

INTRODUCTION

The active linear chilled beam features flexible one-way or two-way air distribution patterns and an optimized nozzle design that delivers high cooling capacity with low noise levels, while its sleek linear form complements modern commercial architectural styling. Designed to integrate seamlessly into standard 24" ceiling systems, it incorporates optimized diffuser geometry to enhance air distribution and maximize occupant comfort.

MODEL

BAL-24 - 24" Wide Active Linear Chilled Beam

FEATURES

- 1-way or 2-way air distribution pattern
- 24" width
- 2' to 10' lengths, 1' increments
- Perforated induced air grille
- Left hand or right hand coil connections
- Side, top, or multi (both) air inlet locations
- 2-pipe and 4-pipe coil configurations
- Field-reversible coil
- Configured nozzle geometry for capacity optimization
- Hinged induced air grille for room-side coil access
- Commissioning port with room-side access for balancing
- Mounting brackets with slotted holes
- Durable powder coat finish
- 1/2" Sweat water coil connections
- Coil air vent
- Coil drain valve

OPTIONS

- Internal closed cell foam insulation
- 1/2" or 3/4" MPT water coil connections
- 12", 18", or 24" stainless steel braided hoses
- Lay-in and narrow tee frame styles
- Coil lint screen
- Constant volume regulator

FINISHES

- Standard Finish - #WHT British White
- Optional Finish - #BLK Black

ADVANTAGES

- Removal of high thermal loads is possible in this air/water system
- The size of the air duct system is reduced to a minimum, due to the low supply of primary air
- Substantial reduction in the operating costs, due to low primary air volume
- Improvement of the thermal comfort inside the room
- Suitable for several standard ceiling grids
- Contributing sound levels below NC-30



APPLICATION

Krueger active chilled beams feature the aerodynamic properties of Krueger ceiling diffusers and benefit from the use of using hydronic coils and induced air to reduce energy consumption associated with removal of sensible thermal loads. The primary air is supplied to the chilled beam subsequent to it being discharged through a series of nozzles located along the length of the beam. The nozzles inject the primary air into the mixing chamber at velocities capable of inducing room air through its coil and mixes with the primary supply air. This mixture of air is then discharged into the space through the ceiling slot diffusers. This provides high cooling outputs with low amounts of primary air. The reduced volume of air results in the reduction of the air handler capacity and size, smaller duct sizes, and the overall energy consumption.

Primary air from the air handling unit is tempered and dehumidified to handle the latent load. The remaining loads in the space are addressed with the heat exchanger which is incorporated into the chilled beam. Applications with low latent cooling loads could use 100% outdoor air allowing for use of a dedicated outdoor air system with energy recovery further reducing total system energy consumption.

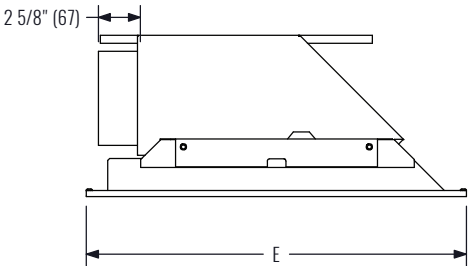
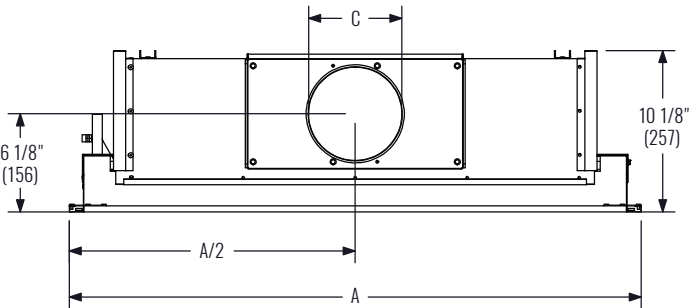
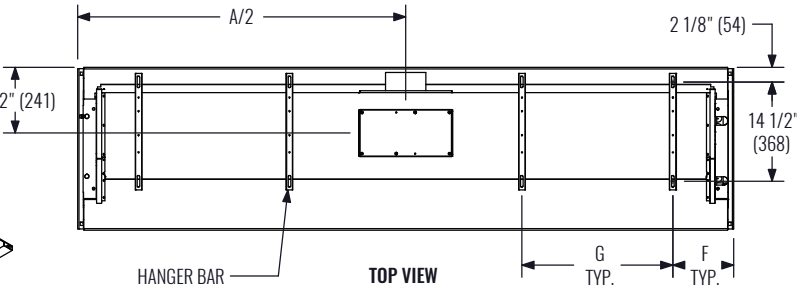
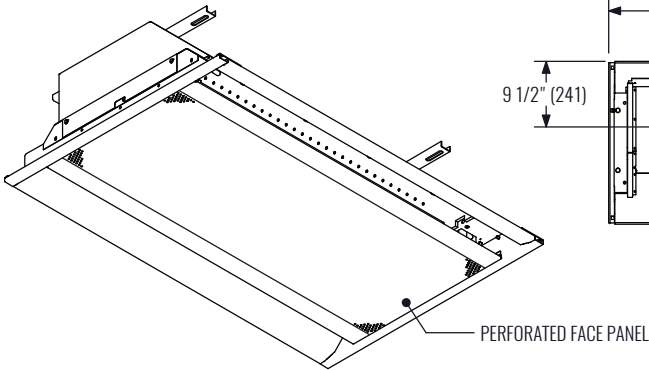
BAL-24s are offered for both cooling and heating, with a 24" width and lengths from 2' to 10'. They can be easily integrated into different grid styles within a suspended ceiling or even in drywall ceilings. The low overall height of the BAL-24 product line is ideal for reducing the space required for false ceiling in any application.

BAL-24

Linear Active Chilled Beam



DIMENSIONAL DATA

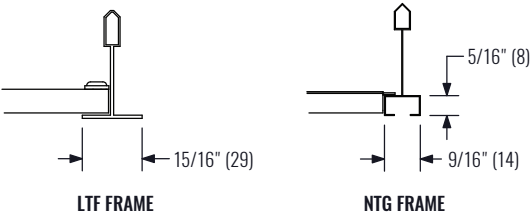


NOMINAL INLET	C
4" ROUND	3 7/8" (98)
5" ROUND	4 7/8" (124)
6" ROUND	5 7/8" (149)
8" OVAL	5 1/4" x 9 3/8" (133 x 238)
10" OVAL	5 1/4" x 12 1/2" (133 x 318)

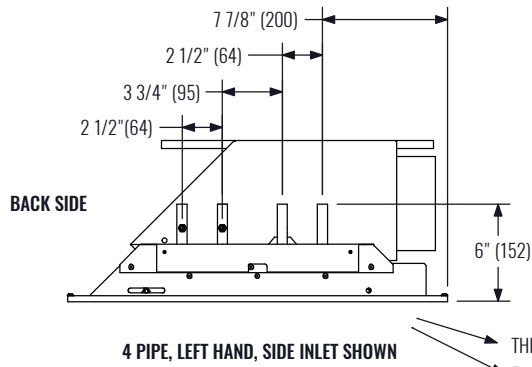
NOMINAL WIDTH	E
LTF	23 3/4" (603)
NTG	23 3/8" (594)

NOMINAL LENGTH	FRAME STYLE		F	G
	LTF A	NTG A		
2 ft	23 3/4" (603)	23 3/8" (594)	4 1/2" (114)	---
3 ft	35 3/4" (908)	35 3/8" (899)	4 7/8" (124)	
4 ft	47 3/4" (1213)	47 3/8" (1203)	6 7/8" (175)	
5 ft	59 3/4" (1518)	59 3/8" (1508)	8 7/8" (225)	
6 ft	71 3/4" (1822)	71 3/8" (1813)	8 7/8" (225)	
7 ft	83 3/4" (2127)	83 3/8" (2118)	8 7/8" (225)	22" (559)
8 ft	95 3/4" (2432)	95 3/8" (2422)	8 7/8" (225)	
9 ft	107 3/4" (2737)	107 3/8" (2727)	8 7/8" (225)	
10 ft	119 3/4" (3041)	119 3/8" (3032)	8 7/8" (225)	

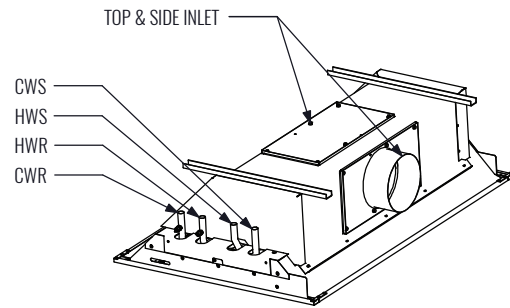
NOTE: Dimensions in parentheses are in millimeters.



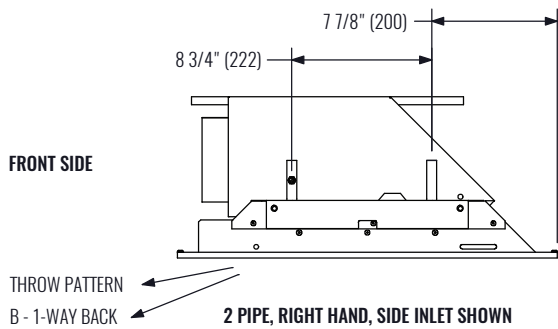
PIPING & HANDING



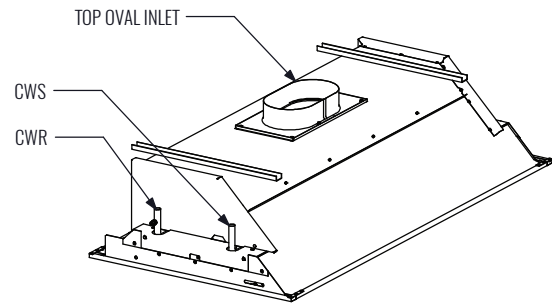
THROW PATTERN
F - 1-WAY FRONT



4 PIPE, LEFT HAND, TOP & SIDE INLET SHOWN



THROW PATTERN
B - 1-WAY BACK

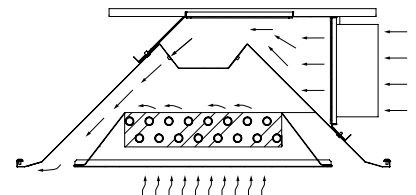
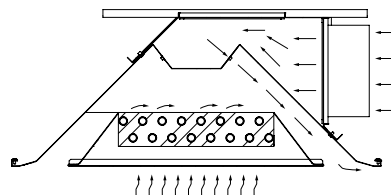
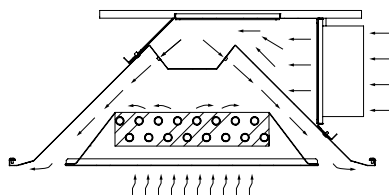


2 PIPE, RIGHT HAND, TOP INLET SHOWN

NOTE: Dimensions in parentheses are in millimeters.

CWS - Cold Water Supply
CWR - Cold Water Return
HWS - Hot Water Supply
HWR - Hot Water Return

THROW PATTERNS



BAL-24

Linear Active Chilled Beam



PERFORMANCE DATA | 4 - PIPE COOLING

NOMINAL LENGTH ft	NOZZLE SIZE	PRIMARY AIR			SOUND	COIL SENSIBLE COOLING (Btu/h)								INDUCTION RATIO	THROW	
		INLET DIA.	FLOW RATE	INLET ΔPs		1.0 GPM		1.5 GPM		2.0 GPM		2.5 GPM				
		in	CFM	(in H ₂ O)		NC	TOTAL	ΔP COIL	TOTAL	ΔP COIL	TOTAL	ΔP COIL	TOTAL			ΔP COIL
4	M13	4	15	0.20	15	1357	2.90	6.40	1412	6.40	1455	1.50	1471	2.30	6.1	0 - 1 - 4
			20	0.35	17	1745			1830		1897		1925			1 - 2 - 7
			25	0.55	20	2035			2143		2208		2248			1 - 3 - 10
	M17	4	20	0.18	16	1419			1484		1537		1556		4.8	1 - 1 - 5
			30	0.40	21	1929			2029		2093		2129			1 - 3 - 10
			40	0.71	25	2460			2608		2725		2785			2 - 5 - 14
	M23	5	40	0.21	20	1703			1799		1850		1885		3.9	2 - 4 - 12
			60	0.48	26	2518			2693		2834		2910			4 - 8 - 18
			75	0.75	29	3069			3317		3459		3570			7 - 12 - 21
	M31	6	70	0.18	20	1923			2035		2109		2153		2.6	2 - 6 - 14
			105	0.41	25	2847			3061		3206		3299			6 - 11 - 20
			140	0.74	31	3528			3831		3987		4131			10 - 14 - 23
6	M13	4	20	0.15	15	1926	4.10	9.30	2044	2.10	2051	3.30	2080	6.1	0 - 1 - 4	
			30	0.34	18	2457			2609		2693		2748		1 - 2 - 9	
			40	0.61	22	3073			3316		3406		3495		2 - 4 - 13	
	M17	5	30	0.17	17	2051			2171		2227		2265		4.8	1 - 2 - 6
			45	0.39	23	2783			2986		3059		3132			2 - 3 - 12
			60	0.69	26	3632			3939		4094		4221			3 - 6 - 17
	M23	6	60	0.21	22	2469			2666		2740		2813		3.9	2 - 5 - 14
			90	0.48	27	3779			4109		4334		4497			5 - 10 - 21
			110	0.71	30	4223			4602		4895		5108			8 - 13 - 24
	M31	8 *	105	0.19	21	2783			3016		3113		3203		2.6	3 - 7 - 18
			160	0.43	27	4161			4525		4794		4988			7 - 13 - 25
			210	0.74	31	4744			5338		5676		5958			12 - 18 - 29
8	M13	4	25	0.14	15	2543	5.40	1.60	2729	2.80	2799	4.30	2847	6.1	0 - 1 - 4	
			40	0.36	20	3432			3694		3836		3937		1 - 2 - 10	
			55	0.67	25	4022			4395		4582		4741		2 - 5 - 16	
	M17	5	40	0.18	19	3003			3228		3333		3406		4.8	1 - 2 - 7
			60	0.40	24	3671			3974		4151		4281			2 - 4 - 14
			80	0.70	28	4632			5098		5358		5571			3 - 7 - 19
	M23	8 *	80	0.22	24	3097			3380		3526		3646		3.9	2 - 5 - 16
			120	0.49	29	4614			5128		5485		5746			5 - 12 - 25
			140	0.67	31	4976			5648		6092		6417			8 - 15 - 28
	M31	10 *	145	0.20	24	3563			3916		4098		4253		2.6	4 - 8 - 21
			215	0.45	29	5061			5711		6145		6462			8 - 16 - 29
			260	0.66	34	5612			6429		6964		7379			14 - 20 - 32
10	M13	5	35	0.17	16	3394	6.70	1.90	3697	3.40	3823	5.30	3913	6.1	1 - 1 - 5	
			50	0.35	21	4133			4533		4746		4897		1 - 3 - 12	
			70	0.69	25	4804			5379		5670		5911		2 - 5 - 18	
	M17	6	55	0.22	21	3807			4155		4333		4458		4.8	1 - 2 - 9
			80	0.46	26	4384			4895		5163		5370			2 - 5 - 17
			100	0.71	29	5335			6009		6389		6696			4 - 9 - 22
	M23	8 *	100	0.23	25	3569			3991		4208		4382		3.9	3 - 6 - 18
			150	0.51	31	5289			6028		6538		6912			6 - 13 - 28
			180	0.73	33	5708			6694		7344		7825			9 - 17 - 32
	M31	10 *	180	0.22	26	4082			4585		4847		5068		2.6	4 - 9 - 23
			240	0.39	31	5483			6249		6778		7165			7 - 15 - 30
			300	0.61	40	6000			7103		7812		8339			11 - 19 - 34

NOTES: Reference page C3-10 for operational conditions used for performance notes.

PERFORMANCE DATA | 4 - PIPE HEATING

NOMINAL LENGTH ft	NOZZLE SIZE	PRIMARY AIR			SOUND	COIL HEATING (Btu/h)								INDUCTION RATIO	THROW
		INLET DIA.	FLOW RATE	INLET ΔPs		0.5 GPM		1.0 GPM		1.5 GPM		2.0 GPM			
		in	CFM	(in H ₂ O)		TOTAL	ΔP COIL	TOTAL	ΔP COIL	TOTAL	ΔP COIL	TOTAL	ΔP COIL		
4	M13	4	15	0.2	15	2108	0.20	2485	0.60	2586	1.40	2664	2.50	6.1	0 - 1 - 4
			20	0.35	17	2663		3196		3350		3473			1 - 2 - 7
			25	0.55	20	3061		3725		3923		4043			1 - 3 - 10
	M17	4	20	0.18	16	2193		2598		2716		2814		4.8	1 - 1 - 5
			30	0.4	21	2906		3531		3715		3831			1 - 3 - 10
			40	0.71	25	3549		4503		4776		4999			2 - 5 - 14
	M23	5	40	0.21	20	2548		3118		3295		3387		3.9	2 - 4 - 12
			60	0.48	26	3592		4611		4930		5188			4 - 8 - 18
			75	0.75	29	4500		5618		6073		6334			7 - 12 - 21
	M31	6	70	0.18	20	2826		3520		3727		3862		2.6	2 - 6 - 14
			105	0.41	25	4136		5212		5605		5870			6 - 11 - 20
			140	0.74	31	5007		6459		7015		7300			10 - 14 - 23
6	M13	4	20	0.15	15	2905	0.20	3526	0.90	3743	2.10	3755	3.70	6.1	0 - 1 - 4
			30	0.34	18	3585		4500		4778		4931			1 - 2 - 9
			40	0.61	22	4400		5627		6071		6236			2 - 4 - 13
	M17	5	30	0.17	17	3036		3756		3974		4078		4.8	1 - 2 - 6
			45	0.39	23	4020		5095		5467		5601			2 - 3 - 12
			60	0.69	26	5123		6649		7212		7496			3 - 6 - 17
	M23	6	60	0.21	22	3529		4520		4882		5017		3.9	2 - 5 - 14
			90	0.48	27	5241		6920		7523		7936			5 - 10 - 21
			110	0.71	30	5744		7733		8427		8962			8 - 13 - 24
	M31	8 *	105	0.19	21	3948		5095		5521		5701		2.6	3 - 7 - 18
			160	0.43	27	5703		7618		8266		8778			7 - 13 - 25
			210	0.74	31	6552		8686		9774		10393			12 - 18 - 29
8	M13	4	25	0.14	15	3811	0.30	4656	1.20	4997	2.70	5125	4.80	6.1	0 - 1 - 4
			40	0.36	20	4870		6283		6764		7025			1 - 2 - 10
			55	0.67	25	5514		7365		8047		8390			2 - 5 - 16
	M17	5	40	0.18	19	4377		5499		5910		6102		4.8	1 - 2 - 7
			60	0.4	24	5044		6722		7277		7600			2 - 4 - 14
			80	0.7	28	6339		8481		9333		9811			3 - 7 - 19
	M23	8 *	80	0.22	24	4247		5671		6190		6455		3.9	2 - 5 - 16
			120	0.49	29	6267		8448		9390		10043			5 - 12 - 25
			140	0.67	31	6659		9111		10341		11154			8 - 15 - 28
	M31	10 *	145	0.2	24	4878		6524		7170		7503		2.6	4 - 8 - 21
			215	0.45	29	6798		9266		10456		11252			8 - 16 - 29
			260	0.66	34	7350		10275		11772		12752			14 - 20 - 32
10	M13	5	35	0.17	16	4882	0.40	6215	1.50	6769	3.40	7000	6.00	6.1	1 - 1 - 5
			50	0.35	21	5707		7567		8299		8689			1 - 3 - 12
			70	0.69	25	6350		8797		9848		10381			2 - 5 - 18
	M17	6	55	0.22	21	5289		6971		7607		7933		4.8	1 - 2 - 9
			80	0.46	26	5928		8027		8963		9453			2 - 5 - 17
			100	0.71	29	6852		9769		11003		11699			4 - 9 - 22
	M23	8 *	100	0.23	25	4764		6534		7307		7705		3.9	3 - 6 - 18
			150	0.51	31	6618		9685		11037		11971			6 - 13 - 28
			180	0.73	33	7158		10452		12257		13446			10 - 17 - 32
	M31	10 *	180	0.22	26	5285		7475		8395		8874		2.6	4 - 9 - 23
			240	0.39	31	6861		10040		11443		12410			7 - 15 - 30
			300	0.61	40	7552		11039		13005		14304			11 - 19 - 34

NOTES: Reference page C3-10 for operational conditions used for performance notes.

BAL-24

Linear Active Chilled Beam



PERFORMANCE DATA | 2 - PIPE COOLING

NOMINAL LENGTH ft	NOZZLE SIZE	PRIMARY AIR			SOUND	COIL SENSIBLE COOLING (Btu/h)								INDUCTION RATIO	THROW	
		INLET DIA.	FLOW RATE	INLET ΔPs		1.0 GPM		1.5 GPM		2.0 GPM		2.5 GPM				
						in	CFM	(in H ₂ O)	NC	TOTAL	ΔP COIL	TOTAL	ΔP COIL			TOTAL
4	M13	4	15	0.20	15	1447	3.80	8.60	1506	8.60	1552	1.90	1569	3.00	6.1	0 - 1 - 4
			20	0.35	17	1862			1952		2023		2053			1 - 2 - 7
			25	0.55	20	2170			2286		2355		2398			1 - 3 - 10
	M17	4	20	0.18	16	1514			1583		1640		1660		4.8	1 - 1 - 5
			30	0.40	21	2057			2164		2232		2271			1 - 3 - 10
			40	0.71	25	2624			2782		2906		2971			2 - 5 - 14
	M23	5	40	0.21	20	1816			8.6		1973		2011		3.9	2 - 4 - 12
			60	0.48	26	2686			2872		3023		3104			4 - 8 - 18
			75	0.75	29	3273			3538		3690		3808			7 - 12 - 21
	M31	6	70	0.18	20	2051			2171		2250		2296		2.6	2 - 6 - 14
			105	0.41	25	3036			3265		3420		3518			6 - 11 - 20
			140	0.74	31	3763			4087		4253		4406			10 - 14 - 23
6	M13	4	20	0.15	15	2054	5.50	1.60	2181	2.80	2188	2.80	2219	4.40	6.1	0 - 1 - 4
			30	0.34	18	2621			2783		2872		2931			1 - 2 - 9
			40	0.61	22	3278			3537		3633		3728			2 - 4 - 13
	M17	5	30	0.17	17	2188			2315		2376		2417		4.8	1 - 2 - 6
			45	0.39	23	2968			3185		3263		3341			2 - 3 - 12
			60	0.69	26	3874			4201		4367		4502			3 - 6 - 17
	M23	6	60	0.21	22	2633			2844		2923		3000		3.9	2 - 5 - 14
			90	0.48	27	4031			4383		4623		4797			5 - 10 - 21
			110	0.71	30	4505			4909		5221		5448			8 - 14 - 26
	M31	8 *	105	0.19	21	2968			3217		3321		3416		2.6	3 - 7 - 18
			160	0.43	27	4438			4827		5114		5321			7 - 13 - 25
			210	0.74	31	5060			5694		6055		6356			12 - 18 - 29
8	M13	4	25	0.14	15	2713	7.20	2.10	2911	3.70	2986	5.70	3037	5.70	6.1	0 - 1 - 4
			40	0.36	20	3660			3940		4092		4200			1 - 2 - 10
			55	0.67	25	4290			4688		4888		5057			2 - 5 - 16
	M17	5	40	0.18	19	3203			3443		3555		3633		4.8	1 - 2 - 7
			60	0.40	24	3916			4239		4428		4566			2 - 4 - 14
			80	0.70	28	4941			5437		5716		5943			3 - 7 - 19
	M23	8 *	80	0.22	24	3304			3606		3761		3889		3.9	2 - 5 - 16
			120	0.49	29	4922			5470		5851		6130			5 - 12 - 25
			140	0.67	31	5308			6024		6496		6844			9 - 16 - 30
	M31	10 *	145	0.20	24	3801			4177		4371		4537		2.6	4 - 8 - 21
			215	0.45	29	5398			6091		6555		6893			8 - 16 - 29
			260	0.66	34	5986			6858		7429		7871			14 - 21 - 33
10	M13	5	35	0.17	16	3620	8.90	2.60	3944	4.60	4078	7.10	4173	7.10	6.1	1 - 1 - 5
			50	0.35	21	4408			4835		5062		5223			1 - 3 - 12
			70	0.69	25	5125			5737		6048		6305			2 - 5 - 18
	M17	6	55	0.22	21	4061			4432		4621		4755		4.8	1 - 2 - 9
			80	0.46	26	4676			5222		5507		5728			2 - 5 - 17
			100	0.71	29	5691			6410		6815		7143			4 - 9 - 22
	M23	8 *	100	0.23	25	3807			4257		4488		4674		3.9	3 - 6 - 18
			150	0.51	31	5642			6430		6974		7372			6 - 13 - 28
			180	0.73	33	6000			7141		7833		8346			10 - 18 - 33
	M31	10 *	180	0.22	26	4354			4891		5170		5405		2.6	4 - 9 - 23
			240	0.39	31	5849			6666		7230		7643			7 - 15 - 30
			300	0.61	40	6000			7576		8333		8894			11 - 19 - 34

NOTES: Reference page C3-10 for operational conditions used for performance notes.

PERFORMANCE DATA | 2 - PIPE HEATING

NOMINAL LENGTH ft	NOZZLE SIZE	PRIMARY AIR			SOUND	COIL HEATING (Btu/h)								INDUCTION RATIO	THROW
		INLET DIA.	FLOW RATE	INLET ΔPs		0.5 GPM		1.0 GPM		1.5 GPM		2.0 GPM			
		in	CFM	(in H ₂ O)	NC	TOTAL	ΔP COIL	TOTAL	ΔP COIL	TOTAL	ΔP COIL	TOTAL	ΔP COIL		
4	M13	4	15	0.2	15	3308	1.00	3900	3.80	4059	8.60	4181	1.90	6.1	0-1-4
			20	0.35	17	4179		5016		5259		5452			1-2-7
			25	0.55	20	4804		5848		6159		6347			1-3-10
	M17	4	20	0.18	16	3442		4079		4264		4418		4.8	1-1-5
			30	0.4	21	4561		5543		5832		6014			1-3-10
			40	0.71	25	5572		7069		7497		7831			2-5-14
	M23	5	40	0.21	20	4000		4894		5172		5316		3.9	2-4-12
			60	0.48	26	5639		7237		7739		8144			4-8-18
			75	0.75	29	7064		8819		9533		9942			7-12-21
	M31	6	70	0.18	20	4437		5526		5850		6062		2.6	2-6-14
			105	0.41	25	6492		8181		8799		9214			6-11-20
			140	0.74	31	7859		10139		11012		11459			10-14-23
6	M13	4	20	0.15	15	4561	1.40	5535	5.50	5876	1.60	5894	2.80	6.1	0-1-4
			30	0.34	18	5628		7063		7500		7740			1-2-9
			40	0.61	22	6907		8832		9530		9789			2-4-13
	M17	5	30	0.17	17	4765		5896		6238		6402		4.8	1-2-6
			45	0.39	23	6310		7998		8582		8791			2-3-12
			60	0.69	26	8041		10438		11321		11766			3-6-17
	M23	6	60	0.21	22	5539		7095		7664		7876		3.9	2-5-14
			90	0.48	27	8227		10862		11809		12458			5-10-21
			110	0.71	30	9016		12139		13228		14068			8-13-24
	M31	8 *	105	0.19	21	6197		7997		8667		8948		2.6	3-7-18
			160	0.43	27	8953		11958		13007		13780			7-13-25
			210	0.74	31	10284		13635		15343		16314			12-18-29
8	M13	4	25	0.14	15	5983	1.80	7309	7.20	7843	2.10	8045	3.70	6.1	0-1-4
			40	0.36	20	7645		9863		10617		11027			1-2-10
			55	0.67	25	8656		11561		12631		13171			2-5-16
	M17	5	40	0.18	19	6870		8631		9278		9579		4.8	1-2-7
			60	0.4	24	7918		10551		11422		11931			2-4-14
			80	0.7	28	9950		13312		14651		15401			3-7-19
	M23	8 *	80	0.22	24	6667		8902		9716		10133		3.9	2-5-16
			120	0.49	29	9637		13261		14739		15764			5-12-25
			140	0.67	31	10453		14302		16233		17509			8-15-28
	M31	10 *	145	0.2	24	7657		10241		11254		11777		2.6	4-8-21
			215	0.45	29	10671		14545		16413		17662			8-16-29
			260	0.66	34	11538		16129		18479		20017			14-20-32
10	M13	5	35	0.17	16	7663	2.20	9755	8.90	10626	2.60	10989	4.60	6.1	1-1-5
			50	0.35	21	8958		11878		13028		13640			1-3-12
			70	0.69	25	9968		13809		15459		16296			2-5-18
	M17	6	55	0.22	21	8302		10943		11941		12452		4.8	1-2-9
			80	0.46	26	9306		12599		14070		14839			2-5-17
			100	0.71	29	10756		15334		17272		18363			4-9-22
	M23	8 *	100	0.23	25	7479		10257		11470		12094		3.9	3-6-18
			150	0.51	31	10389		15202		17326		18791			6-13-28
			180	0.73	33	11235		16406		19240		21107			9-17-32
	M31	10 *	180	0.22	26	8295		11733		13178		13930		2.6	4-9-23
			240	0.39	31	10770		15760		17962		19481			7-15-30
			300	0.61	40	11854		17329		20414		22453			11-19-34

NOTES: Reference page C3-10 for operational conditions used for performance notes.

PERFORMANCE DATA

NOTES:

1. All performance data based on test performed in accordance with ASHRAE Standard 200-2018.
2. ΔP_s values are measured in inches of water.
3. NC values are based on room absorption of 10 dB. A dash (-) indicates an NC value less than 15.
4. Throw values are based on isothermal supply air and represent throw distances to terminal velocities of 150, 100 and 50 fpm respectively.
5. ΔP_{Coil} values are measured in inches of water. ΔP_{Coil} values in shaded cells indicate use of a two circuit coil. All other values represent a single circuit coil.
6. Induction ratio is multiplied by the volume flow rate of primary air to estimate the volume flow rate of room air entrained through the coil.
7. * denotes oval inlet air connection.

COOLING PERFORMANCE:

- Cooling capacity listed (TOTAL) is the total sensible heat removal by the beam's integral coil. It does not include any contribution or offset by the primary air.
- Capacity is based on 18°F ΔT between the induced air and the chilled water supply. Table 1 provides correction factors for other temperature differentials.

- Primary air sensible cooling contribution can be calculated by the following equation:

$$q_{\text{SENSPA}} = 1.085 \times \text{CFM}_{\text{PA}} \times (T_{\text{ROOM}} - T_{\text{PA}})$$

- Primary air latent cooling can be calculated by the following equation:

$$q_{\text{LATENT}} = 0.69 \times \text{CFM}_{\text{PA}} \times (W_{\text{ROOM}} - W_{\text{PA}})$$

where W_{ROOM} and W_{PA} are the humidity ratio of the room and primary air respectively expressed in Grains of moisture per pound dry air.

TABLE 4: CORRECTION FOR (ΔT) BETWEEN ENTERING AIR AND ENTERING CHILLED WATER

ACTUAL ΔT	10	12	14	16	18	20	22	24
MULTIPLY TABLE VALUE BY:	0.56	0.67	0.78	0.89	1.00	1.11	1.22	1.33

HEATING PERFORMANCE:

- Heating capacity listed (TOTAL) is the sensible heat added by the beam's integral coil. It does not include any contribution or offset by the primary air.
- Capacity is based on 50°F ΔT between the induced air and the heating water supply. Table 2 provides correction factors for other temperature differentials.
- Primary air sensible heating offset (or contribution) can be calculated by the following equation:

$$q_{\text{SENSPA}} = 1.085 \times \text{CFM}_{\text{PA}} \times (T_{\text{PA}} - T_{\text{ROOM}})$$

- If the primary air temperature is lower than that of the room, it will offset the coil's heating.
- If the primary air temperature is higher than that of the room, it will contribute to the coil's heating.

TABLE 2: CORRECTION FOR (ΔT) BETWEEN ENTERING AIR AND ENTERING HEATING WATER

ACTUAL ΔT	20	30	40	50	60	70	80	90	100	110	120
MULTIPLY TABLE VALUE BY:	0.40	0.60	0.80	1.00	1.20	1.40	1.60	1.80	2.00	2.20	2.40

LEGEND:

ΔP_s = Unit Inlet Pressure [in wg]

q_{Coil} = Sensible Capacity, Coil [Btu/h]

ΔCoil = Water coil pressure drop [ft wg]

q_{SENSPA} = Sensible Capacity, Primary Air [Btu/h]

W_{ROOM} = Humidity Ratio of the Room

CFM_{PA} = Air Flowrate, Primary Air [CFM]

T_{PA} = Temperature Primary Air [°F]

T_{ROOM} = Temperature Room Air [°F]

q_{LATENT} = Latent Capacity, Primary Air [Btu/h]

W_{PA} = Humidity Ratio of the Primary Air

ENGINEERING SPECIFICATION & CONFIGURATION

Furnish and install active chilled beams in the sizes, configurations and capacities indicated on the project schedules and plans. Unit shall comprise a primary air connection, a pressurized inlet plenum feeding a series of room air induction nozzles and an associated heat transfer coil contained in a single unit housing. A hinged perforated room air induction grille shall be provided for easy access to the unit heat transfer coil.

UNIT CASING

The unit casing shall be constructed from a minimum 24-gauge galvanized sheet steel. Units shall have a maximum casing height of 10 1/8".

FACE

The face of the beam shall consist of a perforated room air induction section of 50% free area flanked by linear supply slots. Face and frame styles shall be designed for flush integration into a standard 24" wide module T-bar lay-in ceiling. The face section shall include hinged fastening that allows the face to be swung opened for coil cleaning.

FINISH

The entire visible face sections and all visible internal surfaces shall be finished in white powder coat paint or as specified by the architect (OPTIONAL). Concealed surfaces shall be G90 galvanized steel.

PRIMARY AIR INLETS

Manufacturer shall provide round or oval inlet collars of diameter(s) as indicated on the project plans and schedules and suitable for connection to common flexible or rigid ductwork sizes. The inlet collar shall be roll-formed to facilitate the connection of flexible or rigid ductwork. Inlet location may be side or top as indicated on the project plans and schedules. Nozzles shall be of a fixed size, selected with respect to cooling and heating requirements, and constructed of formed sheet metal.

PRIMARY AIR PLENUM PRESSURE TAP

A plenum air pressure tap shall be mounted within the pressurized plenum for measuring the pressure differential between the primary air plenum and the room. The pressure tap manometer connection port shall be fitted to the end of a plastic tube accessible from the diffuser face. Airflow calibration charts that relate the pressure differential reading with the primary airflow rates, shall be furnished with the IOM's.

MOUNTING RAILS

Factory installed mounting rails shall incorporate slotted holes for hanging using threaded rods.

HYDRONIC HEAT TRANSFER COIL

Integral heat transfer coils shall be provided with connections for either 2 or 4 pipe water connections as indicated on plans and schedules. Four pipe configurations shall require separate supply and return connections for chilled and hot

water. The coil shall be mounted horizontally and shall be manufactured with seamless copper tubing (1/2" or 3/4" outside diameter as indicated on the plans and schedules) with minimum .016" wall thickness mechanically fixed to aluminum fins. The aluminum fins shall be limited to no more than ten (10) fins per inch. The coil shall have a working pressure of at least 360 PSI, and be factory tested for leakage at a minimum pressure of 500 PSI.

Each chilled beam shall be provided with factory integrated manual air vents.

COILS

- **(Optional)** Coil shall be provided with factory integrated drain fittings. Unless otherwise specified, coil connections shall be bare copper for field sweating to the water supply circuit(s).
- **(Optional)** The chilled water coil shall be provided with NPT male threaded fittings. These fittings must be suitable for field connection to a similar NPT female flexible hose spigot and shall be at least 1 1/2" long to facilitate field connection (by others).

Connections shall face upwards to avoid issues with coordination of ceiling installation. The coil shall be rated and certified in accordance with AHRI Standard 410.

PACKAGING

Beams shall be delivered to site clean with hydronic coils flushed and fitted with protective caps. Protective film shall be applied to the entire beam face to prevent ingress of dirt. Units shall be shipped to site in cartons and labeled with identification tagging.

THE MANUFACTURER SHALL PROVIDE THE FOLLOWING ACCESSORIES

- **(Optional) Lint Screens:** Manufacturer shall provide zinc plated steel mesh lint screens with galvanized frames fitted to the heat exchange coils.
- **(Optional) Water Connection Hoses:** Manufacturer shall provide 1/2" or 3/4" dia. x (12"), (18") or (24") long stainless-steel braided hoses with female swivel connections. Hoses shall be constructed with a KEVLAR® reinforced EPDM core with stainless steel ferrules. Hoses shall be tested for working pressures up to 400 PSIG (at max. operating temperature of 248°F) with a burst pressure of 1600 PSIG.
- **(Optional) Airflow Regulators:** Manufacturer shall supply UL94 V-0 rated ABS polymer and UL2043 listed constant volume regulators (BFR's). BFR's shall be designed to fit inside rigid round ductwork and located at a minimum distance of three duct diameters upstream of the active chilled beam primary air inlet.

ENGINEERING SPECIFICATION & CONFIGURATION

- 1. SERIES: (XXX-XX)**
BAL-24 - Linear Active Chilled Beam
- 2. MODULE SIZE: (XX)**
24 - 24" Width
- 3. BEAM LENGTH: (XX)**
2 - 2 ft
3 - 3 ft
4 - 4 ft
5 - 5 ft
6 - 6 ft
7 - 7 ft
8 - 8 ft
9 - 9 ft
10 - 10 ft
- 4. AIR PATTERN-NOZZLE TYPE: (XXX)**
M13 - M13
M17 - M17
M23 - M23
M31 - M31
- 5. THROW PATTERN: (X)**
2 - 2-Way
F - 1-Way towards inlet
B - 1-Way away from inlet
- 6. COIL TYPE: (XXXX)**
2P1C - 2 Pipe Coil - 1 Circuit
2P2C - 2 Pipe Coil - 2 Circuit
4P1C - 4 Pipe Coil - 1 Circuit
4P2C - 4 Pipe Coil - 2 Circuit
- 7. COIL ACC1: (X)**
M - Manual Air Vent
- 8. COIL ACC2: (X)**
0 - None
D - Drain Pan
- 9. WATER CONNECTION: (X)**
L - Left Handing
R - Right Handing
- 10. PIPING TYPE: (XXX)**
SWT - Sweat
MPT - 1/2" Male Pipe Thread
3PT - 3/4" Male Pipe Thread
- 11. INLET CONFIGURATION: (XX)**
TM - Top Middle
SM - Side Middle
MI - Multi-Inlet
- 12. INLET SIZE: (XX)**
4 - 4" Round
5 - 5" Round
6 - 6" Round
8 - 8" Oval
10 - 10" Oval
- 13. FACE PATTERN: (XX)**
CP - Circular Perforation
- 14. INSULATION: (X)**
0 - None
I - Internal Closed Foam Insulation
- 15. FRAME STYLE: (XXX)**
LTF - Lay-In
NTG - Tegular 9/16" Frame
- 16. FINISH: (XXX)**
WHT - British White
BLK - Black
- 17. ACCESSORY 1: (XX)**
0 - None
LS - Lint Screen
XX - Special

SAMPLE CONFIGURATION: BAL-24 - 24 - 4 - M13 - 2 - 2P1C - M - 0 - L - SWT - TM - 5 - CP - 0 - LTF - WHT - 0