

PERFORMANCE DATA | 4-PIPE COOLING

NOMINAL LENGTH ft	NOZZLE SIZE	PRIMARY AIR			SOUND	COIL SENSIBLE COOLING (Btu/h)								INDUCTION RATIO	PRI + IND.
		INLET DIA.	FLOW RATE	INLET ΔPs		1.0 GPM		1.5 GPM		2.0 GPM		2.5 GPM			TOTAL FLOW RATE
						in	CFM	(in H ₂ O)	NC	TOTAL	ΔP COIL	TOTAL	ΔP COIL		
3	M13	4	6	0.27	15	657	2.20	676	5.00	682	8.80	687	1.80	6.1	43
			8	0.47	17	848		877		887		894			57
			10	0.74	20	1027		1068		1083		1093			71
	M17	4	8	0.20	15	690		711		717		722		4.9	71
			12	0.44	16	982		1020		1034		1043			94
			16	0.79	20	1244		1303		1326		1342			72
	M23	4	16	0.20	15	1109		1155		1173		1184		3.5	113
			25	0.48	17	1575		1665		1702		1728			144
			32	0.79	20	1882		2009		2065		2105			106
	M31	4	28	0.22	16	1395		1463		1489		1508		2.8	160
			42	0.50	22	1886		2007		2059		2097			198
			52	0.77	25	2193		2356		2430		2482			198
4	M13	4	8	0.25	15	864	2.90	893	6.40	903	1.50	910	2.30	6.1	57
			12	0.56	19	1225		1279		1300		1314			85
			14	0.76	21	1393		1461		1488		1507			99
	M17	4	12	0.23	15	1008		1045		1059		1068		4.9	71
			18	0.52	18	1414		1483		1511		1531			106
			22	0.78	21	1653		1749		1788		1815			130
	M23	4	22	0.20	15	1482		1556		1586		1607		3.5	99
			34	0.48	18	2066		2209		2271		2316			153
			42	0.74	21	2393		2587		2675		2737			189
	M31	4	38	0.22	18	1834		1942		1986		2018		2.8	144
			55	0.47	24	2404		2588		2671		2729			209
			70	0.76	31	2824		3081		3202		3287			266
5	M13	4	10	0.25	15	917	3.50	942	7.90	955	1.80	964	2.80	6.1	71
			14	0.49	19	1224		1270		1293		1308			99
			18	0.81	22	1500		1570		1606		1630			128
	M17	4	15	0.24	15	1065		1100		1117		1129		4.9	89
			22	0.51	20	1460		1526		1560		1583			130
			28	0.83	23	1811		1915		1967		2004			165
	M23	4	30	0.24	15	1690		1778		1823		1854		3.5	135
			45	0.55	20	2434		2612		2706		2772			203
			55	0.82	24	2784		3025		3153		3245			248
	M31	6 *	50	0.24	19	2080		2205		2269		2313		2.8	190
			75	0.54	24	2877		3119		3248		3339			285
			95	0.86	28	3331		3668		3852		3983			361
6	M13	4	12	0.26	16	1087	4.10	1123	9.30	1141	2.10	1154	3.30	6.1	85
			16	0.45	20	1396		1454		1483		1504			114
			22	0.86	24	1785		1885		1936		1971			156
	M17	4	18	0.24	16	1262		1310		1334		1351		4.9	106
			26	0.50	21	1693		1783		1829		1861			153
			32	0.76	24	2015		2143		2209		2255			189
	M23	6 *	35	0.23	16	1923		2037		2095		2136		3.5	158
			50	0.47	20	2646		2858		2970		3048			225
			64	0.77	24	3149		3459		3625		3744			288
	M31	6 *	55	0.21	20	2231		2375		2450		2503		2.8	209
			82	0.46	25	3126		3410		3562		3669			312
			105	0.75	28	3641		4044		4265		4424			399

NOTES: Reference page C3-70 for operational conditions used for performance notes.

PERFORMANCE DATA | 4-PIPE HEATING

NOMINAL LENGTH ft	NOZZLE SIZE	PRIMARY AIR			SOUND	COIL SENSIBLE HEATING (Btu/h)								INDUCTION RATIO	PRI + IND.
		INLET DIA.	FLOW RATE	INLET ΔPs		0.5 GPM		1.0 GPM		1.5 GPM		2.0 GPM			TOTAL FLOW RATE
						in	CFM	(in H ₂ O)	TOTAL	ΔP COIL	TOTAL	ΔP COIL	TOTAL		
3	M13	4	6	0.27	15	1277	0.10	1423	0.50	1465	1.10	1477	2.00	6.1	43
			8	0.47	17	1623		1836		1899		1921			57
			10	0.74	20	1940		2223		2312		2344			71
	M17	4	8	0.2	15	1338		1495	1539	1553	4.9	47			
			12	0.44	16	1860		2127	2209	2238		71			
			16	0.79	20	2307		2694	2821	2870		94			
	M23	4	16	0.2	15	2084		2401	2502	2539	3.5	72			
			25	0.48	17	2846		3410	3605	3685		113			
			32	0.79	20	3312		4075	4350	4471		144			
	M31	4	28	0.22	16	2578		3021	3167	3225	2.8	106			
			42	0.5	22	3347		4083	4345	4458		160			
			52	0.77	25	3798		4747	5102	5261		198			
4	M13	4	8	0.25	15	1656	0.20	1870	0.60	1934	1.40	1956	2.50	6.1	57
			12	0.56	19	2286		2653		2769		2814			85
			14	0.76	21	2568		3017		3163		3222			99
	M17	4	12	0.23	15	1913		2181	2263	2292		4.9		71	
			18	0.52	18	2603		3061	3212	3272				106	
			22	0.78	21	2979		3580	3786	3870				130	
	M23	4	22	0.2	15	2718		3208	3369	3434		3.5		99	
			34	0.48	18	3613		4472	4782	4917				153	
			42	0.74	21	4082		5182	5601	5792				189	
	M31	4	38	0.22	18	3295		3972	4205	4301		2.8		144	
			55	0.47	24	4141		5205	5603	5782				209	
			70	0.76	31	4704		6115	6672	6932				266	
5	M13	4	10	0.25	15	1742	0.20	1984	0.80	2040	1.70	2068	3.10	6.1	71
			14	0.49	19	2269		2650		2750		2799			99
			18	0.81	22	2709		3247		3400		3477			128
	M17	4	15	0.24	15	2002		2307	2382	2419		4.9		89	
			22	0.51	20	2645		3160	3305	3378				130	
			28	0.83	23	3324		3922	4145	4260				165	
	M23	4	30	0.24	15	3075		3659	3849	3946		3.5		135	
			45	0.55	20	4335		5269	5656	5858				203	
			55	0.82	24	4809		6027	6549	6827				248	
	M31	6 *	50	0.24	19	3829		4503	4773	4912		2.8		190	
			75	0.54	24	4998		6229	6753	7032				285	
			95	0.86	28	5571		7213	7942	8339				361	
6	M13	4	12	0.26	16	2035	0.20	2354	0.90	2431	2.10	2470	3.70	6.1	85
			16	0.45	20	2554		3023		3148		3211			114
			22	0.86	24	3151		3865		4081		4191			156
	M17	4	18	0.24	16	2329		2732	2836	2888		4.9		106	
			26	0.5	21	3010		3667	3860	3959				153	
			32	0.76	24	3585		4362	4639	4783				189	
	M23	6 *	35	0.23	16	3402		4164	4409	4535		3.5		158	
			50	0.47	20	4633		5729	6188	6429				225	
			64	0.77	24	5293		6819	7488	7849				288	
	M31	6 *	55	0.21	20	3975		4830	5142	5305		2.8		209	
			82	0.46	25	5341		6769	7384	7711				312	
			105	0.75	28	5961		7884	8755	9233				399	

NOTES: Reference page C3-70 for operational conditions used for performance notes.

PERFORMANCE DATA | 2-PIPE COOLING

NOMINAL LENGTH ft	NOZZLE SIZE	PRIMARY AIR			SOUND	COIL SENSIBLE COOLING (Btu/h)								INDUCTION RATIO	PRI + IND.
		INLET DIA.	FLOW RATE	INLET ΔPs		1.0 GPM		1.5 GPM		2.0 GPM		2.5 GPM			TOTAL FLOW RATE
		in	CFM	(in H ₂ O)		NC	TOTAL	ΔP COIL	TOTAL	ΔP COIL	TOTAL	ΔP COIL	TOTAL		ΔP COIL
3	M13	4	6	0.27	15	683	2.90	703	6.60	709	1.50	714	2.30	6.1	43
			8	0.47	17	881		912		922		929			57
			10	0.74	20	1067		1110		1125		1135			71
	M17	4	8	0.2	15	717		739		746		751		4.9	47
			12	0.44	16	1021		1060		1074		1084			71
			16	0.79	20	1293		1354		1378		1394			94
	M23	4	16	0.2	15	1153		1201		1219		1231		3.5	72
			25	0.48	17	1637		1730		1769		1796			113
			32	0.79	20	1956		2088		2146		2187			144
	M31	4	28	0.22	16	1450		1520		1548		1567		2.8	106
			42	0.5	22	1960		2086		2140		2179			160
			52	0.77	25	2279		2449		2525		2580			198
4	M13	4	8	0.25	15	898	3.80	928	8.60	939	1.90	946	3.00	6.1	57
			12	0.56	19	1273		1329		1351		1366			85
			14	0.76	21	1448		1518		1546		1566			99
	M17	4	12	0.23	15	1047		1086		1100		1110		4.9	71
			18	0.52	18	1469		1542		1570		1591			106
			22	0.78	21	1718		1817		1858		1887			130
	M23	4	22	0.2	15	1540		1617		1648		1670		3.5	99
			34	0.48	18	2147		2295		2360		2406			153
			42	0.74	21	2487		2689		2780		2845			189
	M31	4	38	0.22	18	1906		2018		2064		2097		2.8	144
			55	0.47	24	2498		2690		2776		2836			209
			70	0.76	31	2935		3202		3327		3416			266
5	M13	4	10	0.25	15	952	4.70	979	1.30	993	2.40	1002	3.70	6.1	71
			14	0.49	19	1272		1320		1343		1360			99
			18	0.81	22	1559		1632		1669		1694			128
	M17	4	15	0.24	15	1107		1143		1161		1173		4.9	89
			22	0.51	20	1517		1586		1621		1645			130
			28	0.83	23	1882		1990		2045		2083			165
	M23	4	30	0.24	15	1756		1848		1894		1927		3.5	135
			45	0.55	20	2529		2715		2812		2881			203
			55	0.82	24	2893		3143		3277		3372			248
	M31	6 *	50	0.24	19	2162		2291		2358		2404		2.8	190
			75	0.54	24	2990		3242		3375		3470			285
			95	0.86	28	3462		3812		4003		4139			361
6	M13	4	12	0.26	16	1130	5.50	1167	1.60	1186	2.80	1199	4.40	6.1	85
			16	0.45	20	1451		1511		1541		1563			114
			22	0.86	24	1855		1959		2011		2048			156
	M17	4	18	0.24	16	1311		1361		1386		1404		4.9	106
			26	0.5	21	1760		1853		1900		1934			153
			32	0.76	24	2094		2227		2296		2344			189
	M23	6 *	35	0.23	16	1999		2117		2177		2219		3.5	158
			50	0.47	20	2750		2970		3086		3168			225
			64	0.77	24	3273		3594		3768		3891			288
	M31	6 *	55	0.21	20	2318		2468		2546		2601		2.8	209
			82	0.46	25	3249		3544		3701		3813			312
			105	0.75	28	3784		4202		4432		4597			399

NOTES: Reference page C3-70 for operational conditions used for performance notes.

PERFORMANCE DATA | 2-PIPE HEATING

NOMINAL LENGTH ft	NOZZLE SIZE	PRIMARY AIR			SOUND	COIL SENSIBLE HEATING (Btu/h)								INDUCTION RATIO	PRI + IND.			
		INLET DIA.	FLOW RATE	INLET ΔPs		0.5 GPM		1.0 GPM		1.5 GPM		2.0 GPM			TOTAL FLOW RATE			
						in	CFM	(in H ₂ O)	NC	TOTAL	ΔP COIL	TOTAL	ΔP COIL		TOTAL	ΔP COIL	TOTAL	ΔP COIL
3	M13	4	6	0.27	15	1832	0.70		2042	2.90		2101	6.60	2120	1.50	6.1	43	
			8	0.47	17	2328			2634			2725					2756	57
			10	0.74	20	2783			3190			3317					3364	71
	M17	4	8	0.2	15	1919			2145			2209				2229	4.9	47
			12	0.44	16	2669			3051			3169				3212		71
			16	0.79	20	3311			3866			4047				4118		94
	M23	4	16	0.2	15	2990			3445			3589				3643	3.5	72
			25	0.48	17	4084			4893			5172				5287		113
			32	0.79	20	4753			5847			6242				6415		144
	M31	4	28	0.22	16	3699			4335			4544				4627	2.8	106
			42	0.5	22	4803			5858			6234				6397		160
			52	0.77	25	5450			6812			7320				7549		198
4	M13	4	8	0.25	15	2376	1.00		2684	3.80		2775	8.60	2806	1.90	6.1	57	
			12	0.56	19	3279			3806			3974					4038	85
			14	0.76	21	3685			4329			4539					4623	99
	M17	4	12	0.23	15	2744			3130			3246				3289	4.9	71
			18	0.52	18	3734			4393			4608				4694		106
			22	0.78	21	4275			5137			5432				5553		130
	M23	4	22	0.2	15	3901			4603			4835				4928	3.5	99
			34	0.48	18	5183			6417			6861				7055		153
			42	0.74	21	5857			7435			8037				8311		189
	M31	4	38	0.22	18	4728			5699			6033				6171	2.8	144
			55	0.47	24	5942			7468			8040				8297		209
			70	0.76	31	6750			8774			9573				9946		266
5	M13	4	10	0.25	15	2499	1.20		2847	4.70		2927	1.30	2967	2.40	6.1	71	
			14	0.49	19	3256			3803			3945					4016	99
			18	0.81	22	3887			4660			4878					4988	128
	M17	4	15	0.24	15	2873			3310			3417				3471	4.9	89
			22	0.51	20	3795			4535			4742				4847		130
			28	0.83	23	4769			5627			5948				6112		165
	M23	4	30	0.24	15	4412			5250			5523				5663	3.5	135
			45	0.55	20	6220			7560			8116				8406		203
			55	0.82	24	6901			8648			9397				9796		248
	M31	6 *	50	0.24	19	5494			6462			6849				7048	2.8	190
			75	0.54	24	7171			8938			9690				10089		285
			95	0.86	28	7994			10349			11396				11965		361
6	M13	4	12	0.26	16	2920	1.40		3377	5.50		3488	1.60	3544	2.80	6.1	85	
			16	0.45	20	3665			4338			4517					4608	114
			22	0.86	24	4521			5546			5855					6013	156
	M17	4	18	0.24	16	3342			3920			4069				4144	4.9	106
			26	0.5	21	4319			5261			5539				5681		153
			32	0.76	24	5144			6259			6656				6862		189
	M23	6 *	35	0.23	16	4881			5975			6327				6508	3.5	158
			50	0.47	20	6647			8220			8880				9225		225
			64	0.77	24	7595			9784			10745				11263		288
	M31	6 *	55	0.21	20	5704			6930			7379				7612	2.8	209
			82	0.46	25	7664			9712			10595				11064		312
			105	0.75	28	8553			11312			12562				13248		399

NOTES: Reference page C3-70 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. All performance data based on installation with matched Krueger 1600 (1600E) Linear Bar Grille - contact the Krueger Specialty Group for performance with other grilles.
3. ΔP_s values are measured in inches of water.
4. NC values are based on room absorption of 10 dB. A dash (-) indicates an NC value less than 15.
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 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]

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