Active
Chilled Beams
Imperial



"ACTICOOL" – High induction, high performance active chilled beam

Advanced Air MI

Advanced Air

Company Profile



Advanced Air UK factory and technical centre of just over 60,000 sq ft

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Advanced Air are part of the Nailor Industries
Group in the USA and some of the key factors are:-

Turnover £80m Employees 750

Total factory area 600,000 ft²

In the UK Advanced Air manufacture:-

- Chilled Beams
- Fan Coil Units
- Grilles and Diffusers
- Fire and Smoke Dampers

Laboratories and Test Cells

- Volume Control Dampers
- Electrical Control Panels
- VAV Terminal Units

The investment in R & D means there is a continuous flow of new products and upgrades to existing units. Specialist customer testing and mock ups undertaken in Advanced Airs specialist laboratories



R & D Facilities

Chilled Beam Overview

Advanced Air and Nailor Industries have over 40 years experience in the design development and manufacture of terminal air conditioning products and systems.

Through Advanced Air's continuing investment in research and development facilities an extensive range of chilled beams has been created.

Advanced air is one of only a few UK manufacturers who have developed their beams in the UK, specifically for the UK market.



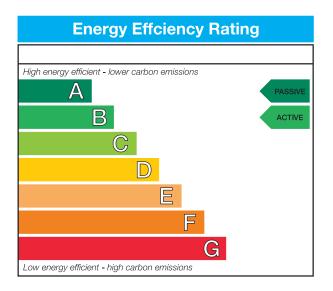
A high induction active beam with specially designed nozzles to create higher cooling outputs.

Advanced Air pursues a policy of continuous product development and we therefore reserve the right to change any of the information in this publication without notice. Please consult your local Advanced Air representative to verify current information.

Active Chilled Beam - Benefits

With the introduction of high induction active chilled beams a wide range of cooling loads can be achieved up to 64 btu/hr/ft² which in today's modern buildings should cover virtually all the cooling loads. When load above 38 btu/hr/ft² are being considered the air distribution within the occupied space needs to be checked by specialist air distribution engineers such as Advanced Air. The chilled beam can therefore replace the fan coil unit and bring about significant benefits.

Display Energy Certificates (DEC) show the specific buildings carbon emissions as calculated by approved software. The appearance is similar to the energy labelling of domestic electrical appliances. If a similar labelling system was used for individual components in an air conditioning system the ratings for chilled beams could look like the label below.





Energy

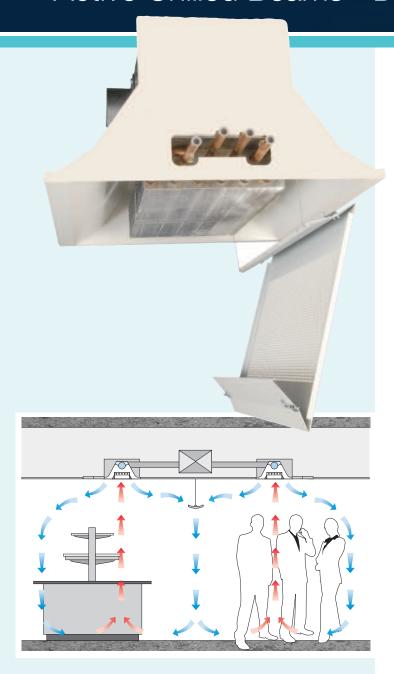
The chilled beam has two important energy considerations when compared to the fan coil unit.

Firstly there is no secondary or terminal fan unit since the beam operates by inducing air with nozzles (active).

Usually a large quantity of fan coils are used even on an average sized project so the total btu/hr consumption of these terminal fan units can be significant particularly where they are left running all the time (i.e. constant speed as opposed to variable volume VAV fan coils).

Secondly elevated chilled water temperatures of 57/63° are utilised as opposed to 48/57° usually associated with fan coils. This provides a further opportunity for "free cooling" thereby reducing energy usage.

Active Chilled Beams - Benefits



Comfort Levels

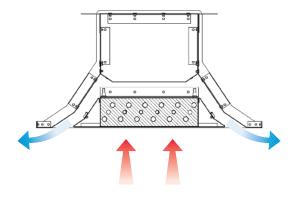
Very good comfort levels can be achieved utilising chilled beams. The air velocities are low within the occupied space and since the supply air temperature is around 61° there is not a high temperature gradient with chilled beams.

Noise levels are also very low with NR35 being easily achieved in the absence of a fan in the unit.

Maintenance and Whole Life Costs

One of the main advantages of chilled beams is the low level of maintenance required. This generally leads to low whole life costs as can be seen in the summary below:-

- No condensate pump
- No fans
- No motors
- No moving parts
- No filter
- No consumables
- Simple on/off control valves
- 3 year inspection
- 20 year life span



Chilled Beam Operation

As can be seen from the diagram the operation of the active chilled beams is relatively simple. Fresh air is supplied along a horizontal duct at the top of the unit. The air is forced through nozzles which are mounted in this horizontal duct and positioned to get maximum air entrainment.

As these jets of air dissipate in the chilled beam exit diffuser they induce room air to pass through the centrally mounted perforated diffuser and over the coils. These coils are normally used for cooling but they can provide heating as well. The 4 pipe heating and cooling chilled beam has coils with twin circuits. Since cooling is the main requirement the coil is designed to meet the maximum cooling load. On the heating cycle the hot water is conveyed to the centre of the coil by a separate micro bore copper pipe and achieves the relevant heating with no impact on the cooling potential.

Active Chilled Beams - Technology

Induction Nozzles

These are probably the most critical part of the beam since they control the induction rate which needs to be as high as possible. The induction rate for a given airflow is a measure of the efficiency of the beam and ultimately the overall cooling which can be achieved.

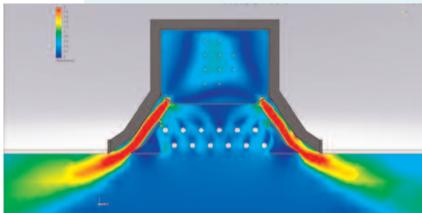
To say the nozzle can come in various "shapes and sizes" is somewhat of an understatement when the induction rate can be influenced by many factors in the nozzle design which include:-

- Shape e.g. circular, oval, slot, star shape, etc
- Diameter measurement of nozzle
- Spacing distance between nozzles
- Configuration pattern of an array of nozzles
- Position in relation to the beam discharge slot
- Angle the angle of discharge

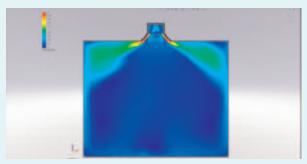
If there were 10 options for each category there would be 1 million variations that needed to be tested to explore the most effective combination.

Engineering fluid dynamics EFD was used to narrow the wide range of option and to create a short list of the most effective combinations for actual testing. It was found later that the EFD predictions on beam velocities, beam temperatures and room velocities were very close to those measured in actual test.





Beam velocity map



Beam function within a room

Active Chilled Beams - Technology



Coil Design

Another very important component is the coil where the objective is to maximise the cooling output and minimise the energy consumption.

The coils used are not a standard "off the shelf" component but have been specially developed jointly by the coil manufacturer and the Advanced Air technical centre. To achieve the objective mentioned above many issues had to be investigated typically:-

- Coil circuits
- Copper pipe diameter
- Fin design and shape
- Fin spacing
- Pipe spacing
- Reynolds number

Each coil configuration was tested against a specific airflow and the output and pressure drop were measured. The best of these were fitted and tested in the beam so that the most effective coil configuration could be selected.

Air Distribution

The discharge air slot needs careful design to minimise any aerodynamic resistance whilst still maintaining coanda effect on the ceiling. In addition the discharge velocities have to be sufficient to give the beam a reasonable throw and maintain comfort conditions within the room at a typical 6-10ft spacing.



The air distribution can be significantly affected by the shape and dimension of the slot and it is therefore essential all beams have been tested in specialist air distribution laboratories BSRIA approved similar to those in the Advanced Air Technical Centre.

Active Chilled Beams Beam performance Nozzle A - 2 way discharge

Performance Parameters

Return Air 76.1 °F Room Air 75.2 °F

Supply Water Heating 113.0 °F

Primary Air 57.2 °F

Supply Water 57.2 °F

Return Water 62.6 °F

Return Water Heating 95.0 °

Beam	Primary Air cfm	13 cfm	17 cfm	21 cfm	25 cfm	30 cfm				
Length (ft)										
4	btu/h/ft	279 b/h/ft	372 b/h/ft	462 b/h/ft	545 b/h/ft	631 b/h/ft				
	Throw ft	0.9-2.9-4.9	1.3-3.9-6.5	1.9-4.9-8.2	2.2-5.5-9.8	2.6-6.5-11.4				
	Static in/wg	0.14 in/wg	0.26 in/wg	0.40 in/wg	0.58 in/wg	0.78 in/wg				
	dB(A)	31	37	42	48	53				
	Water btu/h	836 btu/h	1113 btu/h	1382 btu/h	1621 btu/h	1870 btu/h				
	Water Flow	0.3 gpm	0.4 gpm	0.5 gpm	0.6 gpm	0.7 gpm				
	Water △P	0.16 ft	0.29 ft	0.45 ft	0.62 ft	0.82 ft				
	Heating btu/h	461 btu/h	613 btu/h	762 btu/h	894 btu/h	1031 btu/h				
	btu/h/ft	64 cfm	85 cfm	106 cfm	127 cfm	148 cfm				
	Primary Air btu/h	262 btu/h	350 btu/h	437 btu/h	524 btu/h	612 btu/h				
	Total btu/h	1099 btu/h	1463 btu/h	1819 btu/h	2146 btu/h	2482 btu/h				
		21 cfm	25 cfm	30 cfm	34 cfm	38 cfm	42 cfm	47 cfm		
6	btu/h/ft	320 b/h/ft	383 b/h/ft	446 b/h/ft	508 b/h/ft	562 b/h/ft	619 b/h/ft	675 b/h/ft		
	Throw ft	1.3-3.2-5.5	1.6-3.9-6.8	1.6-4.5-7.8	1.9-5.2-9.1	2.2-5.9-10.1	2.6-6.5-11.1	2.6-7.2-12.1		
	Static in/wg	0.18 in/wg	0.26 in/wg	0.35 in/wg	0.46 in/wg	0.58 in/wg	0.71 in/wg	0.86 in/wg		
	dB(A)	23	26	29	31	34	36	37		
	Water btu/h	1450 btu/h	1736 btu/h	2021 btu/h	2299 btu/h	2529 btu/h	2778 btu/h	3021 btu/h		
	Water Flow	0.5 gpm	0.6 gpm	0.7 gpm	0.9 gpm	0.9 gpm	1.0 gpm	1.1 gpm		
	Water △P	0.64 ft	0.92 ft	1.24 ft	1.61 ft	1.94 ft	2.34 ft	2.77 ft		
	Heating btu/h	799 btu/h	957 btu/h	1114 btu/h	1267 btu/h	1394 btu/h	1531 btu/h	1665 btu/h		
	Total Air cfm	106 cfm	127 cfm	148 cfm	170 cfm	191 cfm	212 cfm	233 cfm		
	Primary Air btu/h	437 btu/h	524 btu/h	612 btu/h	699 btu/h	787 btu/h	874 btu/h	962 btu/h		
	Total btu/h	1887 btu/h	2261 btu/h	2633 btu/h	2999 btu/h	3316 btu/h	3653 btu/h	3983 btu/h		
		25 cfm	30 cfm	34 cfm	38 cfm	42 cfm	47 cfm	51 cfm	55 cfm	59 cfm
8	btu/h/ft	298 b/h/ft	348 b/h/ft	397 b/h/ft	446 b/h/ft	494 b/h/ft	538 b/h/ft	582 b/h/ft	631 b/h/ft	673 b/h/ft
				001 0/11/10	440 0/11/11	494 D/11/11	030 0/11/11	JOZ D/11/11	0310/11/11	6/3 D/N/π
	Throw ft	0.9-2.9-5.2	1.3-3.6-6.2	1.6-4.2-7.2	1.6-4.5-7.8	1.9-5.2-8.8	2.2-5.5-9.8		2.6-6.5-11.4	
	Throw ft	0.9-2.9-5.2	1.3-3.6-6.2	1.6-4.2-7.2	1.6-4.5-7.8	1.9-5.2-8.8	2.2-5.5-9.8	2.2-6.2-10.4	2.6-6.5-11.4	2.6-7.2-12.1
	Throw ft Static in/wg	0.9-2.9-5.2 0.14 in/wg	1.3-3.6-6.2 0.20 in/wg	1.6-4.2-7.2 0.26 in/wg	1.6-4.5-7.8 0.32 in/wg	1.9-5.2-8.8 0.40 in/wg	2.2-5.5-9.8 0.48 in/wg	2.2-6.2-10.4 0.58 in/wg	2.6-6.5-11.4 0.68 in/wg	2.6-7.2-12.1 0.78 in/wg
	Throw ft Static in/wg dB(A)	0.9-2.9-5.2 0.14 in/wg 23	1.3-3.6-6.2 0.20 in/wg 24	1.6-4.2-7.2 0.26 in/wg 26	1.6-4.5-7.8 0.32 in/wg 28	1.9-5.2-8.8 0.40 in/wg 30	2.2-5.5-9.8 0.48 in/wg 33	2.2-6.2-10.4 0.58 in/wg 35	2.6-6.5-11.4 0.68 in/wg 36	2.6-7.2-12.1 0.78 in/wg 38
	Throw ft Static in/wg dB(A) Water btu/h	0.9-2.9-5.2 0.14 in/wg 23 1824 btu/h	1.3-3.6-6.2 0.20 in/wg 24 2127 btu/h	1.6-4.2-7.2 0.26 in/wg 26 2426 btu/h	1.6-4.5-7.8 0.32 in/wg 28 2723 btu/h	1.9-5.2-8.8 0.40 in/wg 30 3012 btu/h	2.2-5.5-9.8 0.48 in/wg 33 3277 btu/h	2.2-6.2-10.4 0.58 in/wg 35 3535 btu/h	2.6-6.5-11.4 0.68 in/wg 36 3829 btu/h	2.6-7.2-12.1 0.78 in/wg 38 4077 btu/h
	Throw ft Static in/wg dB(A) Water btu/h Water Flow	0.9-2.9-5.2 0.14 in/wg 23 1824 btu/h 0.7 gpm	1.3-3.6-6.2 0.20 in/wg 24 2127 btu/h 0.8 gpm 1.80 ft 1172 btu/h	1.6-4.2-7.2 0.26 in/wg 26 2426 btu/h 0.9 gpm	1.6-4.5-7.8 0.32 in/wg 28 2723 btu/h 1.0 gpm	1.9-5.2-8.8 0.40 in/wg 30 3012 btu/h 1.1 gpm	2.2-5.5-9.8 0.48 in/wg 33 3277 btu/h 1.2 gpm	2.2-6.2-10.4 0.58 in/wg 35 3535 btu/h 1.3 gpm	2.6-6.5-11.4 0.68 in/wg 36 3829 btu/h 1.4 gpm	2.6-7.2-12.1 0.78 in/wg 38 4077 btu/h 1.5 gpm
	Throw ft Static in/wg dB(A) Water btu/h Water Flow Water ΔP	0.9-2.9-5.2 0.14 in/wg 23 1824 btu/h 0.7 gpm 1.32 ft	1.3-3.6-6.2 0.20 in/wg 24 2127 btu/h 0.8 gpm 1.80 ft 1172 btu/h	1.6-4.2-7.2 0.26 in/wg 26 2426 btu/h 0.9 gpm 2.33 ft	1.6-4.5-7.8 0.32 in/wg 28 2723 btu/h 1.0 gpm 2.94 ft	1.9-5.2-8.8 0.40 in/wg 30 3012 btu/h 1.1 gpm 3.60 ft	2.2-5.5-9.8 0.48 in/wg 33 3277 btu/h 1.2 gpm 4.26 ft	2.2-6.2-10.4 0.58 in/wg 35 3535 btu/h 1.3 gpm 4.96 ft	2.6-6.5-11.4 0.68 in/wg 36 3829 btu/h 1.4 gpm 5.82 ft	2.6-7.2-12.1 0.78 in/wg 38 4077 btu/h 1.5 gpm 6.59 ft 2247 btu/h
	Throw ft Static in/wg dB(A) Water btu/h Water Flow Water ΔP Heating btu/h	0.9-2.9-5.2 0.14 in/wg 23 1824 btu/h 0.7 gpm 1.32 ft 1005 btu/h	1.3-3.6-6.2 0.20 in/wg 24 2127 btu/h 0.8 gpm 1.80 ft	1.6-4.2-7.2 0.26 in/wg 26 2426 btu/h 0.9 gpm 2.33 ft 1337 btu/h	1.6-4.5-7.8 0.32 in/wg 28 2723 btu/h 1.0 gpm 2.94 ft 1501 btu/h	1.9-5.2-8.8 0.40 in/wg 30 3012 btu/h 1.1 gpm 3.60 ft 1660 btu/h	2.2-5.5-9.8 0.48 in/wg 33 3277 btu/h 1.2 gpm 4.26 ft 1806 btu/h	2.2-6.2-10.4 0.58 in/wg 35 3535 btu/h 1.3 gpm 4.96 ft 1948 btu/h	2.6-6.5-11.4 0.68 in/wg 36 3829 btu/h 1.4 gpm 5.82 ft 2110 btu/h	2.6-7.2-12.1 0.78 in/wg 38 4077 btu/h 1.5 gpm 6.59 ft 2247 btu/h 297 cfm
	Throw ft Static in/wg dB(A) Water btu/h Water Flow Water ΔP Heating btu/h Total Air cfm	0.9-2.9-5.2 0.14 in/wg 23 1824 btu/h 0.7 gpm 1.32 ft 1005 btu/h 127 cfm	1.3-3.6-6.2 0.20 in/wg 24 2127 btu/h 0.8 gpm 1.80 ft 1172 btu/h 148 cfm	1.6-4.2-7.2 0.26 in/wg 26 2426 btu/h 0.9 gpm 2.33 ft 1337 btu/h 170 cfm	1.6-4.5-7.8 0.32 in/wg 28 2723 btu/h 1.0 gpm 2.94 ft 1501 btu/h 191 cfm	1.9-5.2-8.8 0.40 in/wg 30 3012 btu/h 1.1 gpm 3.60 ft 1660 btu/h 212 cfm	2.2-5.5-9.8 0.48 in/wg 33 3277 btu/h 1.2 gpm 4.26 ft 1806 btu/h 233 cfm	2.2-6.2-10.4 0.58 in/wg 35 3535 btu/h 1.3 gpm 4.96 ft 1948 btu/h 254 cfm	2.6-6.5-11.4 0.68 in/wg 36 3829 btu/h 1.4 gpm 5.82 ft 2110 btu/h 275 cfm	2.6-7.2-12.1 0.78 in/wg 38 4077 btu/h 1.5 gpm 6.59 ft 2247 btu/h
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10	Throw ft Static in/wg dB(A) Water btu/h Water Flow Water ΔP Heating btu/h Total Air cfm Primary Air btu/h	0.9-2.9-5.2 0.14 in/wg 23 1824 btu/h 0.7 gpm 1.32 ft 1005 btu/h 127 cfm 524 btu/h 2348 btu/h	1.3-3.6-6.2 0.20 in/wg 24 2127 btu/h 0.8 gpm 1.80 ft 1172 btu/h 148 cfm 612 btu/h 2739 btu/h	1.6-4.2-7.2 0.26 in/wg 26 2426 btu/h 0.9 gpm 2.33 ft 1337 btu/h 170 cfm 699 btu/h 3125 btu/h	1.6-4.5-7.8 0.32 in/wg 28 2723 btu/h 1.0 gpm 2.94 ft 1501 btu/h 191 cfm 787 btu/h 3510 btu/h	1.9-5.2-8.8 0.40 in/wg 30 3012 btu/h 1.1 gpm 3.60 ft 1660 btu/h 212 cfm 874 btu/h 3887 btu/h	2.2-5.5-9.8 0.48 in/wg 33 3277 btu/h 1.2 gpm 4.26 ft 1806 btu/h 233 cfm 962 btu/h 4238 btu/h	2.2-6.2-10.4 0.58 in/wg 35 3535 btu/h 1.3 gpm 4.96 ft 1948 btu/h 254 cfm 1049 btu/h 4584 btu/h	2.6-6.5-11.4 0.68 in/wg 36 3829 btu/h 1.4 gpm 5.82 ft 2110 btu/h 275 cfm 1136 btu/h 4966 btu/h	2.6-7.2-12.1 0.78 in/wg 38 4077 btu/h 1.5 gpm 6.59 ft 2247 btu/h 297 cfm 1224 btu/h 5301 btu/h
10	Throw ft Static in/wg dB(A) Water btu/h Water Flow Water ΔP Heating btu/h Total Air cfm Primary Air btu/h Total btu/h	0.9-2.9-5.2 0.14 in/wg 23 1824 btu/h 0.7 gpm 1.32 ft 1005 btu/h 127 cfm 524 btu/h 2348 btu/h 34 cfm	1.3-3.6-6.2 0.20 in/wg 24 2127 btu/h 0.8 gpm 1.80 ft 1172 btu/h 148 cfm 612 btu/h 2739 btu/h 38 cfm	1.6-4.2-7.2 0.26 in/wg 26 2426 btu/h 0.9 gpm 2.33 ft 1337 btu/h 170 cfm 699 btu/h 3125 btu/h 42 cfm	1.6-4.5-7.8 0.32 in/wg 28 2723 btu/h 1.0 gpm 2.94 ft 1501 btu/h 191 cfm 787 btu/h 3510 btu/h 47 cfm	1.9-5.2-8.8 0.40 in/wg 30 3012 btu/h 1.1 gpm 3.60 ft 1660 btu/h 212 cfm 874 btu/h 3887 btu/h 51 cfm	2.2-5.5-9.8 0.48 in/wg 33 3277 btu/h 1.2 gpm 4.26 ft 1806 btu/h 233 cfm 962 btu/h 4238 btu/h 55 cfm	2.2-6.2-10.4 0.58 in/wg 35 3535 btu/h 1.3 gpm 4.96 ft 1948 btu/h 254 cfm 1049 btu/h 4584 btu/h 59 cfm	2.6-6.5-11.4 0.68 in/wg 36 3829 btu/h 1.4 gpm 5.82 ft 2110 btu/h 275 cfm 1136 btu/h 4966 btu/h 64 cfm 564 b/h/ft	2.6-7.2-12.1 0.78 in/wg 38 4077 btu/h 1.5 gpm 6.59 ft 2247 btu/h 297 cfm 1224 btu/h 5301 btu/h 68 cfm
10	Throw ft Static in/wg dB(A) Water btu/h Water Flow Water AP Heating btu/h Total Air cfm Primary Air btu/h Total btu/h	0.9-2.9-5.2 0.14 in/wg 23 1824 btu/h 0.7 gpm 1.32 ft 1005 btu/h 127 cfm 524 btu/h 2348 btu/h 34 cfm 301 b/h/ft	1.3-3.6-6.2 0.20 in/wg 24 2127 btu/h 0.8 gpm 1.80 ft 1172 btu/h 148 cfm 612 btu/h 2739 btu/h 38 cfm 339 b/h/ft	1.6-4.2-7.2 0.26 in/wg 26 2426 btu/h 0.9 gpm 2.33 ft 1337 btu/h 170 cfm 699 btu/h 3125 btu/h 42 cfm 379 b/h/ft	1.6-4.5-7.8 0.32 in/wg 28 2723 btu/h 1.0 gpm 2.94 ft 1501 btu/h 191 cfm 787 btu/h 3510 btu/h 47 cfm 417 b/h/ft	1.9-5.2-8.8 0.40 in/wg 30 3012 btu/h 1.1 gpm 3.60 ft 1660 btu/h 212 cfm 874 btu/h 3887 btu/h 51 cfm 455 b/h/ft	2.2-5.5-9.8 0.48 in/wg 33 3277 btu/h 1.2 gpm 4.26 ft 1806 btu/h 233 cfm 962 btu/h 4238 btu/h 55 cfm 495 b/h/ft	2.2-6.2-10.4 0.58 in/wg 35 3535 btu/h 1.3 gpm 4.96 ft 1948 btu/h 254 cfm 1049 btu/h 4584 btu/h 59 cfm 530 b/h/ft	2.6-6.5-11.4 0.68 in/wg 36 3829 btu/h 1.4 gpm 5.82 ft 2110 btu/h 275 cfm 1136 btu/h 4966 btu/h 64 cfm 564 b/h/ft 2.2-5.9-10.1	2.6-7.2-12.1 0.78 in/wg 38 4077 btu/h 1.5 gpm 6.59 ft 2247 btu/h 297 cfm 1224 btu/h 5301 btu/h 68 cfm 604 b/h/ft
10	Throw ft Static in/wg dB(A) Water btu/h Water Flow Water ΔP Heating btu/h Total Air cfm Primary Air btu/h Total btu/h btu/h/ft Throw ft	0.9-2.9-5.2 0.14 in/wg 23 1824 btu/h 0.7 gpm 1.32 ft 1005 btu/h 127 cfm 524 btu/h 2348 btu/h 34 cfm 301 b/h/ft 0.9-2.9-5.2	1.3-3.6-6.2 0.20 in/wg 24 2127 btu/h 0.8 gpm 1.80 ft 1172 btu/h 148 cfm 612 btu/h 2739 btu/h 38 cfm 339 b/h/ft 1.3-3.6-5.9 0.21 in/wg	1.6-4.2-7.2 0.26 in/wg 26 2426 btu/h 0.9 gpm 2.33 ft 1337 btu/h 170 cfm 699 btu/h 3125 btu/h 42 cfm 379 b/h/ft 1.3-3.9-6.8	1.6-4.5-7.8 0.32 in/wg 28 2723 btu/h 1.0 gpm 2.94 ft 1501 btu/h 191 cfm 787 btu/h 3510 btu/h 47 cfm 417 b/h/ft 1.6-4.2-7.5	1.9-5.2-8.8 0.40 in/wg 30 3012 btu/h 1.1 gpm 3.60 ft 1660 btu/h 212 cfm 874 btu/h 3887 btu/h 51 cfm 455 b/h/ft 1.6-4.5-8.2	2.2-5.5-9.8 0.48 in/wg 33 3277 btu/h 1.2 gpm 4.26 ft 1806 btu/h 233 cfm 962 btu/h 4238 btu/h 55 cfm 495 b/h/ft 1.9-5.2-8.8	2.2-6.2-10.4 0.58 in/wg 35 3535 btu/h 1.3 gpm 4.96 ft 1948 btu/h 254 cfm 1049 btu/h 4584 btu/h 59 cfm 530 b/h/ft 1.9-5.5-9.5	2.6-6.5-11.4 0.68 in/wg 36 3829 btu/h 1.4 gpm 5.82 ft 2110 btu/h 275 cfm 1136 btu/h 4966 btu/h 64 cfm 564 b/h/ft	2.6-7.2-12.1 0.78 in/wg 38 4077 btu/h 1.5 gpm 6.59 ft 2247 btu/h 297 cfm 1224 btu/h 5301 btu/h 68 cfm 604 b/h/ft 2.2-6.2-10.8
10	Throw ft Static in/wg dB(A) Water btu/h Water Flow Water ΔP Heating btu/h Total Air cfm Primary Air btu/h Total btu/h btu/h/ft Throw ft Static in/wg	0.9-2.9-5.2 0.14 in/wg 23 1824 btu/h 0.7 gpm 1.32 ft 1005 btu/h 127 cfm 524 btu/h 2348 btu/h 34 cfm 301 b/h/ft 0.9-2.9-5.2 0.16 in/wg	1.3-3.6-6.2 0.20 in/wg 24 2127 btu/h 0.8 gpm 1.80 ft 1172 btu/h 148 cfm 612 btu/h 2739 btu/h 38 cfm 339 b/h/ft 1.3-3.6-5.9 0.21 in/wg	1.6-4.2-7.2 0.26 in/wg 26 2426 btu/h 0.9 gpm 2.33 ft 1337 btu/h 170 cfm 699 btu/h 3125 btu/h 42 cfm 379 b/h/ft 1.3-3.9-6.8 0.26 in/wg	1.6-4.5-7.8 0.32 in/wg 28 2723 btu/h 1.0 gpm 2.94 ft 1501 btu/h 191 cfm 787 btu/h 3510 btu/h 47 cfm 417 b/h/ft 1.6-4.2-7.5 0.31 in/wg	1.9-5.2-8.8 0.40 in/wg 30 3012 btu/h 1.1 gpm 3.60 ft 1660 btu/h 212 cfm 874 btu/h 3887 btu/h 51 cfm 455 b/h/ft 1.6-4.5-8.2 0.37 in/wg	2.2-5.5-9.8 0.48 in/wg 33 3277 btu/h 1.2 gpm 4.26 ft 1806 btu/h 233 cfm 962 btu/h 4238 btu/h 55 cfm 495 b/h/ft 1.9-5.2-8.8 0.43 in/wg	2.2-6.2-10.4 0.58 in/wg 35 3535 btu/h 1.3 gpm 4.96 ft 1948 btu/h 254 cfm 1049 btu/h 4584 btu/h 59 cfm 530 b/h/ft 1.9-5.5-9.5 0.50 in/wg	2.6-6.5-11.4 0.68 in/wg 36 3829 btu/h 1.4 gpm 5.82 ft 2110 btu/h 275 cfm 1136 btu/h 4966 btu/h 64 cfm 564 b/h/ft 2.2-5.9-10.1 0.58 in/wg	2.6-7.2-12.1 0.78 in/wg 38 4077 btu/h 1.5 gpm 6.59 ft 2247 btu/h 297 cfm 1224 btu/h 5301 btu/h 68 cfm 604 b/h/ft 2.2-6.2-10.8 0.66 in/wg
10	Throw ft Static in/wg dB(A) Water btu/h Water Flow Water ΔP Heating btu/h Total Air cfm Primary Air btu/h Total btu/h Total btu/h Throw ft Static in/wg dB(A)	0.9-2.9-5.2 0.14 in/wg 23 1824 btu/h 0.7 gpm 1.32 ft 1005 btu/h 127 cfm 524 btu/h 2348 btu/h 34 cfm 301 b/h/ft 0.9-2.9-5.2 0.16 in/wg	1.3-3.6-6.2 0.20 in/wg 24 2127 btu/h 0.8 gpm 1.80 ft 1172 btu/h 148 cfm 612 btu/h 2739 btu/h 38 cfm 339 b/h/ft 1.3-3.6-5.9 0.21 in/wg 25 3057 btu/h	1.6-4.2-7.2 0.26 in/wg 26 2426 btu/h 0.9 gpm 2.33 ft 1337 btu/h 170 cfm 699 btu/h 3125 btu/h 42 cfm 379 b/h/ft 1.3-3.9-6.8 0.26 in/wg 28	1.6-4.5-7.8 0.32 in/wg 28 2723 btu/h 1.0 gpm 2.94 ft 1501 btu/h 191 cfm 787 btu/h 3510 btu/h 47 cfm 417 b/h/ft 1.6-4.2-7.5 0.31 in/wg	1.9-5.2-8.8 0.40 in/wg 30 3012 btu/h 1.1 gpm 3.60 ft 1660 btu/h 212 cfm 874 btu/h 3887 btu/h 455 b/h/ft 1.6-4.5-8.2 0.37 in/wg 32	2.2-5.5-9.8 0.48 in/wg 33 3277 btu/h 1.2 gpm 4.26 ft 1806 btu/h 233 cfm 962 btu/h 4238 btu/h 55 cfm 495 b/h/ft 1.9-5.2-8.8 0.43 in/wg 33	2.2-6.2-10.4 0.58 in/wg 35 3535 btu/h 1.3 gpm 4.96 ft 1948 btu/h 254 cfm 1049 btu/h 4584 btu/h 59 cfm 530 b/h/ft 1.9-5.5-9.5 0.50 in/wg	2.6-6.5-11.4 0.68 in/wg 36 3829 btu/h 1.4 gpm 5.82 ft 2110 btu/h 275 cfm 1136 btu/h 4966 btu/h 64 cfm 564 b/h/ft 2.2-5.9-10.1 0.58 in/wg 37	2.6-7.2-12.1 0.78 in/wg 38 4077 btu/h 1.5 gpm 6.59 ft 2247 btu/h 297 cfm 1224 btu/h 5301 btu/h 68 cfm 604 b/h/ft 2.2-6.2-10.8 0.66 in/wg 38
10	Throw ft Static in/wg dB(A) Water btu/h Water Flow Water ΔP Heating btu/h Total Air cfm Primary Air btu/h Total btu/h Total btu/h Throw ft Static in/wg dB(A) Water btu/h	0.9-2.9-5.2 0.14 in/wg 23 1824 btu/h 0.7 gpm 1.32 ft 1005 btu/h 127 cfm 524 btu/h 2348 btu/h 34 cfm 301 b/h/ft 0.9-2.9-5.2 0.16 in/wg 22 2723 btu/h	1.3-3.6-6.2 0.20 in/wg 24 2127 btu/h 0.8 gpm 1.80 ft 1172 btu/h 148 cfm 612 btu/h 2739 btu/h 38 cfm 339 b/h/ft 1.3-3.6-5.9 0.21 in/wg	1.6-4.2-7.2 0.26 in/wg 26 2426 btu/h 0.9 gpm 2.33 ft 1337 btu/h 170 cfm 699 btu/h 3125 btu/h 42 cfm 379 b/h/ft 1.3-3.9-6.8 0.26 in/wg 28 3396 btu/h	1.6-4.5-7.8 0.32 in/wg 28 2723 btu/h 1.0 gpm 2.94 ft 1501 btu/h 191 cfm 787 btu/h 47 cfm 417 b/h/ft 1.6-4.2-7.5 0.31 in/wg 30 3728 btu/h	1.9-5.2-8.8 0.40 in/wg 30 3012 btu/h 1.1 gpm 3.60 ft 1660 btu/h 212 cfm 874 btu/h 3887 btu/h 51 cfm 455 b/h/ft 1.6-4.5-8.2 0.37 in/wg 32 4049 btu/h	2.2-5.5-9.8 0.48 in/wg 33 3277 btu/h 1.2 gpm 4.26 ft 1806 btu/h 233 cfm 962 btu/h 4238 btu/h 55 cfm 495 b/h/ft 1.9-5.2-8.8 0.43 in/wg 33 4386 btu/h	2.2-6.2-10.4 0.58 in/wg 35 3535 btu/h 1.3 gpm 4.96 ft 1948 btu/h 254 cfm 1049 btu/h 4584 btu/h 59 cfm 530 b/h/ft 1.9-5.5-9.5 0.50 in/wg 35 4671 btu/h	2.6-6.5-11.4 0.68 in/wg 36 3829 btu/h 1.4 gpm 5.82 ft 2110 btu/h 275 cfm 1136 btu/h 4966 btu/h 64 cfm 564 b/h/ft 2.2-5.9-10.1 0.58 in/wg 37 4948 btu/h	2.6-7.2-12.1 0.78 in/wg 38 4077 btu/h 1.5 gpm 6.59 ft 2247 btu/h 297 cfm 1224 btu/h 5301 btu/h 68 cfm 604 b/h/ft 2.2-6.2-10.8 0.66 in/wg 38 5278 btu/h
10	Throw ft Static in/wg dB(A) Water btu/h Water Flow Water ΔP Heating btu/h Total Air cfm Primary Air btu/h Total btu/h btu/h/ft Throw ft Static in/wg dB(A) Water btu/h Water Flow	0.9-2.9-5.2 0.14 in/wg 23 1824 btu/h 0.7 gpm 1.32 ft 1005 btu/h 127 cfm 524 btu/h 34 cfm 301 b/h/ft 0.9-2.9-5.2 0.16 in/wg 22 2723 btu/h 1.0 gpm 3.56 ft	1.3-3.6-6.2 0.20 in/wg 24 2127 btu/h 0.8 gpm 1.80 ft 1172 btu/h 148 cfm 612 btu/h 38 cfm 339 b/h/ft 1.3-3.6-5.9 0.21 in/wg 25 3057 btu/h 1.1 gpm 4.49 ft	1.6-4.2-7.2 0.26 in/wg 26 2426 btu/h 0.9 gpm 2.33 ft 1337 btu/h 170 cfm 699 btu/h 3125 btu/h 42 cfm 379 b/h/ft 1.3-3.9-6.8 0.26 in/wg 28 3396 btu/h 1.3 gpm 5.54 ft	1.6-4.5-7.8 0.32 in/wg 28 2723 btu/h 1.0 gpm 2.94 ft 1501 btu/h 191 cfm 787 btu/h 3510 btu/h 47 cfm 417 b/h/ft 1.6-4.2-7.5 0.31 in/wg 30 3728 btu/h 1.4 gpm 6.67 ft	1.9-5.2-8.8 0.40 in/wg 30 3012 btu/h 1.1 gpm 3.60 ft 1660 btu/h 212 cfm 874 btu/h 51 cfm 55 b/h/ft 1.6-4.5-8.2 0.37 in/wg 32 4049 btu/h 1.5 gpm	2.2-5.5-9.8 0.48 in/wg 33 3277 btu/h 1.2 gpm 4.26 ft 1806 btu/h 233 cfm 962 btu/h 4238 btu/h 455 cfm 495 b/h/ft 1.9-5.2-8.8 0.43 in/wg 33 4386 btu/h 1.6 gpm 9.23 ft	2.2-6.2-10.4 0.58 in/wg 35 3535 btu/h 1.3 gpm 4.96 ft 1948 btu/h 254 cfm 1049 btu/h 4584 btu/h 59 cfm 530 b/h/ft 1.9-5.5-9.5 0.50 in/wg 35 4671 btu/h 1.7 gpm 10.47 ft	2.6-6.5-11.4 0.68 in/wg 36 3829 btu/h 1.4 gpm 5.82 ft 2110 btu/h 275 cfm 1136 btu/h 4966 btu/h 64 cfm 564 b/h/ft 2.2-5.9-10.1 0.58 in/wg 37 4948 btu/h 1.8 gpm 11.75 ft	2.6-7.2-12.1 0.78 in/wg 38 4077 btu/h 1.5 gpm 6.59 ft 2247 btu/h 297 cfm 1224 btu/h 5301 btu/h 68 cfm 604 b/h/ft 2.2-6.2-10.8 0.66 in/wg 38 5278 btu/h 2.0 gpm
10	Throw ft Static in/wg dB(A) Water btu/h Water Flow Water ΔP Heating btu/h Total Air cfm Primary Air btu/h btu/h/ft Throw ft Static in/wg dB(A) Water btu/h Water Flow Water ΔP	0.9-2.9-5.2 0.14 in/wg 23 1824 btu/h 0.7 gpm 1.32 ft 1005 btu/h 127 cfm 524 btu/h 34 cfm 301 b/h/ft 0.9-2.9-5.2 0.16 in/wg 22 2723 btu/h 1.0 gpm	1.3-3.6-6.2 0.20 in/wg 24 2127 btu/h 0.8 gpm 1.80 ft 1172 btu/h 148 cfm 612 btu/h 2739 btu/h 38 cfm 339 b/h/ft 1.3-3.6-5.9 0.21 in/wg 25 3057 btu/h 1.1 gpm	1.6-4.2-7.2 0.26 in/wg 26 2426 btu/h 0.9 gpm 2.33 ft 1337 btu/h 170 cfm 699 btu/h 3125 btu/h 42 cfm 379 b/h/ft 1.3-3.9-6.8 0.26 in/wg 28 3396 btu/h 1.3 gpm	1.6-4.5-7.8 0.32 in/wg 28 2723 btu/h 1.0 gpm 2.94 ft 1501 btu/h 191 cfm 787 btu/h 3510 btu/h 47 cfm 417 b/h/ft 1.6-4.2-7.5 0.31 in/wg 30 3728 btu/h 1.4 gpm 6.67 ft 2054 btu/h	1.9-5.2-8.8 0.40 in/wg 30 3012 btu/h 1.1 gpm 3.60 ft 1660 btu/h 212 cfm 874 btu/h 51 cfm 455 b/h/ft 1.6-4.5-8.2 0.37 in/wg 32 4049 btu/h 1.5 gpm 7.87 ft	2.2-5.5-9.8 0.48 in/wg 33 3277 btu/h 1.2 gpm 4.26 ft 1806 btu/h 233 cfm 962 btu/h 4238 btu/h 55 cfm 495 b/h/ft 1.9-5.2-8.8 0.43 in/wg 33 4386 btu/h 1.6 gpm 9.23 ft 2417 btu/h	2.2-6.2-10.4 0.58 in/wg 35 3535 btu/h 1.3 gpm 4.96 ft 1948 btu/h 254 cfm 1049 btu/h 4584 btu/h 59 cfm 530 b/h/ft 1.9-5.5-9.5 0.50 in/wg 35 4671 btu/h 1.7 gpm	2.6-6.5-11.4 0.68 in/wg 36 3829 btu/h 1.4 gpm 5.82 ft 2110 btu/h 275 cfm 1136 btu/h 4966 btu/h 64 cfm 564 b/h/ft 2.2-5.9-10.1 0.58 in/wg 37 4948 btu/h 1.8 gpm 11.75 ft 2727 btu/h	2.6-7.2-12.1 0.78 in/wg 38 4077 btu/h 1.5 gpm 6.59 ft 2247 btu/h 297 cfm 1224 btu/h 5301 btu/h 68 cfm 604 b/h/ft 2.2-6.2-10.8 0.66 in/wg 38 5278 btu/h 2.0 gpm 13.37 ft
10	Throw ft Static in/wg dB(A) Water btu/h Water Flow Water ΔP Heating btu/h Total Air cfm Primary Air btu/h Total btu/h btu/h/ft Throw ft Static in/wg dB(A) Water btu/h Water Flow Water ΔP Heating btu/h Total Air cfm	0.9-2.9-5.2 0.14 in/wg 23 1824 btu/h 0.7 gpm 1.32 ft 1005 btu/h 127 cfm 524 btu/h 34 cfm 301 b/h/ft 0.9-2.9-5.2 0.16 in/wg 22 2723 btu/h 1.0 gpm 3.56 ft 1501 btu/h	1.3-3.6-6.2 0.20 in/wg 24 2127 btu/h 0.8 gpm 1.80 ft 1172 btu/h 148 cfm 612 btu/h 2739 btu/h 38 cfm 339 b/h/ft 1.3-3.6-5.9 0.21 in/wg 25 3057 btu/h 1.1 gpm 4.49 ft 1685 btu/h	1.6-4.2-7.2 0.26 in/wg 26 2426 btu/h 0.9 gpm 2.33 ft 1337 btu/h 170 cfm 699 btu/h 3125 btu/h 42 cfm 379 b/h/ft 1.3-3.9-6.8 0.26 in/wg 28 3396 btu/h 1.3 gpm 5.54 ft 1872 btu/h 212 cfm	1.6-4.5-7.8 0.32 in/wg 28 2723 btu/h 1.0 gpm 2.94 ft 1501 btu/h 191 cfm 787 btu/h 3510 btu/h 47 cfm 417 b/h/ft 1.6-4.2-7.5 0.31 in/wg 30 3728 btu/h 1.4 gpm 6.67 ft 2054 btu/h 233 cfm	1.9-5.2-8.8 0.40 in/wg 30 3012 btu/h 1.1 gpm 3.60 ft 1660 btu/h 212 cfm 874 btu/h 51 cfm 455 b/h/ft 1.6-4.5-8.2 0.37 in/wg 32 4049 btu/h 1.5 gpm 7.87 ft 2231 btu/h	2.2-5.5-9.8 0.48 in/wg 33 3277 btu/h 1.2 gpm 4.26 ft 1806 btu/h 233 cfm 962 btu/h 4238 btu/h 55 cfm 495 b/h/ft 1.9-5.2-8.8 0.43 in/wg 33 4386 btu/h 1.6 gpm 9.23 ft 2417 btu/h 275 cfm	2.2-6.2-10.4 0.58 in/wg 35 3535 btu/h 1.3 gpm 4.96 ft 1948 btu/h 254 cfm 1049 btu/h 4584 btu/h 59 cfm 530 b/h/ft 1.9-5.5-9.5 0.50 in/wg 35 4671 btu/h 1.7 gpm 10.47 ft 2574 btu/h	2.6-6.5-11.4 0.68 in/wg 36 3829 btu/h 1.4 gpm 5.82 ft 2110 btu/h 275 cfm 1136 btu/h 4966 btu/h 64 cfm 564 b/h/ft 2.2-5.9-10.1 0.58 in/wg 37 4948 btu/h 1.8 gpm 11.75 ft 2727 btu/h 318 cfm	2.6-7.2-12.1 0.78 in/wg 38 4077 btu/h 1.5 gpm 6.59 ft 2247 btu/h 297 cfm 1224 btu/h 5301 btu/h 68 cfm 604 b/h/ft 2.2-6.2-10.8 0.66 in/wg 38 5278 btu/h 2.0 gpm 13.37 ft 2909 btu/h 339 cfm
10	Throw ft Static in/wg dB(A) Water btu/h Water Flow Water ΔP Heating btu/h Total Air cfm Primary Air btu/h Total btu/h btu/h/ft Throw ft Static in/wg dB(A) Water btu/h Water Flow Water ΔP Heating btu/h	0.9-2.9-5.2 0.14 in/wg 23 1824 btu/h 0.7 gpm 1.32 ft 1005 btu/h 127 cfm 524 btu/h 34 cfm 301 b/h/ft 0.9-2.9-5.2 0.16 in/wg 22 2723 btu/h 1.0 gpm 3.56 ft 1501 btu/h	1.3-3.6-6.2 0.20 in/wg 24 2127 btu/h 0.8 gpm 1.80 ft 1172 btu/h 148 cfm 612 btu/h 38 cfm 339 b/h/ft 1.3-3.6-5.9 0.21 in/wg 25 3057 btu/h 1.1 gpm 4.49 ft 1685 btu/h	1.6-4.2-7.2 0.26 in/wg 26 2426 btu/h 0.9 gpm 2.33 ft 1337 btu/h 170 cfm 699 btu/h 3125 btu/h 42 cfm 379 b/h/ft 1.3-3.9-6.8 0.26 in/wg 28 3396 btu/h 1.3 gpm 5.54 ft 1872 btu/h	1.6-4.5-7.8 0.32 in/wg 28 2723 btu/h 1.0 gpm 2.94 ft 1501 btu/h 191 cfm 787 btu/h 3510 btu/h 47 cfm 417 b/h/ft 1.6-4.2-7.5 0.31 in/wg 30 3728 btu/h 1.4 gpm 6.67 ft 2054 btu/h	1.9-5.2-8.8 0.40 in/wg 30 3012 btu/h 1.1 gpm 3.60 ft 1660 btu/h 212 cfm 874 btu/h 3887 btu/h 51 cfm 455 b/h/ft 1.6-4.5-8.2 0.37 in/wg 32 4049 btu/h 1.5 gpm 7.87 ft 2231 btu/h 254 cfm	2.2-5.5-9.8 0.48 in/wg 33 3277 btu/h 1.2 gpm 4.26 ft 1806 btu/h 233 cfm 962 btu/h 4238 btu/h 55 cfm 495 b/h/ft 1.9-5.2-8.8 0.43 in/wg 33 4386 btu/h 1.6 gpm 9.23 ft 2417 btu/h	2.2-6.2-10.4 0.58 in/wg 35 3535 btu/h 1.3 gpm 4.96 ft 1948 btu/h 254 cfm 1049 btu/h 4584 btu/h 59 cfm 530 b/h/ft 1.9-5.5-9.5 0.50 in/wg 35 4671 btu/h 1.7 gpm 10.47 ft 2574 btu/h 297 cfm	2.6-6.5-11.4 0.68 in/wg 36 3829 btu/h 1.4 gpm 5.82 ft 2110 btu/h 275 cfm 1136 btu/h 4966 btu/h 64 cfm 564 b/h/ft 2.2-5.9-10.1 0.58 in/wg 37 4948 btu/h 1.8 gpm 11.75 ft 2727 btu/h	2.6-7.2-12.1 0.78 in/wg 38 4077 btu/h 1.5 gpm 6.59 ft 2247 btu/h 297 cfm 1224 btu/h 5301 btu/h 68 cfm 604 b/h/ft 2.2-6.2-10.8 0.66 in/wg 38 5278 btu/h 2.0 gpm 13.37 ft 2909 btu/h

Recommended maximum heating capacity for the above beams is equal to 50% of the indicated cooling potential.

The return air to the beam is taken as 1 °F above the average room for the values above.

Notations

b/h/ft Cooling capacity per linear foot of chilled beam
Throw ft Throw values are to 150 - 100 - and 50 fpm respectively.
Static in/wg Static pressure in beam plenum chamber in/wg

 $\begin{array}{ll} \text{dB(A)} & \text{Air regenerated sound power level} \\ \text{Water btu/h} & \text{Cooling output of coil btu/h} \\ \text{Water Flow} & \text{Water flow rate gpm} \\ \text{Water } \Delta P & \text{Coil pressure drop in/wg} \\ \end{array}$

Total Air cfm
Primary Air btu/h
Total btu/h
Total btu/h
Total cooling capacity of the primary air btu/h
Total btu/h
Total cooling capacity of the chilled beam btu/h

Correcti	on Table
K	Water W
20	1.25
19	1.18
18	1.12
17	1.06
16	1.00
15	0.94
14	0.88
13	0.82
12	0.75

dB(A)	fpm
40	800
35	700
30	600
25	500
20	400

The sound power dB(A) levels are achieved by limiting the primary air spigot velocity as per the table above.

The thermal data is based on 16 K between mean water and return air to the beam.

Active Chilled Beams Beam performance Nozzle B - 2 way discharge

Performance Parameters

Return Air 76.1 °F Room Air 75.2 °F

Primary Air 57.2 °F

Supply Water 57.2 °F

Return Water 62.6 °F

Supply Water Heating 113.0 °F Return Water Heating 95.0 °

Beam Length (ft)	Primary Air cfm	30 cfm	36 cfm	42 cfm	49 cfm	55 cfm	61 cfm			
4	btu/h/ft	494 b/h/ft	593 b/h/ft	721 b/h/ft	797 b/h/ft	893 b/h/ft	974 b/h/ft	1054 b/h/ft		
	Throw ft	1.9-5.2-8.8	2.2-6.2-10.8	2.9-7.5-13.1	3.2-8.5-14.4	3.6-9.5-16	3.9-10.1-17.7	4.2-11.1-19		
	Static in/wg	0.20 in/wg	0.29 in/wg	0.40 in/wg	0.53 in/wg	0.68 in/wg	0.84 in/wg	1.02 in/wg		
	dB(A)	31	37	42	48	53	53	53		
	Water btu/h	1333 btu/h	1592 btu/h	1931 btu/h	2133 btu/h	2379 btu/h	2565 btu/h	2751 btu/h		
	Water Flow	0.5 gpm	0.6 gpm	0.7 gpm	0.8 gpm	0.9 gpm	0.9 gpm	1.0 gpm		
	Water △P	0.42 ft	0.60 ft	0.88 ft	1.07 ft	1.33 ft	1.55 ft	1.78 ft		
	Heating btu/h	734 btu/h	877 btu/h	1064 btu/h	1176 btu/h	1311 btu/h	1413 btu/h	1516 btu/h		
	btu/h/ft	104 cfm	126 cfm	154 cfm	171 cfm	193 cfm	215 cfm	237 cfm		
	Primary Air btu/h	612 btu/h	743 btu/h	874 btu/h	1005 btu/h	1136 btu/h	1268 btu/h	0 btu/h		
	Total btu/h	1945 btu/h	2335 btu/h	2838 btu/h	3138 btu/h	3516 btu/h	3832 btu/h	4150 btu/h		
		42 cfm	49 cfm	55 cfm	61 cfm	68 cfm	74 cfm	81 cfm	87 cfm	
6	btu/h/ft	502 b/h/ft	550 b/h/ft	621 b/h/ft	690 b/h/ft	761 b/h/ft	831 b/h/ft	894 b/h/ft	958 b/h/ft	
	Throw ft	1.9-5.2-8.8	2.2-5.9-9.8	2.6-6.5-11.1	2.9-7.2-12.4	2.9-7.8-13.7	3.2-8.8-15	3.6-9.5-16	3.9-10.1-17.3	
	Static in/wg	0.18 in/wg	0.24 in/wg	0.30 in/wg	0.37 in/wg	0.46 in/wg	0.54 in/wg	0.64 in/wg	0.75 in/wg	
	dB(A)	32	36	40	42	45	47	50	52	
	Water btu/h	2054 btu/h	2240 btu/h	2533 btu/h	2806 btu/h	3097 btu/h	3376 btu/h	3616 btu/h	3863 btu/h	
	Water Flow	0.8 gpm	0.8 gpm	0.9 gpm	1.0 gpm	1.1 gpm	1.2 gpm	1.3 gpm	1.4 gpm	
	Water △P	1.28 ft	1.52 ft	1.95 ft	2.39 ft	2.91 ft	3.46 ft	3.97 ft	4.53 ft	
	Heating btu/h	1132 btu/h	1235 btu/h	1396 btu/h	1547 btu/h	1707 btu/h	1860 btu/h	1993 btu/h	2129 btu/h	
	Total Air cfm	154 cfm	171 cfm	193 cfm	215 cfm	237 cfm	260 cfm	282 cfm	304 cfm	
	Primary Air btu/h	874 btu/h	1005 btu/h	1136 btu/h	1268 btu/h	1399 btu/h	1530 btu/h	1661 btu/h	1792 btu/h	
	Total btu/h	2961 btu/h	3246 btu/h	3669 btu/h	4074 btu/h	4495 btu/h	4905 btu/h	5277 btu/h	5655 btu/h	
		61 cfm	68 cfm	74 cfm	81 cfm	87 cfm	93 cfm	100 cfm	106 cfm	112 cfm
8	btu/h/ft	537 b/h/ft	593 b/h/ft	648 b/h/ft	704 b/h/ft	756 b/h/ft	809 b/h/ft	864 b/h/ft	915 b/h/ft	959 b/h/ft
	Throw ft	2.2-5.5-9.5	2.2-6.2-10.8	2.6-6.8-11.8	2.9-7.5-12.7	2.9-7.8-13.7	3.2-8.5-14.7	3.6-9.1-15.7	3.9-9.8-16.7	3.9-10.1-17.3
	Static in/wg	0.21 in/wg	0.26 in/wg	0.31 in/wg	0.36 in/wg	0.42 in/wg	0.48 in/wg	0.55 in/wg	0.63 in/wg	0.70 in/wg
	dB(A)					10	40	I		EΛ
	\ /	37	40	43	45	46	48	50	52	54
	Water btu/h	2961 btu/h	3267 btu/h	3573 btu/h	3879 btu/h	4158 btu/h	4448 btu/h	4751 btu/h	5021 btu/h	5233 btu/h
	Water btu/h Water Flow	2961 btu/h 1.1 gpm	3267 btu/h 1.2 gpm	3573 btu/h 1.3 gpm	3879 btu/h 1.4 gpm	4158 btu/h 1.5 gpm	4448 btu/h 1.6 gpm	4751 btu/h 1.8 gpm	5021 btu/h 1.9 gpm	5233 btu/h 1.9 gpm
	Water btu/h Water Flow Water Δ P	2961 btu/h 1.1 gpm 3.48 ft	3267 btu/h 1.2 gpm 4.23 ft	3573 btu/h 1.3 gpm 5.06 ft	3879 btu/h 1.4 gpm 5.97 ft	4158 btu/h 1.5 gpm 6.86 ft	4448 btu/h 1.6 gpm 7.85 ft	4751 btu/h 1.8 gpm 8.95 ft	5021 btu/h 1.9 gpm 10.00 ft	5233 btu/h 1.9 gpm 10.86 ft
	Water btu/h Water Flow Water ΔP Heating btu/h	2961 btu/h 1.1 gpm 3.48 ft 1632 btu/h	3267 btu/h 1.2 gpm 4.23 ft 1800 btu/h	3573 btu/h 1.3 gpm 5.06 ft 1969 btu/h	3879 btu/h 1.4 gpm 5.97 ft 2138 btu/h	4158 btu/h 1.5 gpm 6.86 ft 2292 btu/h	4448 btu/h 1.6 gpm 7.85 ft 2451 btu/h	4751 btu/h 1.8 gpm 8.95 ft 2618 btu/h	5021 btu/h 1.9 gpm 10.00 ft 2767 btu/h	5233 btu/h 1.9 gpm 10.86 ft 2884 btu/h
	Water btu/h Water Flow Water ΔP Heating btu/h Total Air cfm	2961 btu/h 1.1 gpm 3.48 ft 1632 btu/h 215 cfm	3267 btu/h 1.2 gpm 4.23 ft 1800 btu/h 237 cfm	3573 btu/h 1.3 gpm 5.06 ft 1969 btu/h 260 cfm	3879 btu/h 1.4 gpm 5.97 ft 2138 btu/h 282 cfm	4158 btu/h 1.5 gpm 6.86 ft 2292 btu/h 304 cfm	4448 btu/h 1.6 gpm 7.85 ft 2451 btu/h 326 cfm	4751 btu/h 1.8 gpm 8.95 ft 2618 btu/h 349 cfm	5021 btu/h 1.9 gpm 10.00 ft 2767 btu/h 371 cfm	5233 btu/h 1.9 gpm 10.86 ft 2884 btu/h 393 cfm
	Water btu/h Water Flow Water ΔP Heating btu/h Total Air cfm Primary Air btu/h	2961 btu/h 1.1 gpm 3.48 ft 1632 btu/h 215 cfm 1268 btu/h	3267 btu/h 1.2 gpm 4.23 ft 1800 btu/h 237 cfm 1399 btu/h	3573 btu/h 1.3 gpm 5.06 ft 1969 btu/h 260 cfm 1530 btu/h	3879 btu/h 1.4 gpm 5.97 ft 2138 btu/h 282 cfm 1661 btu/h	4158 btu/h 1.5 gpm 6.86 ft 2292 btu/h 304 cfm 1792 btu/h	4448 btu/h 1.6 gpm 7.85 ft 2451 btu/h 326 cfm 1923 btu/h	4751 btu/h 1.8 gpm 8.95 ft 2618 btu/h 349 cfm 2054 btu/h	5021 btu/h 1.9 gpm 10.00 ft 2767 btu/h 371 cfm 2185 btu/h	5233 btu/h 1.9 gpm 10.86 ft 2884 btu/h 393 cfm 2317 btu/h
	Water btu/h Water Flow Water ΔP Heating btu/h Total Air cfm	2961 btu/h 1.1 gpm 3.48 ft 1632 btu/h 215 cfm 1268 btu/h 4228 btu/h	3267 btu/h 1.2 gpm 4.23 ft 1800 btu/h 237 cfm 1399 btu/h 4665 btu/h	3573 btu/h 1.3 gpm 5.06 ft 1969 btu/h 260 cfm 1530 btu/h 5103 btu/h	3879 btu/h 1.4 gpm 5.97 ft 2138 btu/h 282 cfm 1661 btu/h 5540 btu/h	4158 btu/h 1.5 gpm 6.86 ft 2292 btu/h 304 cfm 1792 btu/h 5950 btu/h	4448 btu/h 1.6 gpm 7.85 ft 2451 btu/h 326 cfm 1923 btu/h 6371 btu/h	4751 btu/h 1.8 gpm 8.95 ft 2618 btu/h 349 cfm 2054 btu/h 6805 btu/h	5021 btu/h 1.9 gpm 10.00 ft 2767 btu/h 371 cfm	5233 btu/h 1.9 gpm 10.86 ft 2884 btu/h 393 cfm
	Water btu/h Water Flow Water △P Heating btu/h Total Air cfm Primary Air btu/h Total btu/h	2961 btu/h 1.1 gpm 3.48 ft 1632 btu/h 215 cfm 1268 btu/h 4228 btu/h 74 cfm	3267 btu/h 1.2 gpm 4.23 ft 1800 btu/h 237 cfm 1399 btu/h 4665 btu/h 81 cfm	3573 btu/h 1.3 gpm 5.06 ft 1969 btu/h 260 cfm 1530 btu/h 5103 btu/h 87 cfm	3879 btu/h 1.4 gpm 5.97 ft 2138 btu/h 282 cfm 1661 btu/h 5540 btu/h 93 cfm	4158 btu/h 1.5 gpm 6.86 ft 2292 btu/h 304 cfm 1792 btu/h 5950 btu/h 100 cfm	4448 btu/h 1.6 gpm 7.85 ft 2451 btu/h 326 cfm 1923 btu/h 6371 btu/h 106 cfm	4751 btu/h 1.8 gpm 8.95 ft 2618 btu/h 349 cfm 2054 btu/h 6805 btu/h 112 cfm	5021 btu/h 1.9 gpm 10.00 ft 2767 btu/h 371 cfm 2185 btu/h	5233 btu/h 1.9 gpm 10.86 ft 2884 btu/h 393 cfm 2317 btu/h
10	Water btu/h Water Flow Water △P Heating btu/h Total Air cfm Primary Air btu/h Total btu/h	2961 btu/h 1.1 gpm 3.48 ft 1632 btu/h 215 cfm 1268 btu/h 4228 btu/h 74 cfm 569 b/h/ft	3267 btu/h 1.2 gpm 4.23 ft 1800 btu/h 237 cfm 1399 btu/h 4665 btu/h 81 cfm 610 b/h/ft	3573 btu/h 1.3 gpm 5.06 ft 1969 btu/h 260 cfm 1530 btu/h 5103 btu/h 87 cfm 659 b/h/ft	3879 btu/h 1.4 gpm 5.97 ft 2138 btu/h 282 cfm 1661 btu/h 5540 btu/h 93 cfm 707 b/h/ft	4158 btu/h 1.5 gpm 6.86 ft 2292 btu/h 304 cfm 1792 btu/h 5950 btu/h 100 cfm 755 b/h/ft	4448 btu/h 1.6 gpm 7.85 ft 2451 btu/h 326 cfm 1923 btu/h 6371 btu/h 106 cfm 799 b/h/ft	4751 btu/h 1.8 gpm 8.95 ft 2618 btu/h 349 cfm 2054 btu/h 6805 btu/h 112 cfm 847 b/h/ft	5021 btu/h 1.9 gpm 10.00 ft 2767 btu/h 371 cfm 2185 btu/h	5233 btu/h 1.9 gpm 10.86 ft 2884 btu/h 393 cfm 2317 btu/h
10	Water btu/h Water Flow Water ΔP Heating btu/h Total Air cfm Primary Air btu/h Total btu/h btu/h/ft Throw ft	2961 btu/h 1.1 gpm 3.48 ft 1632 btu/h 215 cfm 1268 btu/h 4228 btu/h 74 cfm 569 b/h/ft 2.2-5.9-10.1	3267 btu/h 1.2 gpm 4.23 ft 1800 btu/h 237 cfm 1399 btu/h 4665 btu/h 81 cfm 610 b/h/ft 2.6-6.5-11.1	3573 btu/h 1.3 gpm 5.06 ft 1969 btu/h 260 cfm 1530 btu/h 5103 btu/h 87 cfm 659 b/h/ft 2.6-6.8-11.8	3879 btu/h 1.4 gpm 5.97 ft 2138 btu/h 282 cfm 1661 btu/h 5540 btu/h 93 cfm 707 b/h/ft 2.9-7.5-12.7	4158 btu/h 1.5 gpm 6.86 ft 2292 btu/h 304 cfm 1792 btu/h 5950 btu/h 100 cfm 755 b/h/ft 2.9-7.8-13.7	4448 btu/h 1.6 gpm 7.85 ft 2451 btu/h 326 cfm 1923 btu/h 6371 btu/h 106 cfm 799 b/h/ft 3.2-8.5-14.4	4751 btu/h 1.8 gpm 8.95 ft 2618 btu/h 349 cfm 2054 btu/h 6805 btu/h 112 cfm 847 b/h/ft 3.6-8.8-15.4	5021 btu/h 1.9 gpm 10.00 ft 2767 btu/h 371 cfm 2185 btu/h	5233 btu/h 1.9 gpm 10.86 ft 2884 btu/h 393 cfm 2317 btu/h
10	Water btu/h Water Flow Water ΔP Heating btu/h Total Air cfm Primary Air btu/h Total btu/h btu/h/ft Throw ft Static in/wg	2961 btu/h 1.1 gpm 3.48 ft 1632 btu/h 215 cfm 1268 btu/h 4228 btu/h 74 cfm 569 b/h/ft 2.2-5.9-10.1 0.20 in/wg	3267 btu/h 1.2 gpm 4.23 ft 1800 btu/h 237 cfm 1399 btu/h 4665 btu/h 81 cfm 610 b/h/ft 2.6-6.5-11.1 0.23 in/wg	3573 btu/h 1.3 gpm 5.06 ft 1969 btu/h 260 cfm 1530 btu/h 5103 btu/h 87 cfm 659 b/h/ft 2.6-6.8-11.8 0.27 in/wg	3879 btu/h 1.4 gpm 5.97 ft 2138 btu/h 282 cfm 1661 btu/h 5540 btu/h 93 cfm 707 b/h/ft 2.9-7.5-12.7 0.31 in/wg	4158 btu/h 1.5 gpm 6.86 ft 2292 btu/h 304 cfm 1792 btu/h 5950 btu/h 100 cfm 755 b/h/ft 2.9-7.8-13.7 0.35 in/wg	4448 btu/h 1.6 gpm 7.85 ft 2451 btu/h 326 cfm 1923 btu/h 6371 btu/h 106 cfm 799 b/h/ft 3.2-8.5-14.4 0.40 in/wg	4751 btu/h 1.8 gpm 8.95 ft 2618 btu/h 349 cfm 2054 btu/h 6805 btu/h 112 cfm 847 b/h/ft 3.6-8.8-15.4 0.45 in/wg	5021 btu/h 1.9 gpm 10.00 ft 2767 btu/h 371 cfm 2185 btu/h	5233 btu/h 1.9 gpm 10.86 ft 2884 btu/h 393 cfm 2317 btu/h
10	Water btu/h Water Flow Water ΔP Heating btu/h Total Air cfm Primary Air btu/h Total btu/h btu/h/ft Throw ft Static in/wg dB(A)	2961 btu/h 1.1 gpm 3.48 ft 1632 btu/h 215 cfm 1268 btu/h 4228 btu/h 74 cfm 569 b/h/ft 2.2-5.9-10.1 0.20 in/wg 40	3267 btu/h 1.2 gpm 4.23 ft 1800 btu/h 237 cfm 1399 btu/h 4665 btu/h 81 cfm 610 b/h/ft 2.6-6.5-11.1 0.23 in/wg 42	3573 btu/h 1.3 gpm 5.06 ft 1969 btu/h 260 cfm 1530 btu/h 5103 btu/h 87 cfm 659 b/h/ft 2.6-6.8-11.8 0.27 in/wg 44	3879 btu/h 1.4 gpm 5.97 ft 2138 btu/h 282 cfm 1661 btu/h 5540 btu/h 93 cfm 707 b/h/ft 2.9-7.5-12.7 0.31 in/wg 46	4158 btu/h 1.5 gpm 6.86 ft 2292 btu/h 304 cfm 1792 btu/h 5950 btu/h 100 cfm 755 b/h/ft 2.9-7.8-13.7 0.35 in/wg 48	4448 btu/h 1.6 gpm 7.85 ft 2451 btu/h 326 cfm 1923 btu/h 6371 btu/h 106 cfm 799 b/h/ft 3.2-8.5-14.4 0.40 in/wg 50	4751 btu/h 1.8 gpm 8.95 ft 2618 btu/h 349 cfm 2054 btu/h 6805 btu/h 112 cfm 847 b/h/ft 3.6-8.8-15.4 0.45 in/wg 52	5021 btu/h 1.9 gpm 10.00 ft 2767 btu/h 371 cfm 2185 btu/h	5233 btu/h 1.9 gpm 10.86 ft 2884 btu/h 393 cfm 2317 btu/h
10	Water btu/h Water Flow Water ΔP Heating btu/h Total Air cfm Primary Air btu/h Total btu/h btu/h/ft Throw ft Static in/wg dB(A) Water btu/h	2961 btu/h 1.1 gpm 3.48 ft 1632 btu/h 215 cfm 1268 btu/h 4228 btu/h 74 cfm 569 b/h/ft 2.2-5.9-10.1 0.20 in/wg 40 4067 btu/h	3267 btu/h 1.2 gpm 4.23 ft 1800 btu/h 237 cfm 1399 btu/h 4665 btu/h 81 cfm 610 b/h/ft 2.6-6.5-11.1 0.23 in/wg 42 4345 btu/h	3573 btu/h 1.3 gpm 5.06 ft 1969 btu/h 260 cfm 1530 btu/h 5103 btu/h 87 cfm 659 b/h/ft 2.6-6.8-11.8 0.27 in/wg 44 4688 btu/h	3879 btu/h 1.4 gpm 5.97 ft 2138 btu/h 282 cfm 1661 btu/h 5540 btu/h 93 cfm 707 b/h/ft 2.9-7.5-12.7 0.31 in/wg 46 5031 btu/h	4158 btu/h 1.5 gpm 6.86 ft 2292 btu/h 304 cfm 1792 btu/h 5950 btu/h 100 cfm 755 b/h/ft 2.9-7.8-13.7 0.35 in/wg 48 5374 btu/h	4448 btu/h 1.6 gpm 7.85 ft 2451 btu/h 326 cfm 1923 btu/h 6371 btu/h 106 cfm 799 b/h/ft 3.2-8.5-14.4 0.40 in/wg 50 5679 btu/h	4751 btu/h 1.8 gpm 8.95 ft 2618 btu/h 349 cfm 2054 btu/h 6805 btu/h 112 cfm 847 b/h/ft 3.6-8.8-15.4 0.45 in/wg 52 6020 btu/h	5021 btu/h 1.9 gpm 10.00 ft 2767 btu/h 371 cfm 2185 btu/h	5233 btu/h 1.9 gpm 10.86 ft 2884 btu/h 393 cfm 2317 btu/h
10	Water btu/h Water Flow Water AP Heating btu/h Total Air cfm Primary Air btu/h Total btu/h btu/h/ft Throw ft Static in/wg dB(A) Water btu/h Water Flow	2961 btu/h 1.1 gpm 3.48 ft 1632 btu/h 215 cfm 1268 btu/h 4228 btu/h 74 cfm 569 b/h/ft 2.2-5.9-10.1 0.20 in/wg 40 4067 btu/h 1.5 gpm	3267 btu/h 1.2 gpm 4.23 ft 1800 btu/h 237 cfm 1399 btu/h 4665 btu/h 81 cfm 610 b/h/ft 2.6-6.5-11.1 0.23 in/wg 42 4345 btu/h 1.6 gpm	3573 btu/h 1.3 gpm 5.06 ft 1969 btu/h 260 cfm 1530 btu/h 5103 btu/h 87 cfm 659 b/h/ft 2.6-6.8-11.8 0.27 in/wg 44 4688 btu/h 1.7 gpm	3879 btu/h 1.4 gpm 5.97 ft 2138 btu/h 282 cfm 1661 btu/h 5540 btu/h 93 cfm 707 b/h/ft 2.9-7.5-12.7 0.31 in/wg 46 5031 btu/h 1.9 gpm	4158 btu/h 1.5 gpm 6.86 ft 2292 btu/h 304 cfm 1792 btu/h 5950 btu/h 100 cfm 755 b/h/ft 2.9-7.8-13.7 0.35 in/wg 48 5374 btu/h 2.0 gpm	4448 btu/h 1.6 gpm 7.85 ft 2451 btu/h 326 cfm 1923 btu/h 6371 btu/h 106 cfm 799 b/h/ft 3.2-8.5-14.4 0.40 in/wg 50 5679 btu/h 2.1 gpm	4751 btu/h 1.8 gpm 8.95 ft 2618 btu/h 349 cfm 2054 btu/h 6805 btu/h 112 cfm 847 b/h/ft 3.6-8.8-15.4 0.45 in/wg 52 6020 btu/h 2.2 gpm	5021 btu/h 1.9 gpm 10.00 ft 2767 btu/h 371 cfm 2185 btu/h	5233 btu/h 1.9 gpm 10.86 ft 2884 btu/h 393 cfm 2317 btu/h
10	Water btu/h Water Flow Water ΔP Heating btu/h Total Air cfm Primary Air btu/h Total btu/h btu/h/ft Throw ft Static in/wg dB(A) Water btu/h Water Flow Water ΔP	2961 btu/h 1.1 gpm 3.48 ft 1632 btu/h 215 cfm 1268 btu/h 4228 btu/h 74 cfm 569 b/h/ft 2.2-5.9-10.1 0.20 in/wg 40 4067 btu/h 1.5 gpm 7.94 ft	3267 btu/h 1.2 gpm 4.23 ft 1800 btu/h 237 cfm 1399 btu/h 4665 btu/h 81 cfm 610 b/h/ft 2.6-6.5-11.1 0.23 in/wg 42 4345 btu/h 1.6 gpm 9.06 ft	3573 btu/h 1.3 gpm 5.06 ft 1969 btu/h 260 cfm 1530 btu/h 5103 btu/h 87 cfm 659 b/h/ft 2.6-6.8-11.8 0.27 in/wg 44 4688 btu/h 1.7 gpm 10.55 ft	3879 btu/h 1.4 gpm 5.97 ft 2138 btu/h 282 cfm 1661 btu/h 5540 btu/h 93 cfm 707 b/h/ft 2.9-7.5-12.7 0.31 in/wg 46 5031 btu/h 1.9 gpm 12.15 ft	4158 btu/h 1.5 gpm 6.86 ft 2292 btu/h 304 cfm 1792 btu/h 5950 btu/h 100 cfm 755 b/h/ft 2.9-7.8-13.7 0.35 in/wg 48 5374 btu/h 2.0 gpm 13.86 ft	4448 btu/h 1.6 gpm 7.85 ft 2451 btu/h 326 cfm 1923 btu/h 6371 btu/h 106 cfm 799 b/h/ft 3.2-8.5-14.4 0.40 in/wg 50 5679 btu/h 2.1 gpm 15.48 ft	4751 btu/h 1.8 gpm 8.95 ft 2618 btu/h 349 cfm 2054 btu/h 6805 btu/h 112 cfm 847 b/h/ft 3.6-8.8-15.4 0.45 in/wg 52 6020 btu/h 2.2 gpm 17.40 ft	5021 btu/h 1.9 gpm 10.00 ft 2767 btu/h 371 cfm 2185 btu/h	5233 btu/h 1.9 gpm 10.86 ft 2884 btu/h 393 cfm 2317 btu/h
10	Water btu/h Water Flow Water AP Heating btu/h Total Air cfm Primary Air btu/h Total btu/h btu/h/ft Throw ft Static in/wg dB(A) Water btu/h Water Flow Water ΔP Heating btu/h	2961 btu/h 1.1 gpm 3.48 ft 1632 btu/h 215 cfm 1268 btu/h 4228 btu/h 74 cfm 569 b/h/ft 2.2-5.9-10.1 0.20 in/wg 40 4067 btu/h 1.5 gpm 7.94 ft 2242 btu/h	3267 btu/h 1.2 gpm 4.23 ft 1800 btu/h 237 cfm 1399 btu/h 4665 btu/h 81 cfm 610 b/h/ft 2.6-6.5-11.1 0.23 in/wg 42 4345 btu/h 1.6 gpm 9.06 ft 2395 btu/h	3573 btu/h 1.3 gpm 5.06 ft 1969 btu/h 260 cfm 1530 btu/h 5103 btu/h 87 cfm 659 b/h/ft 2.6-6.8-11.8 0.27 in/wg 44 4688 btu/h 1.7 gpm 10.55 ft 2584 btu/h	3879 btu/h 1.4 gpm 5.97 ft 2138 btu/h 282 cfm 1661 btu/h 5540 btu/h 93 cfm 707 b/h/ft 2.9-7.5-12.7 0.31 in/wg 46 5031 btu/h 1.9 gpm 12.15 ft 2773 btu/h	4158 btu/h 1.5 gpm 6.86 ft 2292 btu/h 304 cfm 1792 btu/h 5950 btu/h 100 cfm 755 b/h/ft 2.9-7.8-13.7 0.35 in/wg 48 5374 btu/h 2.0 gpm 13.86 ft 2962 btu/h	4448 btu/h 1.6 gpm 7.85 ft 2451 btu/h 326 cfm 1923 btu/h 6371 btu/h 106 cfm 799 b/h/ft 3.2-8.5-14.4 0.40 in/wg 50 5679 btu/h 2.1 gpm 15.48 ft 3130 btu/h	4751 btu/h 1.8 gpm 8.95 ft 2618 btu/h 349 cfm 2054 btu/h 6805 btu/h 112 cfm 847 b/h/ft 3.6-8.8-15.4 0.45 in/wg 52 6020 btu/h 2.2 gpm 17.40 ft 3318 btu/h	5021 btu/h 1.9 gpm 10.00 ft 2767 btu/h 371 cfm 2185 btu/h	5233 btu/h 1.9 gpm 10.86 ft 2884 btu/h 393 cfm 2317 btu/h
10	Water btu/h Water Flow Water AP Heating btu/h Total Air cfm Primary Air btu/h Total btu/h btu/h/ft Throw ft Static in/wg dB(A) Water btu/h Water Flow Water ΔP Heating btu/h Total Air cfm	2961 btu/h 1.1 gpm 3.48 ft 1632 btu/h 215 cfm 1268 btu/h 4228 btu/h 74 cfm 569 b/h/ft 2.2-5.9-10.1 0.20 in/wg 40 4067 btu/h 1.5 gpm 7.94 ft 2242 btu/h 260 cfm	3267 btu/h 1.2 gpm 4.23 ft 1800 btu/h 237 cfm 1399 btu/h 4665 btu/h 81 cfm 610 b/h/ft 2.6-6.5-11.1 0.23 in/wg 42 4345 btu/h 1.6 gpm 9.06 ft 2395 btu/h 282 cfm	3573 btu/h 1.3 gpm 5.06 ft 1969 btu/h 260 cfm 1530 btu/h 5103 btu/h 87 cfm 659 b/h/ft 2.6-6.8-11.8 0.27 in/wg 44 4688 btu/h 1.7 gpm 10.55 ft 2584 btu/h 304 cfm	3879 btu/h 1.4 gpm 5.97 ft 2138 btu/h 282 cfm 1661 btu/h 5540 btu/h 93 cfm 707 b/h/ft 2.9-7.5-12.7 0.31 in/wg 46 5031 btu/h 1.9 gpm 12.15 ft 2773 btu/h 326 cfm	4158 btu/h 1.5 gpm 6.86 ft 2292 btu/h 304 cfm 1792 btu/h 5950 btu/h 100 cfm 755 b/h/ft 2.9-7.8-13.7 0.35 in/wg 48 5374 btu/h 2.0 gpm 13.86 ft 2962 btu/h 349 cfm	4448 btu/h 1.6 gpm 7.85 ft 2451 btu/h 326 cfm 1923 btu/h 6371 btu/h 106 cfm 799 b/h/ft 3.2-8.5-14.4 0.40 in/wg 50 5679 btu/h 2.1 gpm 15.48 ft 3130 btu/h 371 cfm	4751 btu/h 1.8 gpm 8.95 ft 2618 btu/h 349 cfm 2054 btu/h 6805 btu/h 112 cfm 847 b/h/ft 3.6-8.8-15.4 0.45 in/wg 52 6020 btu/h 2.2 gpm 17.40 ft 3318 btu/h 393 cfm	5021 btu/h 1.9 gpm 10.00 ft 2767 btu/h 371 cfm 2185 btu/h	5233 btu/h 1.9 gpm 10.86 ft 2884 btu/h 393 cfm 2317 btu/h
10	Water btu/h Water Flow Water AP Heating btu/h Total Air cfm Primary Air btu/h Total btu/h btu/h/ft Throw ft Static in/wg dB(A) Water btu/h Water Flow Water ΔP Heating btu/h	2961 btu/h 1.1 gpm 3.48 ft 1632 btu/h 215 cfm 1268 btu/h 4228 btu/h 74 cfm 569 b/h/ft 2.2-5.9-10.1 0.20 in/wg 40 4067 btu/h 1.5 gpm 7.94 ft 2242 btu/h	3267 btu/h 1.2 gpm 4.23 ft 1800 btu/h 237 cfm 1399 btu/h 4665 btu/h 81 cfm 610 b/h/ft 2.6-6.5-11.1 0.23 in/wg 42 4345 btu/h 1.6 gpm 9.06 ft 2395 btu/h	3573 btu/h 1.3 gpm 5.06 ft 1969 btu/h 260 cfm 1530 btu/h 5103 btu/h 87 cfm 659 b/h/ft 2.6-6.8-11.8 0.27 in/wg 44 4688 btu/h 1.7 gpm 10.55 ft 2584 btu/h	3879 btu/h 1.4 gpm 5.97 ft 2138 btu/h 282 cfm 1661 btu/h 5540 btu/h 93 cfm 707 b/h/ft 2.9-7.5-12.7 0.31 in/wg 46 5031 btu/h 1.9 gpm 12.15 ft 2773 btu/h	4158 btu/h 1.5 gpm 6.86 ft 2292 btu/h 304 cfm 1792 btu/h 5950 btu/h 100 cfm 755 b/h/ft 2.9-7.8-13.7 0.35 in/wg 48 5374 btu/h 2.0 gpm 13.86 ft 2962 btu/h	4448 btu/h 1.6 gpm 7.85 ft 2451 btu/h 326 cfm 1923 btu/h 6371 btu/h 106 cfm 799 b/h/ft 3.2-8.5-14.4 0.40 in/wg 50 5679 btu/h 2.1 gpm 15.48 ft 3130 btu/h	4751 btu/h 1.8 gpm 8.95 ft 2618 btu/h 349 cfm 2054 btu/h 6805 btu/h 112 cfm 847 b/h/ft 3.6-8.8-15.4 0.45 in/wg 52 6020 btu/h 2.2 gpm 17.40 ft 3318 btu/h	5021 btu/h 1.9 gpm 10.00 ft 2767 btu/h 371 cfm 2185 btu/h	5233 btu/h 1.9 gpm 10.86 ft 2884 btu/h 393 cfm 2317 btu/h

Recommended maximum heating capacity for the above beams is equal to 50% of the indicated cooling potential.

The return air to the beam is taken as 1 °F above the average room for the values above.

Notations

b/h/ft Cooling capacity per linear foot of chilled beam
Throw ft Throw values are to 150 - 100 - and 50 fpm respectively.
Static in/wg Static pressure in beam plenum chamber in/wg

 $\begin{array}{ll} \text{dB(A)} & \text{Air regenerated sound power level} \\ \text{Water btu/h} & \text{Cooling output of coil btu/h} \\ \text{Water Flow} & \text{Water flow rate gpm} \\ \text{Water } \Delta P & \text{Coil pressure drop in/wg} \\ \end{array}$

Total Air cfm
Primary Air btu/h
Total btu/h
Total btu/h
Total cooling capacity of the primary air btu/h
Total btu/h
Total cooling capacity of the chilled beam btu/h

Correction	n Table
K	Water W
20	1.25
19	1.18
18	1.12
17	1.06
16	1.00
15	0.94
14	0.88
13	0.82
12	0.75

dB(A)	fpm
40	800
35	700
30	600
25	500
20	400

The sound power dB(A) levels are achieved by limiting the primary air spigot velocity as per the table above.

The thermal data is based on 16 K between mean water and return air to the beam.

Active Chilled Beams Beam performance Nozzle C - 2 way discharge

Performance Parameters

Return Air 76.1 °F Room Air 75.2 °F Supply Water Heating 113.0 °F

Primary Air 57.2 °F Supply Water 57.2 °F

57.2 °F Return Water 62.6 °F

Return Water Heating 95.0 $^{\circ}$

Beam Length (ft)	Primary Air cfm	42 cfm	53 cfm	64 cfm	74 cfm	85 cfm			
4	btu/h/ft	573 b/h/ft	716 b/h/ft	860 b/h/ft	976 b/h/ft	1068 b/h/ft			
	Throw ft	2.2-5.9-10.1	2.9-7.5-12.7	3.6-9.1-15.4	3.9-10.4-17.7	4.5-11.4-19.3			
	Static in/wg	0.18 in/wg	0.28 in/wg	0.40 in/wg	0.54 in/wg	0.71 in/wg			
	dB(A)	31	37	42	48	53			
	Water btu/h	1382 btu/h	1727 btu/h	2073 btu/h	2311 btu/h	2457 btu/h			
	Water Flow	0.5 gpm	0.6 gpm	0.8 gpm	0.9 gpm	0.9 gpm			
	Water △P	0.45 ft	0.70 ft	1.01 ft	1.26 ft	1.42 ft			
	Heating btu/h	762 btu/h	952 btu/h	1142 btu/h	1273 btu/h	1354 btu/h			
	btu/h/ft	119 cfm	148 cfm	178 cfm	208 cfm	237 cfm			
	Primary Air btu/h	874 btu/h	1093 btu/h	1311 btu/h	1530 btu/h	1748 btu/h			
	Total btu/h	2256 btu/h	2820 btu/h	3384 btu/h	3841 btu/h	4205 btu/h			
		64 cfm	74 cfm	85 cfm	95 cfm	106 cfm	117 cfm	127 cfm	
6	btu/h/ft	587 b/h/ft	685 b/h/ft	783 b/h/ft	881 b/h/ft	1154 b/h/ft	1032 b/h/ft	1093 b/h/ft	
	Throw ft	2.2-6.2-10.4	2.6-7.2-12.4	3.2-8.2-14.1	3.6-9.1-16	4.9-12.1-20.9	4.2-10.8-18.6	4.5-11.4-20	
	Static in/wg	0.18 in/wg	0.24 in/wg	0.32 in/wg	0.40 in/wg	0.49 in/wg	0.60 in/wg	0.71 in/wg	
	dB(A)	35	40	43	46	50	52	54	
	Water btu/h	2156 btu/h	2515 btu/h	2874 btu/h	3234 btu/h	4631 btu/h	3689 btu/h	3832 btu/h	
	Water Flow	0.8 gpm	0.9 gpm	1.1 gpm	1.2 gpm	1.7 gpm	1.4 gpm	1.4 gpm	
	Water △P	1.41 ft	1.92 ft	2.51 ft	3.18 ft	6.51 ft	4.13 ft	4.46 ft	
	Heating btu/h	1188 btu/h	1386 btu/h	1584 btu/h	1782 btu/h	2552 btu/h	2033 btu/h	2112 btu/h	
	Total Air cfm	178 cfm	208 cfm	237 cfm	267 cfm	297 cfm	326 cfm	356 cfm	
	Primary Air btu/h	1311 btu/h	1530 btu/h	1748 btu/h	1967 btu/h	2185 btu/h	2404 btu/h	2622 btu/h	
	Total btu/h	3467 btu/h	4045 btu/h	4623 btu/h	5200 btu/h	6816 btu/h	6093 btu/h	6455 btu/h	
		85 cfm	95 cfm	106 cfm	117 cfm	127 cfm	138 cfm	148 cfm	159 cfm
8	btu/h/ft	605 b/h/ft	680 b/h/ft	756 b/h/ft	832 b/h/ft	907 b/h/ft	138 cfm 1162 b/h/ft	148 cfm 1029 b/h/ft	1086 b/h/ft
8	Throw ft	605 b/h/ft 2.2-6.2-10.8	680 b/h/ft 2.6-7.2-12.1	756 b/h/ft 2.9-7.8-13.7	832 b/h/ft 3.2-8.8-15	907 b/h/ft 3.6-9.5-16.4	138 cfm 1162 b/h/ft 4.9-12.4-20.9	148 cfm 1029 b/h/ft 4.2-10.8-18.6	1086 b/h/ft 4.5-11.4-19.6
8	Throw ft Static in/wg	605 b/h/ft 2.2-6.2-10.8 0.18 in/wg	680 b/h/ft 2.6-7.2-12.1 0.23 in/wg	756 b/h/ft 2.9-7.8-13.7 0.28 in/wg	832 b/h/ft 3.2-8.8-15 0.34 in/wg	907 b/h/ft 3.6-9.5-16.4 0.40 in/wg	138 cfm 1162 b/h/ft 4.9-12.4-20.9 0.47 in/wg	148 cfm 1029 b/h/ft 4.2-10.8-18.6 0.54 in/wg	1086 b/h/ft 4.5-11.4-19.6 0.63 in/wg
8	Throw ft Static in/wg dB(A)	605 b/h/ft 2.2-6.2-10.8 0.18 in/wg 41	680 b/h/ft 2.6-7.2-12.1 0.23 in/wg 44	756 b/h/ft 2.9-7.8-13.7 0.28 in/wg 47	832 b/h/ft 3.2-8.8-15 0.34 in/wg 50	907 b/h/ft 3.6-9.5-16.4 0.40 in/wg 51	138 cfm 1162 b/h/ft 4.9-12.4-20.9 0.47 in/wg 54	148 cfm 1029 b/h/ft 4.2-10.8-18.6 0.54 in/wg 57	1086 b/h/ft 4.5-11.4-19.6 0.63 in/wg 5
8	Throw ft Static in/wg dB(A) Water btu/h	605 b/h/ft 2.2-6.2-10.8 0.18 in/wg 41 3012 btu/h	680 b/h/ft 2.6-7.2-12.1 0.23 in/wg 44 3389 btu/h	756 b/h/ft 2.9-7.8-13.7 0.28 in/wg 47 3766 btu/h	832 b/h/ft 3.2-8.8-15 0.34 in/wg 50 4142 btu/h	907 b/h/ft 3.6-9.5-16.4 0.40 in/wg 51 4519 btu/h	138 cfm 1162 b/h/ft 4.9-12.4-20.9 0.47 in/wg 54 6309 btu/h	148 cfm 1029 b/h/ft 4.2-10.8-18.6 0.54 in/wg 57 5037 btu/h	1086 b/h/ft 4.5-11.4-19.6 0.63 in/wg 5 5272 btu/h
8	Throw ft Static in/wg dB(A) Water btu/h Water Flow	605 b/h/ft 2.2-6.2-10.8 0.18 in/wg 41 3012 btu/h 1.1 gpm	680 b/h/ft 2.6-7.2-12.1 0.23 in/wg 44 3389 btu/h 1.3 gpm	756 b/h/ft 2.9-7.8-13.7 0.28 in/wg 47 3766 btu/h 1.4 gpm	832 b/h/ft 3.2-8.8-15 0.34 in/wg 50 4142 btu/h 1.5 gpm	907 b/h/ft 3.6-9.5-16.4 0.40 in/wg 51 4519 btu/h 1.7 gpm	138 cfm 1162 b/h/ft 4.9-12.4-20.9 0.47 in/wg 54 6309 btu/h 2.3 gpm	148 cfm 1029 b/h/ft 4.2-10.8-18.6 0.54 in/wg 57 5037 btu/h 1.9 gpm	1086 b/h/ft 4.5-11.4-19.6 0.63 in/wg 5 5272 btu/h 2.0 gpm
8	Throw ft Static in/wg dB(A) Water btu/h Water Flow Water ΔP	605 b/h/ft 2.2-6.2-10.8 0.18 in/wg 41 3012 btu/h 1.1 gpm 3.60 ft	680 b/h/ft 2.6-7.2-12.1 0.23 in/wg 44 3389 btu/h 1.3 gpm 4.56 ft	756 b/h/ft 2.9-7.8-13.7 0.28 in/wg 47 3766 btu/h 1.4 gpm 5.63 ft	832 b/h/ft 3.2-8.8-15 0.34 in/wg 50 4142 btu/h 1.5 gpm 6.81 ft	907 b/h/ft 3.6-9.5-16.4 0.40 in/wg 51 4519 btu/h 1.7 gpm 8.10 ft	138 cfm 1162 b/h/ft 4.9-12.4-20.9 0.47 in/wg 54 6309 btu/h 2.3 gpm 15.79 ft	148 cfm 1029 b/h/ft 4.2-10.8-18.6 0.54 in/wg 57 5037 btu/h 1.9 gpm 10.07 ft	1086 b/h/ft 4.5-11.4-19.6 0.63 in/wg 5 5272 btu/h 2.0 gpm 11.03 ft
8	Throw ft Static in/wg dB(A) Water btu/h Water Flow Water ΔP Heating btu/h	605 b/h/ft 2.2-6.2-10.8 0.18 in/wg 41 3012 btu/h 1.1 gpm 3.60 ft 1660 btu/h	680 b/h/ft 2.6-7.2-12.1 0.23 in/wg 44 3389 btu/h 1.3 gpm 4.56 ft 1868 btu/h	756 b/h/ft 2.9-7.8-13.7 0.28 in/wg 47 3766 btu/h 1.4 gpm 5.63 ft 2075 btu/h	832 b/h/ft 3.2-8.8-15 0.34 in/wg 50 4142 btu/h 1.5 gpm 6.81 ft 2283 btu/h	907 b/h/ft 3.6-9.5-16.4 0.40 in/wg 51 4519 btu/h 1.7 gpm 8.10 ft 2490 btu/h	138 cfm 1162 b/h/ft 4.9-12.4-20.9 0.47 in/wg 54 6309 btu/h 2.3 gpm 15.79 ft 3477 btu/h	148 cfm 1029 b/h/ft 4.2-10.8-18.6 0.54 in/wg 57 5037 btu/h 1.9 gpm 10.07 ft 2776 btu/h	1086 b/h/ft 4.5-11.4-19.6 0.63 in/wg 5 5272 btu/h 2.0 gpm 11.03 ft 2905 btu/h
8	Throw ft Static in/wg dB(A) Water btu/h Water Flow Water ΔP Heating btu/h Total Air cfm	605 b/h/ft 2.2-6.2-10.8 0.18 in/wg 41 3012 btu/h 1.1 gpm 3.60 ft 1660 btu/h 237 cfm	680 b/h/ft 2.6-7.2-12.1 0.23 in/wg 44 3389 btu/h 1.3 gpm 4.56 ft 1868 btu/h 267 cfm	756 b/h/ft 2.9-7.8-13.7 0.28 in/wg 47 3766 btu/h 1.4 gpm 5.63 ft 2075 btu/h 297 cfm	832 b/h/ft 3.2-8.8-15 0.34 in/wg 50 4142 btu/h 1.5 gpm 6.81 ft 2283 btu/h 326 cfm	907 b/h/ft 3.6-9.5-16.4 0.40 in/wg 51 4519 btu/h 1.7 gpm 8.10 ft 2490 btu/h 356 cfm	138 cfm 1162 b/h/ft 4.9-12.4-20.9 0.47 in/wg 54 6309 btu/h 2.3 gpm 15.79 ft 3477 btu/h 386 cfm	148 cfm 1029 b/h/ft 4.2-10.8-18.6 0.54 in/wg 57 5037 btu/h 1.9 gpm 10.07 ft 2776 btu/h 415 cfm	1086 b/h/ft 4.5-11.4-19.6 0.63 in/wg 5 5272 btu/h 2.0 gpm 11.03 ft 2905 btu/h 445 cfm
8	Throw ft Static in/wg dB(A) Water btu/h Water Flow Water ΔP Heating btu/h Total Air cfm Primary Air btu/h	605 b/h/ft 2.2-6.2-10.8 0.18 in/wg 41 3012 btu/h 1.1 gpm 3.60 ft 1660 btu/h 237 cfm 1748 btu/h	680 b/h/ft 2.6-7.2-12.1 0.23 in/wg 44 3389 btu/h 1.3 gpm 4.56 ft 1868 btu/h 267 cfm 1967 btu/h	756 b/h/ft 2.9-7.8-13.7 0.28 in/wg 47 3766 btu/h 1.4 gpm 5.63 ft 2075 btu/h 297 cfm 2185 btu/h	832 b/h/ft 3.2-8.8-15 0.34 in/wg 50 4142 btu/h 1.5 gpm 6.81 ft 2283 btu/h 326 cfm 2404 btu/h	907 b/h/ft 3.6-9.5-16.4 0.40 in/wg 51 4519 btu/h 1.7 gpm 8.10 ft 2490 btu/h 356 cfm 2622 btu/h	138 cfm 1162 b/h/ft 4.9-12.4-20.9 0.47 in/wg 54 6309 btu/h 2.3 gpm 15.79 ft 3477 btu/h 386 cfm 2841 btu/h	148 cfm 1029 b/h/ft 4.2-10.8-18.6 0.54 in/wg 57 5037 btu/h 1.9 gpm 10.07 ft 2776 btu/h 415 cfm 3060 btu/h	1086 b/h/ft 4.5-11.4-19.6 0.63 in/wg 5 5272 btu/h 2.0 gpm 11.03 ft 2905 btu/h 445 cfm 3278 btu/h
8	Throw ft Static in/wg dB(A) Water btu/h Water Flow Water ΔP Heating btu/h Total Air cfm	605 b/h/ft 2.2-6.2-10.8 0.18 in/wg 41 3012 btu/h 1.1 gpm 3.60 ft 1660 btu/h 237 cfm 1748 btu/h 4761 btu/h	680 b/h/ft 2.6-7.2-12.1 0.23 in/wg 44 3389 btu/h 1.3 gpm 4.56 ft 1868 btu/h 267 cfm 1967 btu/h 5356 btu/h	756 b/h/ft 2.9-7.8-13.7 0.28 in/wg 47 3766 btu/h 1.4 gpm 5.63 ft 2075 btu/h 297 cfm 2185 btu/h 5951 btu/h	832 b/h/ft 3.2-8.8-15 0.34 in/wg 50 4142 btu/h 1.5 gpm 6.81 ft 2283 btu/h 326 cfm 2404 btu/h 6546 btu/h	907 b/h/ft 3.6-9.5-16.4 0.40 in/wg 51 4519 btu/h 1.7 gpm 8.10 ft 2490 btu/h 356 cfm 2622 btu/h 7141 btu/h	138 cfm 1162 b/h/ft 4.9-12.4-20.9 0.47 in/wg 54 6309 btu/h 2.3 gpm 15.79 ft 3477 btu/h 386 cfm 2841 btu/h 9150 btu/h	148 cfm 1029 b/h/ft 4.2-10.8-18.6 0.54 in/wg 57 5037 btu/h 1.9 gpm 10.07 ft 2776 btu/h 415 cfm 3060 btu/h 8097 btu/h	1086 b/h/ft 4.5-11.4-19.6 0.63 in/wg 5 5272 btu/h 2.0 gpm 11.03 ft 2905 btu/h 445 cfm 3278 btu/h 8550 btu/h
	Throw ft Static in/wg dB(A) Water btu/h Water Flow Water AP Heating btu/h Total Air cfm Primary Air btu/h Total btu/h	605 b/h/ft 2.2-6.2-10.8 0.18 in/wg 41 3012 btu/h 1.1 gpm 3.60 ft 1660 btu/h 237 cfm 1748 btu/h 4761 btu/h 106 cfm	680 b/h/ft 2.6-7.2-12.1 0.23 in/wg 44 3389 btu/h 1.3 gpm 4.56 ft 1868 btu/h 267 cfm 1967 btu/h 5356 btu/h	756 b/h/ft 2.9-7.8-13.7 0.28 in/wg 47 3766 btu/h 1.4 gpm 5.63 ft 2075 btu/h 297 cfm 2185 btu/h 5951 btu/h 127 cfm	832 b/h/ft 3.2-8.8-15 0.34 in/wg 50 4142 btu/h 1.5 gpm 6.81 ft 2283 btu/h 326 cfm 2404 btu/h 6546 btu/h 138 cfm	907 b/h/ft 3.6-9.5-16.4 0.40 in/wg 51 4519 btu/h 1.7 gpm 8.10 ft 2490 btu/h 356 cfm 2622 btu/h 7141 btu/h 148 cfm	138 cfm 1162 b/h/ft 4.9-12.4-20.9 0.47 in/wg 54 6309 btu/h 2.3 gpm 15.79 ft 3477 btu/h 386 cfm 2841 btu/h 9150 btu/h 159 cfm	148 cfm 1029 b/h/ft 4.2-10.8-18.6 0.54 in/wg 57 5037 btu/h 1.9 gpm 10.07 ft 2776 btu/h 415 cfm 3060 btu/h 8097 btu/h 170 cfm	1086 b/h/ft 4.5-11.4-19.6 0.63 in/wg 5 5272 btu/h 2.0 gpm 11.03 ft 2905 btu/h 445 cfm 3278 btu/h 8550 btu/h 180 cfm
8	Throw ft Static in/wg dB(A) Water btu/h Water Flow Water AP Heating btu/h Total Air cfm Primary Air btu/h Total btu/h	605 b/h/ft 2.2-6.2-10.8 0.18 in/wg 41 3012 btu/h 1.1 gpm 3.60 ft 1660 btu/h 237 cfm 1748 btu/h 4761 btu/h 106 cfm 651 b/h/ft	680 b/h/ft 2.6-7.2-12.1 0.23 in/wg 44 3389 btu/h 1.3 gpm 4.56 ft 1868 btu/h 267 cfm 1967 btu/h 5356 btu/h 117 cfm 716 b/h/ft	756 b/h/ft 2.9-7.8-13.7 0.28 in/wg 47 3766 btu/h 1.4 gpm 5.63 ft 2075 btu/h 297 cfm 2185 btu/h 5951 btu/h 781 b/h/ft	832 b/h/ft 3.2-8.8-15 0.34 in/wg 50 4142 btu/h 1.5 gpm 6.81 ft 2283 btu/h 326 cfm 2404 btu/h 6546 btu/h 138 cfm 846 b/h/ft	907 b/h/ft 3.6-9.5-16.4 0.40 in/wg 51 4519 btu/h 1.7 gpm 8.10 ft 2490 btu/h 356 cfm 2622 btu/h 7141 btu/h 148 cfm 911 b/h/ft	138 cfm 1162 b/h/ft 4.9-12.4-20.9 0.47 in/wg 54 6309 btu/h 2.3 gpm 15.79 ft 3477 btu/h 386 cfm 2841 btu/h 9150 btu/h 159 cfm 976 b/h/ft	148 cfm 1029 b/h/ft 4.2-10.8-18.6 0.54 in/wg 57 5037 btu/h 1.9 gpm 10.07 ft 2776 btu/h 415 cfm 3060 btu/h 8097 btu/h 170 cfm 1239 b/h/ft	1086 b/h/ft 4.5-11.4-19.6 0.63 in/wg 5 5272 btu/h 2.0 gpm 11.03 ft 2905 btu/h 445 cfm 3278 btu/h 8550 btu/h 180 cfm
	Throw ft Static in/wg dB(A) Water btu/h Water Flow Water ΔP Heating btu/h Total Air cfm Primary Air btu/h Total btu/h Total btu/h Throw ft	605 b/h/ft 2.2-6.2-10.8 0.18 in/wg 41 3012 btu/h 1.1 gpm 3.60 ft 1660 btu/h 237 cfm 1748 btu/h 4761 btu/h 106 cfm 651 b/h/ft 2.6-6.8-11.8	680 b/h/ft 2.6-7.2-12.1 0.23 in/wg 44 3389 btu/h 1.3 gpm 4.56 ft 1868 btu/h 267 cfm 1967 btu/h 5356 btu/h 117 cfm 716 b/h/ft 2.9-7.5-12.7	756 b/h/ft 2.9-7.8-13.7 0.28 in/wg 47 3766 btu/h 1.4 gpm 5.63 ft 2075 btu/h 297 cfm 2185 btu/h 5951 btu/h 127 cfm 781 b/h/ft 3.2-8.2-14.1	832 b/h/ft 3.2-8.8-15 0.34 in/wg 50 4142 btu/h 1.5 gpm 6.81 ft 2283 btu/h 326 cfm 2404 btu/h 6546 btu/h 138 cfm 846 b/h/ft 3.6-8.8-15.4	907 b/h/ft 3.6-9.5-16.4 0.40 in/wg 51 4519 btu/h 1.7 gpm 8.10 ft 2490 btu/h 356 cfm 2622 btu/h 7141 btu/h 148 cfm 911 b/h/ft 3.6-9.5-16.4	138 cfm 1162 b/h/ft 4.9-12.4-20.9 0.47 in/wg 54 6309 btu/h 2.3 gpm 15.79 ft 3477 btu/h 386 cfm 2841 btu/h 9150 btu/h 159 cfm 976 b/h/ft 3.9-10.4-17.7	148 cfm 1029 b/h/ft 4.2-10.8-18.6 0.54 in/wg 57 5037 btu/h 1.9 gpm 10.07 ft 2776 btu/h 415 cfm 3060 btu/h 8097 btu/h 170 cfm 1239 b/h/ft 5.2-13.1-22.6	1086 b/h/ft 4.5-11.4-19.6 0.63 in/wg 5 5272 btu/h 2.0 gpm 11.03 ft 2905 btu/h 445 cfm 3278 btu/h 8550 btu/h 180 cfm 1074 b/h/ft 4.5-11.4-19.3
	Throw ft Static in/wg dB(A) Water btu/h Water Flow Water ΔP Heating btu/h Total Air cfm Primary Air btu/h Total btu/h Total btu/h Static in/wg	605 b/h/ft 2.2-6.2-10.8 0.18 in/wg 41 3012 btu/h 1.1 gpm 3.60 ft 1660 btu/h 237 cfm 1748 btu/h 4761 btu/h 106 cfm 651 b/h/ft 2.6-6.8-11.8 0.18 in/wg	680 b/h/ft 2.6-7.2-12.1 0.23 in/wg 44 3389 btu/h 1.3 gpm 4.56 ft 1868 btu/h 267 cfm 1967 btu/h 5356 btu/h 117 cfm 716 b/h/ft 2.9-7.5-12.7 0.22 in/wg	756 b/h/ft 2.9-7.8-13.7 0.28 in/wg 47 3766 btu/h 1.4 gpm 5.63 ft 2075 btu/h 297 cfm 2185 btu/h 5951 btu/h 127 cfm 781 b/h/ft 3.2-8.2-14.1 0.26 in/wg	832 b/h/ft 3.2-8.8-15 0.34 in/wg 50 4142 btu/h 1.5 gpm 6.81 ft 2283 btu/h 326 cfm 2404 btu/h 6546 btu/h 138 cfm 846 b/h/ft 3.6-8.8-15.4 0.30 in/wg	907 b/h/ft 3.6-9.5-16.4 0.40 in/wg 51 4519 btu/h 1.7 gpm 8.10 ft 2490 btu/h 356 cfm 2622 btu/h 7141 btu/h 148 cfm 911 b/h/ft 3.6-9.5-16.4 0.35 in/wg	138 cfm 1162 b/h/ft 4.9-12.4-20.9 0.47 in/wg 54 6309 btu/h 2.3 gpm 15.79 ft 3477 btu/h 386 cfm 2841 btu/h 9150 btu/h 159 cfm 976 b/h/ft 3.9-10.4-17.7 0.40 in/wg	148 cfm 1029 b/h/ft 4.2-10.8-18.6 0.54 in/wg 57 5037 btu/h 1.9 gpm 10.07 ft 2776 btu/h 415 cfm 3060 btu/h 8097 btu/h 170 cfm 1239 b/h/ft 5.2-13.1-22.6 0.46 in/wg	1086 b/h/ft 4.5-11.4-19.6 0.63 in/wg 5 5272 btu/h 2.0 gpm 11.03 ft 2905 btu/h 445 cfm 3278 btu/h 8550 btu/h 180 cfm 1074 b/h/ft 4.5-11.4-19.3 0.51 in/wg
	Throw ft Static in/wg dB(A) Water btu/h Water Flow Water AP Heating btu/h Total Air cfm Primary Air btu/h Total btu/h Total btu/h Stu/h/ft Throw ft Static in/wg dB(A)	605 b/h/ft 2.2-6.2-10.8 0.18 in/wg 41 3012 btu/h 1.1 gpm 3.60 ft 1660 btu/h 237 cfm 1748 btu/h 4761 btu/h 106 cfm 651 b/h/ft 2.6-6.8-11.8 0.18 in/wg	680 b/h/ft 2.6-7.2-12.1 0.23 in/wg 44 3389 btu/h 1.3 gpm 4.56 ft 1868 btu/h 267 cfm 1967 btu/h 5356 btu/h 117 cfm 716 b/h/ft 2.9-7.5-12.7 0.22 in/wg	756 b/h/ft 2.9-7.8-13.7 0.28 in/wg 47 3766 btu/h 1.4 gpm 5.63 ft 2075 btu/h 297 cfm 2185 btu/h 5951 btu/h 127 cfm 781 b/h/ft 3.2-8.2-14.1 0.26 in/wg	832 b/h/ft 3.2-8.8-15 0.34 in/wg 50 4142 btu/h 1.5 gpm 6.81 ft 2283 btu/h 326 cfm 2404 btu/h 6546 btu/h 138 cfm 846 b/h/ft 3.6-8.8-15.4 0.30 in/wg	907 b/h/ft 3.6-9.5-16.4 0.40 in/wg 51 4519 btu/h 1.7 gpm 8.10 ft 2490 btu/h 356 cfm 2622 btu/h 7141 btu/h 148 cfm 911 b/h/ft 3.6-9.5-16.4 0.35 in/wg	138 cfm 1162 b/h/ft 4.9-12.4-20.9 0.47 in/wg 54 6309 btu/h 2.3 gpm 15.79 ft 3477 btu/h 386 cfm 2841 btu/h 9150 btu/h 159 cfm 976 b/h/ft 3.9-10.4-17.7 0.40 in/wg	148 cfm 1029 b/h/ft 4.2-10.8-18.6 0.54 in/wg 57 5037 btu/h 1.9 gpm 10.07 ft 2776 btu/h 415 cfm 3060 btu/h 8097 btu/h 170 cfm 1239 b/h/ft 5.2-13.1-22.6 0.46 in/wg 58	1086 b/h/ft 4.5-11.4-19.6 0.63 in/wg 5 5272 btu/h 2.0 gpm 11.03 ft 2905 btu/h 445 cfm 3278 btu/h 8550 btu/h 180 cfm 1074 b/h/ft 4.5-11.4-19.3 0.51 in/wg
	Throw ft Static in/wg dB(A) Water btu/h Water Flow Water ΔP Heating btu/h Total Air cfm Primary Air btu/h Total btu/h Total btu/h Static in/wg dB(A) Water btu/h	605 b/h/ft 2.2-6.2-10.8 0.18 in/wg 41 3012 btu/h 1.1 gpm 3.60 ft 1660 btu/h 237 cfm 1748 btu/h 4761 btu/h 106 cfm 651 b/h/ft 2.6-6.8-11.8 0.18 in/wg 44 4217 btu/h	680 b/h/ft 2.6-7.2-12.1 0.23 in/wg 44 3389 btu/h 1.3 gpm 4.56 ft 1868 btu/h 267 cfm 1967 btu/h 5356 btu/h 716 b/h/ft 2.9-7.5-12.7 0.22 in/wg 47 4639 btu/h	756 b/h/ft 2.9-7.8-13.7 0.28 in/wg 47 3766 btu/h 1.4 gpm 5.63 ft 2075 btu/h 297 cfm 2185 btu/h 5951 btu/h 127 cfm 781 b/h/ft 3.2-8.2-14.1 0.26 in/wg 50 5061 btu/h	832 b/h/ft 3.2-8.8-15 0.34 in/wg 50 4142 btu/h 1.5 gpm 6.81 ft 2283 btu/h 326 cfm 2404 btu/h 6546 btu/h 138 cfm 846 b/h/ft 3.6-8.8-15.4 0.30 in/wg 53 5483 btu/h	907 b/h/ft 3.6-9.5-16.4 0.40 in/wg 51 4519 btu/h 1.7 gpm 8.10 ft 2490 btu/h 356 cfm 2622 btu/h 7141 btu/h 148 cfm 911 b/h/ft 3.6-9.5-16.4 0.35 in/wg 55	138 cfm 1162 b/h/ft 4.9-12.4-20.9 0.47 in/wg 54 6309 btu/h 2.3 gpm 15.79 ft 3477 btu/h 386 cfm 2841 btu/h 9150 btu/h 159 cfm 976 b/h/ft 3.9-10.4-17.7 0.40 in/wg 55 6326 btu/h	148 cfm 1029 b/h/ft 4.2-10.8-18.6 0.54 in/wg 57 5037 btu/h 1.9 gpm 10.07 ft 2776 btu/h 415 cfm 3060 btu/h 8097 btu/h 170 cfm 1239 b/h/ft 5.2-13.1-22.6 0.46 in/wg 58 8697 btu/h	1086 b/h/ft 4.5-11.4-19.6 0.63 in/wg 5 5272 btu/h 2.0 gpm 11.03 ft 2905 btu/h 445 cfm 3278 btu/h 8550 btu/h 180 cfm 1074 b/h/ft 4.5-11.4-19.3 0.51 in/wg 60 6851 btu/h
	Throw ft Static in/wg dB(A) Water btu/h Water Flow Water ΔP Heating btu/h Total Air cfm Primary Air btu/h btu/h/ft Throw ft Static in/wg dB(A) Water btu/h Water Flow	605 b/h/ft 2.2-6.2-10.8 0.18 in/wg 41 3012 btu/h 1.1 gpm 3.60 ft 1660 btu/h 237 cfm 1748 btu/h 4761 btu/h 4761 btu/h 651 b/h/ft 2.6-6.8-11.8 0.18 in/wg 44 4217 btu/h 1.6 gpm	680 b/h/ft 2.6-7.2-12.1 0.23 in/wg 44 3389 btu/h 1.3 gpm 4.56 ft 1868 btu/h 267 cfm 1967 btu/h 5356 btu/h 716 b/h/ft 2.9-7.5-12.7 0.22 in/wg 47 4639 btu/h 1.7 gpm	756 b/h/ft 2.9-7.8-13.7 0.28 in/wg 47 3766 btu/h 1.4 gpm 5.63 ft 2075 btu/h 297 cfm 2185 btu/h 5951 btu/h 127 cfm 781 b/h/ft 3.2-8.2-14.1 0.26 in/wg 50 5061 btu/h 1.9 gpm	832 b/h/ft 3.2-8.8-15 0.34 in/wg 50 4142 btu/h 1.5 gpm 6.81 ft 2283 btu/h 326 cfm 2404 btu/h 138 cfm 846 b/h/ft 3.6-8.8-15.4 0.30 in/wg 53 5483 btu/h 2.0 gpm	907 b/h/ft 3.6-9.5-16.4 0.40 in/wg 51 4519 btu/h 1.7 gpm 8.10 ft 2490 btu/h 356 cfm 2622 btu/h 7141 btu/h 148 cfm 911 b/h/ft 3.6-9.5-16.4 0.35 in/wg 55 5904 btu/h 2.2 gpm	138 cfm 1162 b/h/ft 4.9-12.4-20.9 0.47 in/wg 54 6309 btu/h 2.3 gpm 15.79 ft 3477 btu/h 386 cfm 2841 btu/h 9150 btu/h 159 cfm 976 b/h/ft 3.9-10.4-17.7 0.40 in/wg 55 6326 btu/h 2.3 gpm	148 cfm 1029 b/h/ft 4.2-10.8-18.6 0.54 in/wg 57 5037 btu/h 1.9 gpm 10.07 ft 2776 btu/h 415 cfm 3060 btu/h 8097 btu/h 170 cfm 1239 b/h/ft 5.2-13.1-22.6 0.46 in/wg 58 8697 btu/h 3.2 gpm	1086 b/h/ft 4.5-11.4-19.6 0.63 in/wg 5 5272 btu/h 2.0 gpm 11.03 ft 2905 btu/h 445 cfm 3278 btu/h 8550 btu/h 180 cfm 1074 b/h/ft 4.5-11.4-19.3 0.51 in/wg 60 6851 btu/h 2.5 gpm
	Throw ft Static in/wg dB(A) Water btu/h Water Flow Water ΔP Heating btu/h Total Air cfm Primary Air btu/h Total btu/h btu/h/ft Throw ft Static in/wg dB(A) Water btu/h Water Flow Water ΔP	605 b/h/ft 2.2-6.2-10.8 0.18 in/wg 41 3012 btu/h 1.1 gpm 3.60 ft 1660 btu/h 237 cfm 1748 btu/h 4761 btu/h 106 cfm 651 b/h/ft 2.6-6.8-11.8 0.18 in/wg 44 4217 btu/h 1.6 gpm 8.54 ft	680 b/h/ft 2.6-7.2-12.1 0.23 in/wg 44 3389 btu/h 1.3 gpm 4.56 ft 1868 btu/h 267 cfm 1967 btu/h 5356 btu/h 117 cfm 716 b/h/ft 2.9-7.5-12.7 0.22 in/wg 47 4639 btu/h 1.7 gpm 10.33 ft	756 b/h/ft 2.9-7.8-13.7 0.28 in/wg 47 3766 btu/h 1.4 gpm 5.63 ft 2075 btu/h 297 cfm 2185 btu/h 5951 btu/h 127 cfm 781 b/h/ft 3.2-8.2-14.1 0.26 in/wg 50 5061 btu/h 1.9 gpm 12.29 ft	832 b/h/ft 3.2-8.8-15 0.34 in/wg 50 4142 btu/h 1.5 gpm 6.81 ft 2283 btu/h 326 cfm 2404 btu/h 138 cfm 846 b/h/ft 3.6-8.8-15.4 0.30 in/wg 53 5483 btu/h 2.0 gpm 14.43 ft	907 b/h/ft 3.6-9.5-16.4 0.40 in/wg 51 4519 btu/h 1.7 gpm 8.10 ft 2490 btu/h 356 cfm 2622 btu/h 148 cfm 911 b/h/ft 3.6-9.5-16.4 0.35 in/wg 55 5904 btu/h 2.2 gpm 16.73 ft	138 cfm 1162 b/h/ft 4.9-12.4-20.9 0.47 in/wg 54 6309 btu/h 2.3 gpm 15.79 ft 3477 btu/h 386 cfm 2841 btu/h 9150 btu/h 159 cfm 976 b/h/ft 3.9-10.4-17.7 0.40 in/wg 55 6326 btu/h 2.3 gpm 19.21 ft	148 cfm 1029 b/h/ft 4.2-10.8-18.6 0.54 in/wg 57 5037 btu/h 1.9 gpm 10.07 ft 2776 btu/h 415 cfm 3060 btu/h 170 cfm 1239 b/h/ft 5.2-13.1-22.6 0.46 in/wg 58 8697 btu/h 3.2 gpm 36.31 ft	1086 b/h/ft 4.5-11.4-19.6 0.63 in/wg 5 5272 btu/h 2.0 gpm 11.03 ft 2905 btu/h 445 cfm 3278 btu/h 180 cfm 1074 b/h/ft 4.5-11.4-19.3 0.51 in/wg 60 6851 btu/h 2.5 gpm 22.53 ft
	Throw ft Static in/wg dB(A) Water btu/h Water Flow Water AP Heating btu/h Total Air cfm Primary Air btu/h Total btu/h btu/h/ft Throw ft Static in/wg dB(A) Water btu/h Water Flow Water AP Heating btu/h	605 b/h/ft 2.2-6.2-10.8 0.18 in/wg 41 3012 btu/h 1.1 gpm 3.60 ft 1660 btu/h 237 cfm 1748 btu/h 4761 btu/h 106 cfm 651 b/h/ft 2.6-6.8-11.8 0.18 in/wg 44 4217 btu/h 1.6 gpm 8.54 ft 2324 btu/h	680 b/h/ft 2.6-7.2-12.1 0.23 in/wg 44 3389 btu/h 1.3 gpm 4.56 ft 1868 btu/h 267 cfm 1967 btu/h 5356 btu/h 117 cfm 716 b/h/ft 2.9-7.5-12.7 0.22 in/wg 47 4639 btu/h 1.7 gpm 10.33 ft 2557 btu/h	756 b/h/ft 2.9-7.8-13.7 0.28 in/wg 47 3766 btu/h 1.4 gpm 5.63 ft 2075 btu/h 297 cfm 2185 btu/h 5951 btu/h 127 cfm 781 b/h/ft 3.2-8.2-14.1 0.26 in/wg 50 5061 btu/h 1.9 gpm 12.29 ft 2789 btu/h	832 b/h/ft 3.2-8.8-15 0.34 in/wg 50 4142 btu/h 1.5 gpm 6.81 ft 2283 btu/h 326 cfm 2404 btu/h 138 cfm 846 b/h/ft 3.6-8.8-15.4 0.30 in/wg 53 5483 btu/h 2.0 gpm 14.43 ft 3022 btu/h	907 b/h/ft 3.6-9.5-16.4 0.40 in/wg 51 4519 btu/h 1.7 gpm 8.10 ft 2490 btu/h 356 cfm 2622 btu/h 148 cfm 911 b/h/ft 3.6-9.5-16.4 0.35 in/wg 55 5904 btu/h 2.2 gpm 16.73 ft 3254 btu/h	138 cfm 1162 b/h/ft 4.9-12.4-20.9 0.47 in/wg 54 6309 btu/h 2.3 gpm 15.79 ft 3477 btu/h 386 cfm 2841 btu/h 159 cfm 976 b/h/ft 3.9-10.4-17.7 0.40 in/wg 55 6326 btu/h 2.3 gpm 19.21 ft 3486 btu/h	148 cfm 1029 b/h/ft 4.2-10.8-18.6 0.54 in/wg 57 5037 btu/h 1.9 gpm 10.07 ft 2776 btu/h 415 cfm 3060 btu/h 170 cfm 1239 b/h/ft 5.2-13.1-22.6 0.46 in/wg 58 8697 btu/h 3.2 gpm 36.31 ft 4793 btu/h	1086 b/h/ft 4.5-11.4-19.6 0.63 in/wg 5 5272 btu/h 2.0 gpm 11.03 ft 2905 btu/h 445 cfm 3278 btu/h 8550 btu/h 180 cfm 1074 b/h/ft 4.5-11.4-19.3 0.51 in/wg 60 6851 btu/h 2.5 gpm 22.53 ft 3776 btu/h
	Throw ft Static in/wg dB(A) Water btu/h Water Flow Water ΔP Heating btu/h Total Air cfm Primary Air btu/h Total btu/h btu/h/ft Throw ft Static in/wg dB(A) Water btu/h Water Flow Water ΔP Heating btu/h Total Air cfm	605 b/h/ft 2.2-6.2-10.8 0.18 in/wg 41 3012 btu/h 1.1 gpm 3.60 ft 1660 btu/h 237 cfm 1748 btu/h 4761 btu/h 106 cfm 651 b/h/ft 2.6-6.8-11.8 0.18 in/wg 44 4217 btu/h 1.6 gpm 8.54 ft 2324 btu/h 297 cfm	680 b/h/ft 2.6-7.2-12.1 0.23 in/wg 44 3389 btu/h 1.3 gpm 4.56 ft 1868 btu/h 267 cfm 1967 btu/h 5356 btu/h 117 cfm 716 b/h/ft 2.9-7.5-12.7 0.22 in/wg 47 4639 btu/h 1.7 gpm 10.33 ft 2557 btu/h 326 cfm	756 b/h/ft 2.9-7.8-13.7 0.28 in/wg 47 3766 btu/h 1.4 gpm 5.63 ft 2075 btu/h 297 cfm 2185 btu/h 5951 btu/h 127 cfm 781 b/h/ft 3.2-8.2-14.1 0.26 in/wg 50 5061 btu/h 1.9 gpm 12.29 ft 2789 btu/h 356 cfm	832 b/h/ft 3.2-8.8-15 0.34 in/wg 50 4142 btu/h 1.5 gpm 6.81 ft 2283 btu/h 326 cfm 2404 btu/h 138 cfm 846 b/h/ft 3.6-8.8-15.4 0.30 in/wg 53 5483 btu/h 2.0 gpm 14.43 ft 3022 btu/h 386 cfm	907 b/h/ft 3.6-9.5-16.4 0.40 in/wg 51 4519 btu/h 1.7 gpm 8.10 ft 2490 btu/h 356 cfm 2622 btu/h 7141 btu/h 148 cfm 911 b/h/ft 3.6-9.5-16.4 0.35 in/wg 55 5904 btu/h 2.2 gpm 16.73 ft 3254 btu/h 415 cfm	138 cfm 1162 b/h/ft 4.9-12.4-20.9 0.47 in/wg 54 6309 btu/h 2.3 gpm 15.79 ft 3477 btu/h 386 cfm 2841 btu/h 159 cfm 976 b/h/ft 3.9-10.4-17.7 0.40 in/wg 55 6326 btu/h 2.3 gpm 19.21 ft 3486 btu/h 445 cfm	148 cfm 1029 b/h/ft 4.2-10.8-18.6 0.54 in/wg 57 5037 btu/h 1.9 gpm 10.07 ft 2776 btu/h 415 cfm 3060 btu/h 170 cfm 1239 b/h/ft 5.2-13.1-22.6 0.46 in/wg 58 8697 btu/h 3.2 gpm 36.31 ft 4793 btu/h 475 cfm	1086 b/h/ft 4.5-11.4-19.6 0.63 in/wg 5 5272 btu/h 2.0 gpm 11.03 ft 2905 btu/h 445 cfm 3278 btu/h 8550 btu/h 180 cfm 1074 b/h/ft 4.5-11.4-19.3 0.51 in/wg 60 6851 btu/h 2.5 gpm 22.53 ft 3776 btu/h 504 cfm
	Throw ft Static in/wg dB(A) Water btu/h Water Flow Water AP Heating btu/h Total Air cfm Primary Air btu/h Total btu/h btu/h/ft Throw ft Static in/wg dB(A) Water btu/h Water Flow Water AP Heating btu/h	605 b/h/ft 2.2-6.2-10.8 0.18 in/wg 41 3012 btu/h 1.1 gpm 3.60 ft 1660 btu/h 237 cfm 1748 btu/h 4761 btu/h 106 cfm 651 b/h/ft 2.6-6.8-11.8 0.18 in/wg 44 4217 btu/h 1.6 gpm 8.54 ft 2324 btu/h	680 b/h/ft 2.6-7.2-12.1 0.23 in/wg 44 3389 btu/h 1.3 gpm 4.56 ft 1868 btu/h 267 cfm 1967 btu/h 5356 btu/h 117 cfm 716 b/h/ft 2.9-7.5-12.7 0.22 in/wg 47 4639 btu/h 1.7 gpm 10.33 ft 2557 btu/h	756 b/h/ft 2.9-7.8-13.7 0.28 in/wg 47 3766 btu/h 1.4 gpm 5.63 ft 2075 btu/h 297 cfm 2185 btu/h 5951 btu/h 127 cfm 781 b/h/ft 3.2-8.2-14.1 0.26 in/wg 50 5061 btu/h 1.9 gpm 12.29 ft 2789 btu/h	832 b/h/ft 3.2-8.8-15 0.34 in/wg 50 4142 btu/h 1.5 gpm 6.81 ft 2283 btu/h 326 cfm 2404 btu/h 138 cfm 846 b/h/ft 3.6-8.8-15.4 0.30 in/wg 53 5483 btu/h 2.0 gpm 14.43 ft 3022 btu/h	907 b/h/ft 3.6-9.5-16.4 0.40 in/wg 51 4519 btu/h 1.7 gpm 8.10 ft 2490 btu/h 356 cfm 2622 btu/h 148 cfm 911 b/h/ft 3.6-9.5-16.4 0.35 in/wg 55 5904 btu/h 2.2 gpm 16.73 ft 3254 btu/h	138 cfm 1162 b/h/ft 4.9-12.4-20.9 0.47 in/wg 54 6309 btu/h 2.3 gpm 15.79 ft 3477 btu/h 386 cfm 2841 btu/h 159 cfm 976 b/h/ft 3.9-10.4-17.7 0.40 in/wg 55 6326 btu/h 2.3 gpm 19.21 ft 3486 btu/h	148 cfm 1029 b/h/ft 4.2-10.8-18.6 0.54 in/wg 57 5037 btu/h 1.9 gpm 10.07 ft 2776 btu/h 415 cfm 3060 btu/h 170 cfm 1239 b/h/ft 5.2-13.1-22.6 0.46 in/wg 58 8697 btu/h 3.2 gpm 36.31 ft 4793 btu/h	1086 b/h/ft 4.5-11.4-19.6 0.63 in/wg 5 5272 btu/h 2.0 gpm 11.03 ft 2905 btu/h 445 cfm 3278 btu/h 8550 btu/h 180 cfm 1074 b/h/ft 4.5-11.4-19.3 60 6851 btu/h 2.5 gpm 22.53 ft 3776 btu/h

Recommended maximum heating capacity for the above beams is equal to 50% of the indicated cooling potential.

The return air to the beam is taken as 1 °F above the average room for the values above.

Notations

b/h/ft Cooling capacity per linear foot of chilled beam
Throw ft Throw values are to 150 - 100 - and 50 fpm respectively.
Static in/wg Static pressure in beam plenum chamber in/wg

 $\begin{array}{ll} \text{dB(A)} & \text{Air regenerated sound power level} \\ \text{Water btu/h} & \text{Cooling output of coil btu/h} \\ \text{Water Flow} & \text{Water flow rate gpm} \\ \text{Water } \Delta P & \text{Coil pressure drop in/wg} \\ \end{array}$

Total Air cfm
Primary Air btu/h
Total btu/h
Total btu/h
Total cooling capacity of the primary air btu/h
Total cooling capacity of the chilled beam btu/h

Correct	ion Table
K	Water W
20	1.25
19	1.18
18	1.12
17	1.06
16	1.00
15	0.94
14	0.88
13	0.82
12	0.75

dB(A)	fpm
40	800
35	700
30	600
25	500
20	400

The sound power dB(A) levels are achieved by limiting the primary air spigot velocity as per the table above.

The thermal data is based on 16 K between mean water and return air to the beam.

Active Chilled Beams Beam performance Nozzle A - 1 way discharge

Performance Parameters

Return Air 76.1 °F Room Air 75.2 °F

Supply Water Heating 113.0 °F

Primary Air 57.2 °F

Supply Water 57.2 °F

Return Water 62.6 °F

Return Water Heating 95.0 °

Beam Length (ft)	Primary Air cfm	6 cfm	8 cfm	11 cfm	13 cfm	15 cfm				
4	btu/h/ft	147 b/h/ft	194 b/h/ft	239 b/h/ft	282 b/h/ft	323 b/h/ft				
	Throw ft	0.9-2.9-5.2	1.6-3.9-6.8	1.9-4.9-8.5	2.2-5.9-10.1	2.6-6.8-11.8				
	Static in/wg	0.14 in/wg	0.26 in/wg	0.40 in/wg	0.58 in/wg	0.78 in/wg				
	dB(A)	31	37	42	48	53				
	Water btu/h	447 btu/h	590 btu/h	722 btu/h	848 btu/h	967 btu/h				
	Water Flow	0.2 gpm	0.2 gpm	0.3 gpm	0.3 gpm	0.4 gpm				
	Water ΔP	0.05 ft	0.08 ft	0.12 ft	0.17 ft	0.22 ft				
	Heating btu/h	246 btu/h	325 btu/h	398 btu/h	467 btu/h	533 btu/h				
	btu/h/ft	32 cfm	42 cfm	53 cfm	64 cfm	74 cfm				
	Primary Air btu/h	131 btu/h	175 btu/h	219 btu/h	262 btu/h	306 btu/h				
	Total btu/h	578 btu/h	764 btu/h	940 btu/h	1110 btu/h	1273 btu/h				
		11 cfm	13 cfm	15 cfm	17 cfm	19 cfm	21 cfm	23 cfm		
6	btu/h/ft	168 b/h/ft	200 b/h/ft	232 b/h/ft	263 b/h/ft	291 b/h/ft	317 b/h/ft	349 b/h/ft		
	Throw ft	1.3-3.6-5.9	1.6-4.2-7.2	1.9-4.9-8.2	1.9-5.5-9.5	2.2-6.2-10.4	2.6-6.5-11.4	2.9-7.2-12.4		
	Static in/wg	0.18 in/wg	0.26 in/wg	0.35 in/wg	0.46 in/wg	0.58 in/wg	0.71 in/wg	0.86 in/wg		
	dB(A)	23	26	26	31	34	36	37		
	Water btu/h	774 btu/h	920 btu/h	1062 btu/h	1201 btu/h	1322 btu/h	1437 btu/h	1581 btu/h		
	Water Flow	0.3 gpm	0.3 gpm	0.4 gpm	0.4 gpm	0.5 gpm	0.5 gpm	0.6 gpm		
	Water ΔP	0.18 ft	0.26 ft	0.34 ft	0.44 ft	0.53 ft	0.63 ft	0.76 ft		
	Heating btu/h	427 btu/h	507 btu/h	585 btu/h	662 btu/h	729 btu/h	792 btu/h	871 btu/h		
	Total Air cfm	53 cfm	64 cfm	74 cfm	85 cfm	95 cfm	106 cfm	117 cfm		
	Primary Air btu/h	219 btu/h	262 btu/h	306 btu/h	350 btu/h	393 btu/h	437 btu/h	481 btu/h		
	Total btu/h	993 btu/h	1182 btu/h	1368 btu/h	1550 btu/h	1716 btu/h	1874 btu/h	2062 btu/h		
		13 cfm	15 cfm	17 cfm	19 cfm	21 cfm	23 cfm	25 cfm	27 cfm	29 cfm
8	btu/h/ft	157 b/h/ft	183 b/h/ft	208 b/h/ft	232 b/h/ft	255 b/h/ft	279 b/h/ft	301 b/h/ft	326 b/h/ft	346 b/h/ft
	Throw ft	1.3-3.2-5.5	1.3-3.9-6.5	1.6-4.2-7.5	1.9-4.9-8.2	1.9-5.2-9.1	2.2-5.9-10.1	2.2-6.2-10.8	2.6-6.8-11.8	2.9-7.2-12.4
	Static in/wg	0.14 in/wg	0.20 in/wg	0.26 in/wg	0.32 in/wg	0.40 in/wg	0.48 in/wg	0.58 in/wg	0.001./	0.78 in/wg
	T Otatio ii ii vvg		0.20 III/ Wg	0.20 III/Wg	0.32 III/Wg	0.40 III/ Wg	0.40 III/ Wg	0.56 ii i/wg	0.68 in/wg	0.70 117 119
	dB(A)	23	24	26	28	30	33	35	0.68 in/wg 36	38
	dB(A)	23	24	26	28	30	33	35	36	38
	dB(A) Water btu/h Water Flow Water ΔP	23 974 btu/h 0.4 gpm 0.38 ft	24 1136 btu/h	26 1285 btu/h 0.5 gpm 0.66 ft	28 1431 btu/h 0.5 gpm 0.81 ft	30 1573 btu/h	33 1712 btu/h	35 1848 btu/h 0.7 gpm 1.35 ft	36 2002 btu/h 0.7 gpm 1.59 ft	38 2109 btu/h
	dB(A) Water btu/h Water Flow	23 974 btu/h 0.4 gpm	24 1136 btu/h 0.4 gpm	26 1285 btu/h 0.5 gpm 0.66 ft 708 btu/h	28 1431 btu/h 0.5 gpm 0.81 ft 789 btu/h	30 1573 btu/h 0.6 gpm	33 1712 btu/h 0.6 gpm	35 1848 btu/h 0.7 gpm 1.35 ft 1018 btu/h	36 2002 btu/h 0.7 gpm 1.59 ft 1103 btu/h	38 2109 btu/h 0.8 gpm
	dB(A) Water btu/h Water Flow Water ΔP	23 974 btu/h 0.4 gpm 0.38 ft	24 1136 btu/h 0.4 gpm 0.51 ft	26 1285 btu/h 0.5 gpm 0.66 ft	28 1431 btu/h 0.5 gpm 0.81 ft	30 1573 btu/h 0.6 gpm 0.98 ft	33 1712 btu/h 0.6 gpm 1.16 ft	35 1848 btu/h 0.7 gpm 1.35 ft	36 2002 btu/h 0.7 gpm 1.59 ft	38 2109 btu/h 0.8 gpm 1.76 ft
	dB(A) Water btu/h Water Flow Water ΔP Heating btu/h	23 974 btu/h 0.4 gpm 0.38 ft 537 btu/h	24 1136 btu/h 0.4 gpm 0.51 ft 626 btu/h 74 cfm 306 btu/h	26 1285 btu/h 0.5 gpm 0.66 ft 708 btu/h	28 1431 btu/h 0.5 gpm 0.81 ft 789 btu/h	30 1573 btu/h 0.6 gpm 0.98 ft 867 btu/h	33 1712 btu/h 0.6 gpm 1.16 ft 944 btu/h	35 1848 btu/h 0.7 gpm 1.35 ft 1018 btu/h 127 cfm 524 btu/h	36 2002 btu/h 0.7 gpm 1.59 ft 1103 btu/h 138 cfm 568 btu/h	38 2109 btu/h 0.8 gpm 1.76 ft 1162 btu/h
	dB(A) Water btu/h Water Flow Water ΔP Heating btu/h Total Air cfm	23 974 btu/h 0.4 gpm 0.38 ft 537 btu/h 64 cfm	24 1136 btu/h 0.4 gpm 0.51 ft 626 btu/h 74 cfm	26 1285 btu/h 0.5 gpm 0.66 ft 708 btu/h 85 cfm	28 1431 btu/h 0.5 gpm 0.81 ft 789 btu/h 95 cfm	30 1573 btu/h 0.6 gpm 0.98 ft 867 btu/h 106 cfm	33 1712 btu/h 0.6 gpm 1.16 ft 944 btu/h 117 cfm	35 1848 btu/h 0.7 gpm 1.35 ft 1018 btu/h 127 cfm	36 2002 btu/h 0.7 gpm 1.59 ft 1103 btu/h 138 cfm	38 2109 btu/h 0.8 gpm 1.76 ft 1162 btu/h 148 cfm
	dB(A) Water btu/h Water Flow Water ΔP Heating btu/h Total Air cfm Primary Air btu/h	23 974 btu/h 0.4 gpm 0.38 ft 537 btu/h 64 cfm 262 btu/h	24 1136 btu/h 0.4 gpm 0.51 ft 626 btu/h 74 cfm 306 btu/h	26 1285 btu/h 0.5 gpm 0.66 ft 708 btu/h 85 cfm 350 btu/h	28 1431 btu/h 0.5 gpm 0.81 ft 789 btu/h 95 cfm 393 btu/h	30 1573 btu/h 0.6 gpm 0.98 ft 867 btu/h 106 cfm 437 btu/h	33 1712 btu/h 0.6 gpm 1.16 ft 944 btu/h 117 cfm 481 btu/h	35 1848 btu/h 0.7 gpm 1.35 ft 1018 btu/h 127 cfm 524 btu/h	36 2002 btu/h 0.7 gpm 1.59 ft 1103 btu/h 138 cfm 568 btu/h	38 2109 btu/h 0.8 gpm 1.76 ft 1162 btu/h 148 cfm 612 btu/h
10	dB(A) Water btu/h Water Flow Water ΔP Heating btu/h Total Air cfm Primary Air btu/h	23 974 btu/h 0.4 gpm 0.38 ft 537 btu/h 64 cfm 262 btu/h 1236 btu/h	24 1136 btu/h 0.4 gpm 0.51 ft 626 btu/h 74 cfm 306 btu/h 1442 btu/h	26 1285 btu/h 0.5 gpm 0.66 ft 708 btu/h 85 cfm 350 btu/h 1635 btu/h	28 1431 btu/h 0.5 gpm 0.81 ft 789 btu/h 95 cfm 393 btu/h 1824 btu/h	30 1573 btu/h 0.6 gpm 0.98 ft 867 btu/h 106 cfm 437 btu/h 2010 btu/h	33 1712 btu/h 0.6 gpm 1.16 ft 944 btu/h 117 cfm 481 btu/h 2193 btu/h	35 1848 btu/h 0.7 gpm 1.35 ft 1018 btu/h 127 cfm 524 btu/h 2372 btu/h	36 2002 btu/h 0.7 gpm 1.59 ft 1103 btu/h 138 cfm 568 btu/h 2570 btu/h	38 2109 btu/h 0.8 gpm 1.76 ft 1162 btu/h 148 cfm 612 btu/h 2721 btu/h
10	dB(A) Water btu/h Water Flow Water ΔP Heating btu/h Total Air cfm Primary Air btu/h Total btu/h Total btu/h Total btu/h	23 974 btu/h 0.4 gpm 0.38 ft 537 btu/h 64 cfm 262 btu/h 1236 btu/h 17 cfm	24 1136 btu/h 0.4 gpm 0.51 ft 626 btu/h 74 cfm 306 btu/h 1442 btu/h 19 cfm	26 1285 btu/h 0.5 gpm 0.66 ft 708 btu/h 85 cfm 350 btu/h 1635 btu/h 21 cfm	28 1431 btu/h 0.5 gpm 0.81 ft 789 btu/h 95 cfm 393 btu/h 1824 btu/h 23 cfm	30 1573 btu/h 0.6 gpm 0.98 ft 867 btu/h 106 cfm 437 btu/h 2010 btu/h 25 cfm	33 1712 btu/h 0.6 gpm 1.16 ft 944 btu/h 117 cfm 481 btu/h 2193 btu/h 27 cfm	35 1848 btu/h 0.7 gpm 1.35 ft 1018 btu/h 127 cfm 524 btu/h 2372 btu/h 29 cfm	36 2002 btu/h 0.7 gpm 1.59 ft 1103 btu/h 138 cfm 568 btu/h 2570 btu/h 31 cfm 285 b/h/ft	38 2109 btu/h 0.8 gpm 1.76 ft 1162 btu/h 148 cfm 612 btu/h 2721 btu/h 33 cfm
10	dB(A) Water btu/h Water Flow Water ΔP Heating btu/h Total Air cfm Primary Air btu/h Total btu/h Total btu/h Stu/h/ft Throw ft Static in/wg	23 974 btu/h 0.4 gpm 0.38 ft 537 btu/h 64 cfm 262 btu/h 1236 btu/h 17 cfm 156 b/h/ft 1.3-3.2-5.5 0.16 in/wg	24 1136 btu/h 0.4 gpm 0.51 ft 626 btu/h 74 cfm 306 btu/h 1442 btu/h 19 cfm 175 b/h/ft 1.3-3.6-6.2 0.21 in/wg	26 1285 btu/h 0.5 gpm 0.66 ft 708 btu/h 85 cfm 350 btu/h 1635 btu/h 21 cfm 195 b/h/ft 1.6-3.9-6.8 0.26 in/wg	28 1431 btu/h 0.5 gpm 0.81 ft 789 btu/h 95 cfm 393 btu/h 1824 btu/h 23 cfm 213 b/h/ft 1.6-4.2-7.5 0.31 in/wg	30 1573 btu/h 0.6 gpm 0.98 ft 867 btu/h 106 cfm 437 btu/h 2010 btu/h 25 cfm 230 b/h/ft 1.9-4.9-8.2 0.37 in/wg	33 1712 btu/h 0.6 gpm 1.16 ft 944 btu/h 117 cfm 481 btu/h 2193 btu/h 27 cfm 250 b/h/ft 1.9-5.2-8.8 0.43 in/wg	35 1848 btu/h 0.7 gpm 1.35 ft 1018 btu/h 127 cfm 524 btu/h 2372 btu/h 29 cfm 268 b/h/ft	36 2002 btu/h 0.7 gpm 1.59 ft 1103 btu/h 138 cfm 568 btu/h 2570 btu/h 31 cfm 285 b/h/ft 2.2-5.9-10.1 0.58 in/wg	38 2109 btu/h 0.8 gpm 1.76 ft 1162 btu/h 148 cfm 612 btu/h 2721 btu/h 33 cfm 304 b/h/ft 2.2-6.2-10.8 0.66 in/wg
10	dB(A) Water btu/h Water Flow Water ΔP Heating btu/h Total Air cfm Primary Air btu/h Total btu/h Total btu/h Total btu/h	23 974 btu/h 0.4 gpm 0.38 ft 537 btu/h 64 cfm 262 btu/h 1236 btu/h 17 cfm 156 b/h/ft 1.3-3.2-5.5 0.16 in/wg	24 1136 btu/h 0.4 gpm 0.51 ft 626 btu/h 74 cfm 306 btu/h 1442 btu/h 19 cfm 175 b/h/ft 1.3-3.6-6.2 0.21 in/wg	26 1285 btu/h 0.5 gpm 0.66 ft 708 btu/h 85 cfm 350 btu/h 1635 btu/h 21 cfm 195 b/h/ft 1.6-3.9-6.8 0.26 in/wg 28	28 1431 btu/h 0.5 gpm 0.81 ft 789 btu/h 95 cfm 393 btu/h 1824 btu/h 23 cfm 213 b/h/ft 1.6-4.2-7.5 0.31 in/wg	30 1573 btu/h 0.6 gpm 0.98 ft 867 btu/h 106 cfm 437 btu/h 2010 btu/h 25 cfm 230 b/h/ft 1.9-4.9-8.2 0.37 in/wg	33 1712 btu/h 0.6 gpm 1.16 ft 944 btu/h 117 cfm 481 btu/h 2193 btu/h 27 cfm 250 b/h/ft 1.9-5.2-8.8 0.43 in/wg	35 1848 btu/h 0.7 gpm 1.35 ft 1018 btu/h 127 cfm 524 btu/h 2372 btu/h 29 cfm 268 b/h/ft 2.2-5.5-9.5 0.50 in/wg	36 2002 btu/h 0.7 gpm 1.59 ft 1103 btu/h 138 cfm 568 btu/h 2570 btu/h 31 cfm 285 b/h/ft 2.2-5.9-10.1 0.58 in/wg 37	38 2109 btu/h 0.8 gpm 1.76 ft 1162 btu/h 148 cfm 612 btu/h 2721 btu/h 33 cfm 304 b/h/ft 2.2-6.2-10.8 0.66 in/wg
10	dB(A) Water btu/h Water Flow Water ΔP Heating btu/h Total Air cfm Primary Air btu/h Total btu/h Total btu/h Stu/h/ft Throw ft Static in/wg	23 974 btu/h 0.4 gpm 0.38 ft 537 btu/h 64 cfm 262 btu/h 1236 btu/h 17 cfm 156 b/h/ft 1.3-3.2-5.5 0.16 in/wg	24 1136 btu/h 0.4 gpm 0.51 ft 626 btu/h 74 cfm 306 btu/h 1442 btu/h 19 cfm 175 b/h/ft 1.3-3.6-6.2 0.21 in/wg	26 1285 btu/h 0.5 gpm 0.66 ft 708 btu/h 85 cfm 350 btu/h 1635 btu/h 21 cfm 195 b/h/ft 1.6-3.9-6.8 0.26 in/wg	28 1431 btu/h 0.5 gpm 0.81 ft 789 btu/h 95 cfm 393 btu/h 1824 btu/h 23 cfm 213 b/h/ft 1.6-4.2-7.5 0.31 in/wg	30 1573 btu/h 0.6 gpm 0.98 ft 867 btu/h 106 cfm 437 btu/h 2010 btu/h 25 cfm 230 b/h/ft 1.9-4.9-8.2 0.37 in/wg	33 1712 btu/h 0.6 gpm 1.16 ft 944 btu/h 117 cfm 481 btu/h 2193 btu/h 27 cfm 250 b/h/ft 1.9-5.2-8.8 0.43 in/wg	35 1848 btu/h 0.7 gpm 1.35 ft 1018 btu/h 127 cfm 524 btu/h 2372 btu/h 29 cfm 268 b/h/ft 2.2-5.5-9.5 0.50 in/wg	36 2002 btu/h 0.7 gpm 1.59 ft 1103 btu/h 138 cfm 568 btu/h 2570 btu/h 31 cfm 285 b/h/ft 2.2-5.9-10.1 0.58 in/wg	38 2109 btu/h 0.8 gpm 1.76 ft 1162 btu/h 148 cfm 612 btu/h 2721 btu/h 33 cfm 304 b/h/ft 2.2-6.2-10.8 0.66 in/wg
10	dB(A) Water btu/h Water Flow Water ΔP Heating btu/h Total Air cfm Primary Air btu/h Total btu/h Total btu/h Stu/h/ft Throw ft Static in/wg dB(A)	23 974 btu/h 0.4 gpm 0.38 ft 537 btu/h 64 cfm 262 btu/h 1236 btu/h 17 cfm 156 b/h/ft 1.3-3.2-5.5 0.16 in/wg	24 1136 btu/h 0.4 gpm 0.51 ft 626 btu/h 74 cfm 306 btu/h 1442 btu/h 19 cfm 175 b/h/ft 1.3-3.6-6.2 0.21 in/wg	26 1285 btu/h 0.5 gpm 0.66 ft 708 btu/h 85 cfm 350 btu/h 1635 btu/h 21 cfm 195 b/h/ft 1.6-3.9-6.8 0.26 in/wg 28	28 1431 btu/h 0.5 gpm 0.81 ft 789 btu/h 95 cfm 393 btu/h 1824 btu/h 23 cfm 213 b/h/ft 1.6-4.2-7.5 0.31 in/wg	30 1573 btu/h 0.6 gpm 0.98 ft 867 btu/h 106 cfm 437 btu/h 2010 btu/h 25 cfm 230 b/h/ft 1.9-4.9-8.2 0.37 in/wg	33 1712 btu/h 0.6 gpm 1.16 ft 944 btu/h 117 cfm 481 btu/h 2193 btu/h 27 cfm 250 b/h/ft 1.9-5.2-8.8 0.43 in/wg	35 1848 btu/h 0.7 gpm 1.35 ft 1018 btu/h 127 cfm 524 btu/h 2372 btu/h 29 cfm 268 b/h/ft 2.2-5.5-9.5 0.50 in/wg	36 2002 btu/h 0.7 gpm 1.59 ft 1103 btu/h 138 cfm 568 btu/h 2570 btu/h 31 cfm 285 b/h/ft 2.2-5.9-10.1 0.58 in/wg 37	38 2109 btu/h 0.8 gpm 1.76 ft 1162 btu/h 148 cfm 612 btu/h 2721 btu/h 33 cfm 304 b/h/ft 2.2-6.2-10.8 0.66 in/wg
10	dB(A) Water btu/h Water Flow Water ΔP Heating btu/h Total Air cfm Primary Air btu/h Total btu/h tu/h/ft Throw ft Static in/wg dB(A) Water btu/h	23 974 btu/h 0.4 gpm 0.38 ft 537 btu/h 64 cfm 262 btu/h 17 cfm 156 b/h/ft 1.3-3.2-5.5 0.16 in/wg 22 1455 btu/h 0.5 gpm 1.02 ft	24 1136 btu/h 0.4 gpm 0.51 ft 626 btu/h 74 cfm 306 btu/h 1442 btu/h 19 cfm 175 b/h/ft 1.3-3.6-6.2 0.21 in/wg 25 1619 btu/h 0.6 gpm 1.26 ft	26 1285 btu/h 0.5 gpm 0.66 ft 708 btu/h 85 cfm 350 btu/h 1635 btu/h 21 cfm 195 b/h/ft 1.6-3.9-6.8 0.26 in/wg 28 1799 btu/h 0.7 gpm 1.55 ft	28 1431 btu/h 0.5 gpm 0.81 ft 789 btu/h 95 cfm 393 btu/h 1824 btu/h 23 cfm 213 b/h/ft 1.6-4.2-7.5 0.31 in/wg 30 1959 btu/h	30 1573 btu/h 0.6 gpm 0.98 ft 867 btu/h 106 cfm 437 btu/h 2010 btu/h 25 cfm 230 b/h/ft 1.9-4.9-8.2 0.37 in/wg 32 2114 btu/h 0.8 gpm 2.15 ft	33 1712 btu/h 0.6 gpm 1.16 ft 944 btu/h 117 cfm 481 btu/h 27 cfm 250 b/h/ft 1.9-5.2-8.8 0.43 in/wg 33 2291 btu/h 0.8 gpm 2.52 ft	35 1848 btu/h 0.7 gpm 1.35 ft 1018 btu/h 127 cfm 524 btu/h 2372 btu/h 29 cfm 268 b/h/ft 2.2-5.5-9.5 0.50 in/wg 35 2440 btu/h 0.9 gpm 2.86 ft	36 2002 btu/h 0.7 gpm 1.59 ft 1103 btu/h 138 cfm 568 btu/h 2570 btu/h 31 cfm 285 b/h/ft 2.2-5.9-10.1 0.58 in/wg 37 2587 btu/h	38 2109 btu/h 0.8 gpm 1.76 ft 1162 btu/h 148 cfm 612 btu/h 2721 btu/h 33 cfm 304 b/h/ft 2.2-6.2-10.8 0.66 in/wg 38 2759 btu/h
10	dB(A) Water btu/h Water Flow Water ΔP Heating btu/h Total Air cfm Primary Air btu/h Total btu/h tu/h/ft Throw ft Static in/wg dB(A) Water btu/h Water Flow	23 974 btu/h 0.4 gpm 0.38 ft 537 btu/h 64 cfm 262 btu/h 1236 btu/h 17 cfm 156 b/h/ft 1.3-3.2-5.5 0.16 in/wg 22 1455 btu/h 0.5 gpm	24 1136 btu/h 0.4 gpm 0.51 ft 626 btu/h 74 cfm 306 btu/h 1442 btu/h 19 cfm 175 b/h/ft 1.3-3.6-6.2 0.21 in/wg 25 1619 btu/h 0.6 gpm	26 1285 btu/h 0.5 gpm 0.66 ft 708 btu/h 85 cfm 350 btu/h 1635 btu/h 21 cfm 195 b/h/ft 1.6-3.9-6.8 0.26 in/wg 28 1799 btu/h 0.7 gpm	28 1431 btu/h 0.5 gpm 0.81 ft 789 btu/h 95 cfm 393 btu/h 1824 btu/h 23 cfm 213 b/h/ft 1.6-4.2-7.5 0.31 in/wg 30 1959 btu/h 0.7 gpm 1.84 ft 1079 btu/h	30 1573 btu/h 0.6 gpm 0.98 ft 867 btu/h 106 cfm 437 btu/h 2010 btu/h 25 cfm 230 b/h/ft 1.9-4.9-8.2 0.37 in/wg 32 2114 btu/h 0.8 gpm	33 1712 btu/h 0.6 gpm 1.16 ft 944 btu/h 117 cfm 481 btu/h 2193 btu/h 27 cfm 250 b/h/ft 1.9-5.2-8.8 0.43 in/wg 33 2291 btu/h 0.8 gpm	35 1848 btu/h 0.7 gpm 1.35 ft 1018 btu/h 127 cfm 524 btu/h 2372 btu/h 29 cfm 268 b/h/ft 2.2-5.5-9.5 0.50 in/wg 35 2440 btu/h 0.9 gpm	36 2002 btu/h 0.7 gpm 1.59 ft 1103 btu/h 138 cfm 568 btu/h 2570 btu/h 31 cfm 285 b/h/ft 2.2-5.9-10.1 0.58 in/wg 37 2587 btu/h 1.0 gpm	38 2109 btu/h 0.8 gpm 1.76 ft 1162 btu/h 148 cfm 612 btu/h 2721 btu/h 33 cfm 304 b/h/ft 2.2-6.2-10.8 0.66 in/wg 38 2759 btu/h 1.0 gpm
10	dB(A) Water btu/h Water Flow Water ΔP Heating btu/h Total Air cfm Primary Air btu/h Total btu/h btu/h/ft Throw ft Static in/wg dB(A) Water btu/h Water Flow Water ΔP	23 974 btu/h 0.4 gpm 0.38 ft 537 btu/h 64 cfm 262 btu/h 17 cfm 156 b/h/ft 1.3-3.2-5.5 0.16 in/wg 22 1455 btu/h 0.5 gpm 1.02 ft	24 1136 btu/h 0.4 gpm 0.51 ft 626 btu/h 74 cfm 306 btu/h 1442 btu/h 19 cfm 175 b/h/ft 1.3-3.6-6.2 0.21 in/wg 25 1619 btu/h 0.6 gpm 1.26 ft	26 1285 btu/h 0.5 gpm 0.66 ft 708 btu/h 85 cfm 350 btu/h 1635 btu/h 21 cfm 195 b/h/ft 1.6-3.9-6.8 0.26 in/wg 28 1799 btu/h 0.7 gpm 1.55 ft	28 1431 btu/h 0.5 gpm 0.81 ft 789 btu/h 95 cfm 393 btu/h 1824 btu/h 23 cfm 213 b/h/ft 1.6-4.2-7.5 0.31 in/wg 30 1959 btu/h 0.7 gpm 1.84 ft	30 1573 btu/h 0.6 gpm 0.98 ft 867 btu/h 106 cfm 437 btu/h 2010 btu/h 25 cfm 230 b/h/ft 1.9-4.9-8.2 0.37 in/wg 32 2114 btu/h 0.8 gpm 2.15 ft	33 1712 btu/h 0.6 gpm 1.16 ft 944 btu/h 117 cfm 481 btu/h 27 cfm 250 b/h/ft 1.9-5.2-8.8 0.43 in/wg 33 2291 btu/h 0.8 gpm 2.52 ft	35 1848 btu/h 0.7 gpm 1.35 ft 1018 btu/h 127 cfm 524 btu/h 2372 btu/h 29 cfm 268 b/h/ft 2.2-5.5-9.5 0.50 in/wg 35 2440 btu/h 0.9 gpm 2.86 ft	36 2002 btu/h 0.7 gpm 1.59 ft 1103 btu/h 138 cfm 568 btu/h 2570 btu/h 31 cfm 285 b/h/ft 2.2-5.9-10.1 0.58 in/wg 37 2587 btu/h 1.0 gpm 3.21 ft	38 2109 btu/h 0.8 gpm 1.76 ft 1162 btu/h 148 cfm 612 btu/h 2721 btu/h 33 cfm 304 b/h/ft 2.2-6.2-10.8 0.66 in/wg 38 2759 btu/h 1.0 gpm 3.65 ft
10	dB(A) Water btu/h Water Flow Water ΔP Heating btu/h Total Air cfm Primary Air btu/h Total btu/h btu/h/ft Throw ft Static in/wg dB(A) Water btu/h Water Flow Water ΔP Heating btu/h	23 974 btu/h 0.4 gpm 0.38 ft 537 btu/h 64 cfm 262 btu/h 1236 btu/h 156 b/h/ft 1.3-3.2-5.5 0.16 in/wg 22 1455 btu/h 0.5 gpm 1.02 ft 802 btu/h	24 1136 btu/h 0.4 gpm 0.51 ft 626 btu/h 74 cfm 306 btu/h 1442 btu/h 19 cfm 175 b/h/ft 1.3-3.6-6.2 0.21 in/wg 25 1619 btu/h 0.6 gpm 1.26 ft 893 btu/h	26 1285 btu/h 0.5 gpm 0.66 ft 708 btu/h 85 cfm 350 btu/h 1635 btu/h 21 cfm 195 b/h/ft 1.6-3.9-6.8 0.26 in/wg 28 1799 btu/h 0.7 gpm 1.55 ft 992 btu/h	28 1431 btu/h 0.5 gpm 0.81 ft 789 btu/h 95 cfm 393 btu/h 1824 btu/h 23 cfm 213 b/h/ft 1.6-4.2-7.5 0.31 in/wg 30 1959 btu/h 0.7 gpm 1.84 ft 1079 btu/h	30 1573 btu/h 0.6 gpm 0.98 ft 867 btu/h 106 cfm 437 btu/h 2010 btu/h 25 cfm 230 b/h/ft 1.9-4.9-8.2 0.37 in/wg 32 2114 btu/h 0.8 gpm 2.15 ft 1165 btu/h	33 1712 btu/h 0.6 gpm 1.16 ft 944 btu/h 117 cfm 481 btu/h 27 cfm 250 b/h/ft 1.9-5.2-8.8 0.43 in/wg 33 2291 btu/h 0.8 gpm 2.52 ft 1262 btu/h	35 1848 btu/h 0.7 gpm 1.35 ft 1018 btu/h 127 cfm 524 btu/h 2372 btu/h 29 cfm 268 b/h/ft 2.2-5.5-9.5 0.50 in/wg 35 2440 btu/h 0.9 gpm 2.86 ft 1345 btu/h	36 2002 btu/h 0.7 gpm 1.59 ft 1103 btu/h 138 cfm 568 btu/h 2570 btu/h 31 cfm 285 b/h/ft 2.2-5.9-10.1 0.58 in/wg 37 2587 btu/h 1.0 gpm 3.21 ft 1426 btu/h	38 2109 btu/h 0.8 gpm 1.76 ft 1162 btu/h 148 cfm 612 btu/h 2721 btu/h 33 cfm 304 b/h/ft 2.2-6.2-10.8 0.66 in/wg 38 2759 btu/h 1.0 gpm 3.65 ft 1521 btu/h

Recommended maximum heating capacity for the above beams is equal to 50% of the indicated cooling potential.

The return air to the beam is taken as 1 °F above the average room for the values above.

Notations

b/h/ft Cooling capacity per linear foot of chilled beam
Throw ft Throw values are to 150 - 100 - and 50 fpm respectively.
Static in/wg Static pressure in beam plenum chamber in/wg

 $\begin{array}{ll} \text{dB(A)} & \text{Air regenerated sound power level} \\ \text{Water btu/h} & \text{Cooling output of coil btu/h} \\ \text{Water Flow} & \text{Water flow rate gpm} \\ \text{Water } \Delta P & \text{Coil pressure drop in/wg} \\ \end{array}$

Total Air cfm
Primary Air btu/h
Total btu/h
Total btu/h
Total cooling capacity of the primary air btu/h
Total cooling capacity of the chilled beam btu/h

Correct	ion Table
K	Water W
20	1.25
19	1.18
18	1.12
17	1.06
16	1.00
15	0.94
14	0.88
13	0.82
12	0.75

dB(A)	fpm
40	800
35	700
30	600
25	500
20	400

The sound power dB(A) levels are achieved by limiting the primary air spigot velocity as per the table above.

The thermal data is based on 16 K between mean water and return air to the beam.

Active Chilled Beams Beam performance Nozzle B - 1 way discharge

Performance Parameters

Return Air 76.1 °F Room Air 75.2 °F Supply Water Heating 113.0 °F

Primary Air 57.2 °F Supply Water 57.2 °F

Return Water 62.6 °F

Return Water Heating 95.0 °

Beam Length (ft)	Primary Air cfm	13 cfm	17 cfm	21 cfm	25 cfm	30 cfm	34 cfm		
4	btu/h/ft	254 b/h/ft	335 b/h/ft	415 b/h/ft	494 b/h/ft	571 b/h/ft	646 b/h/ft		
	Throw ft	1.9-5.2-9.1	2.6-7.2-12.1	3.2-8.8-15	3.9-10.4-18	4.5-12.1-20.6	5.2-13.7-23.6		
	Static in/wg	0.14 in/wg	0.26 in/wg	0.40 in/wg	0.58 in/wg	0.78 in/wg	1.02 in/wg		
	dB(A)	31	37	42	48	53	53		
	Water btu/h	737 btu/h	970 btu/h	1198 btu/h	1419 btu/h	1634 btu/h	1842 btu/h		
	Water Flow	0.3 gpm	0.4 gpm	0.4 gpm	0.5 gpm	0.6 gpm	0.7 gpm		
	Water △P	0.13 ft	0.22 ft	0.34 ft	0.47 ft	0.63 ft	0.80 ft		
	Heating btu/h	406 btu/h	535 btu/h	660 btu/h	782 btu/h	900 btu/h	1015 btu/h		
	btu/h/ft	53 cfm	71 cfm	89 cfm	107 cfm	125 cfm	142 cfm		
	Primary Air btu/h	262 btu/h	350 btu/h	437 btu/h	524 btu/h	612 btu/h	699 btu/h		
	Total btu/h	999 btu/h	1320 btu/h	1635 btu/h	1943 btu/h	2246 btu/h	2542 btu/h		
		21 cfm	25 cfm	30 cfm	34 cfm	38 cfm	42 cfm	47 cfm	51 cfm
6	btu/h/ft	290 b/h/ft	345 b/h/ft	403 b/h/ft	456 b/h/ft	508 b/h/ft	559 b/h/ft	615 b/h/ft	665 b/h/ft
	Throw ft	2.2-6.2-10.4	2.9-7.2-12.4	3.2-8.5-14.4	3.6-9.5-16.4	4.2-10.8-18.3	4.5-11.8-20.3	5.2-13.1-22.3	5.5-14.1-24.2
	Static in/wg	0.18 in/wg	0.26 in/wg	0.35 in/wg	0.46 in/wg	0.58 in/wg	0.71 in/wg	0.86 in/wg	1.02 in/wg
	dB(A)	32	37	40	45	48	51	53	56
	Water btu/h	1277 btu/h	1514 btu/h	1766 btu/h	1993 btu/h	2213 btu/h	2427 btu/h	2670 btu/h	2874 btu/h
	Water Flow	0.5 gpm	0.6 gpm	0.7 gpm	0.7 gpm	0.8 gpm	0.9 gpm	1.0 gpm	1.1 gpm
	Water △P	0.50 ft	0.70 ft	0.95 ft	1.21 ft	1.49 ft	1.79 ft	2.17 ft	2.51 ft
	Heating btu/h	704 btu/h	834 btu/h	973 btu/h	1098 btu/h	1220 btu/h	1338 btu/h	1471 btu/h	1584 btu/h
	Total Air cfm	89 cfm	107 cfm	125 cfm	142 cfm	160 cfm	178 cfm	196 cfm	214 cfm
	Primary Air btu/h	437 btu/h	524 btu/h	612 btu/h	699 btu/h	787 btu/h	874 btu/h	962 btu/h	1049 btu/h
	Total btu/h	1715 btu/h	2038 btu/h	2378 btu/h	2692 btu/h	3000 btu/h	3301 btu/h	3631 btu/h	3923 btu/h
		34 cfm	38 cfm	42 cfm	47 cfm	51 cfm	55 cfm	59 cfm	
8	btu/h/ft	358 b/h/ft	402 b/h/ft	443 b/h/ft	487 b/h/ft	526 b/h/ft	570 b/h/ft	608 b/h/ft	
	Throw ft	2.9-7.5-12.7	3.2-8.5-14.4	3.6-9.5-16	3.9-10.1-17.7	4.2-11.1-19	4.5-12.1-20.6	4.9-12.7-21.9	
	Static in/wg	0.26 in/wg	0.32 in/wg	0.40 in/wg	0.48 in/wg	0.58 in/wg	0.68 in/wg	0.78 in/wg	
	dB(A)	40	44	45	48	50	54	58	
	Water btu/h	2115 btu/h	2380 btu/h	2611 btu/h	2872 btu/h	3093 btu/h	3351 btu/h	3561 btu/h	
	Water Flow	0.8 gpm	0.9 gpm	1.0 gpm	1.1 gpm	1.1 gpm	1.2 gpm	1.3 gpm	
	Water △P	1.78 ft	2.25 ft	2.70 ft	3.27 ft	3.79 ft	4.45 ft	5.03 ft	
	Heating btu/h	1166 btu/h	1312 btu/h	1439 btu/h	1583 btu/h	1704 btu/h	1847 btu/h	1963 btu/h	
	Total Air cfm	142 cfm	160 cfm	178 cfm	196 cfm	214 cfm	231 cfm	249 cfm	
	Primary Air btu/h	699 btu/h	787 btu/h	874 btu/h	962 btu/h	1049 btu/h	1136 btu/h	1224 btu/h	
	Total btu/h	2815 btu/h	3167 btu/h	3485 btu/h	3833 btu/h	4142 btu/h	4487 btu/h	4785 btu/h	
		42 cfm	47 cfm	51 cfm	55 cfm	59 cfm	64 cfm	68 cfm	
10									
10	btu/h/ft	390 b/h/ft	429 b/h/ft	463 b/h/ft	502 b/h/ft	540 b/h/ft	573 b/h/ft	612 b/h/ft	
10	Throw ft	390 b/h/ft 3.2-8.2-14.1				540 b/h/ft 4.5-11.4-19.6	4.9-12.1-20.6		
10			429 b/h/ft	463 b/h/ft					
10	Throw ft	3.2-8.2-14.1 0.26 in/wg 43	429 b/h/ft 3.6-9.1-15.4 0.31 in/wg 46	463 b/h/ft 3.9-9.8-16.7 0.37 in/wg 49	4.2-10.4-18.3 0.43 in/wg 51	4.5-11.4-19.6 0.50 in/wg 54	4.9-12.1-20.6 0.58 in/wg 58	5.2-13.1-22.3	
10	Throw ft Static in/wg	3.2-8.2-14.1 0.26 in/wg	429 b/h/ft 3.6-9.1-15.4 0.31 in/wg	463 b/h/ft 3.9-9.8-16.7 0.37 in/wg	4.2-10.4-18.3 0.43 in/wg	4.5-11.4-19.6 0.50 in/wg	4.9-12.1-20.6 0.58 in/wg	5.2-13.1-22.3 0.66 in/wg	
10	Throw ft Static in/wg dB(A)	3.2-8.2-14.1 0.26 in/wg 43	429 b/h/ft 3.6-9.1-15.4 0.31 in/wg 46	463 b/h/ft 3.9-9.8-16.7 0.37 in/wg 49	4.2-10.4-18.3 0.43 in/wg 51	4.5-11.4-19.6 0.50 in/wg 54	4.9-12.1-20.6 0.58 in/wg 58	5.2-13.1-22.3 0.66 in/wg 60	
10	Throw ft Static in/wg dB(A) Water btu/h	3.2-8.2-14.1 0.26 in/wg 43 2962 btu/h	429 b/h/ft 3.6-9.1-15.4 0.31 in/wg 46 3258 btu/h	463 b/h/ft 3.9-9.8-16.7 0.37 in/wg 49 3509 btu/h	4.2-10.4-18.3 0.43 in/wg 51 3801 btu/h	4.5-11.4-19.6 0.50 in/wg 54 4094 btu/h	4.9-12.1-20.6 0.58 in/wg 58 4330 btu/h	5.2-13.1-22.3 0.66 in/wg 60 4619 btu/h	
10	Throw ft Static in/wg dB(A) Water btu/h Water Flow	3.2-8.2-14.1 0.26 in/wg 43 2962 btu/h 1.1 gpm	429 b/h/ft 3.6-9.1-15.4 0.31 in/wg 46 3258 btu/h 1.2 gpm	463 b/h/ft 3.9-9.8-16.7 0.37 in/wg 49 3509 btu/h 1.3 gpm	4.2-10.4-18.3 0.43 in/wg 51 3801 btu/h 1.4 gpm	4.5-11.4-19.6 0.50 in/wg 54 4094 btu/h 1.5 gpm	4.9-12.1-20.6 0.58 in/wg 58 4330 btu/h 1.6 gpm	5.2-13.1-22.3 0.66 in/wg 60 4619 btu/h 1.7 gpm	
10	Throw ft Static in/wg dB(A) Water btu/h Water Flow Water Δ P	3.2-8.2-14.1 0.26 in/wg 43 2962 btu/h 1.1 gpm 4.21 ft	429 b/h/ft 3.6-9.1-15.4 0.31 in/wg 46 3258 btu/h 1.2 gpm 5.09 ft	463 b/h/ft 3.9-9.8-16.7 0.37 in/wg 49 3509 btu/h 1.3 gpm 5.91 ft	4.2-10.4-18.3 0.43 in/wg 51 3801 btu/h 1.4 gpm 6.94 ft	4.5-11.4-19.6 0.50 in/wg 54 4094 btu/h 1.5 gpm 8.04 ft	4.9-12.1-20.6 0.58 in/wg 58 4330 btu/h 1.6 gpm 9.00 ft	5.2-13.1-22.3 0.66 in/wg 60 4619 btu/h 1.7 gpm 10.24 ft	
10	Throw ft Static in/wg dB(A) Water btu/h Water Flow Water Δ P Heating btu/h	3.2-8.2-14.1 0.26 in/wg 43 2962 btu/h 1.1 gpm 4.21 ft 1632 btu/h	429 b/h/ft 3.6-9.1-15.4 0.31 in/wg 46 3258 btu/h 1.2 gpm 5.09 ft 1795 btu/h	463 b/h/ft 3.9-9.8-16.7 0.37 in/wg 49 3509 btu/h 1.3 gpm 5.91 ft 1934 btu/h	4.2-10.4-18.3 0.43 in/wg 51 3801 btu/h 1.4 gpm 6.94 ft 2095 btu/h	4.5-11.4-19.6 0.50 in/wg 54 4094 btu/h 1.5 gpm 8.04 ft 2256 btu/h	4.9-12.1-20.6 0.58 in/wg 58 4330 btu/h 1.6 gpm 9.00 ft 2386 btu/h	5.2-13.1-22.3 0.66 in/wg 60 4619 btu/h 1.7 gpm 10.24 ft 2545 btu/h	

Recommended maximum heating capacity for the above beams is equal to 50% of the indicated cooling potential.

The return air to the beam is taken as 1 °F above the average room for the values above.

Notations

b/h/ft Cooling capacity per linear foot of chilled beam
Throw ft Throw values are to 150 - 100 - and 50 fpm respectively.
Static in/wg Static pressure in beam plenum chamber in/wg

 $\begin{array}{ll} \text{dB(A)} & \text{Air regenerated sound power level} \\ \text{Water btu/h} & \text{Cooling output of coil btu/h} \\ \text{Water Flow} & \text{Water flow rate gpm} \\ \text{Water } \Delta P & \text{Coil pressure drop in/wg} \\ \end{array}$

Total Air cfm
Primary Air btu/h
Total btu/h
Total btu/h
Total cooling capacity of the primary air btu/h
Total btu/h
Total cooling capacity of the chilled beam btu/h

Correction Table		
K	Water W	
20	1.25	
19	1.18	
18	1.12	
17	1.06	
16	1.00	
15	0.94	
14	0.88	
13	0.82	
12	0.75	

dB(A)	fpm
40	800
35	700
30	600
25	500
20	400

The sound power dB(A) levels are achieved by limiting the primary air spigot velocity as per the table above.

The thermal data is based on 16 K between mean water and return air to the beam.

Active Chilled Beams Beam performance Nozzle C - 1 way discharge

Performance Parameters

Return Air 76.1 °F Room Air 75.2 °F Supply Water Heating 113.0 °F

Primary Air 57.2 °F Supply Water 57.2 °F

Return Water 62.6 °F

Return Water Heating 95.0 °

Length (ft) btu/h/ft 353 b/h/ft 459 b/h/ft 558 b/h/ft 656 b/h/ft 733 b/h/ft 814 b/h/ft Throw ft 2.9-7.5-12.7 3.9-9.8-16.7 4.5-11.8-20.3 5.5-14.1-23.9 6.2-15.7-26.5 6.8-17.3-29.5 Static in/wg 0.18 in/wg 0.30 in/wg 0.46 in/wg 0.64 in/wg 0.86 in/wg 1.11 in/wg dB(A) 31 37 42 48 53 53		
Static in/wg 0.18 in/wg 0.30 in/wg 0.46 in/wg 0.64 in/wg 0.86 in/wg 1.11 in/wg		
dB(A) 31 37 42 48 53 53		
Water btu/h 952 btu/h 1238 btu/h 1499 btu/h 1750 btu/h 1925 btu/h 2111 btu/h		
Water Flow 0.4 gpm 0.5 gpm 0.6 gpm 0.6 gpm 0.7 gpm 0.8 gpm		
Water ΔP 0.21 ft 0.36 ft 0.53 ft 0.72 ft 0.87 ft 1.05 ft		
Heating btu/h 525 btu/h 682 btu/h 826 btu/h 965 btu/h 1061 btu/h 1163 btu/h		
btu/h/ft 72 cfm 94 cfm 115 cfm 137 cfm 159 cfm 180 cfm		
Primary Air btu/h 437 btu/h 568 btu/h 699 btu/h 830 btu/h 962 btu/h 1093 btu/h		
Total btu/h 1389 btu/h 1806 btu/h 2198 btu/h 2581 btu/h 2887 btu/h 3204 btu/h		
34 cfm 40 cfm 47 cfm 53 cfm 59 cfm 66 cfm	72 cfm	
6 btu/h/ft 387 b/h/ft 459 b/h/ft 526 b/h/ft 598 b/h/ft 662 b/h/ft 716 b/h/ft	776 b/h/ft	
	5.5-16.4-28.2	
	0.91 in/wg	
dB(A) 45 42 45 50 52 55	60	
	3095 btu/h	
Water Flow 0.6 gpm 0.7 gpm 0.8 gpm 0.9 gpm 1.0 gpm 1.1 gpm	1.1 gpm	
Water ΔP 0.76 ft 1.07 ft 1.39 ft 1.80 ft 2.19 ft 2.50 ft	2.91 ft	
· ·	1705 btu/h	
Total Air cfm 115 cfm 137 cfm 159 cfm 180 cfm 202 cfm 223 cfm	245 cfm	
	1486 btu/h	
	4581 btu/h	
47 cfm 53 cfm 59 cfm 66 cfm 72 cfm 78 cfm	85 cfm	91cfm
8 btu/h/ft 412 b/h/ft 468 b/h/ft 525 b/h/ft 574 b/h/ft 622 b/h/ft 677 b/h/ft	724 b/h/ft	769 b/h/ft
	3.2-15.4-26.2	6.5-16.4-27.8
Static in/wg 0.22 in/wg 0.28 in/wg 0.35 in/wg 0.43 in/wg 0.51 in/wg 0.61 in/wg dB(A) 42 47 50 52 56 58	0.71 in/wg 61	0.82 in/wg 64
	3950 btu/h	4174 btu/h
Water Flow 0.9 gpm 1.0 gpm 1.1 gpm 1.2 gpm 1.2 gpm 1.4 gpm	1.5 gpm 6.19 ft	1.5 gpm
Water Flow 0.8 gpm 1.0 gpm 1.1 gpm 1.2 gpm 1.3 gpm 1.4 gpm	0.1911	6 O1 #
Water ΔP 2.07 ft 2.67 ft 3.35 ft 3.97 ft 4.62 ft 5.48 ft	2177 htu/h	6.91 ft
Water ΔP 2.07 ft 2.67 ft 3.35 ft 3.97 ft 4.62 ft 5.48 ft Heating btu/h 1258 btu/h 1430 btu/h 1601 btu/h 1744 btu/h 1882 btu/h 2048 btu/h 2048 btu/h	2177 btu/h	2300 btu/h
Water ∆P 2.07 ft 2.67 ft 3.35 ft 3.97 ft 4.62 ft 5.48 ft Heating btu/h 1258 btu/h 1430 btu/h 1601 btu/h 1744 btu/h 1882 btu/h 2048 btu/h 2048 btu/h 207 cfm Total Air cfm 159 cfm 180 cfm 202 cfm 223 cfm 245 cfm 267 cfm	288 cfm	2300 btu/h 310 cfm
Water ΔP 2.07 ft 2.67 ft 3.35 ft 3.97 ft 4.62 ft 5.48 ft Heating btu/h 1258 btu/h 1430 btu/h 1601 btu/h 1744 btu/h 1882 btu/h 2048 btu/h 2048 btu/h 2048 btu/h 202 cfm 223 cfm 245 cfm 267 cfm Primary Air btu/h 962 btu/h 1093 btu/h 1224 btu/h 1355 btu/h 1486 btu/h 1617 btu/h	288 cfm 1748 btu/h	2300 btu/h 310 cfm 1879 btu/h
Water ΔP 2.07 ft 2.67 ft 3.35 ft 3.97 ft 4.62 ft 5.48 ft Heating btu/h 1258 btu/h 1430 btu/h 1601 btu/h 1744 btu/h 1882 btu/h 2048 btu/h 1 Total Air cfm 159 cfm 180 cfm 202 cfm 223 cfm 245 cfm 267 cfm Primary Air btu/h 962 btu/h 1093 btu/h 1224 btu/h 1355 btu/h 1486 btu/h 1617 btu/h Total btu/h 3244 btu/h 3687 btu/h 4129 btu/h 4520 btu/h 4900 btu/h 5333 btu/h	288 cfm 1748 btu/h 5698 btu/h	2300 btu/h 310 cfm 1879 btu/h 6053 btu/h
Water ΔP 2.07 ft 2.67 ft 3.35 ft 3.97 ft 4.62 ft 5.48 ft Heating btu/h 1258 btu/h 1430 btu/h 1601 btu/h 1744 btu/h 1882 btu/h 2048 btu/h 2048 btu/h 2048 btu/h 202 cfm 223 cfm 245 cfm 267 cfm Primary Air btu/h 962 btu/h 1093 btu/h 1224 btu/h 1355 btu/h 1486 btu/h 1617 btu/h	288 cfm 1748 btu/h	2300 btu/h 310 cfm 1879 btu/h
Water ΔP 2.07 ft 2.67 ft 3.35 ft 3.97 ft 4.62 ft 5.48 ft Heating btu/h 1258 btu/h 1430 btu/h 1601 btu/h 1744 btu/h 1882 btu/h 2048 btu/h Total Air cfm 159 cfm 180 cfm 202 cfm 223 cfm 245 cfm 267 cfm Primary Air btu/h 962 btu/h 1093 btu/h 1224 btu/h 1355 btu/h 1486 btu/h 1617 btu/h Total btu/h 3244 btu/h 3687 btu/h 4129 btu/h 4520 btu/h 4900 btu/h 5333 btu/h Total btu/h 455 b/h/ft 504 b/h/ft 553 b/h/ft 594 b/h/ft 642 b/h/ft 682 b/h/ft	288 cfm 1748 btu/h 5698 btu/h 97 cfm 730 b/h/ft	2300 btu/h 310 cfm 1879 btu/h 6053 btu/h 104 cfm 768 b/h/ft
Water ΔP 2.07 ft 2.67 ft 3.35 ft 3.97 ft 4.62 ft 5.48 ft Heating btu/h 1258 btu/h 1430 btu/h 1601 btu/h 1744 btu/h 1882 btu/h 2048 btu/h Total Air cfm 159 cfm 180 cfm 202 cfm 223 cfm 245 cfm 267 cfm Primary Air btu/h 962 btu/h 1093 btu/h 1224 btu/h 1355 btu/h 1486 btu/h 1617 btu/h Total btu/h 3244 btu/h 3687 btu/h 4129 btu/h 4520 btu/h 4900 btu/h 5333 btu/h Total btu/h 455 b/h/ft 504 b/h/ft 553 b/h/ft 594 b/h/ft 642 b/h/ft Throw ft 3.6-9.5-16.4 4.2-10.8-18.3 4.5-11.8-20 4.9-12.7-21.6 5.2-13.7-23.2 5.5-14.4-24.9 60 Source 5.48 ft 5.48 ft 5.48 ft 5.48 ft 5.48 ft 5.48 ft Total Dtu/h 450 btu/h 450 btu/h 450 btu/h 450 btu/h 4500 btu/h 4500 btu/h 4500 btu/h 5333 btu/h 400 btu/h 450 btu/h 45	288 cfm 1748 btu/h 5698 btu/h 97 cfm 730 b/h/ft 5.2-15.4-26.5	2300 btu/h 310 cfm 1879 btu/h 6053 btu/h 104 cfm 768 b/h/ft 6.5-16.4-27.8
Water ΔP 2.07 ft 2.67 ft 3.35 ft 3.97 ft 4.62 ft 5.48 ft Heating btu/h 1258 btu/h 1430 btu/h 1601 btu/h 1744 btu/h 1882 btu/h 2048 btu/h Total Air cfm 159 cfm 180 cfm 202 cfm 223 cfm 245 cfm 267 cfm Primary Air btu/h 962 btu/h 1093 btu/h 1224 btu/h 1355 btu/h 1486 btu/h 1617 btu/h Total btu/h 3244 btu/h 3687 btu/h 4129 btu/h 4520 btu/h 4900 btu/h 5333 btu/h Total btu/h 455 b/h/ft 504 b/h/ft 553 b/h/ft 594 b/h/ft 642 b/h/ft Throw ft 3.6-9.5-16.4 4.2-10.8-18.3 4.5-11.8-20 4.9-12.7-21.6 5.2-13.7-23.2 5.5-14.4-24.9 60 Source 5.48 ft 5.48 ft 5.48 ft 5.48 ft 5.48 ft 5.48 ft Total Dtu/h 450 btu/h 450 btu/h 450 btu/h 450 btu/h 4500 btu/h 4500 btu/h 4500 btu/h 5333 btu/h 400 btu/h 450 btu/h 45	288 cfm 1748 btu/h 5698 btu/h 97 cfm 730 b/h/ft	2300 btu/h 310 cfm 1879 btu/h 6053 btu/h 104 cfm 768 b/h/ft
Water ΔP 2.07 ft 2.67 ft 3.35 ft 3.97 ft 4.62 ft 5.48 ft Heating btu/h 1258 btu/h 1430 btu/h 1601 btu/h 1744 btu/h 1882 btu/h 2048 btu/h Total Air cfm 159 cfm 180 cfm 202 cfm 223 cfm 245 cfm 267 cfm Primary Air btu/h 962 btu/h 1093 btu/h 1224 btu/h 1355 btu/h 1486 btu/h 1617 btu/h Total btu/h 3244 btu/h 3687 btu/h 4129 btu/h 4520 btu/h 4900 btu/h 5333 btu/h Total btu/h 455 b/h/ft 504 b/h/ft 553 b/h/ft 594 b/h/ft 642 b/h/ft 682 b/h/ft Throw ft 3.6-9.5-16.4 4.2-10.8-18.3 4.5-11.8-20 4.9-12.7-21.6 5.2-13.7-23.2 5.5-14.4-24.9 68	288 cfm 1748 btu/h 5698 btu/h 97 cfm 730 b/h/ft 5.2-15.4-26.5 0.60 in/wg 63	2300 btu/h 310 cfm 1879 btu/h 6053 btu/h 104 cfm 768 b/h/ft 6.5-16.4-27.8 0.68 in/wg
Water ΔP 2.07 ft 2.67 ft 3.35 ft 3.97 ft 4.62 ft 5.48 ft Heating btu/h 1258 btu/h 1430 btu/h 1601 btu/h 1744 btu/h 1882 btu/h 2048 btu/h 2048 btu/h 2048 btu/h 202 cfm 223 cfm 245 cfm 267 cfm Primary Air btu/h 962 btu/h 1093 btu/h 1224 btu/h 1355 btu/h 1486 btu/h 1617 btu/h	288 cfm 1748 btu/h 5698 btu/h 97 cfm 730 b/h/ft 5.2-15.4-26.5 0.60 in/wg 63 5173 btu/h	2300 btu/h 310 cfm 1879 btu/h 6053 btu/h 104 cfm 768 b/h/ft 6.5-16.4-27.8 0.68 in/wg 65 5419 btu/h
Water ΔP 2.07 ft 2.67 ft 3.35 ft 3.97 ft 4.62 ft 5.48 ft Heating btu/h 1258 btu/h 1430 btu/h 1601 btu/h 1744 btu/h 1882 btu/h 2048 btu/h 2048 btu/h 2048 btu/h 202 cfm 223 cfm 245 cfm 267 cfm 267 cfm 267 cfm 267 cfm 267 cfm 267 cfm 270 cfm	288 cfm 1748 btu/h 5698 btu/h 97 cfm 730 b/h/ft 5.2-15.4-26.5 0.60 in/wg 63	2300 btu/h 310 cfm 1879 btu/h 6053 btu/h 104 cfm 768 b/h/ft 6.5-16.4-27.8 0.68 in/wg
Water ΔP 2.07 ft 2.67 ft 3.35 ft 3.97 ft 4.62 ft 5.48 ft Heating btu/h 1258 btu/h 1430 btu/h 1601 btu/h 1744 btu/h 1882 btu/h 2048 btu/h Total Air cfm 159 cfm 180 cfm 202 cfm 223 cfm 245 cfm 267 cfm Primary Air btu/h 962 btu/h 1093 btu/h 1224 btu/h 1355 btu/h 1486 btu/h 1617 btu/h Total btu/h 3244 btu/h 3687 btu/h 4129 btu/h 4520 btu/h 4900 btu/h 5333 btu/h Sp cfm 66 cfm 72 cfm 78 cfm 85 cfm 91 cfm btu/h/ft 455 b/h/ft 504 b/h/ft 553 b/h/ft 594 b/h/ft 642 b/h/ft 682 b/h/ft Throw ft 3.6-9.5-16.4 4.2-10.8-18.3 4.5-11.8-20 4.9-12.7-21.6 5.2-13.7-23.2 5.5-14.4-24.9 68 Static in/wg 0.22 in/wg 0.27 in/wg 0.33 in/wg 0.39 in/wg 0.46 in/wg 0.53 in/wg dB(A) 46 50 54 54 58 60 Water btu/h 3254 btu/h 3603 btu/h 3951 btu/h 4231 btu/h 4574 btu/h 4836 btu/h Water Flow 1.2 gpm 1.3 gpm 1.5 gpm 1.6 gpm 1.7 gpm 1.8 gpm Water ΔP 5.08 ft 6.23 ft 7.49 ft 8.59 ft 10.04 ft 11.23 ft	288 cfm 1748 btu/h 5698 btu/h 97 cfm 730 b/h/ft 6.2-15.4-26.5 0.60 in/wg 63 5173 btu/h 1.9 gpm	2300 btu/h 310 cfm 1879 btu/h 6053 btu/h 104 cfm 768 b/h/ft 6.5-16.4-27.8 0.68 in/wg 65 5419 btu/h 2.0 gpm
Water ΔP 2.07 ft 2.67 ft 3.35 ft 3.97 ft 4.62 ft 5.48 ft Heating btu/h 1258 btu/h 1430 btu/h 1601 btu/h 1744 btu/h 1882 btu/h 2048 btu/h Total Air cfm 159 cfm 180 cfm 202 cfm 223 cfm 245 cfm 267 cfm Primary Air btu/h 962 btu/h 1093 btu/h 1224 btu/h 1355 btu/h 1486 btu/h 1617 btu/h Total btu/h 3244 btu/h 3687 btu/h 4129 btu/h 4520 btu/h 4900 btu/h 5333 btu/h Total btu/h 455 b/h/ft 504 b/h/ft 553 b/h/ft 594 b/h/ft 642 b/h/ft 682 b/h/ft Throw ft 3.6-9.5-16.4 4.2-10.8-18.3 4.5-11.8-20 4.9-12.7-21.6 5.2-13.7-23.2 5.5-14.4-24.9 68(A) 46 50 54 54 58 60 Water btu/h 3254 btu/h 3603 btu/h 3951 btu/h 4231 btu/h 4574 btu/h 4836 btu/h 4836 btu/h Water Flow 1.2 gpm 1.3 gpm 1.5 gpm 1.6 gpm 1.7 gpm 1.8 gpm Water ΔP 5.08 ft 6.23 ft 7.49 ft 8.59 ft 10.04 ft 11.23 ft Heating btu/h 1793 btu/h 1985 btu/h 2178 btu/h 2332 btu/h 2521 btu/h 2665 btu/h	288 cfm 1748 btu/h 5698 btu/h 97 cfm 730 b/h/ft 5.2-15.4-26.5 0.60 in/wg 63 5173 btu/h 1.9 gpm 12.85 ft	2300 btu/h 310 cfm 1879 btu/h 6053 btu/h 104 cfm 768 b/h/ft 6.5-16.4-27.8 0.68 in/wg 65 5419 btu/h 2.0 gpm 14.10 ft
Water ΔP 2.07 ft 2.67 ft 3.35 ft 3.97 ft 4.62 ft 5.48 ft Heating btu/h 1258 btu/h 1430 btu/h 1601 btu/h 1744 btu/h 1882 btu/h 2048 btu/h Total Air cfm 159 cfm 180 cfm 202 cfm 223 cfm 245 cfm 267 cfm Primary Air btu/h 962 btu/h 1093 btu/h 1224 btu/h 1355 btu/h 1486 btu/h 1617 btu/h Total btu/h 3244 btu/h 3687 btu/h 4129 btu/h 4520 btu/h 4900 btu/h 5333 btu/h Total btu/h 455 b/h/ft 504 b/h/ft 553 b/h/ft 594 b/h/ft 642 b/h/ft 682 b/h/ft Throw ft 3.6-9.5-16.4 4.2-10.8-18.3 4.5-11.8-20 4.9-12.7-21.6 5.2-13.7-23.2 5.5-14.4-24.9 68(A) 46 50 54 54 58 60 Water btu/h 3254 btu/h 3603 btu/h 3951 btu/h 4231 btu/h 4574 btu/h 4836 btu/h 4836 btu/h Water Flow 1.2 gpm 1.3 gpm 1.5 gpm 1.6 gpm 1.7 gpm 1.8 gpm Water ΔP 5.08 ft 6.23 ft 7.49 ft 8.59 ft 10.04 ft 11.23 ft Heating btu/h 1793 btu/h 1985 btu/h 2178 btu/h 2332 btu/h 2521 btu/h 2665 btu/h Total Air cfm 188 cfm 219 cfm 252 cfm 286 cfm 322 cfm 358 cfm	288 cfm 1748 btu/h 5698 btu/h 97 cfm 730 b/h/ft 5.2-15.4-26.5 0.60 in/wg 63 5173 btu/h 1.9 gpm 12.85 ft 2851 btu/h	2300 btu/h 310 cfm 1879 btu/h 6053 btu/h 104 cfm 768 b/h/ft 6.5-16.4-27.8 0.68 in/wg 65 5419 btu/h 2.0 gpm 14.10 ft 2986 btu/h

Recommended maximum heating capacity for the above beams is equal to 50% of the indicated cooling potential.

The return air to the beam is taken as 1 °F above the average room for the values above.

Notations

b/h/ft Cooling capacity per linear foot of chilled beam
Throw ft Throw values are to 150 - 100 - and 50 fpm respectively.
Static in/wg Static pressure in beam plenum chamber in/wg

 $\begin{array}{ll} \text{dB(A)} & \text{Air regenerated sound power level} \\ \text{Water btu/h} & \text{Cooling output of coil btu/h} \\ \text{Water Flow} & \text{Water flow rate gpm} \\ \text{Water } \Delta P & \text{Coil pressure drop in/wg} \\ \end{array}$

Total Air cfm
Primary Air btu/h
Total btu/h
Total btu/h
Total cooling capacity of the primary air btu/h
Total cooling capacity of the chilled beam btu/h

Correct	ion Table
K	Water W
20	1.25
19	1.18
18	1.12
17	1.06
16	1.00
15	0.94
14	0.88
13	0.82
12	0.75

dB(A)	fpm
40	800
35	700
30	600
25	500
20	400

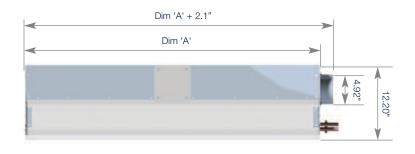
The sound power dB(A) levels are achieved by limiting the primary air spigot velocity as per the table above.

The thermal data is based on 16 K between mean water and return air to the beam.

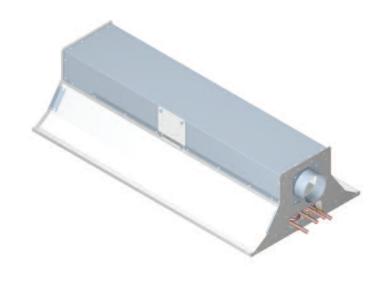
Active Chilled Beams - Dimensional Data

Active Chilled Beams

Nominal Size	Dim A	Wet Weight (lb)
4	47 ³ / ₄ "	71
6	713/4"	97
8	95³/4"	126
10	1193/4"	152







Active Chilled Beams - Specification

Frame & Casing

The frame is manufactured from 16 swg thick galvanised mild steel and suitable for most ceiling types. The plenum section is fitted to the top of the unit manufactured from 20 swg galvanised mild steel with a spigot connection mounted on the side or the end.

Fixed hanger supports brackets are mounted on the top of the unit as standard. Adjustable sliding brackets are available as an option.

The unit is supplied with a powder coated finish RAL 9010 Semi Gloss as standard other colours are available as an option.

Access Panel

Access panel is manufactured from 20 swg thick galvanised mild steel.

The free area of the perforated sections are 50% & the whole size of the perforations is approx. 0.19".

The access panel has safety wires that are attached to the main body of the unit. These are designed to stop the panel falling & can also be used to suspend the panel for access to the coil for maintenance.

Coil

Manufactured from copper tubes with mechanically bonded aluminium fins. Available in both 2 pipe, cooling only & 4 pipe, heating & cooling. The coil is supported at either end of the unit, on longer units the coil is also supported in the middle. Coils are supplied as standard with vent & drain points.

Controls

Controls, including water valves can be factory fitted as required on individual projects. Free issue components can be fitted and/or full control packages can be supplied.

Other products from Advanced Air

Air Distribution Equipment

- Grilles and diffusers including louvre face diffusers
- Linear slot diffusers
- Linear bar grilles
- Eggcrate grilles and door transfer grilles
- A variety of finishes, powder coated to RAL9010 as standard, with other colours available
- Floor swirl diffusers which supply a low velocity, helical discharge air pattern
- "Twister" ceiling swirl diffuser
- External weather louvers suitable for most wall configurations

Air Control Products

- Low leakage fire smoke dampers, tested to BS ISO 10294
- Smoke and high temperature smoke dampers, which can be used up to 300°C for 120 minutes
- Curtain fire dampers provide a wide range of models suitable for most applications
- Control dampers from value solutions to a low leakage, low pressure drop, airfoil blade type

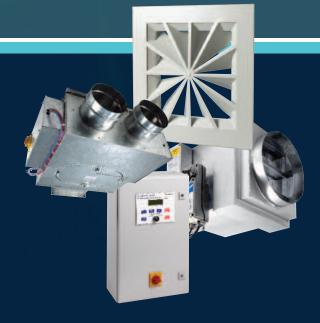
VAV Terminal Units

- Single duct and dual duct units for different types of variable air volume systems
- Fan Powered VAV units that use advance Brushless DC motors to give lower energy consumption and simpler commissioning

Control Panels

- Fire smoke damper control panels are available to provide solutions to suit all requirements
- Bespoke units, which can be manufactured to suit specific customer requirements

For more information on these products, please contact Advanced Air Sales



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