

BEL-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		
4	M13	4	15	0.20	15	1357	2.90	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	2044	9.30	2051	2.10	2080	3.30	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	2882	5.40	3093	1.60	3172	2.80	3227	4.30	6.1	0 - 1 - 4
			40	0.36	20	3889		4187		4348		4462			1 - 2 - 10
			55	0.67	25	4559		4981		5193		5373			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	3767	6.70	4103	1.90	4243	3.40	4342	5.30	6.1	1 - 1 - 5
			50	0.35	21	4586		5030		5267		5434			1 - 3 - 12
			70	0.69	25	5332		5969		6292		6559			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 C3-30 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)	NC	TOTAL	ΔP COIL	TOTAL	ΔP COIL			TOTAL	ΔP COIL	TOTAL
4	M13	4	15	0.2	15	2108	0.20		0.20	0.60	1.40	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		0.90	2.10	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	4320	0.30		1.20	2.70	4.80	6.1	0 - 1 - 4					
			40	0.36	20	5520							7121	7665	7961	1 - 2 - 10		
			55	0.67	25	6249							8347	9120	9509	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	5417	0.40		1.50	3.40	6.00	6.1	1 - 1 - 5					
			50	0.35	21	6333							8397	9210	9643	1 - 3 - 12		
			70	0.69	25	7047							9762	10929	11521	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 C3-30 for operational conditions used for performance notes.

BEL-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		
4	M13	4	15	0.20	15	1447	3.80	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	2181	1.60	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	3074	7.20	3299	2.10	3384	3.70	3442	5.70	6.1	0 - 1 - 4
			40	0.36	20	4148		4466		4638		4760			1 - 2 - 10
			55	0.67	25	4863		5313		5540		5731			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	4018	8.90	4376	2.60	4526	4.60	4632	7.10	6.1	1 - 1 - 5
			50	0.35	21	4892		5366		5618		5796			1 - 3 - 12
			70	0.69	25	5687		6367		6712		6997			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 C3-30 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		1.0 GPM		2.0 GPM		3.0 GPM		4.0 GPM			
						in	CFM	(in H ₂ O)	NC	TOTAL	ΔP COIL	TOTAL	ΔP COIL		
4	M13	4	15	0.2	15	3308	1.00		3900		4059		4181	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		5876		5894	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	6781	1.80		8283		8889		9117	6.1	0-1-4
			40	0.36	20	8665			11178		12033		12497		1-2-10
			55	0.67	25	9810			13102		14315		14927		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	8504	2.20		10826		11792		12195	6.1	1-1-5
			50	0.35	21	9941			13182		14458		15137		1-3-12
			70	0.69	25	11062			15324		17155		18084		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 C3-30 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:

$$q_{SENSPA} = 1.085 \times CFM_{PA} \times (T_{ROOM} - T_{PA})$$

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

$$q_{LATENT} = 0.69 \times CFM_{PA} \times (W_{ROOM} - W_{PA})$$

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:

$$q_{SENSPA} = 1.085 \times CFM_{PA} \times (T_{PA} - T_{ROOM})$$

- 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 CHILLED 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]

ΔP_{Coil} = 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