

Series NC[®]



**Factory
Mutual
System**

Approval Available



*Heavy Duty Cooling Towers
for HVAC and Industrial Service*

The Marley Difference

You'll enjoy single source responsibility and reliability because we design and manufacture virtually all major cooling tower components.

All Marley components are designed and selected to be part of an *integrated system*. For example, the spray pattern from nozzles and the pressure drop through drift eliminators both affect a fill's heat transfer capacity. So, we include that impact in our thermal analysis.

Drift eliminators must be effective at the air velocities where fill is most efficient. So, we've carefully designed both components to work together efficiently.

How many other cooling tower companies can offer you this assurance? They may use Brand "A" nozzles with Brand "B" fill and Brand "C" drift eliminators. When they all come together, the whole may be less than the sum of the parts.

Our *total system* approach assures that *all the parts work together* to provide you the greatest total performance.

And because we design specifically for cooling towers, all our components will provide many years of service with minimal maintenance.

The Marley Cooling Tower Company Five-Year Limited Warranty

The Marley Cooling Tower Company warrants that the Mechanical Equipment, which includes the fan(s), gearbox(es), driveshaft(s), coupling(s), and torque tube(s) or mechanical equipment support(s), [but excluding the motor(s) which is warranted by its manufacturer, and all motor components] sold will be free from all defects in materials and workmanship for a period of five years from the date of shipment by Marley to the original installation. The obligation under this warranty is limited to the repair or the replacement of defective materials, at Marley's option, F.O.B. original shipping point. Warranty on repaired or replaced Equipment will be for the time remaining under the terms of the original warranty. This warranty is not transferable.

This warranty does not obligate Marley to bear the cost of labor, transportation charges, or other costs incurred in connection with the repair or replacement of defective parts; nor does this warranty apply to normal wear and tear nor to damage resulting from operation not conforming with Marley's operation and maintenance instructions, accident, alteration, misuse, or an abnormally corrosive or abrasive use environment.

This warranty applies only to the Marley Series NC, Series NC Modular, Compac II®, QuadraFlow®, Series 10, Series 15, Series 100/120 Sigma, and the Masonry Shell (MS) cooling tower product lines.

MARLEY SHALL NOT BE LIABLE FOR DAMAGES TO OR LOSS OF OTHER PROPERTY OR EQUIPMENT, OR ANY SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES RESULTING FROM THE FAILURE OF THE MECHANICAL EQUIPMENT TO COMPLY WITH CONTRACT OF SALE, BREACH OF THE ABOVE WARRANTY, OR THE BREACH OF ANY EXPRESS OR IMPLIED WARRANTIES ARISING UNDER APPLICABLE LAW, NEGLIGENCE, OR OTHERWISE.

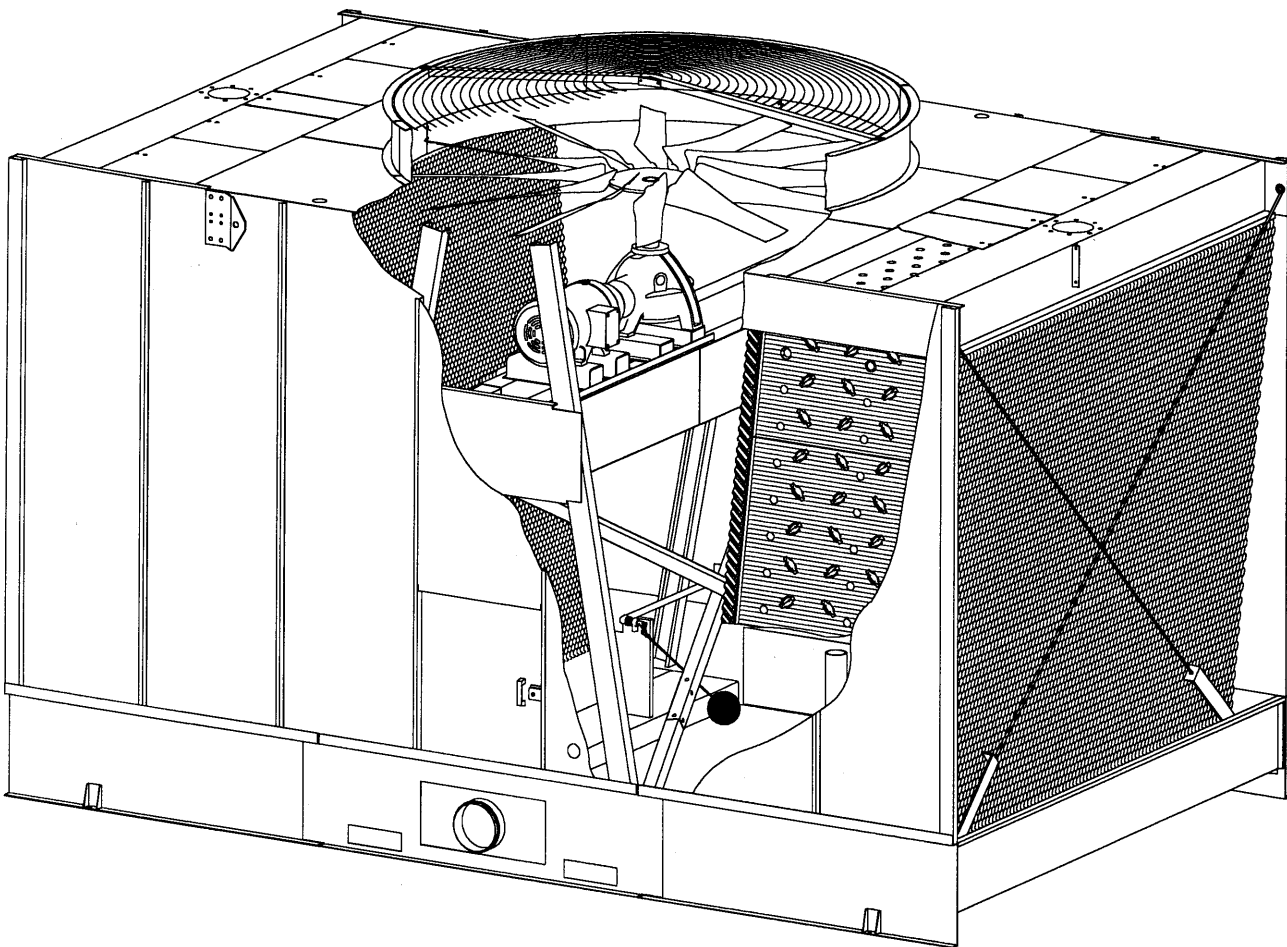
THE ABOVE WARRANTIES ARE IN LIEU OF ALL OTHER WARRANTIES EXPRESS OR IMPLIED ON THE MECHANICAL EQUIPMENT, AND ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED AND EXCLUDED FROM THIS AGREEMENT.



The Marley Cooling Tower Company
5800 Foxridge Drive • Mission, Kansas 66202
913/362-1818

APWARR-3

Series NC Advantages



1. **Guaranteed Performance.** Don't rely on outside agencies with limited enforcement powers. We'll stand by our responsibility for reliable thermal performance. We designed it. We rate it. *We guarantee it!*
2. **Exclusive 5-Year Mechanical Equipment Warranty.** Your no-cost assurance of trouble-free mechanical operation for 5 years. Isn't that where a lot of your tower maintenance dollars have gone in the past? (See the certificate on page 4.)
3. **Low Operating Costs.** Marley's high-efficiency fill and fans, gravity-flow water distribution, and efficient Geareducer® drive work together to offer maximum cooling with minimum power use.
4. **Low Maintenance Costs.** Induced-draft propeller fans on Marley right-angle Geareducers; TEFC, 1.15 service factor motors; and heavy-duty mechanical equipment supports assure long service life with minimum maintenance.
5. **All-Season Reliability.** Series NC towers perform as specified in the heat of summer. They respond well to energy management techniques in the spring and fall. They operate virtually ice-free in the dead of winter. And they offer simple maintenance all year long. *We guarantee it!*
6. **Proven Corrosion Protection.** Thousands of users over more than 30 years confirm the value of heavy galvanizing. And Marley's G-210 is the most effective galvanizing used in the industry. For especially tough applications, you can choose either all stainless steel construction or galvanized tower on a stainless cold water basin.
7. **Single Source Parts Availability.** Marley designs, manufactures, guarantees, and stocks all major components of the tower except motors. (In fact, we stock a number of motors, too.) We'll have the parts if you ever need them.
8. **Select Your Tower From This Bulletin.** You can use the charts on pages 12 through 15 for almost all your needs. If available space is a problem, or if you run into some unusual operating requirements, we'll be glad to help.
9. **No Hidden Rigging or On-site Labor Costs.** Just mount the fan cylinder extension and fan guard, and adjust the float valve. Your Series NC tower is ready for operation.

Freeze Prevention

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

Water collects in the cold water basin during shutdowns, 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

We offer an automatic basin heater system, consisting of these components (shipped separately for installation by others):

- Stainless steel electric immersion heater(s).
(Threaded couplings are provided in the side of the 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 cut-off.
 (Enclosure may be mounted on the side of the tower.)
- Control probe in collection basin to monitor water temperature and water level.

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

Steam Injectors (Mufflers)

Penberthy bronze steam mufflers (1/4" to 3/4") are available for control and installation by others. They install in a 3/4" coupling provided in the side of the basin. Live steam, as required, is injected directly into the water. The amount and temperature of steam required is that which will provide the heat equivalent of the "required kW" in the table on page 11. (kW x 3412 = Btu/hr.) Condensed steam adds water to the basin, and the excess will exit the overflow of the tower.

Indoor Tank Method

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 table below lists typical drain-down capacities for all Series NC 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 make-up water according to the level where the tank stabilizes during operation.

Series NC Drain-Down Capacity		
Tower Model	Range of Tower Design GPM	Maximum Gallons of Drain-Down
NC101 thru NC131	180 – 440	474
	450 – 630	507
	640 – 900	538
	890 – 1200	573
	1210 – 1600	606
NC201 thru NC221	220 – 380	575
	390 – 580	620
	590 – 810	649
	820 – 1530	728
	1540 – 2000	756
NC301 thru NC311	220 – 380	649
	390 – 580	707
	590 – 810	748
	820 – 1530	855
	1540 – 2000	897
NC401 thru NC421	250 – 520	767
	530 – 760	818
	770 – 1040	869
	1050 – 1730	967
	1740 – 2270	1017
NC501 thru NC531	310 – 650	956
	660 – 940	1012
	950 – 1280	1071
	1290 – 2140	1196
	2200 – 2800	1258
NC601 thru NC631	340 – 710	1046
	720 – 1240	1145
	1250 – 1790	1238
	1800 – 2340	1309
	2350 – 3070	1375
NC701 thru NC721	490 – 1010	1558
	1020 – 1760	1695
	1770 – 2550	1831
	2560 – 3330	1930
	3340 – 4140	2000

Note: Volumes shown are maximums for the GPM ranges indicated. Actual volumes will usually be less. Contact your Marley Application Engineer for more specific information.

Temperature Control and Energy Management

Cooling towers are usually selected to produce a specific cold water temperature at the higher summer-time wet-bulb temperatures. During the remainder of the year, the cooling tower is capable of producing much colder water. Unless your system will benefit from the coldest possible water temperature, you should consider controlling cold water temperatures to higher levels. You'll also save energy by using such control. (See Marley Technical Report #H-001A, *Cooling Tower Energy and its Management*.)

Always control leaving water temperature by manipulating the quantity of air that the fan moves through the tower. *Varying the quantity of water flow is not normally recommended and can be harmful in freezing weather.* You can alternately start and stop single-speed motors to maintain water temperatures within an acceptable range. However, exceeding a total acceleration time of 30 seconds per hour can overheat the motor, causing the insulation to fail. Limiting the number of motor starts, on the other hand, can produce significant variations in the temperature of the water delivered to the process.

Increased flexibility can simplify your operating procedures and save you money in the long run both on operation and on maintenance. Here are two of the more popular options.

Two-Speed Motors

Two-speed motors improve operating flexibility by increasing the number of potential operating modes. Users in northern climates will find that the tower can carry winter loads at half-speed; reducing fan power requirements by 85+% during that time. Two-speed motors also help to control icing during wintertime operation. (See Marley Technical Report #H-003, *Operating Cooling Towers During Freezing Weather*.)

Normally, two-speed motors are provided in 1800/900 RPM, single winding configuration, which is the least expensive two-speed option. They are also available in other combinations including the more expensive double winding.

Variable Speed Control

Frequency modulation devices work well on induced draft, propeller fan cooling towers such as the Series NC. However, their design must include the capability to lock out any critical fan speeds and the very low fan speed ranges. Consult your Marley application engineer for specific recommendations when considering variable speed control. In many cases, for example, you'll achieve the best results by using a single control to regulate the speed of several fans on a multi-cell tower.

Series NC Basin Heater Selection Chart						
Tower Model	+10°F Ambient		0°F Ambient		-10°F Ambient	
	Req'd kW	Heater kW	Req'd kW	Heater kW	Req'd kW	Heater kW
NC101 - 131	5.84	6	7.53	7.5	9.20	9
NC201 - 221	7.14	7.5	9.21	9	11.24	12
NC301 - 311	7.94	9	10.24	12	12.49	15
NC401 - 421	8.91	9	11.48	12	14.01	15
NC501 - 531	10.85	12	13.98	15	17.05	18
NC601 - 631	11.82	12	15.22	15	18.56	18
NC701 - 721	14.82	15	19.14	2 @ 12	23.34	2 @ 12

Notes:

1. "Required kW" is the calculated amount of heat needed to maintain +40°F basin water temperature at the indicated ambient air temperature. "Heater kW" is nominal capacity of heater actually supplied.
2. Heaters shown are 480 volts, 3-phase. Options or special heater selections may add several weeks to delivery.
3. Heaters do **not** operate continuously. They cycle on and off automatically as basin water temperature dictates.

Hoisting & Installation

In order to reduce weight for helicopter hoisting, components of the tower may be removed, and reinstalled after hoisting is complete. The adjacent table indicates weight reductions as components are removed – listed in approved order of removal.

Component	Series NC Component Weights (Lbs.)						
	Model						
	NC101 thru NC131	NC201 thru NC221	NC301 thru NC311	NC401 thru NC421	NC501 thru NC531	NC601 thru NC631	NC701 thru NC721
Fan Guard	30	38	38	86	88	120	142
Upper Fan Cylinder	67	78	78	89	89	100	108
H.W. Basin Covers	73	93	93	104	129	140	237
Flume Assy.	44	54	54	62	76	84	103
Lower Fan Cylinder	41	48	48	55	55	62	67
Suction Assy. & End Plate	76-90	76-90	76-90	76-90	76-104	76-104	133
Overflow	23	23	23	23	23	23	26
Float Valve	16	16	16	16	16	16	16
Fan Deck & C.E.I.	164	187	235	285	345	356	348
Fan	107	231	231	290	290	345	270
Motor & Coupling	108-268	189-329	268-329	268-378	329-596	378-662	451-662
Gearreducer	75-218	218	218	218	218-379	379	379
Corner Cols.	37	37	52	52	52	52	50
Fill, Tubes & End Supports	856	1063	1391	1571	1934	2115	3005
Mechanical Eqpt. Suppts.	197	240	240	411	512	557	638
Remainder Do Not REMOVE	3154	3392	4033	4346	4922	5125	6193

Use the information appearing on these cautionary stickers (reproduced below) to hoist your tower safely. One of these stickers also appears on each access door of every tower.

HOISTING - INSTALLATION

OFFSET REQUIRED TO COUNTERBALANCE MOTOR WEIGHT

Cooling tower must be installed level to insure maximum thermal performance and to avoid racking.

Hoisting clips are provided for ease of unloading and positioning. For overhead lifts or where additional safety precautions are prudent, add slings beneath the tower.

MODEL	A	B
NC100	6'-6"	6'-6"
NC200	8'-0"	6'-6"
NC300	8'-0"	8'-6"
NC400	9'-0"	8'-6"
NC500	11'-0"	8'-6"
NC600	12'-0"	8'-6"

89-2458

Models NC100 through NC600 Only

HOISTING - INSTALLATION

OFFSET REQUIRED TO COUNTERBALANCE MOTOR WEIGHT

Cooling tower must be installed level to insure maximum thermal performance and to avoid racking.

Hoisting clips are provided for ease of unloading and positioning. For overhead lifts or where additional safety precautions are prudent, add slings beneath the tower.

90-281

Models NC700 Only

76°F Wet-Bulb Selection Factors												
Approach	5	6	7	8	9	10	11	12	13	14	15	
Range												
5	5.61	6.22	6.76	7.24	7.68	8.08	8.46	8.81	—	—	—	
6	5.11	5.69	6.21	6.67	7.10	7.49	7.86	8.20	8.52	8.83	—	
7	4.70	5.26	5.76	6.21	6.63	7.01	7.37	7.71	8.02	8.32	8.61	
8	4.36	4.90	5.39	5.83	6.24	6.61	6.96	7.29	7.60	7.89	8.17	
9	4.07	4.60	5.08	5.51	5.90	6.27	6.61	6.93	7.24	7.53	7.80	
10	3.83	4.35	4.81	5.23	5.61	5.97	6.31	6.63	6.93	7.21	7.48	
11	3.62	4.12	4.57	4.98	5.36	5.71	6.04	6.36	6.65	6.93	7.20	
12	3.43	3.92	4.36	4.77	5.14	5.48	5.81	6.12	6.41	6.68	6.95	
13	3.26	3.74	4.18	4.57	4.94	5.28	5.60	5.90	6.19	6.46	6.72	
14	3.11	3.58	4.01	4.40	4.76	5.09	5.41	5.71	5.99	6.26	6.52	
15	2.97	3.44	3.86	4.24	4.60	4.93	5.24	5.53	5.81	6.08	6.33	
16	2.85	3.31	3.72	4.10	4.45	4.77	5.08	5.37	5.65	5.91	6.16	
17	2.74	3.19	3.59	3.97	4.31	4.63	4.94	5.22	5.50	5.76	6.01	
18	2.63	3.08	3.48	3.85	4.19	4.51	4.81	5.09	5.36	5.62	5.86	

77°F Wet-Bulb Selection Factors												
Approach	5	6	7	8	9	10	11	12	13	14	15	
Range												
5	5.71	6.32	6.85	7.33	7.77	8.18	8.55	8.90	-	-	-	
6	5.20	5.78	6.30	6.77	7.19	7.59	7.95	8.30	8.62	8.92	-	
7	4.79	5.36	5.86	6.31	6.72	7.11	7.47	7.80	8.12	8.42	8.70	
8	4.46	5.00	5.49	5.93	6.33	6.71	7.06	7.39	7.70	7.99	8.27	
9	4.17	4.70	5.17	5.60	6.00	6.37	6.71	7.03	7.33	7.62	7.90	
10	3.93	4.44	4.90	5.32	5.71	6.07	6.41	6.72	7.02	7.31	7.58	
11	3.71	4.22	4.67	5.08	5.46	5.81	6.14	6.45	6.75	7.03	7.30	
12	3.52	4.02	4.46	4.86	5.23	5.58	5.91	6.21	6.50	6.78	7.04	
13	3.36	3.84	4.27	4.67	5.03	5.38	5.70	6.00	6.28	6.56	6.82	
14	3.20	3.68	4.11	4.50	4.86	5.19	5.51	5.80	6.09	6.36	6.61	
15	3.07	3.53	3.95	4.34	4.69	5.02	5.33	5.63	5.91	6.17	6.43	
16	2.95	3.40	3.82	4.19	4.54	4.87	5.18	5.47	5.74	6.01	6.26	
17	2.83	3.28	3.69	4.06	4.41	4.73	5.03	5.32	5.59	5.85	6.10	
18	2.73	3.17	3.58	3.94	4.28	4.60	4.90	5.19	5.46	5.71	5.96	

78°F Wet-Bulb Selection Factors												
Approach	5	6	7	8	9	10	11	12	13	14	15	
Range												
5	5.80	6.41	6.95	7.43	7.87	8.27	8.65	9.00	—	—	—	
6	5.30	5.88	6.40	6.86	7.29	7.68	8.05	8.39	8.72	9.02	—	
7	4.89	5.45	5.95	6.41	6.82	7.20	7.56	7.90	8.21	8.51	8.80	
8	4.55	5.10	5.58	6.02	6.43	6.80	7.15	7.48	7.79	8.09	8.37	
9	4.27	4.80	5.27	5.70	6.10	6.46	6.80	7.13	7.43	7.72	8.00	
10	4.02	4.54	5.00	5.42	5.81	6.17	6.50	6.82	7.12	7.40	7.67	
11	3.81	4.31	4.76	5.18	5.55	5.91	6.24	6.55	6.84	7.12	7.39	
12	3.62	4.11	4.56	4.96	5.33	5.68	6.00	6.31	6.60	6.88	7.14	
13	3.45	3.94	4.37	4.77	5.13	5.47	5.79	6.09	6.38	6.65	6.91	
14	3.30	3.78	4.20	4.59	4.95	5.29	5.60	5.90	6.18	6.45	6.71	
15	3.17	3.63	4.05	4.43	4.79	5.12	5.43	5.73	6.00	6.27	6.53	
16	3.04	3.50	3.91	4.29	4.64	4.97	5.27	5.56	5.84	6.10	6.36	
17	2.93	3.38	3.79	4.16	4.51	4.83	5.13	5.42	5.69	5.95	6.20	
18	2.83	3.27	3.67	4.04	4.38	4.70	5.00	5.28	5.55	5.81	6.06	

79°F Wet-Bulb Selection Factors												
Approach	5	6	7	8	9	10	11	12	13	14	15	
Range												
5	5.90	6.51	7.04	7.53	7.97	8.37	8.75	—	—	—	—	
6	5.39	5.97	6.49	6.96	7.39	7.78	8.15	8.49	8.81	—	—	
7	4.98	5.55	6.05	6.50	6.92	7.30	7.66	7.99	8.31	8.61	8.89	
8	4.65	5.19	5.68	6.12	6.53	6.90	7.25	7.58	7.89	8.18	8.46	
9	4.36	4.89	5.37	5.80	6.19	6.56	6.90	7.22	7.53	7.82	8.09	
10	4.12	4.63	5.10	5.52	5.90	6.26	6.60	6.92	7.22	7.50	7.77	
11	3.91	4.41	4.86	5.27	5.65	6.00	6.33	6.65	6.94	7.22	7.49	
12	3.72	4.21	4.65	5.06	5.43	5.77	6.10	6.41	6.70	6.97	7.24	
13	3.55	4.03	4.47	4.86	5.23	5.57	5.89	6.19	6.48	6.75	7.01	
14	3.40	3.87	4.30	4.69	5.05	5.39	5.70	6.00	6.28	6.55	6.81	
15	3.26	3.73	4.15	4.53	4.89	5.22	5.53	5.82	6.10	6.37	6.62	
16	3.14	3.60	4.01	4.39	4.74	5.07	5.37	5.66	5.94	6.20	6.45	
17	3.03	3.48	3.89	4.26	4.60	4.93	5.23	5.52	5.79	6.05	6.30	
18	2.92	3.37	3.77	4.14	4.48	4.80	5.10	5.38	5.65	5.91	6.16	

80°F Wet-Bulb Selection Factors												
Approach	5	6	7	8	9	10	11	12	13	14	15	
Range												
5	5.99	6.60	7.14	7.62	8.06	8.47	8.84	—	—	—	—	
6	5.49	6.07	6.59	7.06	7.48	7.88	8.24	8.59	8.91	—	—	
7	5.08	5.64	6.15	6.60	7.01	7.40	7.75	8.09	8.41	8.71	8.99	
8	4.75	5.29	5.78	6.22	6.62	7.00	7.35	7.68	7.99	8.28	8.56	
9	4.46	4.99	5.46	5.89	6.29	6.66	7.00	7.32	7.63	7.91	8.19	
10	4.22	4.73	5.19	5.61	6.00	6.36	6.70	7.01	7.31	7.60	7.87	
11	4.00	4.51	4.96	5.37	5.75	6.10	6.43	6.74	7.04	7.32	7.59	
12	3.81	4.31	4.75	5.15	5.53	5.87	6.20	6.50	6.79	7.07	7.33	
13	3.65	4.13	4.56	4.96	5.33	5.67	5.99	6.29	6.58	6.85	7.11	
14	3.50	3.97	4.40	4.79	5.15	5.48	5.80	6.10	6.38	6.65	6.91	
15	3.36	3.83	4.25	4.63	4.98	5.32	5.63	5.92	6.20	6.47	6.72	
16	3.24	3.70	4.11	4.49	4.84	5.16	5.47	5.76	6.04	6.30	6.55	
17	3.12	3.58	3.98	4.36	4.70	5.02	5.33	5.61	5.89	6.15	6.40	
18	3.02	3.47	3.87	4.24	4.58	4.89	5.19	5.48	5.75	6.01	6.25	

The following chart defines the maximum cooling capacity in GPM for each Series NC model at the **Tower Selection Factor** defining your design conditions of entering hot water, leaving cold water, and entering air wet-bulb temperatures. **Select the model whose GPM capacity equals or exceeds the design requirement at your calculated Tower Selection Factor.**

Example: Tower Selection Factor is 4.89. Design GPM is 900.

1. Using the 4.5 column (*smaller than 4.89*) the selection would be a Model NC411.
2. However, interpolating for a 4.89 factor between the 4.5 column (869 GPM) and the 5.0 column (979 GPM) reveals that the Model NC311 is capable of cooling 954.8 GPM at the design temperatures.

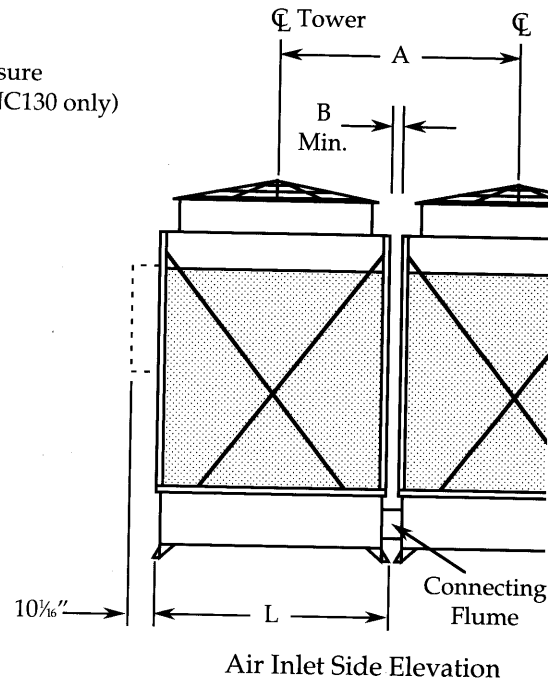
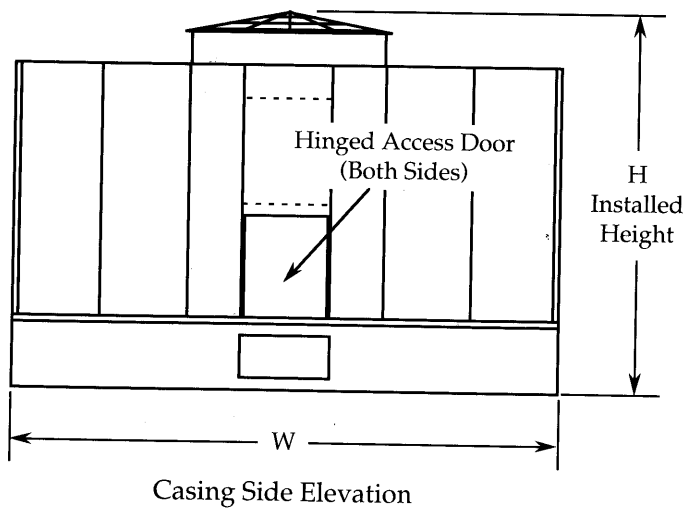
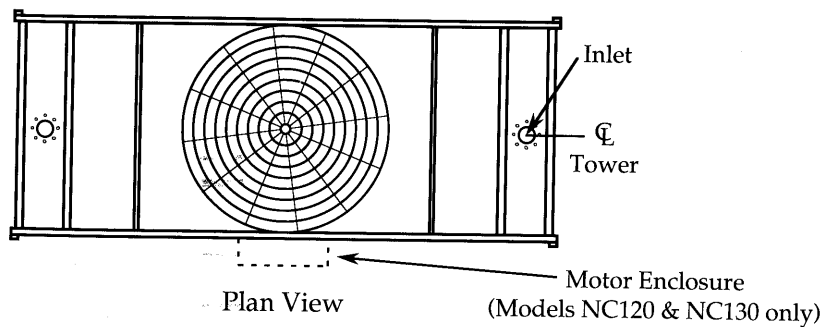
Note: If GPM exceeds maximum model capacity, divide into two or more towers.

1. "Safe" selections result from using the **Tower Selection Factor** column equal to or *smaller than* the factor calculated.
2. "Accurate" selections result from mathematical interpolation, if necessary.

Model Capacities In GPM of Clear Water

Tower Models	Tower Selection Factor															
	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0
NC101	*	*	196	222	250	283	319	361	407	459	517	582	654	734	823	923
NC111	*	199	225	254	287	324	366	413	466	524	589	661	740	829	928	1039
NC121	186	209	236	266	301	340	385	434	490	552	621	698	783	878	984	1102
NC131	214	240	271	306	347	393	444	502	566	637	715	801	896	1001	1118	1248
NC201	226	254	287	324	366	413	467	527	594	669	752	845	948	1063	1191	1333
NC211	260	292	330	372	421	476	539	608	685	771	866	970	1086	1214	1356	1514
NC221	284	319	360	407	460	521	590	667	752	846	950	1064	1189	1328	1481	1652
NC301	302	340	384	433	489	553	624	705	795	896	1009	1134	1273	1426	1595	1781
NC311	329	371	418	472	533	603	681	770	869	979	1102	1238	1389	1555	1738	1938
NC401	332	371	418	472	536	609	691	783	886	999	1123	1259	1408	1572	1753	1953
NC411	381	429	484	546	618	699	790	893	1008	1136	1278	1435	1607	1796	2002	2227
NC421	417	470	530	599	676	764	863	974	1098	1235	1387	1554	1737	1937	2154	2467
NC501	415	466	525	593	671	760	860	973	1100	1241	1398	1571	1763	1974	2207	2464
NC511	454	511	577	652	736	833	941	1063	1200	1353	1523	1712	1921	2151	2404	2681
NC521	470	529	596	674	762	863	977	1105	1249	1409	1587	1784	2000	2239	2501	2788
NC531	526	594	670	758	857	969	1094	1235	1393	1568	1762	1977	2212	2471	2754	3067
NC601	494	556	627	708	800	903	1020	1152	1299	1463	1645	1847	2069	2312	2578	2868
NC611	518	584	659	744	840	949	1072	1210	1365	1538	1730	1942	2176	2433	2714	3019
NC621	566	639	721	815	921	1041	1176	1327	1497	1685	1894	2124	2377	2654	2955	3307
NC631	612	691	781	882	998	1128	1274	1438	1620	1821	2043	2286	2551	2839	3167	3539
NC701	596	664	744	838	946	1070	1208	1362	1531	1716	1917	2134	2370	2626	2904	3207
NC711	652	727	815	918	1037	1172	1323	1491	1676	1878	2097	2335	2592	2870	3171	3498
NC721	699	779	874	984	1111	1256	1418	1598	1796	2012	2246	2499	2773	3068	3388	3734

* Below acceptable flow rate for proper performance
Maximum design water flow rate

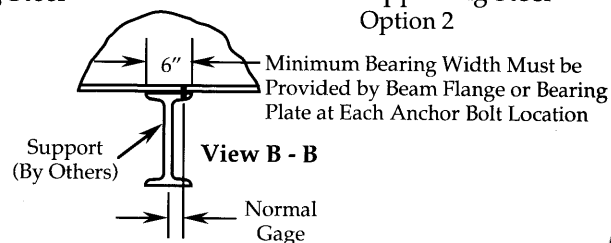
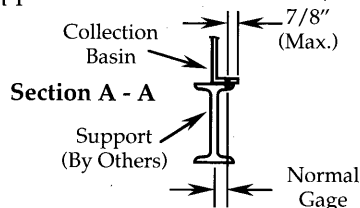
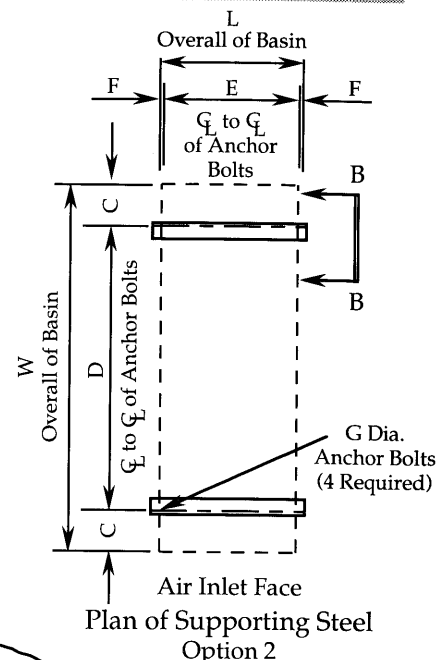
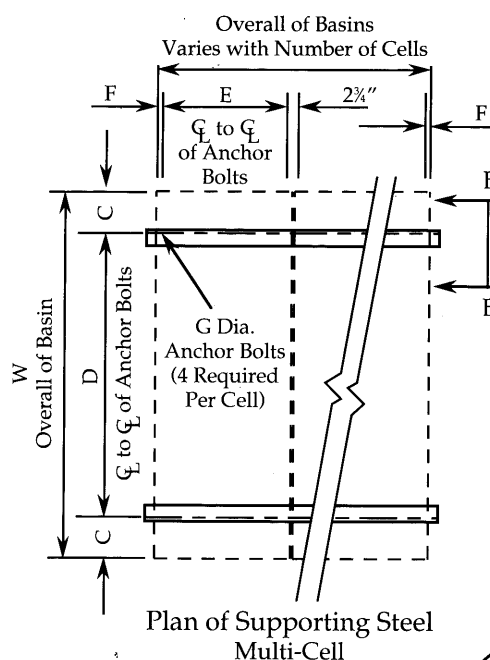
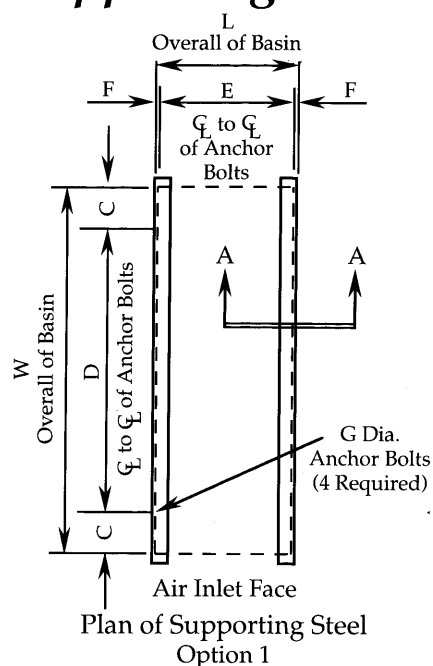


Tower Model	Nominal Tons (1)	Dimensions					Shipping Weight (lbs.)	Motor HP	Nominal Airflow (CFM)	Inlet Connections
		W	L	H	A	B				
NC101	153	17'-1 1/4"	6'-4 1/2"	10'-1 1/2"	6'-5 1/2"	0'-1"	5045	5	42,050	2 @ 6"
NC111	175	17'-1 1/4"	6'-4 1/2"	10'-1 1/2"	6'-5 1/2"	0'-1"	5100	7.5	48,750	2 @ 6"
NC121	184	17'-1 1/4"	6'-4 1/2"	10'-1 1/2"	6'-5 1/2"	0'-1"	5265	10	51,700	2 @ 6"
NC131	212	17'-1 1/4"	6'-4 1/2"	10'-1 1/2"	6'-5 1/2"	0'-1"	5345	15	60,500	2 @ 6"
NC201	223	17'-1 1/4"	7'-10 1/2"	10'-2"	7'-11 1/2"	0'-1"	5960	10	62,400	2 @ 6"
NC211	257	17'-1 1/4"	7'-10 1/2"	10'-2"	7'-11 1/2"	0'-1"	6035	15	73,000	2 @ 6"
NC221	282	17'-1 1/4"	7'-10 1/2"	10'-2"	7'-11 1/2"	0'-1"	6110	20	80,800	2 @ 6"
NC301	299	19'-1"	7'-10 1/2"	12'-11 1/2"	7'-11 1/2"	0'-1"	7080	15	80,350	2 @ 8"
NC311	326	19'-1"	7'-10 1/2"	12'-11 1/2"	7'-11 1/2"	0'-1"	7145	20	88,500	2 @ 8"
NC401	333	19'-1"	8'-10 1/2"	12'-11 1/2"	8'-11 1/2"	0'-1"	7940	15	89,400	2 @ 8"
NC411	379	19'-1"	8'-10 1/2"	12'-11 1/2"	8'-11 1/2"	0'-1"	8000	20	102,950	2 @ 8"
NC421	412	19'-1"	8'-10 1/2"	12'-11 1/2"	8'-11 1/2"	0'-1"	8050	25	112,800	2 @ 8"
NC501	414	19'-1"	10'-10 1/2"	12'-11 1/2"	10'-11 1/2"	0'-1"	9155	20	111,150	2 @ 8"
NC511	451	19'-1"	10'-10 1/2"	12'-11 1/2"	10'-11 1/2"	0'-1"	9205	25	122,200	2 @ 8"
NC521	470	19'-1"	10'-10 1/2"	12'-11 1/2"	10'-11 1/2"	0'-1"	9280	30	127,800	2 @ 8"
NC531	523	19'-1"	10'-10 1/2"	12'-11 1/2"	10'-11 1/2"	0'-1"	9585	40	143,650	2 @ 8"
NC601	488	19'-1"	11'-10 1/2"	12'-11 1/2"	11'-11 1/2"	0'-1"	9930	25	132,000	2 @ 8"
NC611	513	19'-1"	11'-10 1/2"	12'-11 1/2"	11'-11 1/2"	0'-1"	10,005	30	139,450	2 @ 8"
NC621	562	19'-1"	11'-10 1/2"	12'-11 1/2"	11'-11 1/2"	0'-1"	10,150	40	154,050	2 @ 8"
NC631	607	19'-1"	11'-10 1/2"	12'-11 1/2"	11'-11 1/2"	0'-1"	10,215	50	167,550	2 @ 8"
NC701	572	23'-10"	11'-11"	12'-11 1/2"	11'-11 1/2"	0'-1/2"	12,160	30	142,150	2 @ 8"
NC711	626	23'-10"	11'-11"	12'-11 1/2"	11'-11 1/2"	0'-1/2"	12,310	40	156,050	2 @ 8"
NC721	671	23'-10"	11'-11"	12'-11 1/2"	11'-11 1/2"	0'-1/2"	12,375	50	167,550	2 @ 8"

Table Notes

- Nominal tons are based upon 95°F HW, 85°F CW, 78°F WB and 3 GPM/ton.
- All table data is per cell.
- Last digit of model number indicates number of cells. Change as appropriate for your selection.
- Standard overflow is 4" dia. standpipe inside basin. Standpipe removes for flush-out and drain. See pages 20 & 21 for details & options.
- Outlet sizes vary according to GPM and arrangement. See pages 20 & 21 for outlet sizes and details.
- Make-up connection may be 1" or 2" dia., depending upon tower heat load, water pressure, and desired connections. See page 20.

Supporting Steel

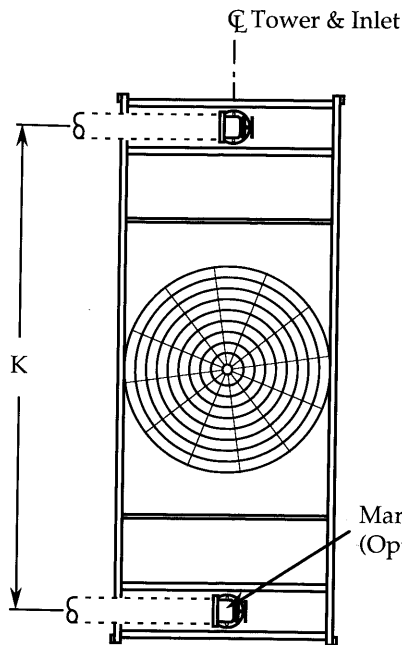


Tower Model	Dimensions							Maximum Operating Wt./Cell (lbs.)	Maximum Operating Load at Anchor (lbs.)	Wind Loads (lbs.)	
	W	L	C	D	E	F	G			Max. Vert. Reaction at Anchor	Max. Horiz. Reaction at Anchor
NC101	17'-1 1/4"	6'-4 1/2"	1'-11 1/16"	13'-2 1/2"	6'-2 1/4"	7/8"	1/2"	11,720	2930	1680	1150
NC111	17'-1 1/4"	6'-4 1/2"	1'-11 1/16"	13'-2 1/2"	6'-2 1/4"	7/8"	1/2"	11,780	2945	1680	1150
NC121	17'-1 1/4"	6'-4 1/2"	1'-11 1/16"	13'-2 1/2"	6'-2 1/4"	7/8"	1/2"	11,940	2985	1680	1150
NC131	17'-1 1/4"	6'-4 1/2"	1'-11 1/16"	13'-2 1/2"	6'-2 1/4"	7/8"	1/2"	12,020	3005	1680	1150
NC201	17'-1 1/4"	7'-10 1/2"	1'-11 1/16"	13'-2 1/2"	7'-8 3/4"	7/8"	1/2"	14,320	3580	1680	1150
NC211	17'-1 1/4"	7'-10 1/2"	1'-11 1/16"	13'-2 1/2"	7'-8 3/4"	7/8"	1/2"	14,380	3595	1680	1150
NC221	17'-1 1/4"	7'-10 1/2"	1'-11 1/16"	13'-2 1/2"	7'-8 3/4"	7/8"	1/2"	14,460	3615	1680	1150
NC301	19'-1 1/4"	7'-10 1/2"	1'-8 1/2"	15'-8 3/4"	7'-8 3/4"	7/8"	1/2"	16,340	4085	2580	1685
NC311	19'-1 1/4"	7'-10 1/2"	1'-8 1/2"	15'-8 3/4"	7'-8 3/4"	7/8"	1/2"	16,400	4100	2580	1685
NC401	19'-1 1/4"	8'-10 1/2"	1'-8 1/2"	15'-8 3/4"	8'-8 3/4"	7/8"	1/2"	18,420	4605	2580	1685
NC411	19'-1 1/4"	8'-10 1/2"	1'-8 1/2"	15'-8 3/4"	8'-8 3/4"	7/8"	1/2"	18,480	4620	2580	1685
NC421	19'-1 1/4"	8'-10 1/2"	1'-8 1/2"	15'-8 3/4"	8'-8 3/4"	7/8"	1/2"	18,540	4635	2580	1685
NC501	19'-1 1/4"	10'-10 1/2"	1'-8 1/2"	15'-8 3/4"	10'-8 3/4"	7/8"	1/2"	22,100	5525	2580	1685
NC511	19'-1 1/4"	10'-10 1/2"	1'-8 1/2"	15'-8 3/4"	10'-8 3/4"	7/8"	1/2"	22,160	5540	2580	1685
NC521	19'-1 1/4"	10'-10 1/2"	1'-8 1/2"	15'-8 3/4"	10'-8 3/4"	7/8"	1/2"	22,240	5560	2580	1685
NC531	19'-1 1/4"	10'-10 1/2"	1'-8 1/2"	15'-8 3/4"	10'-8 3/4"	7/8"	1/2"	22,540	5635	2580	1685
NC601	19'-1 1/4"	11'-10 1/2"	1'-8 1/2"	15'-8 3/4"	11'-8 3/4"	7/8"	1/2"	24,600	6150	2580	1685
NC611	19'-1 1/4"	11'-10 1/2"	1'-8 1/2"	15'-8 3/4"	11'-8 3/4"	7/8"	1/2"	24,680	6170	2580	1685
NC621	19'-1 1/4"	11'-10 1/2"	1'-8 1/2"	15'-8 3/4"	11'-8 3/4"	7/8"	1/2"	24,820	6205	2580	1685
NC631	19'-1 1/4"	11'-10 1/2"	1'-8 1/2"	15'-8 3/4"	11'-8 3/4"	7/8"	1/2"	24,880	6220	2580	1685
NC701	23'-10"	11'-11"	1'-8"	20'-6"	11'-8 3/4"	1-1/8"	5/8"	34,180	8545	2580	1685
NC711	23'-10"	11'-11"	1'-8"	20'-6"	11'-8 3/4"	1-1/8"	5/8"	34,340	8585	2580	1685
NC721	23'-10"	11'-11"	1'-8"	20'-6"	11'-8 3/4"	1-1/8"	5/8"	34,400	8600	2580	1685

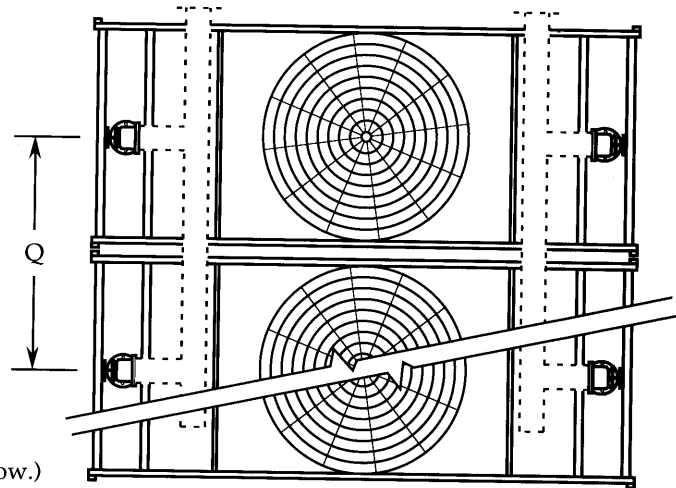
Table Notes

1. Use this bulletin for preliminary layouts only. Obtain current drawings from your Marley application engineer for final design.
2. Purchaser to provide tower supports complete with holes for anchor bolts furnished by others. Anchor points must be framed flush and level at top.
3. Maximum operating weight occurs with basin full to overflow level. Actual operating weight varies with GPM and piping scheme, but is usually less than shown here.
4. Wind loads are based on 30 psf and are additive to operating loads. Reactions due to wind loads exceed those resulting from seismic loads based on UBC, Zone 4.
5. You may support the tower on a flat concrete slab if you specify side outlet and optional side drain and overflow. See pages 20 & 21 and consult your Marley application engineer.

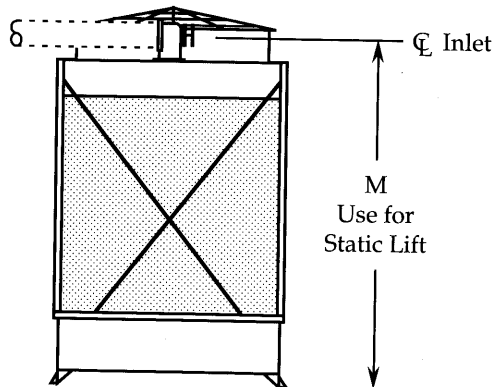
Inlet Piping



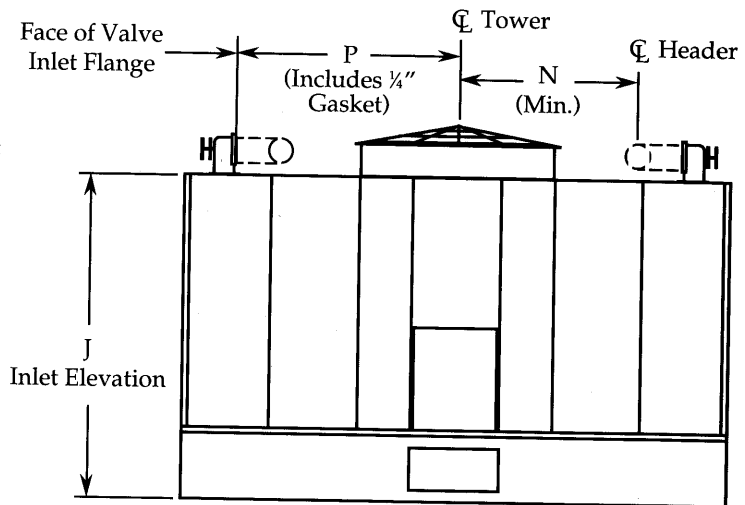
Single Cell Piping Plan View



Multi-Cell Piping Plan View



Single Cell Piping Side Elevation



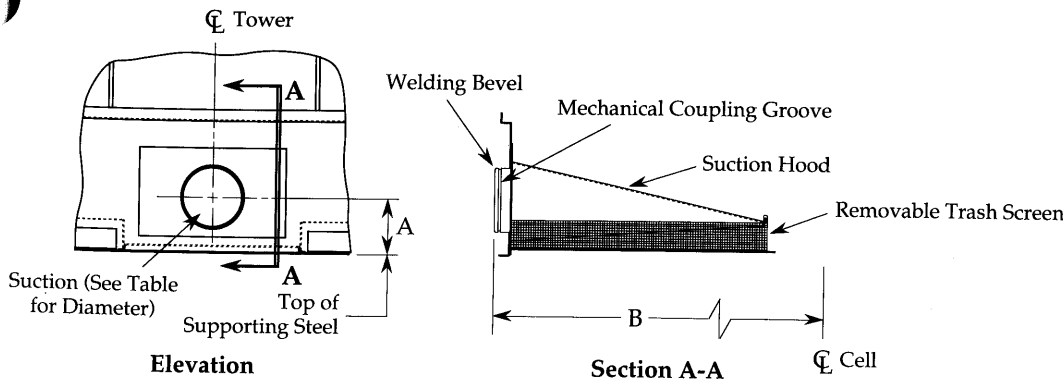
Multi-Cell Piping End Elevation

Tower Model	Dimensions						Inlet Diameter
	J	K	M	N	P	Q	
NC101 thru NC111	8'-8½"	15'-0"	9'-5"	5'-5½"	7'-3"	6'-5½"	2 @ 6"
NC121 thru NC131	8'-8½"	15'-0"	9'-5"	5'-5½"	7'-3"	7'-4½"	2 @ 6"
NC201 thru NC221	8'-8½"	15'-0"	9'-5"	5'-5½"	7'-3"	7'-11½"	2 @ 6"
NC301 thru NC311	11'-5½"	17'-1"	12'-3"	6'-5½"	8'-3"	7'-11½"	2 @ 8"
NC401 thru NC421	11'-5½"	17'-1"	12'-3"	6'-5½"	8'-3"	8'-11½"	2 @ 8"
NC501 thru NC531	11'-5½"	17'-1"	12'-3"	6'-5½"	8'-3"	10'-11½"	2 @ 8"
NC601 thru NC631	11'-5½"	17'-1"	12'-3"	6'-5½"	8'-3"	11'-11½"	2 @ 8"
NC701 thru NC721	11'-5½"	21'-11"	12'-3"	6'-6"	10'-8"	11'-11½"	2 @ 8"

Table Notes

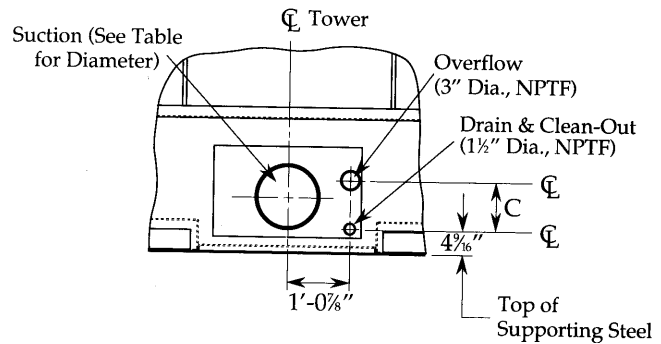
1. Use this bulletin for preliminary layouts only. Obtain current drawings from your Marley application engineer.
2. Pumping head contributed by the tower is static lift "M". Add your system dynamic pipe losses for total.
3. All piping loads, including weight, thrust and lateral loads of riser and horizontal piping must be supported independent of tower. The tower will support the weight of any manifold or horizontal supply piping within the plan area of the tower only.
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 attached ladder. Refer to appropriate Marley drawings.
6. You may choose to use 90° short radius flanged elbows in place of balancing valves on single-cell towers where inlet piping is balanced for equal flow. Pipe elevation remains as shown.

Outflow Options

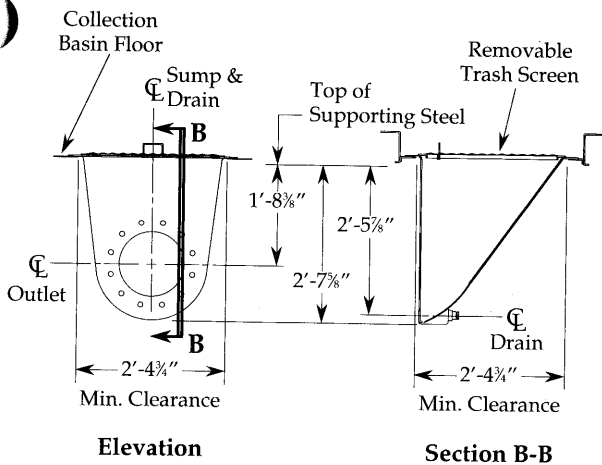


Side Outlet Suction

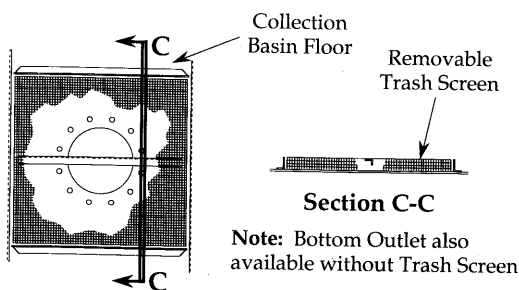
Tower Model	A	B	C
NC100	0'-10"	3'-3 $\frac{3}{16}$ "	0'-6 $\frac{7}{8}$ "
NC200	0'-10"	4'-0 $\frac{3}{16}$ "	0'-6 $\frac{7}{8}$ "
NC300	0'-10"	4'-0 $\frac{3}{16}$ "	0'-6 $\frac{7}{8}$ "
NC400	0'-10"	4'-6 $\frac{3}{16}$ "	0'-6 $\frac{7}{8}$ "
NC500	0'-10"	5'-6 $\frac{3}{16}$ "	0'-6 $\frac{7}{8}$ "
NC600	0'-10"	6'-0 $\frac{3}{16}$ "	0'-6 $\frac{7}{8}$ "
NC700	0'-11 $\frac{1}{4}$ "	6'-0 $\frac{3}{16}$ "	0'-10 $\frac{3}{16}$ "



Optional Side Drain & Overflow



Depressed Side Outlet Sump



Bottom Outlet Plan

Outlet Dia.	Maximum GPM per Outlet					
	Standard		Options			
	Side Outlet Suction		Depressed Side Outlet Sump		Bottom Outlet	
	NC100 thru NC600	NC700	NC100 thru NC600	NC700	NC100 thru NC600	NC700
4"	N/A	N/A	N/A	N/A	150	N/A
6"	900	N/A	900	N/A	350	N/A
8"	1500	1550	1500	1550	600	660
10"	2400	2450	2400	2450	950	1020
12"	2700 for NC100 - NC400 3750 for NC500 - NC600	3500	3500	3500	1400	1500
14"	N/A	4250	3500	4250	1700	1800
16"	N/A	N/A	N/A	N/A	2200	2400
18"	N/A	N/A	N/A	N/A	2800	3050
20"	N/A	N/A	N/A	N/A	3200	3700
24"	N/A	N/A	N/A	N/A	4000	4900

Note: For gravity-flow situations (as to an indoor tank), use bottom outlet or oversize the standard side outlet suction. Request special sizing from your Marley application engineer.

Marley Series NC

Cooling Tower Specifications

Base: Furnish and install an induced-draft, crossflow, factory-assembled, steel cooling tower of ____ cell(s), as shown on plans. Tower shall be similar and equal in all respects to Marley Series NC, Model ____.

Performance: Tower shall be guaranteed capable of cooling ____ GPM of water from ____ °F to ____ °F at a design entering air wet-bulb temperature of ____ °F.

Warranty: The cooling tower manufacturer shall certify that the tower supplied meets the specified performance conditions when the tower is installed according to plans. If, because of a suspected thermal performance deficiency, the owner chooses to conduct an on-site thermal performance test under the supervision of a qualified, disinterested third party in accordance with CTI or ASME standards during the first year of operation; and if the tower fails to perform within the limits of test tolerance; then the cooling tower manufacturer will pay for the cost of the test and will make such corrections as are appropriate and agreeable to the owner to compensate for the performance deficiency. In addition, the tower's mechanical equipment must be warranted for at least 5 (five) years as defined below. Towers whose mechanical equipment is not warranted for at least 5 (five) years will *not* be accepted.

Construction: Structural components of the tower, including the cold water basin, framework, mechanical equipment supports, casing, hot water basin, fan deck, and fan cylinder shall be fabricated of heavy-gauge steel, protected against corrosion by G-210 galvanizing. All components subjected to factory welding shall be hot dip galvanized *after* completion of fabrication to a zinc thickness equivalent of G-210.

Motor: Motor(s) shall be ____ HP, TEFC, 1.15 service factor, and specially insulated for cooling tower duty. Speed and electrical characteristics shall be 1800 (1800/900) RPM, single-winding, ____ phase, ____ hertz, ____ volts.

Mechanical Equipment: Fan(s) shall be propeller type, incorporating heavy-duty, cast aluminum blades. Fan blades shall be individually adjustable and replaceable. Fan(s) shall be driven through a right-angle, industrial-duty, oil-lubricated, geared speed reducer, equipped with an oil level sight glass. The mechanical equipment shall be structurally supported independent of the casing, and shall be installed and adjusted to proper fan tip clearance at the factory. With the exception of the motor itself, the mechanical equipment system shall be warranted against

any failure caused by defects in materials and workmanship for a period of 5 (five) years from date of tower shipment. This warranty shall cover the fans, speed reducers, couplings or belts, and the mechanical equipment supports.

Fill, Louvers & Drift Eliminators: Fill shall be film-type, vacu-formed PVC, with louvers and drift eliminators formed as part of each fill sheet. Fill shall be suspended from hot dip galvanized structural tubing supported from the upper tower structure, and shall be elevated above the floor of the cold water basin to facilitate cleaning. Air inlet faces of the tower shall be free of water splash-out. Guaranteed drift losses shall not exceed 0.005% of the design GPM.

Hot Water Distribution System: Two open basins (one above each fill bank) shall receive hot water piped to each cell of the tower. These basins shall be installed and sealed at the factory. G-210 galvanized steel distribution basin covers are required. Each basin shall include a ____" diameter hole and bolt circle to accept a 125# flange connection per ANSI B16.1. If shown on plans, flow-control valves shall be provided at the inlet to each basin. These valves shall permit both flow balancing and positive shut off to selected cells. Water shall enter the basins through removable wave-suppressor flumes. Each basin shall be no less than 6-3/4" deep to provide adequate freeboard against overflow and splash-out. Removable and replaceable polypropylene nozzles installed in the floor of these basins shall provide full coverage of the fill by gravity flow. Nozzles must all have the same orifice size and be spaced symmetrically in both longitudinal and transverse directions.

Cold Water Basin & Accessories: The cold water basin shall be completed and sealed at the factory, requiring only the field installation of cell-interconnecting flumes (if any). The number and type of suction connections shall be as required to accomplish the outflow piping shown on the plans. Towers of more than one cell shall include stainless steel flumes for flow and equalizing between cells. Suction connection shall include a protective screen. A factory-installed, float-operated, mechanical make-up valve shall be included, having a ____" diameter inlet connection. A 4" diameter galvanized standpipe overflow shall be provided in each cell of the tower. Overflows shall be removable to permit flush-out cleaning of the basin. All basin accessories shall be easily accessible through large hinged access doors at each end of each cell of the tower.

