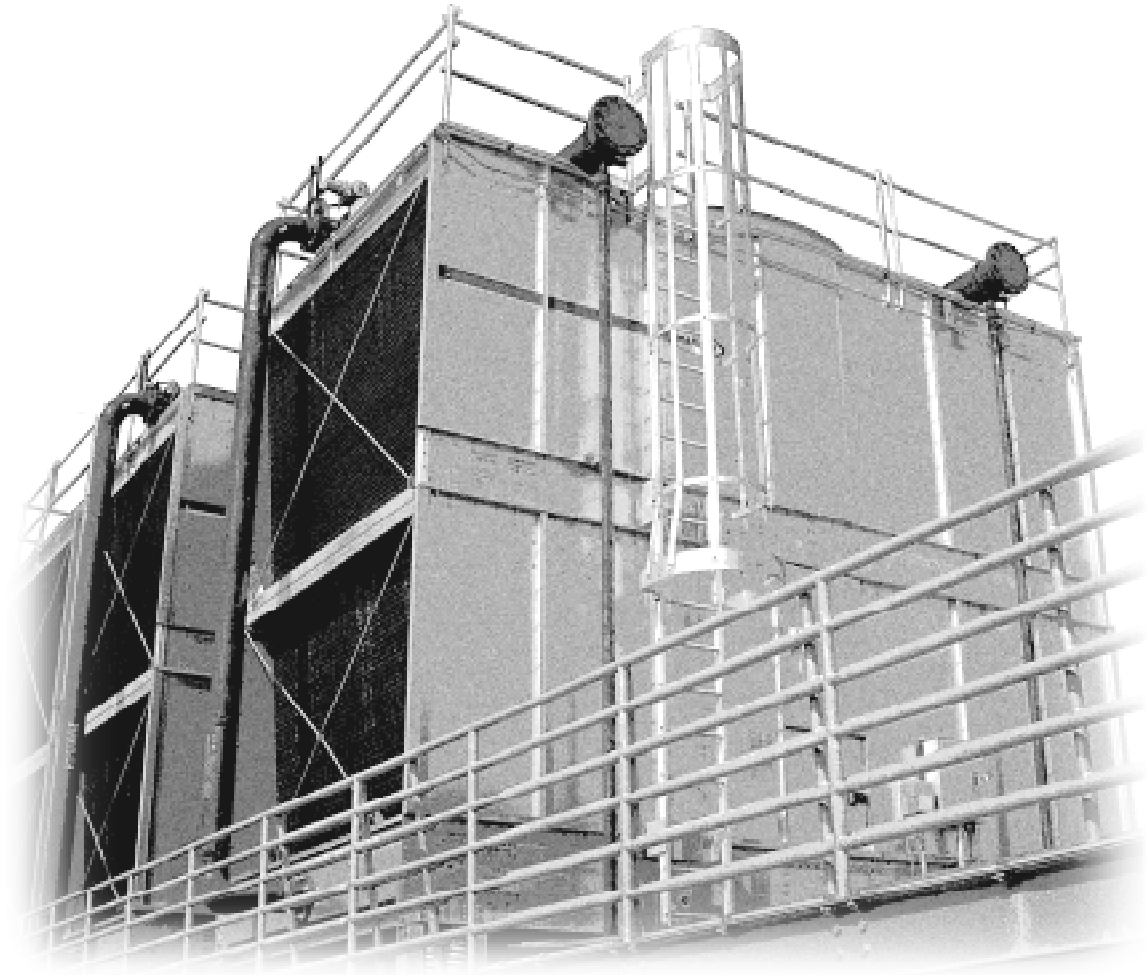


# NC<sup>®</sup>SERIES M O D U L A R



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**Technical Reference**



**Marley**

# Tower Model Selection



Tower Model	Motor bhp	temp	GPM cooling capability at indicated Hot Water, Cold Water and Wet-Bulb temperatures											
		HW ° F	95	96	100	102	95	97	100	102	95	97	100	102
		CW ° F	85	86	85	87	85	87	85	87	85	87	85	87
		WB ° F	80	80	80	80	78	78	78	78	76	76	76	76
NC8201	25		1542	1730	1267	1554	1833	2173	1486	1753	2088	2404	1679	1931
NC8211	30		1636	1835	1345	1648	1944	2303	1577	1859	2213	2547	1781	2047
NC8221	40		1784	2000	1467	1797	2118	2506	1720	2026	2409	2768	1942	2230
NC8231	50		1973	2206	1627	1988	2334	2748	1903	2235	2645	3025	2144	2454
NC8241	60		2065	2309	1703	2080	2442	2875	1992	2339	2767	3164	2243	2567
NC9201	25		1704	1907	1404	1717	2019	2385	1643	1932	2293	2632	1852	2124
NC9211	30		1787	2001	1472	1800	2118	2502	1723	2027	2406	2762	1943	2229
NC9221	40		1984	2218	1637	1998	2346	2763	1913	2247	2659	3043	2155	2467
NC9231	50		2111	2360	1741	2126	2496	2939	2036	2390	2828	3235	2293	2624
NC9241	60		2258	2519	1869	2275	2661	3119	2180	2551	3005	3424	2449	2794
NC9251	75		2403	2676	1993	2420	2823	3295	2321	2709	3178	3498*	2603	2961
NC9261	75		2562	2847	2130	2580	3000	3486	2476	2881	3367	3498*	2771	3142
NCC201	25		1935	2169	1596	1950	2298	2728	1866	2197	2620	3025	2105	2421
NCC211	30		2039	2285	1682	2055	2421	2872	1967	2315	2758	3183	2219	2550
NCC221	40		2249	2518	1856	2266	2667	3158	2169	2552	3034	3492	2446	2807
NCC231	50		2425	2712	2002	2442	2871	3392	2339	2748	3261	3746	2635	3021
NCC241	60		2454	2750	2022	2473	2913	3452	2366	2786	3316	3819	2670	3067
NCC251	75		2619	2933	2160	2639	3105	3672	2526	2971	3529	4057	2848	3268
NCC261	75		2800	3127	2317	2821	3306	3890	2703	3167	3744	4100*	3039	3474

Tower Model	Motor bhp	temp	GPM cooling capability at indicated Hot Water, Cold Water and Wet-Bulb temperatures											
		HW ° F	95	97	100	102	90	92	95	97	90	92	95	97
		CW ° F	85	87	85	87	80	82	80	82	80	82	80	82
		WB ° F	75	75	75	75	72	72	72	72	70	70	70	70
NC8201	25		2204	2511	1768	2013	1770	2076	1420	1658	1995	2283	1589	1816
NC8211	30		2335	2659	1875	2134	1878	2201	1507	1759	2115	2419	1686	1926
NC8221	40		2541	2887	2043	2324	2047	2396	1644	1918	2303	2630	1838	2099
NC8231	50		2785	3150	2253	2554	2257	2631	1820	2118	2532	2880	2032	2313
NC8241	60		2913	3194*	2358	2672	2362	2752	1905	2216	2649	3012	2126	2420
NC9201	25		2418	2745	1948	2213	1951	2281	1571	1830	2193	2502	1755	2001
NC9211	30		2537	2881	2044	2322	2047	2393	1648	1920	2301	2626	1841	2099
NC9221	40		2801	3170	2265	2568	2269	2645	1830	2129	2546	2897	2043	2325
NC9231	50		2978	3370	2410	2731	2414	2814	1948	2266	2708	3080	2174	2474
NC9241	60		3160	3498*	2572	2905	2575	2990	2087	2421	2881	3265	2324	2638
NC9251	75		3336	3498*	2730	3075	2734	3163	2223	2573	3050	3443	2472	2799
NC9261	75		3498*	3498*	2903	3261	2908	3351	2373	2740	3235	3498*	2634	2975
NC9201	25		2768	3162	2216	2525	2220	2605	1785	2080	2502	2869	1994	2277
NC9211	30		2913	3326	2335	2659	2339	2743	1881	2192	2635	3020	2101	2399
NC9221	40		3202	3646	2573	2926	2577	3018	2075	2416	2900	3317	2317	2643
NC9231	50		3439	3907	2771	3147	2775	3244	2237	2603	3119	3560	2497	2845
NC9241	60		3500	3988	2810	3198	2814	3298	2263	2638	3169	3626	2528	2887
NC9251	75		3723	4100*	2996	3405	3001	3511	2416	2814	3375	3855	2698	3077
NC9261	75		3942	4100*	3193	3616	3198	3725	2587	3003	3585	4077	2883	3277



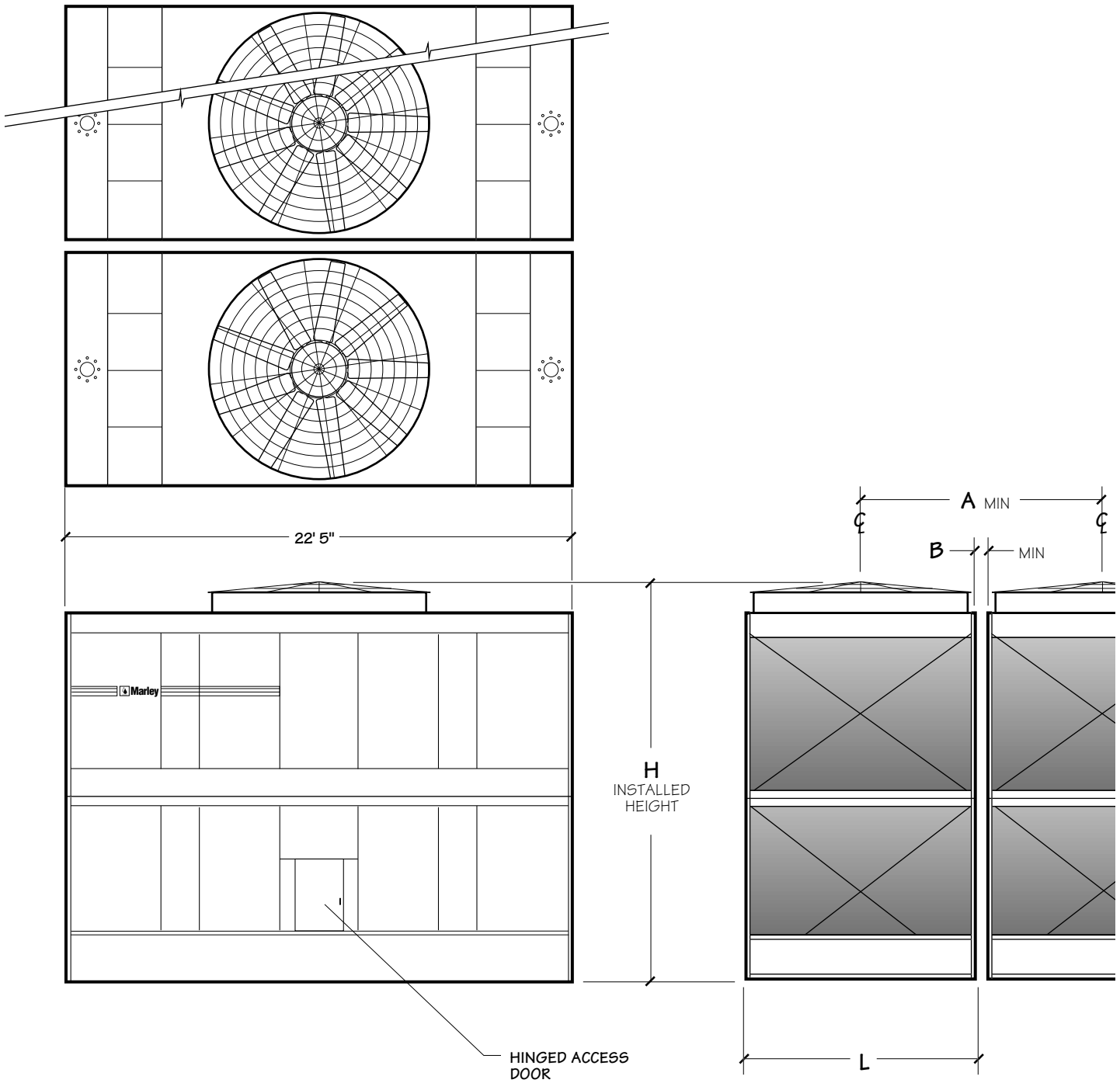
Tower Model	Motor bhp	temp	GPM cooling capability at indicated Hot Water, Cold Water and Wet-Bulb temperatures											
		HW ° F	90	92	95	97	85	90	90	95	85	90	90	95
		CW ° F	80	82	80	82	75	80	75	80	75	80	75	80
		WB ° F	68	68	68	68	66	66	66	66	64	64	64	64
NC8201	25		2197	2470	1742	1960	1702	2380	1352	1883	1901	2546	1501	2012
NC8211	30		2328	2616	1848	2078	1805	2521	1435	1997	2016	2696	1592	2133
NC8221	40		2533	2841	2014	2264	1968	2740	1565	2175	2196	2927	1736	2322
NC8231	50		2777	3102	2222	2490	2172	2995	1734	2395	2418	3192	1921	2553
NC8241	60		2904	3194*	2325	2605	2273	3133	1815	2506	2529	3194*	2011	2671
NC9201	25		2410	2702	1921	2156	1877	2606	1497	2073	2092	2783	1659	2212
NC9211	30		2529	2835	2015	2262	1969	2734	1569	2174	2195	2921	1740	2321
NC9221	40		2792	3121	2234	2503	2184	3013	1744	2408	2430	3213	1932	2566
NC9231	50		2969	3318	2377	2663	2323	3204	1856	2561	2585	3415	2055	2730
NC9241	60		3151	3498*	2537	2834	2481	3391	1990	2729	2754	3498*	2200	2904
NC9251	75		3327	3498*	2694	3002	2636	3498*	2121	2893	2919	3498*	2342	3074
NC9261	75		3498*	3498*	2866	3185	2805	3498*	2265	3073	3100	3498*	2498	3259
NC9201	25		2759	3110	2185	2458	2134	2993	1700	2361	2384	3209	1884	2523
NC9211	30		2904	3271	2302	2589	2249	3149	1792	2487	2511	3374	1985	2658
NC9221	40		3192	3587	2537	2850	2479	3457	1977	2739	2765	3698	2190	2925
NC9231	50		3428	3845	2732	3066	2670	3708	2132	2947	2975	3962	2361	3145
NC9241	60		3489	3923	2770	3114	2706	3780	2155	2992	3021	4045	2389	3196
NC9251	75		3711	4100*	2954	3317	2887	4016	2302	3188	3219	4100*	2550	3403
NC9261	75		3930	4100*	3149	3525	3079	4100*	2467	3392	3424	4100*	2728	3614

• Thermal performance of the NC Series has been certified by CTI (Cooling Tower Institute) in accordance with CTI Standard STD-201(96), and has been assigned CTI certification validation number 92-14-01.

• CTI Certification under STD-201(96) applies ONLY to selections with entering water temperature of 125°F or less, temperature ranges of 4°F or more, temperature approaches of 5°F or more, and wet bulb temperatures between 60°F and 85°F.

\* Indicates maximum hydraulic flow limit.

# Tower Schematic



Tower Model Note 2	Nominal Tons Note 3	Dimensions				Design Operating Wt/Cell lbs	Motor hp	Shipping Weight lbs	
		L	H	A	B			Weight/Cell	Heaviest Section
NC8201	611	10'-10 3/4"	19'-9 3/4"	11'-2 1/4"	5 1/2"	33,014	25	15,337	8,338
NC8211	648					33,076	30	15,399	8,400
NC8221	706					33,219	40	15,542	8,543
NC8231	778					33,285	50	15,608	8,609
NC8241	814					33,557	60	15,880	8,881
NC9201	673	11'-10 3/4"	19'-9 3/4"	12'-2 1/4"	5 1/2"	35,689	25	16,335	8,838
NC9211	706					35,751	30	16,397	8,900
NC9221	782					35,815	40	16,461	8,964
NC9231	832					35,881	50	16,527	9,030
NC9241	887					36,153	60	16,799	9,302
NC9251	941	36,292	75	16,938	9,441				
NC9261	1,000	12'-8 5/8"	23'-4"	12'-9 1/2"	12 3/4"	36,372	75	17,018	9,521
NCC201	766	13'-10 3/4"	19'-9 3/4"	14'-2 1/4"	5 1/2"	41,442	25	18,802	9,894
NCC211	807					41,504	30	18,864	9,956
NCC221	889					41,648	40	19,007	10,099
NCC231	957					41,714	50	19,073	10,165
NCC241	971					42,339	60	19,698	10,790
NCC251	1035					42,339	75	19,758	10,850
NCC261	1,102	13'-10 3/4"	23'-4"	14'-2 1/4"	5 1/2"	42,491	75	19,850	10,942

### Note

- 1 Use this bulletin for preliminary layouts only. Obtain current drawings from your Marley sales representative. All table data is per cell.
- 2 Last numeral of model number indicates number of cells. Change as appropriate for your selection.
- 3 Nominal tons are based upon 95°F HW, 85°F CW, 78°F WB and 3 GPM/ton.
- 4 Standard overflow is a 4" dia. standpipe in the collection basin floor. The standpipe removes for flush out and draining. See page 9 for side overflow option.
- 5 Outlet sizes vary according to GPM and arrangement. See pages 6 and 9 for outlet sizes and details.
- 6 Makeup water connection may be 1" or 2" dia, depending upon tower heat load, water pressure, and desired connections. See page 6 for additional information.

# SystemConnect

Tired of having to design your piping and tower layout to accommodate the standards of others? Marley's SystemConnect™ variety of piping systems accommodates your design intentions to make your layout of the NC Series both expedient and economical.

- Single or dual hot water inlet connections
- Side inlet, bottom inlet or top inlet connections
- Side or bottom cold water outlet connections
- A variety of makeup, overflow and drain options

All piping from the single inlet connection to the distribution basins is part of the tower package. Installation and design costs are reduced and the need for extra piping and supports are eliminated. The single bottom inlet connection is perfect for multicell applications, keeping all the inlet piping below the tower.

Unless otherwise specified, single-cell towers normally have a side-outlet suction appropriate for the design water flow rate—see page 9. This usually assures the lowest possible installed tower elevation. Side-suction connection pipes extend roughly 3" outside the basin, and are beveled for weld connection and also grooved for a mechanical coupling.

Outlet piping can be kept below the cold water basin level by choosing either a depressed sump or a bottom outlet connection in lieu of the side suction. Bottom outlets conform to standard class 125 ANSI pipe flange specifications. All outlet arrangements include easily removable debris screens.

Depressed sumps are made of inert FRP or heavy-gauge welded stainless steel. Unless otherwise specified towers with galvanized steel collection basins use FRP sumps and towers with stainless steel basins use stainless sumps.

Multicell towers, intended to operate together as a common unit, are joined by steel flumes between the collection basins. These flumes equalize the operating water level between basins and also provide a flow passage from cells not equipped with outlets or makeup valves, often eliminating the need to specify an outlet and makeup valve for each cell on a multicell installation. Select the number of outlets required to maintain a maximum flow of 2,203 GPM through each flume. Flow values are for side-suctions or bottom-outlets w/o trash screen. Refer to sales drawings to obtain flow values for sumps and bottom outlets w/trash screens.

If each cell is to be equipped with an outlet, side-suctions can be used at both ends of multicell towers, but not on intermediate cells of installations over two cells. For direct outlet from each cell of towers with three or more cells, use either the sump or bottom outlet arrangements.

The best choice for a tower used with a remote or indoor storage tank (see page 10) or on a concrete cold water basin is usually a bottom outlet, with or without screen.

A side-suction equipped tower can be installed on a flat concrete slab if a side drain and overflow are also specified. Consult your Marley application engineer for complete information.

## Make-Up

The amount of water constantly evaporated from a cooling tower varies directly with the heat load applied. In addition to evaporation, water is normally lost to the blow-down (bleed-off) necessary to maintain dissolved solids concentration at an acceptable level in the circulating water system.

Makeup Water Flow Required—GPM to Maintain Three (3) Concentrations						
Tower GPM	Cooling "Range" (hot water minus cold water)					
	5° F	10° F	15° F	20° F	30° F	40° F
200	2	3	4	5	8	10
400	3	5	8	10	15	20
600	4	8	12	15	23	30
800	5	10	15	20	30	40
1,000	7	13	19	25	38	50
1,500	10	19	29	38	57	75
2,000	13	25	38	50	75	100
3,000	19	38	57	75	113	150
4,000	25	50	75	100	150	200
5,000	32	63	94	125	188	250
6,000	38	75	113	150	225	300
8,000	50	100	150	200	300	400

### Note

If circulating water is to be maintained at 2 concentrations instead of 3, multiply table GPM values by 1.36 before sizing makeup valve.

Marley provides one or more float-operated, mechanical makeup valves to automatically replenish this lost water. The tables below, calculated for a concentration of 3 times normal, indicate the rate of water loss—and the size of valve(s) required. If your installation's cold water basin will drain by gravity to a remote storage tank—or if you plan a separate means of controlling makeup water—we offer a price reduction for deleting the Marley-supplied valve(s).

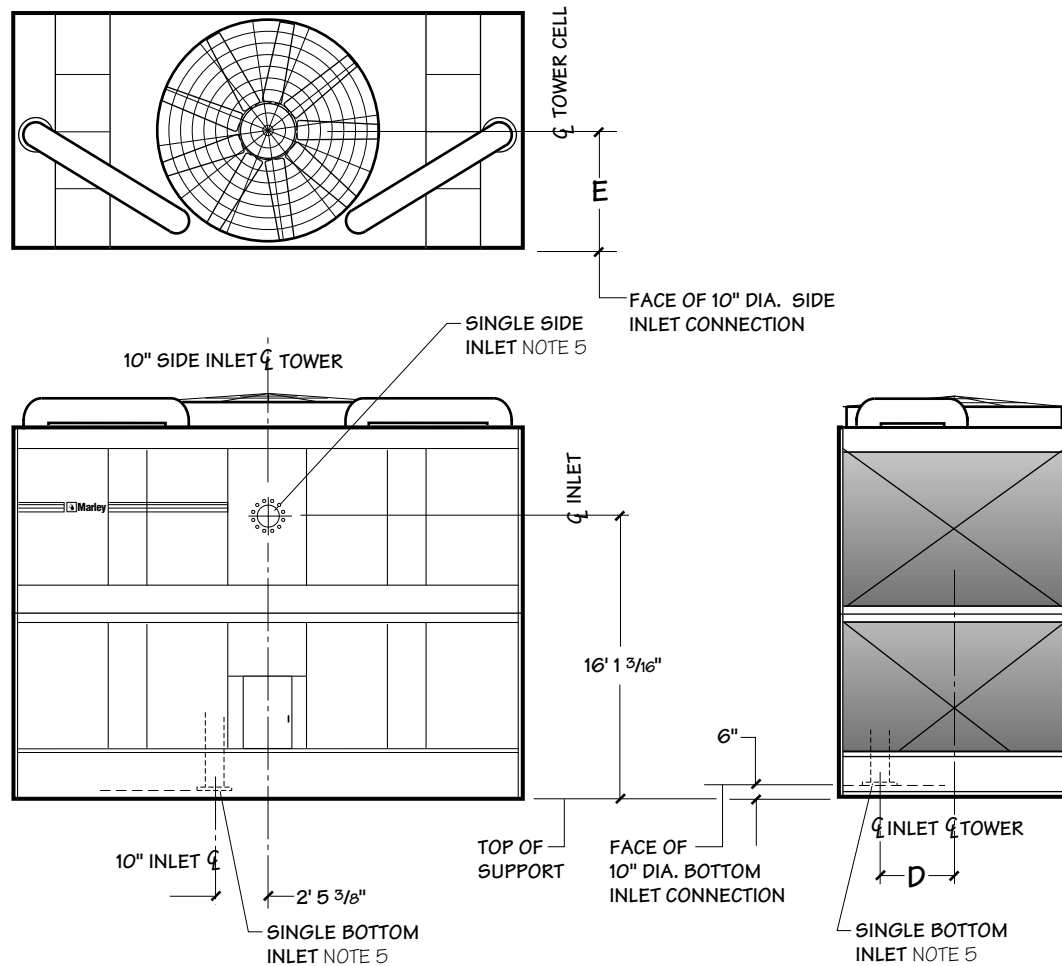
Makeup Valve Flow Capacities—GPM		
Pressure at Valve Inlet while flowing—psig	1" Diameter Valve	2" Diameter Valve
10	26	62
20	46	108
30	60	143
40	68	170
50	75	188

### Note

- If makeup water pressure exceeds 50 psig, use pressure reducer ahead of valve.
- For flow requirements exceeding the above limitations, use multiples of the same size valve.

# SystemConnect

## SINGLE INLET CONNECTION OPTION



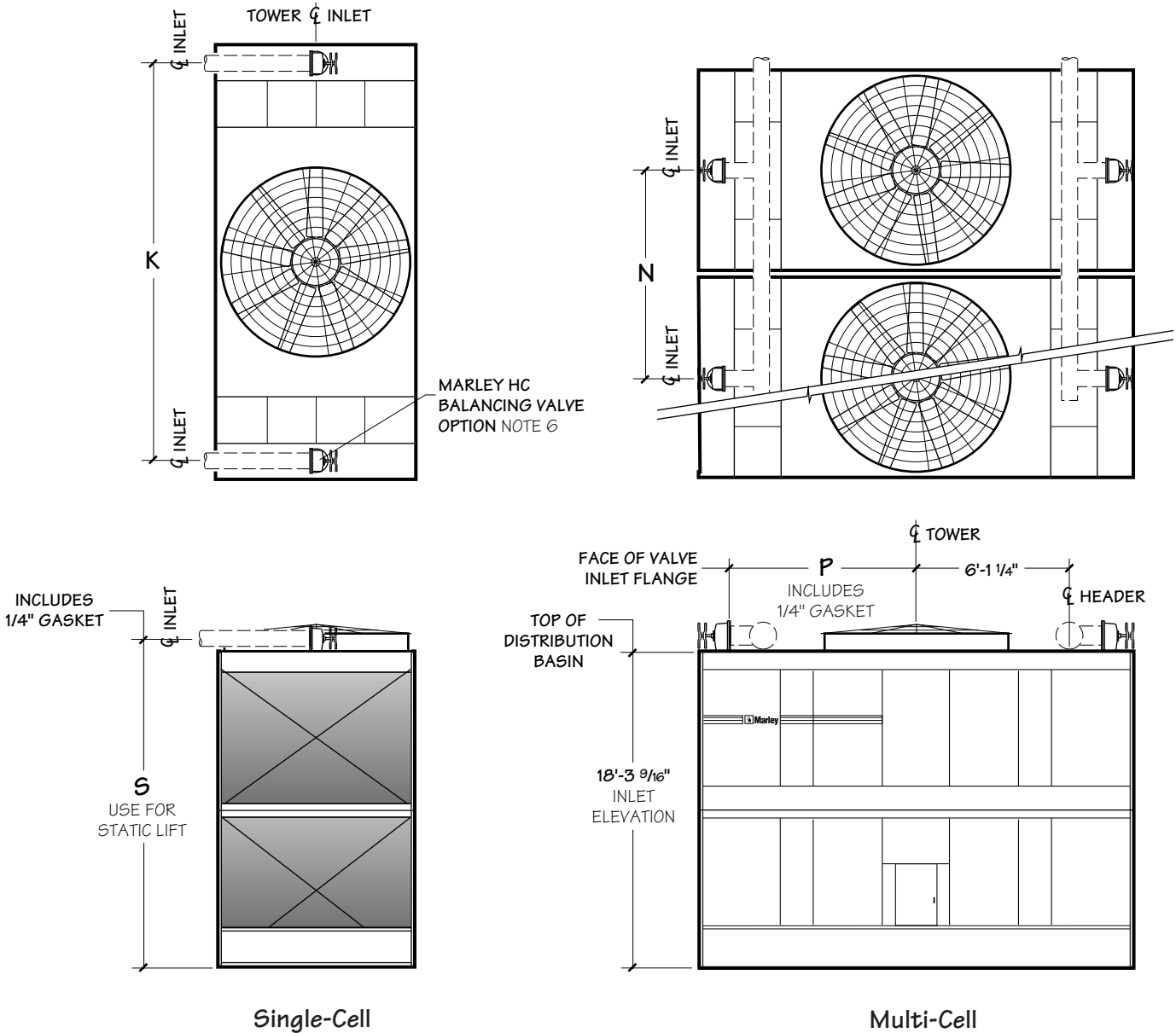
Tower Model	Dimensions	
	D	E
NC8200	3'-10 1/8"	5'-3 5/16"
NC9200	4'-4 1/8"	5'-9 5/16"
NCC200	3'-4 1/8"	6'-9 5/16"

### Note

- 1 Use this bulletin for preliminary layouts only. Obtain current drawings from your Marley sales representative.
- 2 All piping loads, including weight, thrust and lateral loads of riser and horizontal piping must be supported independent of tower.
- 3 All piping and supports beyond the inlet connection—and their design—are by others.
- 4 Allow adequate clearance for entry to tower access doors and safe use of optional ladder. Refer to appropriate Marley drawings.
- 5 You may choose either a bottom inlet connection or a side inlet connection. The bottom inlet connects at the tower collection basin floor. Refer to appropriate Marley drawings.
- 6 Contact your Marley sales representative for the required pump head for single-inlet applications.

# SystemConnect

## DUAL INLET CONNECTION



Single-Cell

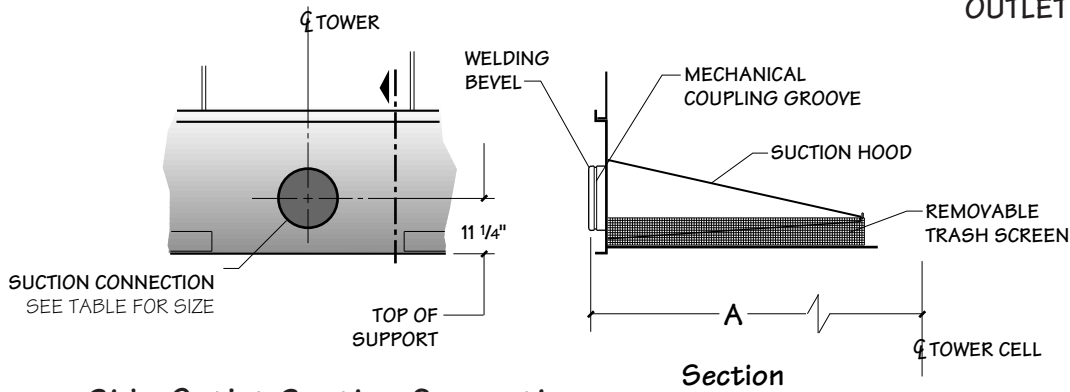
Multi-Cell

Tower Model	K	S	N	P	Inlet Diameter
NC8200	20'-6"	19'-0 13/16"	11'-2 1/4"	9'-11 1/2"	2@8"
NC9200 thru NC9250	20'-6"	19'-0 13/16"	12'-2 1/4"	9'-11 1/2"	2@8"
NC9260	20'-6"	19'-0 13/16"	12'-9 1/2"	9'-11 1/2"	2@8"
NCC200	20'-3 1/2"	19'-2 9/16"	14'-2 1/4"	9'-9 1/2"	2@10"

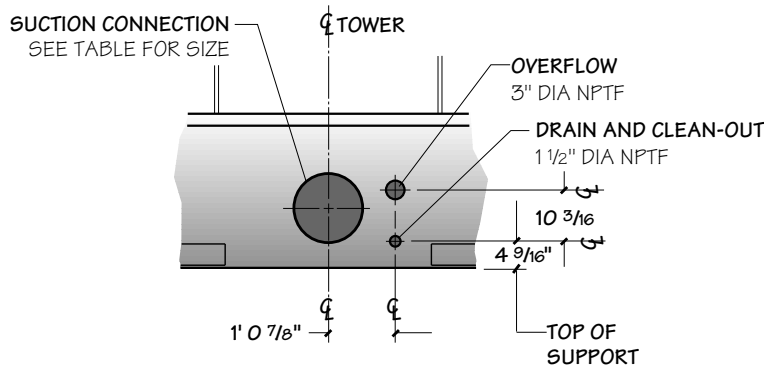
### Note

- 1 Use this bulletin for preliminary layouts only. Obtain current drawings from your Marley sales representative.
- 2 Pumping head contributed by the tower is static lift. Add your system dynamic pipe losses for total.
- 3 The tower will support the vertical weight of any piping within the plan area of the tower only. All piping loads, including thrust and lateral loads of riser and horizontal piping must be supported independent of tower. See inlet piping drawing for details.
- 4 All piping and supports—and their design—are by others.
- 5 Allow adequate clearance for entry to tower access doors and safe use of optional ladder. Refer to appropriate Marley drawings.
- 6 You may choose to use 90° short radius flanged elbows in place of HC balancing valves on single-cell towers where inlet piping is balanced for equal flow. Pipe elevation remains as shown.



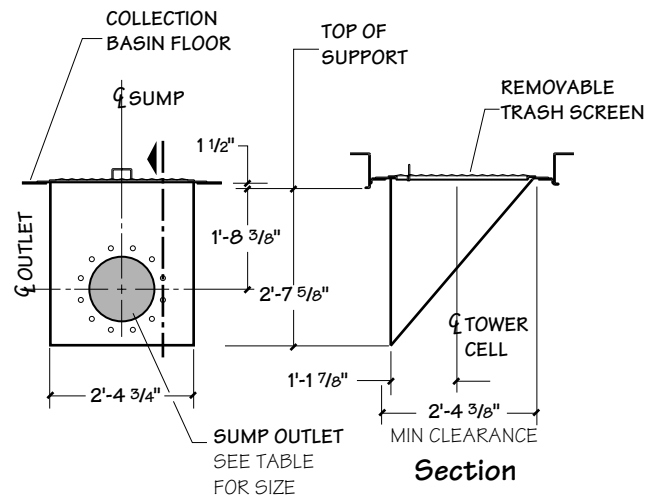


Side-Outlet Suction Connection



Side-Outlet Drain and Overflow Connection

Tower Model	A
NC8200	5'-6 3/16"
NC9200 NCC200	6'-0 3/16"



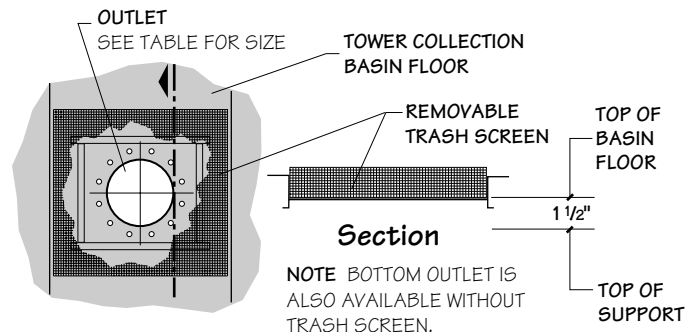
Depressed Side-Outlet Sump Connection

STAINLESS STEEL OR FRP

Maximum GPM per Outlet					
Outlet Diameter	Side Suction pump flow	Sump pump flow w/o anti-vortex plate	Sump pump flow w/ anti-vortex plate or gravity flow w/ or w/o anti-vortex plate	Bottom Outlet pump flow w/o anti-vortex plate	Bottom Outlet pump flow w/ anti-vortex plate or gravity flow w/ or w/o anti-vortex plate
6"		630	900	162	
8"	1,595	1,116	1,595	287	673
10"	2,515	1,760	2,515	453	1,061
12"	3,578	2,504	3,578	644	1,509
14"	4,252	3,065	4,378	788	1,847
16"				1,041	2,441
18"				1,349	3,162
20"				1,675	4,045
24"				2,433	4,897

**Note**

- For gravity-flow situations (as to an indoor tank), use bottom outlet or depressed side outlet sump. **Side outlet suction is not recommended for gravity flow.**
- GPM limits are based on single-cell or multicell towers with a single outlet per cell. For multicell towers connected with collection basin flumes and less than one outlet per tower cell consult your Marley sales representative for more specific information.



Bottom Outlet Connection

# Freeze Prevention

When the ambient air temperature falls below 32°F, the water in a cooling tower can freeze. *Marley Technical Report #H-003 “Operating Cooling Towers in Freezing Weather”* describes how to prevent freezing during operation. Ask your Marley application engineer for a copy.

During shutdowns, water collects in the cold water basin and may freeze solid. You can prevent freezing by adding heat to the water left in the tower. Or, you can drain the tower and all exposed pipework at shutdown.

## Electric Basin Heaters

Marley offers an automatic basin heater system, consisting of these components:

- Stainless steel electric immersion heater(s).  
—Threaded couplings are provided in the side of the collection basin.
- NEMA 4 enclosure containing these components:  
—Magnetic contactor to energize heater.  
—Transformer to convert power supply to 24 volts for control circuit.  
—Solid state circuit board for temperature and low-water cutoff.  
Enclosure may be mounted on the side of the tower.
- Control probe in collection basin to monitor water temperature and water level.

These components are normally shipped separately for installation at the job site by others. When purchased in conjunction with the Marley Control System option, they are factory installed and tested.

Any exposed piping that is still filled with water at shutdown—including the makeup water line—should be electrically traced and insulated (by others).

## Steam Jet Basin Heaters

Penberthy Houdaille bronze steam jet heaters (1/4" to 3/4") are available from Marley for freeze protection (installation by others). Injectors install in a coupling provided in the side of the collection basin. Live steam, as required, is injected directly into the water. Condensed steam adds water to the basin, and the excess will exit the overflow of the tower.

## Indoor Tank

In this type of system, water flows from an indoor tank, through the load system, and back to the tower, where it is cooled. The cooled water flows by gravity from the tower to the tank located in a heated space. At shutdown, all exposed water drains into the tank, where it is safe from freezing.

The following table lists typical drain-down capacities for all NC Series Modular models. Although Marley does not produce tanks, many of our representatives offer tanks supplied by reputable manufacturers.

The amount of water needed to successfully operate the system depends on the tower size and GPM and on the volume of water contained in the piping system to and from the tower. You must select a tank large enough to contain those combined volumes—plus a level sufficient to maintain a flooded suction on your pump. Control makeup water according to the level where the tank stabilizes during operation.

NC Series Modular Drain Down Capacity		
Tower Model	Range of Tower Design GPM	Maximum Gallons of Drain-Down
NC8200	350-510	1,338
	520-630	1,394
	640-760	1,442
	770-950	1,507
	960-1,100	1,543
	1,110-1,320	1,607
	1,330-1,500	1,648
	1,510-1,910	1,746
	1,920-2,500	1,869
NC9200	2,510-3,120	1,974
	480-550	1,451
	560-690	1,526
	700-830	1,576
	840-1,040	1,649
	1,050-1,200	1,684
	1,210-1,440	1,755
	1,450-1,640	1,801
	1,650-2,090	1,909
NCC200	2,100-2,730	2,040
	2,740-3,410	2,156
	480-640	1,677
	650-810	1,773
	820-970	1,827
	980-1,220	1,917
	1,230-1,420	1,969
	1,430-1,690	2,042
	1,700-1,930	2,100
1,940-2,460	2,226	
2,470-3,210	2,380	
3,220-4,100	2,549	

### Note

Volumes shown are maximums for the GPM ranges indicated. Actual volumes will usually be less. Contact your Marley sales representative for more specific information.

# Operating and Environmental Awareness

## Sound Control

Sound produced by a NC Series Modular tower operating in an unobstructed environment will meet all but the most restrictive noise limitations—and will react favorably to natural attenuation. Where the tower has been sized to operate within an enclosure, the enclosure itself will have a damping effect on sound. Sound also declines with distance—by about 6 dBA each time the distance doubles. Where noise at a critical point is likely to exceed an acceptable limit, several options are available—listed below in ascending order of cost impact:

- In many cases, noise concerns are limited to nighttime, when ambient noise levels are lower and neighbors are trying to sleep. You can usually resolve these situations by using two-speed motors in either 1800/900 or 1800/1200 RPM configuration—operating the fans at reduced speed **without cycling** “after hours”. The natural nighttime reduction in wet-bulb temperature makes this a very feasible solution in most areas of the world, but the need to avoid cycling may cause the cold water temperature to vary significantly.
- The Marley Variable Frequency Drive automatically minimize the tower’s noise level during periods of reduced load and / or reduced ambient temperature without sacrificing the system’s ability to maintain a constant cold water temperature. This is a relatively inexpensive solution, and can pay for itself quickly in reduced energy costs.
- Where noise is a concern at all times—for example, near a hospital—the best solution is to oversize the tower so it can operate continuously at reduced (1200 or 900 RPM) motor speed. Typical sound reductions are 7 dBA at 2/3 fan speed or 10 dBA at 1/2 fan speed.
- Extreme cases may require inlet and discharge sound attenuator sections—however, the static pressure loss imposed by attenuators may necessitate an increase in tower size. This is the least desirable approach because of the significant cost impact—and because of the obstruction to normal maintenance procedures.

Your Marley application engineer can help you meet your sound requirements.

## Enclosures

Occasionally, cooling towers are located inside architectural enclosures for aesthetic reasons. Although NC Series Modular towers adapt well to enclosures, the designer must realize the potential impact of a poorly arranged enclosure on the tower’s performance and operation. The designer must take care to provide generous air inlet paths, and the tower’s fan cylinder discharge height should not be lower than the elevation of the top of the enclosure. Obtain a copy of *Marley Technical Report #H-004 “External Influences on Cooling Tower Performance”* from your Marley application engineer.

As suggested in the aforementioned Technical Report, it may also be advisable to specify a design wet-bulb temperature 1°F higher than normal to compensate for potential recirculation initiated by the enclosure. You’ll benefit from discussing your project with your Marley application engineer.

## System Cleanliness

Cooling towers are very effective air washers. Atmospheric dust able to pass through the relatively small louver openings will enter the circulating water system. Increased concentrations can intensify system maintenance by clogging screens and strainers—and smaller particulates can coat system heat transfer surfaces. In areas of low flow velocity—such as the cold water basin—sedimentary deposits can provide a breeding ground for bacteria.

In areas prone to dust and sedimentation, you should consider installing some means for keeping the cold water basin clean. Typical devices include side stream filters and a variety of filtration media.

## Water Treatment

In order to control the inevitable buildup of dissolved solids as water evaporates from the cooling tower, you should plan to develop a consistent, effective program of water treatment. The program must control corrosion, scale buildup and accumulation of biological contaminants.

An acceptable water treatment program must be compatible with the variety of materials incorporated into a cooling tower, ideally the pH of the circulating water should fall between 6.5 and 8.0. Batch feeding of chemicals directly into the cooling tower is not a good practice, since localized damage to the tower is possible. Additional water quality requirements appear in the **NC and NC Modular Owners Manual** which accompanies the tower.

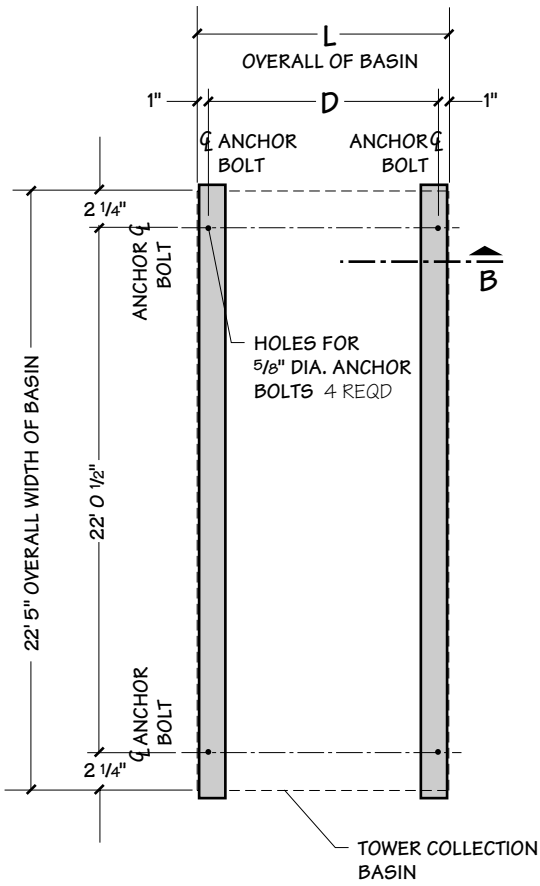
For complete water treatment recommendations, consult a competent, qualified water treatment supplier.

Most systems can be successfully treated with a **MARLEYOZONE™** System. This usually removes the requirement for other chemical feed systems. In many installations there is the potential for significant water savings. For complete information, contact your local Marley application engineer.

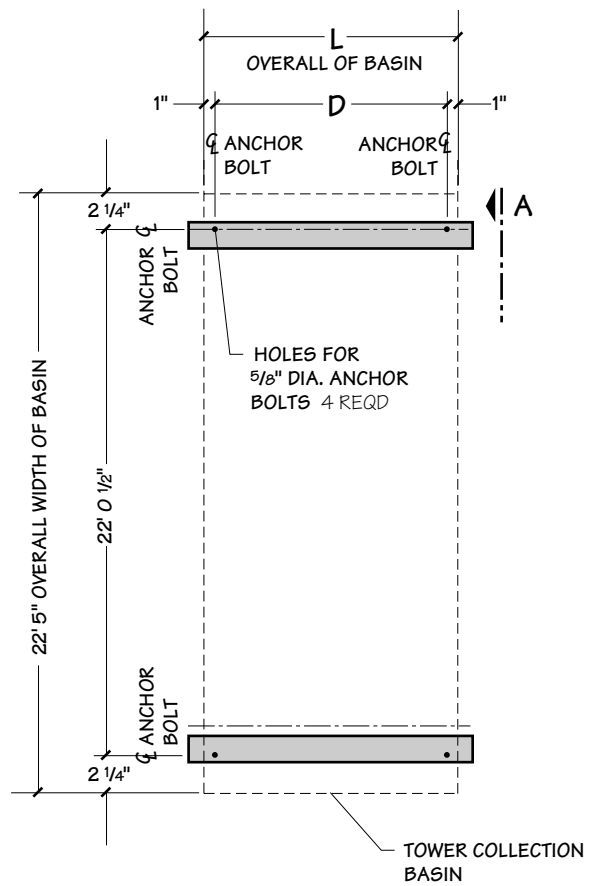
### △ CAUTION

***The cooling tower must be located at such distance and direction to avoid the possibility of contaminated tower discharge air being drawn into building fresh air intake ducts. The purchaser should obtain the services of a Licensed Professional Engineer or Registered Architect to certify that the location of the tower is in compliance with applicable air pollution, fire, and clean air codes.***

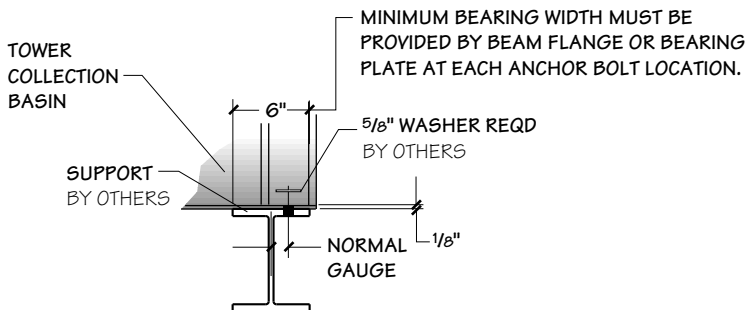
# Tower Support



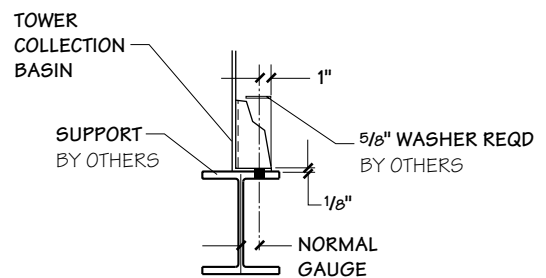
**Supporting Steel**  
SINGLE-CELL



**Supporting Steel Alternate**  
SINGLE-CELL

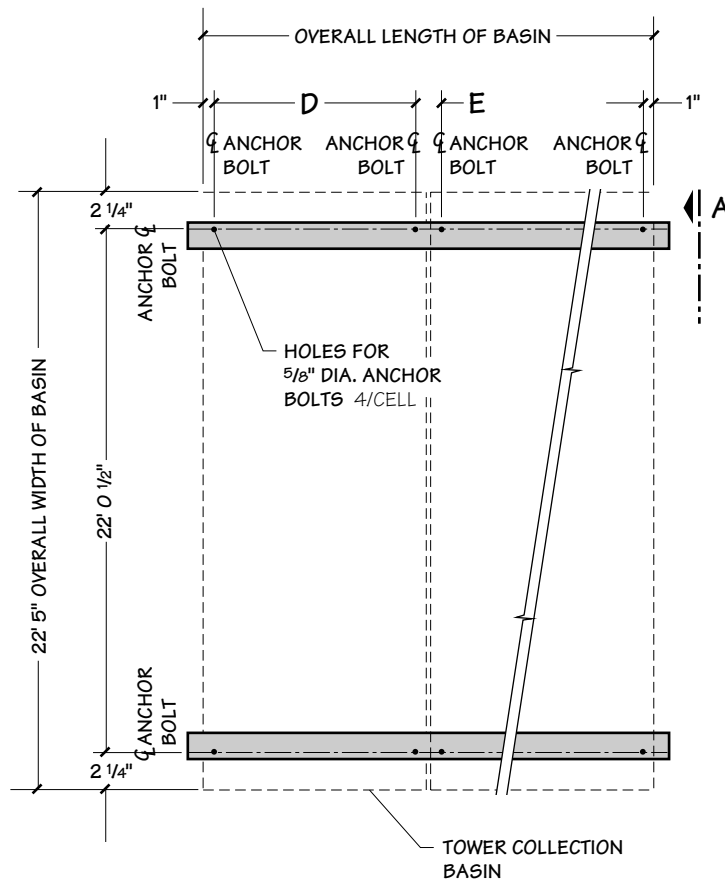


**View A**



**Section B**

# Tower Support



## Supporting Steel MULTICELL

Tower Model	Dimensions			Design Operating Wt /Cell lbs	Design Operating Load at Anchor lbs	Wind/Seismic Loads lbs	
	L	D	E			Max. Vertical Reaction at Anchor	Max. Horizontal Reaction at Anchor
NC8200	10'-10 3/4"	10'-8 3/4"	5 1/2"	33,557	8,389	7,292	3,416
NC9200 thru NC9250	11'-10 3/4"	11'-8 3/4"	5 1/2"	36,292	9,073	7,338	3,757
NC9260	11'-10 3/4"	11'-8 3/4"	1'-0 3/4"	36,372	9,093	7,338	3,757
NCC200	13'-10 3/4"	13'-8 3/4"	5 1/2"	42,491	10,623	5,434	3,641

### Note

1. Use this bulletin for preliminary layouts only. Obtain current drawings from your Marley sales representative for final design.
2. Purchaser to provide tower support complete with holes and anchor bolts. Do not use studs! Anchor points must be framed flush and level at top.
3. Design operating weight occurs with collection basin full to overflow level. Actual operating weight varies with GPM and piping scheme, but is normally less than shown here.
4. Wind loads are based on 30 psf and are additive to operating loads. Reactions due to seismic loads exceed those resulting from wind loads. Seismic loads are based on UBC, Zone 4. See sales drawings for details.
5. Tower may be placed on a flat concrete slab. Side outlet and optional side drain and overflow must be specified. See pages 4 and 7 and consult your Marley application engineer.
6. Tower may be supported from piers at each anchor bolt location, as a support alternative.

# Additional Information

## Typical Applications

You can use the NC Series Modular tower in normal applications requiring cold water for the dissipation of heat. This includes condenser water cooling for air conditioning, refrigeration, and thermal storage systems, as well as their utilization for *Free Cooling* in all of those systems. They are also used in the cooling of jacket water for engines and air compressors, and are widely applied to dissipate waste heat in a variety of industrial and manufacturing processes.

Being constructed of stainless steel and other inert materials, the NC Diamond Series Modular can be confidently applied in unusually corrosive processes and operating environments. However, no single product line can answer all problems, and selective judgement should be exercised in the following situations

## Applications Requiring Alternative Cooling Tower Selections

Certain types of applications are incompatible with any cooling tower with PVC film fill—whether NC Series Modular or a competitive tower of similar manufacture. PVC is subject to distortion in high water temperatures, and the narrow passages typical of film-type fill are easily clogged by turbid or debris-laden water. Some of the applications, which call for alternative tower designs are:

- **Water temperatures exceeding 125°F**—will adversely affect the service life and performance of normal PVC fill.
- **Ethylene glycol content**—can plug fill passages as slime and algae accumulate to feed on the available organic materials.
- **Fatty acid content**—found in processes such as soap and detergent manufacturing and some food processing, fatty acids pose a serious threat for plugging fill passages.
- **Particulate carryover**—often found in steel mills and cement plants, can both cause fill plugging, and can build up to potentially damaging levels on tower structure.
- **Pulp carryover**—typical of the paper industry and food processing where vacuum pumps or barometric condensers are used. Causes fill plugging which may be intensified by algae.

## Alternative Selections

In addition to the NC and NC Diamond Series Modular towers, Marley offers a full scope of products in various designs and capacities to meet the special demands of specific applications.

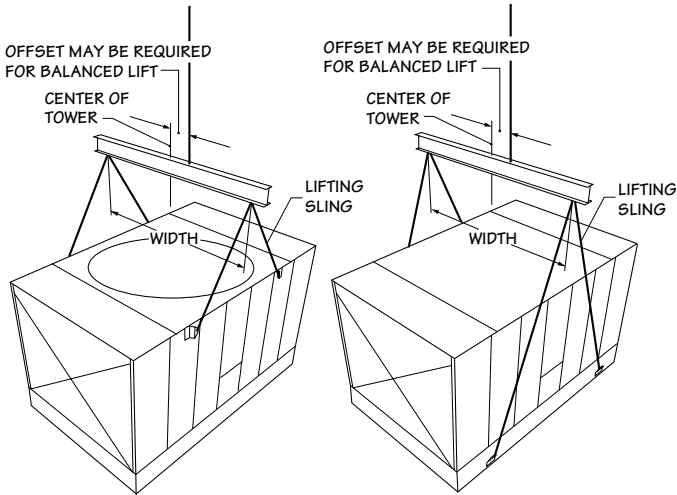
## Corrosion Resistant Towers

- **QuadraFlow®**—fiberglass and stainless steel construction assures long service life in virtually any environment. Five-year full product warranty. Efficient PVC film fill. Uniquely different and architecturally attractive.
- **Sigma™ Series**—available in wood, fiberglass, HDG steel or stainless steel structure. Field-erected for medium to large projects. Available in a wide range of sizes. Efficient PVC film-type fill.

## Splash Fill Towers

- **Series 10/Series 15**—wood structure, fiberglass casing, with splash-type fill. Similar capacities to Sigma series towers. Proven in hundreds of installations. Excellent in “dirty water” situations.

## Hoisting Information



Model	Tower Width	Minimum Sling Length
NC8 Top	11'-0"	10'-0"
NC8 Bottom	11'-0"	17'-6"
NC9 Top	12'-0"	10'-0"
NC9 Bottom	12'-0"	17'-6"
NCC Top	14'-0"	10'-0"
NCC Bottom	14'-0"	17'-6"

### Note

- All hoisting clip holes are 1¼".
- Overall length of shackle pins should not exceed 5¼".
- For overhead lifts or where additional safety is required, add slings beneath the module.



## **Marley Cooling Tower**

A United Dominion Company

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In the interest of technological progress, all products are  
subject to design and/or material change without notice.

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**TECH NCM 98**