

AIRFIT H Horizontal
Active Chilled Beams



Introduction

The Barcol-Air AIRFIT H chilled beam system is designed specifically for the air-conditioning of hotel rooms, hospital rooms and individual offices. The system provides cooling, heating, ventilation and humidity control with minimal noise and with almost no maintenance required.

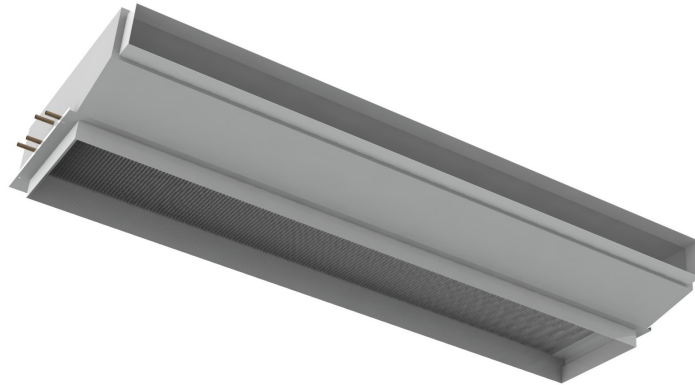


Figure 1: AIRFIT H Active Chilled Beam

System Concept

The principle of the chilled beam system is to use terminal chilled water heat exchangers in the ceiling to handle the room sensible loads and primary air to take care of the ventilation and humidity control requirements of the conditioned space as well as to create the induction of room air through the chilled water heat exchanger.

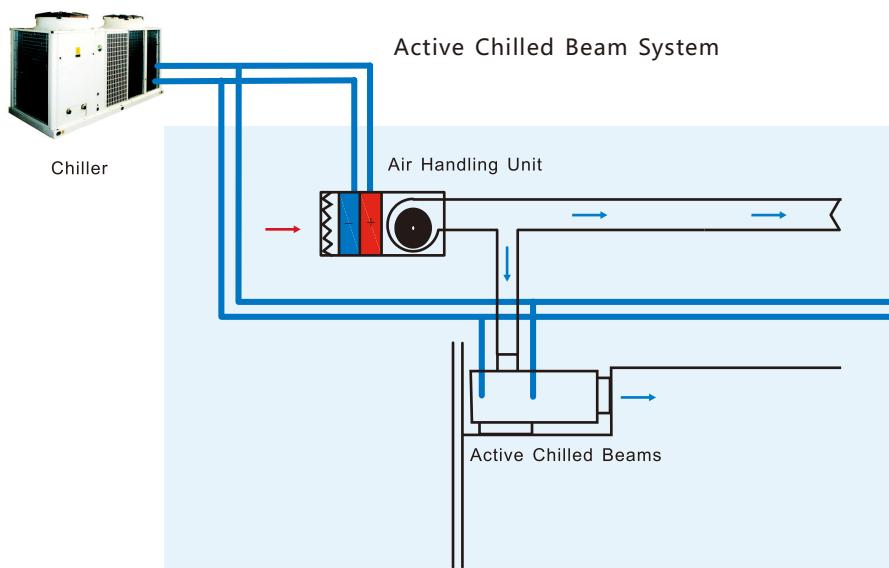


Figure 2: AIRFIT H Active Chilled Beam System

This arrangement has several significant advantages. Firstly because air is only needed for ventilation and humidity control the amount of air used by the system can be greatly reduced resulting in large reductions in the amount of energy used to circulate air around the building. Also as the water heat exchanger only handles sensible cooling it can operate dry with higher water temperatures than other systems such as fan coil systems. This means there is no need for condensate drainage systems in the ceiling with all the maintenance and hygiene issues that they bring. Also using higher water temperatures for cooling brings opportunities for further energy savings if dedicated water chillers are used for the high temperature water circuit. Also with the elimination of local fans and motors the system is very quiet and maintenance is reduced.

These advantages make the system highly suitable for the air conditioning of hotel rooms, hospital rooms and individual offices.

System Technology

Barcol-Air AIRFIT H active chilled beams integrate the primary air distribution function with the secondary air heat exchange using a proprietary air nozzle technology to induce secondary room air into the unit and through the heat exchanger before mixing with the primary air. The resulting mixture of primary air and induced room air is then supplied to the room through horizontal discharge grilles just below the ceiling to maximize the air throw across the room using the Coanda effect.

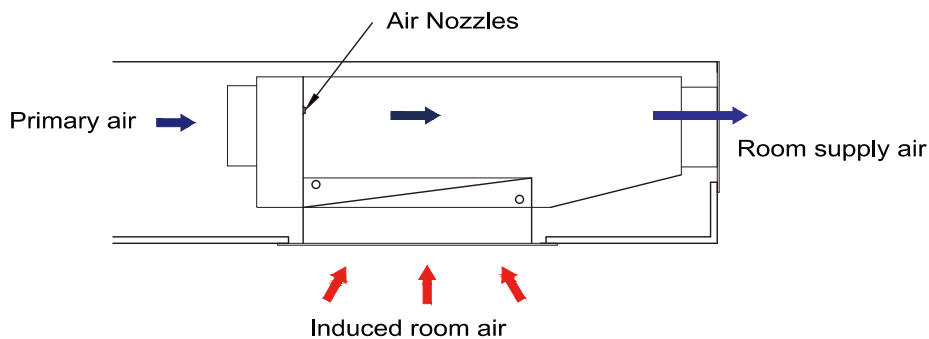


Figure 3: Operating Principle of the AIRFIT H Active Chilled Beam

Application

The AIRFIT H series is configured to match the air distribution requirements for hotel rooms, individual hospital rooms and offices

Its compact size is designed for installation in the ceiling above the entrance to the room with a horizontal air discharge to maximize the air throw across the room using the Coanda effect to attach the air to the ceiling.

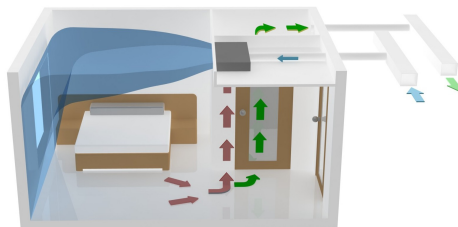


Figure 4: AIRFIT H – Air Distribution

Product Features

Configuration Choices

Barcol-Air AIRFIT H active chilled beams are configured for horizontal air discharge with 2 pipe water heat exchangers for cooling or heating or 4 pipe heat exchangers for independent cooling and heating water circuits.

Simple Mounting

The units are designed to be suspended from the ceiling slab and enclosed in a builder's work decorated dropped bulkhead and connected to optional supply air diffuser and a return air diffuser.

Different Capacities

The active chilled beams are available in different widths from 1200mm to 3,000mm to suit various applications with different capacities.

Nozzle Technology

The active chilled beams are supplied with proprietary design air nozzles available in eight different nozzle sizes to match the required airflows and the required air distribution pattern.

Ultra Quiet Operation

The air movement through the unit and into the room is created by the induction of room air into the unit due to low air pressures created around the air nozzles. Therefore no electric fans are required to push the air into the room resulting in very low noise operation.

Hygienic Operation

The cooling coil in the unit operates dry with supply and return water temperatures of about 15C to 17C. Therefore there is no need for condensate drain pans or condensate drainage pipe work. This eliminates the health risks due to algae growth in drain pans or the smells and problems which can arise from wet drain pans and drain pipes.

Ventilation Humidity and Air Quality Control.

Ventilation, humidity and air quality control is provided by the primary air which is ducted to the active chilled beams from a central air handling unit (AHU). The AHU ensures that the incoming air is dehumidified to control the room humidity for comfort conditions and to eliminate the possibility of any condensation on the cooling coils. The AHU also includes high efficiency air filters to control the room air quality and this eliminates the need for additional air filters in the rooms.

Low Maintenance

With the elimination of air fans and motors, air filters and condensate pans or drains there is almost no maintenance required for the chilled beams. Only the coil requires vacuum cleaning occasionally – typically once per year, to remove any dust.

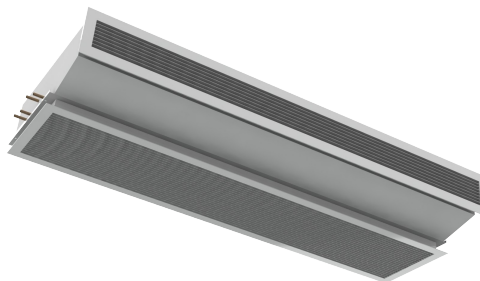


Figure 4: AIRFIT H – Air Distribution

Dimensions

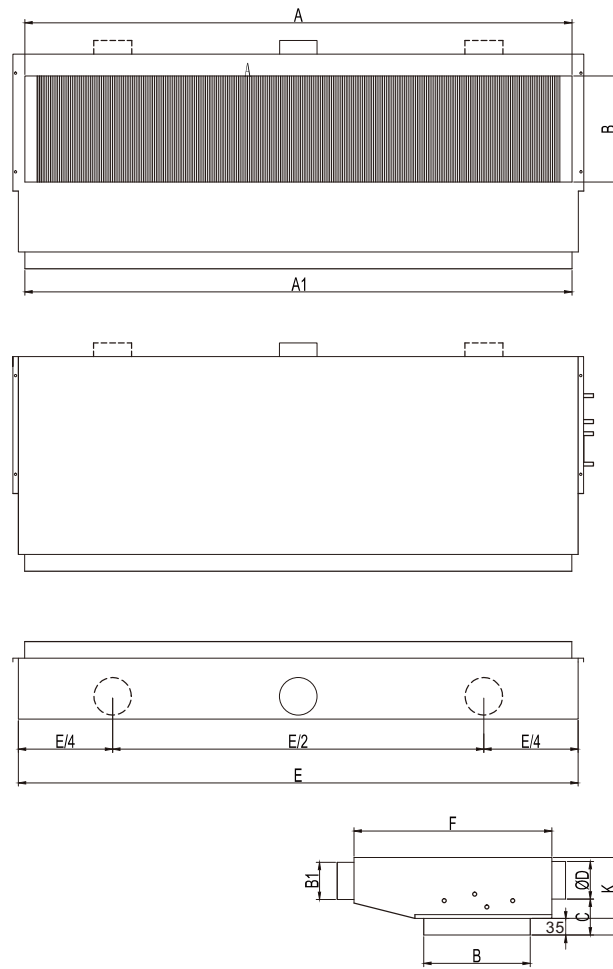


Table1: Dimensional data

AIRFIT H Dimensions (mm)						
Model	900	1200	1500	1800	2400	3000
A	898	1198	1498	1798	2398	2998
B	318	318	318	318	318	318
A1	898	1198	1498	1798	2398	2998
B1	122	122	122	122	122	122
C	83	83	83	83	83	83
D	1x Φ 123	1x Φ 123	1x Φ 123	1x Φ 123	2x Φ 123	2x Φ 123
E	940	1240	1540	1840	2240	3040
F	604	604	604	604	604	604
K	185	185	185	185	185	185
Operating weight (kg)	22	25	30	34	44	54

Performance Data AIRFIT-H

Model	Nozzle	Primary Airflow	Plenum Pressure	Sound Pressure Level	Sound Pressure Level	Air Cooling Capacity $\Delta T = 10$	Water Flow	Water ΔP	Water Cooling Capacity	Water ΔT	Water Flow	Water ΔP	Water Cooling Capacity	Water ΔT	Water Flow	Water ΔP	Water Cooling Capacity	Water ΔT		
		m ³ /h	Pa	dBA	NC	W	m ³ /h	Kpa	W	degC	m ³ /h	Kpa	W	degC	m ³ /h	Kpa	W	degC		
900	C1	25	46	≤15	≤15	84	0.144	3.6	261	1.6	0.216	7.6	280	1.1	0.288	13.0	294	0.9		
		30	66	≤15	≤15	101	0.144	3.6	331	2.0	0.216	7.6	358	1.4	0.288	13.0	376	1.1		
		35	90	18	≤15	118	0.144	3.6	400	2.4	0.216	7.6	435	1.7	0.288	13.0	457	1.4		
	D1	40	118	20	17	135	0.144	3.6	449	2.7	0.216	7.6	490	2.0	0.288	13.0	519	1.5		
		45	156	24	21	155	0.144	3.6	515	3.1	0.216	7.6	564	2.2	0.288	13.0	598	1.8		
		46	48	≤15	≤15	155	0.144	3.6	409	2.4	0.216	7.6	445	1.8	0.288	13.0	468	1.4		
		54	66	17	≤15	182	0.144	3.6	462	2.8	0.216	7.6	505	2.0	0.288	13.0	533	1.6		
		66	98	20	17	222	0.144	3.6	523	3.1	0.216	7.6	575	2.3	0.288	13.0	607	1.8		
		76	130	24	21	256	0.144	3.6	569	3.4	0.216	7.6	628	2.5	0.288	13.0	668	2.0		
		85	163	28	24	286	0.144	3.6	615	3.7	0.216	7.6	679	2.7	0.288	13.0	721	2.2		
		D2	85	41	≤15	≤15	286	0.144	3.6	400	2.4	0.216	7.6	435	1.7	0.288	13.0	458	1.4	
			102	59	19	16	344	0.144	3.6	465	2.8	0.216	7.6	509	2.0	0.288	13.0	537	1.6	
			120	81	23	20	404	0.144	3.6	518	3.1	0.216	7.6	569	2.3	0.288	13.0	601	1.8	
			148	124	29	26	499	0.144	3.6	590	3.5	0.216	7.6	652	2.6	0.288	13.0	696	2.1	
			170	163	33	29	573	0.144	3.6	646	3.9	0.216	7.6	715	2.8	0.288	13.0	759	2.3	
			1200	C1	35	48	≤15	≤15	118	0.144	4.2	349	2.1	0.216	9.0	378	1.5	0.288	15.2	397
		45			79	≤15	≤15	152	0.144	4.2	473	2.8	0.216	9.0	517	2.1	0.288	15.2	546	1.6
		54			114	20	17	182	0.144	4.2	565	3.4	0.216	9.0	624	2.5	0.288	15.2	661	2.0
D1	58	131		23	20	195	0.144	4.2	600	3.6	0.216	9.0	665	2.6	0.288	15.2	706	2.1		
	62	150		25	21	209	0.144	4.2	646	3.9	0.216	9.0	718	2.9	0.288	15.2	765	2.3		
	62	46		≤15	≤15	209	0.144	4.2	511	3.1	0.216	9.0	562	2.2	0.288	15.2	594	1.8		
	72	62		17	≤15	243	0.144	4.2	573	3.4	0.216	9.0	634	2.5	0.288	15.2	670	2.0		
	84	84		20	17	283	0.144	4.2	634	3.8	0.216	9.0	704	2.8	0.288	15.2	747	2.2		
	102	124		25	21	344	0.144	4.2	707	4.2	0.216	9.0	791	3.1	0.288	15.2	846	2.5		
	118	166		30	27	398	0.144	4.2	775	4.6	0.216	9.0	869	3.5	0.288	15.2	928	2.8		
	D2	118		42	17	≤15	398	0.144	4.2	513	3.1	0.216	9.0	563	2.2	0.288	15.2	596	1.8	
		130		50	20	17	438	0.144	4.2	550	3.3	0.216	9.0	606	2.4	0.288	15.2	641	1.9	
		166		82	28	24	559	0.144	4.2	653	3.9	0.216	9.0	727	2.9	0.288	15.2	770	2.3	
		202		122	34	30	681	0.144	4.2	733	4.4	0.216	9.0	822	3.3	0.288	15.2	876	2.6	
		225		151	37	33	758	0.144	4.2	786	4.7	0.216	9.0	884	3.5	0.288	15.2	948	2.8	
		1500		C1	45	49	≤15	≤15	152	0.144	4.8	433	2.6	0.216	10.2	468	1.9	0.288	17.4	496
	50				60	≤15	≤15	168	0.144	4.8	495	3.0	0.216	10.2	543	2.2	0.288	17.4	574	1.7
	60				87	18	≤15	202	0.144	4.8	608	3.6	0.216	10.2	675	2.7	0.288	17.4	715	2.1
D1	70		118	22	19	236	0.144	4.8	692	4.1	0.216	10.2	766	3.0	0.288	17.4	825	2.5		
	80		154	27	23	270	0.144	4.8	779	4.7	0.216	10.2	872	3.5	0.288	17.4	938	2.8		
	80		47	≤15	≤15	270	0.144	4.8	624	3.7	0.216	10.2	694	2.8	0.288	17.4	735	2.2		
	95		67	18	≤15	320	0.144	4.8	705	4.2	0.216	10.2	788	3.1	0.288	17.4	838	2.5		
	110		89	23	19	371	0.144	4.8	766	4.6	0.216	10.2	861	3.4	0.288	17.4	917	2.7		
	125		115	27	23	421	0.144	4.8	824	4.9	0.216	10.2	931	3.7	0.288	17.4	995	3.0		
	145		155	31	27	489	0.144	4.8	901	5.4	0.216	10.2	1022	4.1	0.288	17.4	1095	3.3		
	D2		145	39	22	19	489	0.144	4.8	593	3.5	0.216	10.2	658	2.6	0.288	17.4	696	2.1	
			180	59	28	24	607	0.144	4.8	692	4.1	0.216	10.2	773	3.1	0.288	17.4	821	2.5	
			220	89	34	30	741	0.144	4.8	788	4.7	0.216	10.2	889	3.5	0.288	17.4	946	2.8	
			260	124	39	35	876	0.144	4.8	864	5.2	0.216	10.2	982	3.9	0.288	17.4	1046	3.1	
			300	165	43	39	1011	0.144	4.8	945	5.6	0.216	10.2	1078	4.3	0.288	17.4	1152	3.4	

Performance table notes:

1) Air cooling capacities are based on Troom minus Tprimary air = 10 degC. For other conditions multiply the table air cooling capacity by the required (Troom minus Tprimary air) divided by 10. Alternatively the air cooling capacity can be calculated from the formula: Air cooling capacity W =

$$1.213 \cdot (\text{airFLOW}(\text{m}^3/\text{h})/3.6) \cdot (\text{Troom} - \text{Tprimary air})$$

2) Water cooling capacities are based on Troom minus Tentering water temperature = 10degC. For other conditions multiply the table water cooling capacity by the required (Troom minus Tentering water) divided by 10.

Guide Specifications

Barcol-Air AIRFIT H Horizontal series active chilled beams shall be used to compensate for the external and internal heat loads of the building and shall maintain the thermal comfort in the room within the specified comfort and noise criteria.

Functional description

- Primary air will be supplied by the fresh air handling unit to the chilled beam air plenum box. The primary air shall then pass through the induction nozzles into the mixing section to mix with the induced room air before being distributed into the room horizontally from an optional air diffuser.
- Induction nozzles shall induce air from the room through the inlet air diffuser and then through the fin and tube cooling/heating heat exchanger before mixing with the primary air and being supplied to the room. The size and quantity of induction nozzles shall be factory installed to provide the required unit capacity with the specified primary airflow, air inlet pressure and noise level.
- Heat exchangers shall be 2-pipe type for cooling only or cooling/heating changeover systems or 4 pipe type for systems with separate cooling and heating circuits.
- The units shall be configured to discharge the supply air horizontally across the ceiling through an optional linear air diffuser using the Coanda effect to increase the air throw of the units and to ensure the air mixing with the room air above the occupied zone. The optional inlet air grille for the room air shall be a linear bar type and shall be easily removable to provide access to the active chilled beam.

Construction of the chilled beam:

- The primary air plenum box shall be manufactured from galvanized sheet steel and shall have one or more circular air spigot connectors to ensure the inlet air velocity does not exceed 2 m/s. The plenum should be internally insulated to prevent condensation if the primary supply air temperature is less than the surrounding air dew point temperature.
- The nozzle plate and chilled beam body shall be manufactured from galvanized steel with a minimum thickness of 0.8mm.
- The heat exchangers shall be made from seamless copper tubes with aluminum fins and shall have 12 or 15 mm diameter water connections depending on unit's size and connections. The heat exchangers shall be suitable to operate at 15 bar working pressure and shall be factory pressure tested at 20 bar pressure.
- The supply air diffuser and room air inlet diffuser shall be manufactured from galvanized steel with a minimum thickness of 1.0 mm and shall be finished with polyester powder paint to RAL9010 with 20% gloss or with an alternative finish to be specified.

Dimensions

The active chilled beam height shall be no more than 258 mm and the lengths shall be between 1200mm and 3000mm as indicated in the project schedules. The depth of the chilled beams shall a maximum of 650mm.

Installation

The chilled beam shall have 7 mm diameter mounting holes for suspension by 6mm diameter threaded rod or suspension wires.

