}$	in	gpm: Water volume flow rate, cooling
$\dot{V}_{supply}$	in	cfm: Total discharge airflow rate
$\dot{Q}_{Pr}$	in	Btu/h: Primary air cooling capacity
$\dot{Q}_{HW}$	in	Btu/h: Water heating capacity
$\dot{Q}_{CW}$	in	Btu/h: Water cooling capacity
$\dot{Q}_{tot}$	in	Btu/h: Total beam thermal capacity
$W_{ROOM}$	in	gr: Room humidity ratio
$W_{Pr}$	in	gr: Primary air humidity ratio
$\Delta W$	in	gr: Difference between room and primary air humidity ratio
$\Delta t_{Pr}$	in	°F: Difference between room air and primary air temperature
$\Delta t_W$	in	°F: Supply to return water temperature difference

$\Delta t_{RW}$	in	°F: Difference between room air and water supply temperature
$\Delta p_t$	in	in. H <sub>2</sub> O: Air pressure drop
$\Delta p_w$	in	ft. H <sub>2</sub> O: Water pressure drop
$t_R$	in	°F: Room temperature
$t_{HWS}$	in	°F: Water supply temperature, heating
$t_{HWR}$	in	°F: Water return temperature, heating
$t_{CWS}$	in	°F: Water supply temperature, cooling
$t_{CWR}$	in	°F: Water return temperature, cooling
$\bar{V}_L$	in	fpm: Air velocity distance L
$\bar{V}_{H1}$	in	fpm: Air velocity distance H <sub>1</sub>
A	in	ft: Spacing between two diffusers with opposing blow patterns
L	in	ft: Horizontal and vertical distance (x+H <sub>1</sub> ) discharge to the wall
H <sub>1</sub>	in	ft: Distance from ceiling to top of occupied zone
$\Delta t_o$	in	ft: Temperature difference room air and beam discharge temperature

For Other Chilled Water Flow Rates	Chilled Water Flow Rate, GPM				
	0.50	0.75	1.00	1.25	1.50
<b>Multiply <math>\dot{Q}_{CW}</math> by</b>	0.84	0.94	1.00	1.05	1.08
<b>Multiply <math>\Delta P_w</math> by</b>	0.3	0.60	1.00	1.50	2.1

Table 1: Correction factors for chilled water flow rate

For Other Room and Chilled Water Supply Temperatures	$T_{ROOM} - T_{CWS}, ^\circ F$								
	12	13	14	15	16	17	18	19	20
<b>Multiply <math>\dot{Q}_{CW}</math> by</b>	0.67	0.72	0.78	0.83	0.89	0.94	1.00	1.06	1.11

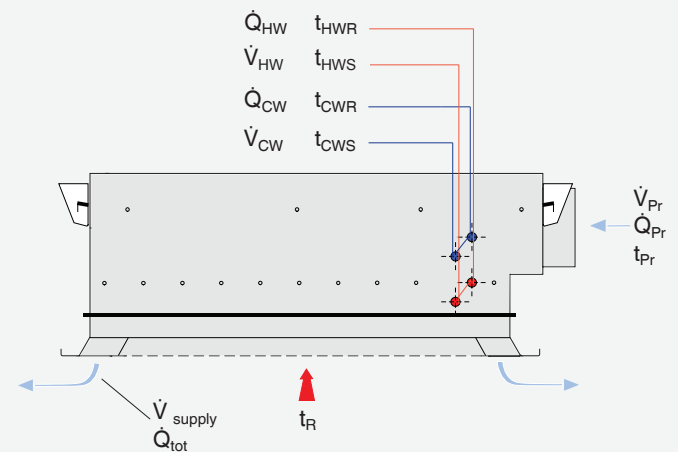
Table 2: Correction factors for room to chilled water temperature differential

For Other Hot Water Flow Rates	Hot Water Flow Rate, GPM					
	0.25	0.50	0.75	1.00	1.25	1.50
<b>Multiply <math>\dot{Q}_{HW}</math> by</b>	0.58	0.79	0.91	1.00	1.07	1.12
<b>Multiply <math>\Delta P_w</math> by</b>	0.20	0.3	0.6	1.00	1.50	2.1

Table 3: Correction factors for hot water flow rate

For Other Room and Hot Water Supply Temperatures	$T_{HWS} - T_{ROOM}, ^\circ F$								
	30	35	40	45	50	55	60	65	70
<b>Multiply <math>\dot{Q}_{HW}</math> by</b>	0.60	0.70	0.80	0.90	1.00	1.10	1.20	1.30	1.40

Table 4: Correction factors for room to hot water temperature differential



Useful equations:

$$\begin{aligned}\dot{Q}_{Pr} &= 1.09 \times \dot{V}_{Pr} \times (t_R - t_{Pr}) \\ \Delta t_W &= \dot{Q}_{CW} / (500 \times \dot{V}_{CW}) \\ \Delta t_W &= \dot{Q}_{HW} / (500 \times \dot{V}_{HW})\end{aligned}$$



# Quick selection table

## Reference Values - Cooling

$t_R$	75 °F
$t_{Pr}$	55 °F
$t_{CWS}$	57 °F
$\dot{V}_{CW}$	1.00 GPM

## Reference Values - Heating

$t_R$	75 °F
$t_{Pr}$	55 °F
$t_{HWS}$	125 °F
$\dot{V}_{HW}$	1.00 GPM

Table based on Trane Twenty-four IV model beam (4-way) with 50% free-area perforated face

Nominal Length and Width	Nozzle Type	Primary Air			Cooling				Heating		Isothermal Throw <sup>6</sup>	NC <sup>7</sup>
					Two pipe system		Four pipe system		Four pipe system			
		V <sub>Pr</sub>	Δp <sub>t</sub>	Q <sub>Pr</sub> <sup>1</sup>	Q <sub>CW</sub> <sup>2</sup>	Δp <sub>w</sub> <sup>3</sup>	Q <sub>CW</sub> <sup>2</sup>	Δp <sub>w</sub> <sup>3</sup>	Q <sub>HW</sub> <sup>4,5</sup>	Δp <sub>w</sub> <sup>3</sup>		
ft		CFM	in. H <sub>2</sub> O	btuh	btuh	ft. H <sub>2</sub> O	btuh	ft. H <sub>2</sub> O	btuh	ft. H <sub>2</sub> O	ft	
2 x 2	Z	13	0.21	283	783	1.4	751	1.2	2,086	1.3	2-3-4	<15
		16	0.31	349	919		886		2,461		3-4-5	<15
		19	0.44	414	1,050		1,013		2,813		3-4-6	<15
		22	0.59	480	1,176		1,132		3,145		3-5-6	<15
		25	0.77	545	1,298		1,245		3,460		4-5-7	<15
		28	0.96	610	1,417		1,353		3,758		4-6-8	18
	M	20	0.21	436	946		928		2,577		2-4-5	<15
		24	0.31	523	1,100		1,052		2,923		3-4-5	<15
		28	0.42	610	1,248		1,168		3,246		3-4-6	<15
		32	0.54	698	1,390		1,277		3,549		3-5-6	<15
		36	0.69	785	1,526		1,380		3,834		4-5-7	17
		40	0.85	872	1,658		1,478		4,105		4-6-8	20
	G	35	0.19	763	1,133		1,050		2,918		3-4-6	<15
		43	0.28	937	1,363		1,223		3,398		4-5-7	<15
		51	0.39	1,112	1,573		1,383		3,842		4-6-8	<15
		59	0.53	1,286	1,764		1,531		4,254		4-6-9	15
		67	0.68	1,461	1,938		1,670		4,638		5-6-9	19
		75	0.85	1,635	2,097		1,799		4,998		5-7-9	23

## PERFORMANCE NOTES:

<sup>1</sup> $\dot{Q}_{Pr}$  is the sensible cooling provided by primary air 20°F below room temperature at the flow rate indicated.

<sup>2</sup> $\dot{Q}_{CW}$  is coil sensible cooling using 1.00 GPM of chilled water supplied 18°F below the room temperature.

<sup>3</sup> $\Delta p_w$  is the water head loss at a supply flow rate of 1.00 GPM.

<sup>4</sup> $\dot{Q}_{HW}$  is coil heating using 1.00 GPM of hot water supplied 50°F above the room temperature.

<sup>5</sup>Heating coil output must be corrected for primary air cooling (or heating) contribution ( $\dot{Q}_{Pr}$ ) to estimate net heating provided to the space.

<sup>6</sup>isothermal throw values presented are to 150, 100 and 50 FPM, respectively.

<sup>7</sup>NC values are based on a room absorption of 10 dB (per octave band) re 10<sup>-12</sup> watts.

See Tables 1 through 4 on page 7 for correction factors for water flow rates and/or room to water temperature differentials other than those specified above.



# Selection program description

## Selection Software

For detailed selections designers may download Trane Twenty-four IV model selection software at [www.trane.com](http://www.trane.com). Available for all types of beams, this software (see sample below) affords easy access to the beams' performance data against user defined parameters.

User defined input parameters include:

- Beam length and nozzle type
- Water flow rates and supply temperatures
- Primary airflow rate and temperature
- Room temperature and RH%
- Room height, beam spacing and distance to walls and occupied zone height

Upon entry of these parameters, the software returns values for:

- Air and water pressure requirements
- Sensible cooling and/or heating capacity
- Water temperature rises and/or drops
- Resultant noise (NC) levels
- Local velocities and temperatures (based on non-isothermal supply air) along adjacent walls and at a point where the airstream enters the occupied zone beneath two colliding airstreams (from beams with opposing discharges).

In addition, these programs caution (see red text in exhibit below) the user when unusual pressure losses or excessive occupied zone velocities result from the selection. The program also warns the user when a chilled water temperature is specified which is below the dew point temperature of the space.

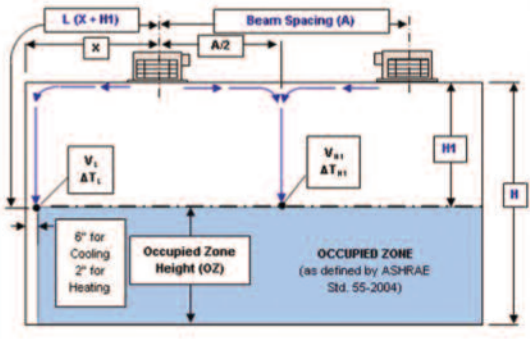
These selection programs also include a feature that allows the user to save the selection in an Excel spreadsheet that allows it and all of its calculated performance to be exported directly to the project schedule.

**NOTE: Macros must be enabled for the spreadsheet to function.**

## Twenty-four - IV Four Way Active Chilled Beam Selection Program

Input Parameters	4 pipe coil		2 pipe coil		Project	Room-No.	Comment
	cooling	heating	cooling	heating			
V <sub>water</sub> (GPM)	1.00 GPM	1.00 GPM	1.00 GPM	1.00 GPM			
Unit length	2ft by 2ft						
Nozzle-type	M						
V <sub>air-primary</sub> (CFM)	36.0 CFM						
Spigot Diameter	5 in						
Input Temperatures	cooling		heating		Input Mounting Height and Beam Spacing		
T <sub>air-primary</sub> (EAT)	55.0 °F		55.0 °F		Mounting Height (H)	10.0 ft	
T <sub>room</sub> / rel. Humidity	75.0 °F	50.0 %	75.0 °F	50.0 %	Beam Spacing (A)	8.0 ft	
T <sub>water-flow</sub> (EWT)	57.0 °F		125.0 °F		Distance to Wall (X)	4.0 ft	
					Occupied Zone Height (OZ)	5.5 ft	

Results	4 pipe coil		2 pipe coil	
	cooling	heating	cooling	heating
T <sub>water-return</sub> (LWT)	59.8 °F	117.2 °F	60.1 °F	8.7 °F
Q <sub>water</sub>	-1380 BTUH	3834 BTUH	-1526 BTUH	4240 BTUH
Q <sub>air</sub>	-785 BTUH	-785 BTUH	-785 BTUH	-785 BTUH
Q <sub>Total</sub>	-2165 BTUH	3049 BTUH	-2311 BTUH	3455 BTUH
ΔP <sub>water</sub>	1.25 ft WG	1.29 ft WG	1.41 ft WG	1.35 ft WG
ΔP <sub>air</sub>	0.69 inches WG			
NC (including 10 dB room absorption)	<15			



**Microsoft Excel Macros must be enabled in order for this program to function.**

Terminal Velocities and Temperatures				
vL2 (measured 2" from wall)	42 FPM	42 FPM	42 FPM	42 FPM
vL6 (measured 6" from wall)	25 FPM	25 FPM	25 FPM	25 FPM
vH1	26 FPM		26 FPM	
ΔTL	-2.2 °F	1.6 °F	-2.2 °F	1.6 °F
ΔTH1	-2.2 °F	1.6 °F	-2.2 °F	1.6 °F
ΔTsupply	-10.8 °F	15.2 °F	-11.5 °F	17.3 °F
Spigot Diameter	5.0 inches			

Care must be taken to ensure that the combination of the temperature differentials at ΔTH1 and velocities at VH1 do not exceed the recommended 20% discomfort curve as stated by the ASHRAE Handbook and as shown in the User Notes. Care should also be taken with respect to the velocities down internal walls, where objects (e.g. desk, cabinets, shelves, etc) are likely to redirect the air stream into the occupied zone, at which point velocities vL2 and temperature differential ΔTL must also be considered.

Text in red represents a value that is not generally recommended (see user notes for details).

## Room air distribution with active chilled beams

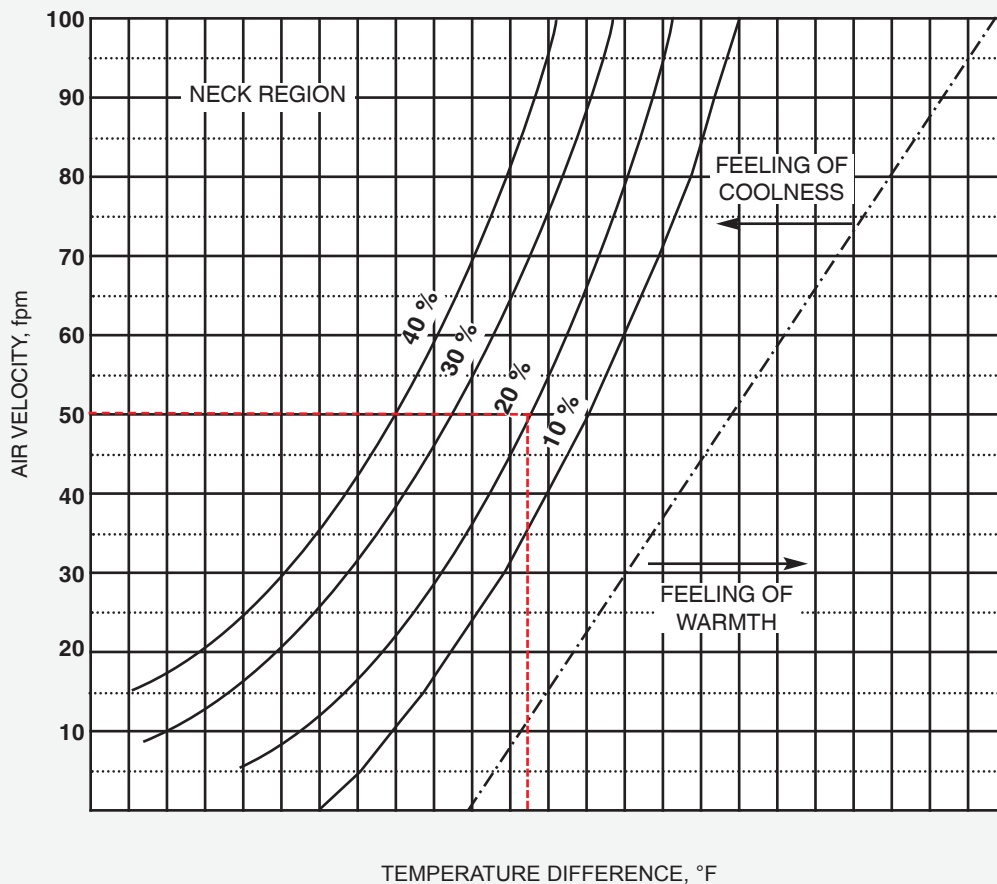
Active chilled beams distribute air within the room in a manner consistent with that of linear slot diffusers. As such, the relationship between air stream terminal velocities and thermal decay of the supply air stream that applies to linear slot diffusers also applies to active chilled beams. Upon discharge to the open space, velocity and temperature differentials between the supply air mixture and the room begin to diminish due to room air entrainment. As with linear slot, chilled beams exhibit relatively long throw characteristics and their velocity and temperature differentials diminish at a rate that is directly proportional to the distance the air has traveled within the space.

Most manufacturers present throw data using isothermal air for terminal velocities of 150, 100 and 50 FPM. This data can be used to map the airstream and predict the local velocity at the point where it enters the occupied zone. As the room to supply air differential decays at a similar rate, its temperature can also be predicted at the entry point based on the initial temperature difference ( $\Delta t_o$ ) between the beam discharge temperature and that of the room into which it is introduced.

**TRANE selection software can be used to predict the value of local velocities and temperatures at critical locations where the air stream enters the occupied zone.**

As the region near outside walls is not defined as part of the occupied zone, local velocities and temperatures do not generally affect occupant thermal comfort. Care should still be taken that velocities down walls are not so high they affect processes (e.g. fume hoods) and on outer walls, they are sufficient to provide adequate heating where applicable.

The area of greatest draft risk usually occurs directly below the point where two opposing airstreams collide. Figure 1 below indicates that at a temperature difference of  $1.25^\circ$  (ie. air is  $1.25^\circ$  cooler than the occupied space temperature measuring point) the velocity ( $\bar{v}_{H1}$ ) entering the occupied zone below the collision point must generally be 50 FPM or less to prevent draft complaints by more than 20% of the occupants. Throw mapping techniques can be used to determine the minimum centerline spacing of those beams that will limit the velocity ( $\bar{v}_{H1}$ ) entering the occupied zone to 50 FPM or less. The selection example that follows illustrates the use of mapping to determine the minimum beam spacing. Other temperature differences can also be used to vary the air velocity to keep draft complaints under the 20% criteria.



**Figure 1: Percentage of Occupants Objecting to Drafts**

(Source: 2009 ASHRAE Handbook - Fundamentals)

# Selection example

## Selection Example:

The office space shown in the figure below is designed for one (1) occupant, has a sensible load of 1,560 Btu/h and a latent gain of 200 Btu/h. Trane Twenty-four IV model beams (2 pipe, cooling only) will be used to condition and ventilate the space. A minimum space outdoor airflow rate of 14 cfm is calculated per ASHRAE Standard 62.1-2010.

The room will be controlled at 75°F with a dew point temperature not to exceed 57°F. This dew point temperature corresponds to a humidity ratio of 69 grains. Chilled water supplied to the beams is to be maintained 1°F above the space dew point temperature, or in this case 58°F. Primary air is delivered at 55°F with a humidity ratio of 57 grains (52°F dew point temperature).

The beams will be mounted flush in a 9'-0" high ceiling and the occupied zone height will be considered to be 1.1 m (42 inches) as the occupant will be primarily seated.

Determined the required space primary airflow rate and select/locate the beam such that no velocity exceeding 50 fpm will enter the defined occupied zone.

### Solution:

The primary airflow rate must be sufficient to cool and ventilate the space while providing sufficient latent heat removal to maintain the required space dew point temperature (57°F).

The primary airflow rate required to maintain the design space dew point is thus calculated as:

$$\begin{aligned}\dot{V}_{LAT} &= \dot{Q}_{LAT} / (.68 \times \Delta_W) \\ &= 200 / [(.68 \times (69 - 57))] = 24.5 \text{ cfm}\end{aligned}$$

Therefore the airflow needed to meet the latent requirements exceeds the required outdoor airflow rate (14 cfm) so 24.5 cfm is the minimum airflow rate required to ventilate and provide adequate humidity control within the space.

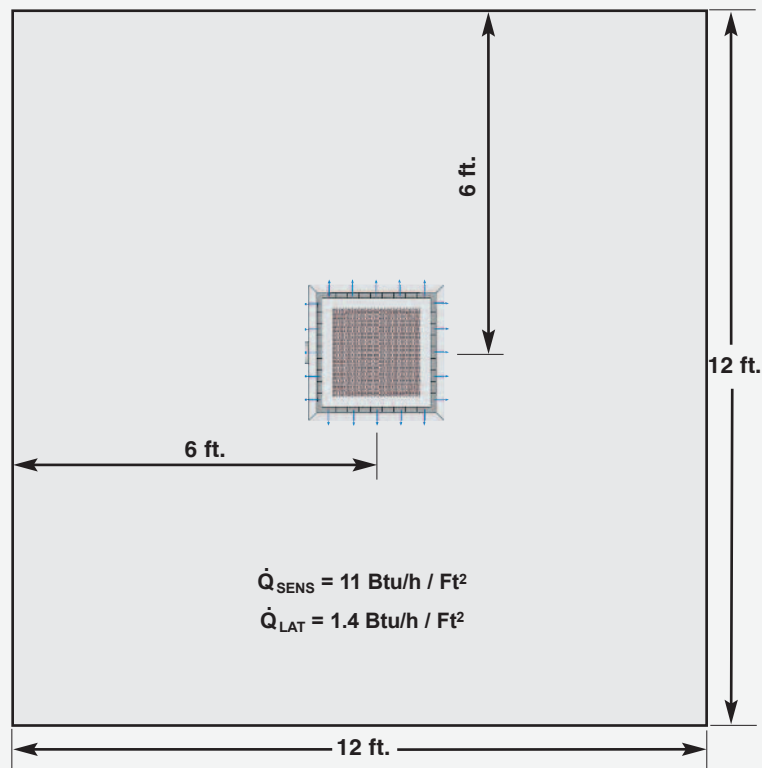
The performance table on page 8 indicates that one beam with "Z" nozzles delivering 25 cfm and a water supply of 1.0 gpm at 57°F will provide 545 Btu/h of airside cooling and 1,298 Btu/h of water side cooling.

A factor must be applied to correct for the temperature differential (17°F) between the room air and the chilled water supply temperature, since the performance table assumes an 18°F differential. Table 2 (page 7) identifies this factor as 0.94, so the beam water side cooling must be reduced accordingly. The predicted water side cooling performance of the beam now becomes  $1,298 \times 0.94$  or 1,220 Btu/h. Adding this to the airside contribution of 545 Btu/h, the total sensible cooling becomes 1,765 Btu/h, or about 13% more than the space requires.

Table 1 (page 7) provides correction factors for other chilled water flow rates. Applying a correction factor of 0.84 (for a water flow rate of 0.5 gpm), the water side cooling becomes 1,025 Btu/h and the total cooling is thus 1,570 Btu/h, which meets the design requirement. Thus, the beam will be require a chilled water flow rate of 0.5 gpm.

The individual acoustical level of the beam is less than NC15 and the throw to a terminal velocity of 50 fpm is 7 feet.

Figure 2: Chilled beam location for selection example



# Specification

## Specification Text - Trane Twenty-four IV Active Chilled Beam

### PART 1- GENERAL

#### 1.01 Summary

This section describes the active chilled beams.

#### 1.02 Submittals

Submit product data for all items complete with the following information:

- 1) Operating weights and dimensions of all unit assemblies.
- 2) Performance data, including air and water sensible cooling capacities, nozzle types, primary airflow rates, chilled (and where applicable hot) water flow rates, noise levels, air and water side pressure losses and maximum discharge air throw values.
- 3) Construction details and dimensions including manufacturer's recommendations for installation, mounting and connection.

### PART 2- PRODUCTS

#### 2.01 General

Materials and products required for the work of this section shall not contain asbestos, polychlorinated biphenyls (PCB) or other hazardous materials identified by the engineer or owner.

#### Approved Manufacturers:

These specifications set forth the minimum requirements for the active chilled beams to be accepted for this project. Products provided by the following manufacturers will be deemed acceptable provided they meet all of the construction and performance requirements of this specification:

#### 1. TRANE

#### 2.02 Design

- 1) Furnish and install TRANE TWENTY-FOUR IV series 4 way active chilled beams of sizes and capacities as indicated on the drawings and the mechanical equipment schedules. The beams shall be constructed and delivered to the job site as single units.
- 2) The face of the beam shall consist of a removable room air induction section of 50% free area perforated steel flanked by linear supply slots; the return air section shall lock into position. The entire visible face section shall be finished in white powder coat paint or as specified by the architect.
- 3) Beams that are integrated into acoustical ceiling grids shall be provided with a flat border configured to fit a 24 inch wide suspension tee spacing. Beams used for exposed mounting applications (product code 'CBWA') shall include factory mounted Coanda plates which extend the face to thirty six (36) inches to assure a horizontal discharge of the supply air.
- 4) The beams shall consist of minimum 20 gauge steel housing which encases the integral sensible cooling coil and a primary air plenum feeding a series of induction nozzles. The inside

and outside surfaces of the plenum and inlet connection shall be finished with black powder coat paint. The beam shall be provided with side (or top) entry duct connections as required. The overall height of beams shall not exceed 9¼ inches for side entry and 12 inches for top entry.

- 5) Each beam shall be provided with a pressure tap that may be used to measure the pressure differential between the primary air plenum and the room. An airflow calibration chart which relates this pressure differential reading with the primary and beam supply airflow rates shall be provided by the beam supplier.
- 6) Beams shall be provided with connections for either 2 or 4 pipe operation as indicated on plans and schedules. Four pipe configurations shall require separate supply and return connections for chilled and hot water. The single wraparound coil shall be mounted vertically and manufactured with seamless copper tubing (½" outside diameter) with minimum .025 inch wall thickness mechanically fixed to aluminum fins. The aluminum fins shall be limited to no more than ten (10) fins per inch. The beam shall have a working pressure of at least 300 PSI and be factory tested for leakage at a minimum pressure of 360 PSI. Each chilled beam shall be provided with factory integrated drain and vent fittings. Unless otherwise specified, coil connections shall be bare copper for field sweating to the water supply circuit. Connections shall be horizontal and be located on the side of the beam.
- 7) (OPTIONAL) The chilled water coil shall be provided with ½" NPT male threaded fittings. These fittings must be suitable for field connection to a similar (½" NPT) female flexible hose spigot and shall be at least 18" long to facilitate field connection (by others).
- 8) Beams shall be delivered clean, flushed and capped to prevent ingress of dirt.

#### 2.03 Performance

- 1) All performance shall be in compliance with that shown on the equipment schedule. Acoustical testing shall have been performed in accordance with ANSI S12.51.
- 2) Coils shall be rated in accordance with ARI Standard 410, but their cooling and heating capacities shall be established in accordance to DIN Standard 4715 for the specific application on the inlet side of the submitted chilled beam. Evidence of this testing must be included in the submittal.
- 3) Chilled water flow rates to the beams shall be limited to that which results in a maximum ten (10) foot head loss. Water flow velocities through the beam shall not exceed 4 FPS.

### PART 3- EXECUTION

#### 3.02 Installation

- 1) Beams should not be installed if they show any signs of damage and coils should never be connected if there are any signs of damage to the coil water circuits or its connections. The beam should be visually inspected before it is installed.
- 2) Coordinate the size, tagging and capacity of the beams to their proper location.
- 3) Chilled beams shall be independently suspended from the structure above by four (4) threaded rods of ¾" diameter (by others) or other methods meeting code approval.

- 4) (OPTIONAL) A lateral adjustment kit shall be factory supplied consisting of 2 uni-strut channels and 4 rod drops and fixings that are a) mounted perpendicular to the beam length and b) at least six inches wider than the beam. The rods shall be fixed to factory furnished mounting brackets on the beam such that the beam can be repositioned in the direction of its length. The lateral adjustment kits shall allow adjustment perpendicular to the beam length.
- 5) The beam, either with or without lateral adjustment kit, shall be hung below the structural slab by the installer who will supply the appropriate wire or drop rods and fixings (according to the applicable building code) to hang the beam with/without adjustment kit from the slab. The beam shall then be positioned either into the acoustical ceiling grid where ceiling mounted or at the appropriate level when exposed mounted and leveled horizontally by adjusting the nuts connecting the threaded rods or support members either to the beam or the lateral adjustment kit.
- 6) Before connecting the supply water system(s) to the beams, contractor shall flush the piping system(s) to assure that all debris and other matter have been removed.
- 7) Contractor shall perform connection of beams to the chilled water circuit by method specified (sweated hard connection or connection using flexible hoses).
- 8) Flexible connector hoses shall be furnished by others (optionally by the beam supplier). Hoses shall be eighteen (18) inches in length and suitable for operation with a bend radius as small as five (5) inches. Such hoses shall be 100% tested and certified for no leakage at 500 PSI. Connector hoses shall consist of a PTFE lined hose with a wire braided jacket. The hoses shall be suitable for operation in an environment between 40 and 200°F, rated for a least 400 PSI (1600 PSI burst). Contractor shall assure that the chilled water supplying the beams has been properly treated in accordance to BSRIA publication AG 2/93.
- 9) No power or direct control connections shall be required for the operation of the chilled beam.

### **3.03 Cleaning and Protection**

- 1) Protect units before, during and after installation. Damaged material due to improper site protection shall be cause for rejection.
- 2) Clean equipment, repair damaged finishes as required to restore beams to as-new appearance.



# Order Details

## TRANE Numbering System: Twenty-four IV Active Chilled Beam

Chilled	Beam	Where its Mounted	Development Sequence	Length (ft)	Width (ft)	Direction	Nozzle Size	Air Connection	Coil Connection	Paint	Lateral Adjustment Kit
1	2	3	4	5	6	7	8	9	10	11	12
C	B	C or W	A	2 or 3	2 or 3	4	Z, M or G	S or R or T	(1 or 2) or (5 or 6)	W or S	Y or N

*Where is beam mounted?*  
C = Ceiling Mounted or  
W = Exposed Wing

*Beam Length (Nom) in ft*  
C length = 2 ft or W length = 3 ft

*Beam Width (Nom) in ft*  
C length = 2 ft or W length = 3 ft

*Beam Nozzle Size*  
Z, M, or G (from selection program)

*Air Connection*  
S = side inlet (STD 4-way LH discharge)  
R = side inlet (4-way RH discharge)  
T = top inlet (STD 4-way discharge)

### *Coil Connections, all 1/2" Nominal*

1 = 2 pipe 1/2" straight pipe (no fittings)  
2 = 2 pipe c/w 1/2" Male NPT fittings  
5 = 4 pipe 1/2" straight pipe (no fittings)  
6 = 4 pipe c/w 1/2" Male NPT fittings

*Beam Paint Finish (Powder Coat)*  
W = Standard White or S = Special Color  
(Cost extra if color not defined on order)

*Lateral Adjustment Kit*  
Y = Factory Supplied or N = Not included