CAT - SCT -2010(4)

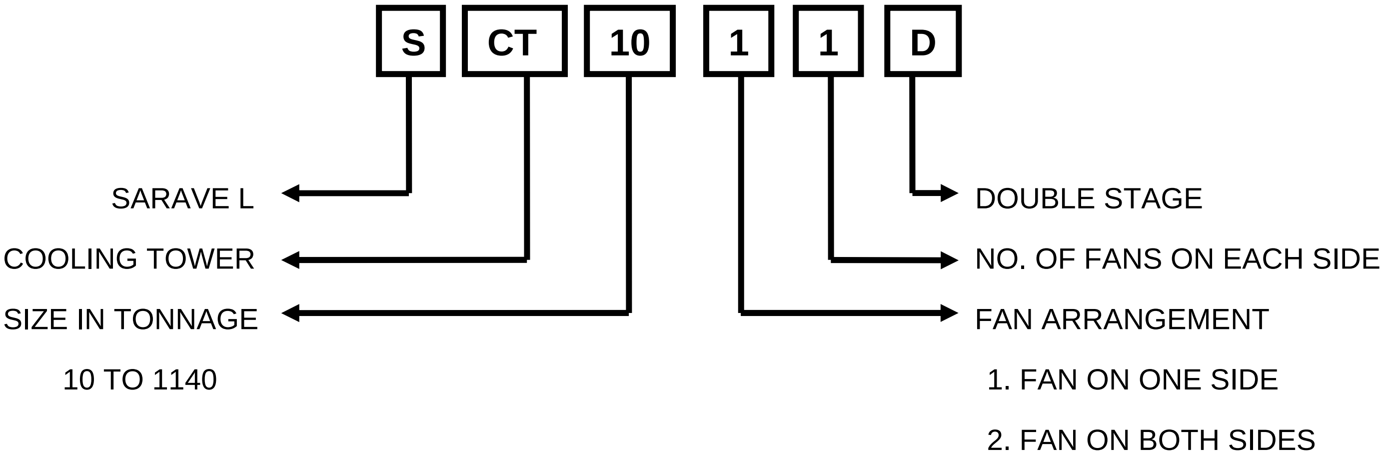
SARAVEL COOLING TOWER

(10 TO 1140 TONS)

SARAVEL

Table of Content

Nomenclature



NOTE:
All specifications & dimensions subject to change without notice.

INTRODUCTION

SARAVEL cooling towers are Non-Clogging, forced draft, Counter flow, splash type cooling towers designed for a multitude of refrigeration, air conditioning, and industrial process cooling applications. Among the numerous applications are petrochemical, pulp and paper, injection mold cooling, and dairy production industrial.

Using state-of-the-art *SARAVEL* technology, closed-loop cooling cycles were created to minimize fouling, reduce cleaning, improve efficiency and reliability, and reduce water costs.

The versatility of applications along with the broad range of capacities offered-from 10 to 1140 tons of refrigeration, make *SARAVEL* cooling towers the premium choice in industrial and commercial refrigeration and air conditioning.

FILL

“Get free of annual accumulation of Clogging “

The heat transfer surface in *SARAVEL* cooling towers are splash type, Non-Clogging fills fabricated of polypropylene. The unique design of the fill with optimum 3-dimentional flow through the fill promotes greater air to water contact over other types of designs and are more effective with in the same amount of space, air flow and GPM with really inconsiderable pressure drop.

The durability against blockage, non-corrosive material and ease of service and replacement are the benefits of this type of fill.

Picture 1

SPRAY NOZZLES

SARAVEL Non-Clogging spray nozzles are designed to break and distribute the water flow in an umbrella type into predetermined size spray and swirl the flow, thus exposing the maximum transient water surface to the maximum flow of air for the longest period of time. Hot dipped galvanized steel header supply water to spray nozzle branches.

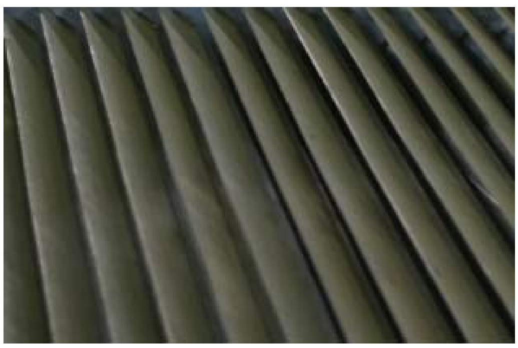
The nozzles are injection molded polypropylene unit consisting of two parts—the main assembly with integral turbulator.

Picture 2

DRIFT ELIMINATORS

Heavy Gage Galvanized Drift Eliminators

An assembly of galvanized steel baffles provide labyrinth passages through which the air passes prior to its exit from the tower. The durability and ease of service and replacement are the benefits of this type of drift eliminators.



Picture 3

FANS

The squirrel cage, forward curved, double width double inlet type centrifugal fans offer the advantage of operating against high static pressures needed to overcome the pressure drop associated with ductwork, thus making *SARAVEL* cooling tower suitable for indoor installations or within a specially designed enclosure that provides significant separation between the intake and discharge locations.

All fan shafts are made of carbon steel and are precision machined to provide an accurate fit with the fan bearings and the wheel hub. Solid and hollow shafts are designed to operate in less than 20% of the critical speed. Fan shafts are defined according to the AMCA classification

Fan wheels, shafts, sheaves, and pulleys, are balanced both statically and dynamically to assure smooth and quiet operation. Steel shaft is conversion coated thus protected against rust and corrosion. Bearings are heavy duty, grease-packed, with pillow-block type cast iron housing with extended lube to permit easy re lubrication.
Whisper quiet operation is another key element in superiority of *SARAVEL* cooling towers fans over other types of cooling towers.

MOTORS

All electrical motors employed in *SARAVEL* cooling towers are squirrel cage, totally enclosed fan cooled (TEFC) with degree of protection of IP-54 and insulation class F. All motors are 380V-3Ø-50Hz and operate at 1450 RPM and selected to match the horsepower requirements of the fans.
Tow speed motors with either single or double winding and spark proof electrical motors are furnished as per engineering specification.

CASING

SARAVEL cooling tower casing is constructed of water tight galvanized steel sheet panels thus ensuring years of dependable service. Paneled construction offer significant time saving in repair and reconstruction of *SARAVEL* cooling towers after a normal life span. A man-size access door provides easy access for inspection and maintenance.
Alternate choices of casing material include brass and stainless steel.

COOLING TOWER BASIN

The cooling tower basin is constructed of heavy gage galvanized steel metal and is integral with the tower with provisions for overflow, pump suction, quick fill, and drain.

ALL Season Operation

The unique feature of *SARAVEL* cooling towers is the all year round performance capabilities offered by the winterizing option. In this modification, electric immersion heaters are selected to replenish heat lost to the atmosphere. The immersion heaters are sized according to the collection basin size and the specified winter ambient conditions.

FOR MORE DETAILS ON THE WINTERIZING OPTIONS CONSULT SARAVEL CORP. SALES OFFICE.

Selection Examples

In this section certain guidelines and definition are presented in the selection of cooling tower under different condition.

1. NOMINAL CONDITIONS

For vapor compression refrigeration systems employed in air-conditioning applications, irrespective of the type of compressor employed, the following standard conditions are considered as nominal cooling tower condition:

Entering Wet Bulb Temperature = 75°F Inlet Water Temperature = 95°F
Outlet Water Temperature = 85°F

Under nominal conditions, a Nominal Cooling Tower Ton defined as cooling 3 GPM of water from 95°F to 85°F at 78°F entering wet-bulb temperature. This is expressed as:

$$TONS = \frac{GPM}{3\,GPM/TON}$$

Where T.R. denotes tons of refrigeration. Under these condition, the tower reject 15000 BTU/HR which include 3000 BTU/HR due to heat of compression and compressor heat.

For standard applications under nominal conditions Stated above, the cooling tower may be selected Directly from TABLE 1.

2. DEFINITIONS

The difference between the entering/leaving water temperatures to/from the cooling tower is defined as the Degree Range.

The difference between the leaving water temperature and the entering air wet bulb temperature is defined as the Approach Temperature.

In section 1, both Degree Range and Approach Temperature are 15 °F. For Degree Ranges less than 15°F single stage cooling towers are selected by applying Correction Factor from FIGURE 1.

For Degree Ranges greater than 15°F, double stage cooling towers are selected by applying suitable correction Factor from FIGURE 2.

All performance ratings and correcting factors presented in this catalogue are based on sea level conditions. For altitudes other than sea level, appropriate altitude adjustment correction factors should be applied from the table below.

Altitude Correction Factor

Altitude (ft)	Correction Factor
0	1
1000	0.99
2000	0.98
3000	0.98
4000	0.97
5000	0.96
6000	0.95
7000	0.94

The following examples illustrate the selection procedure for a cooling tower operating under each of the aforementioned conditions.

EXAMPLE 1 (Single Stage)
Given:
a) Water Flow Rate = 250 GPM
b) Entering Water Temp. = 95°F
c) Leaving Water Temp. = 85°F
d) Entering Wet bulb Temp. = 75°F
e) Altitude: Sea Level

Find:
Cooling tower tons and model.

Solution:
I. Nominal Tons

$$TONS = \frac{250}{3\,GPM/TON} = 83.3$$

II. Correction Factor (C.F.)
Degree Range = 95°F - 85 °F = 10°F
Approach Temp. = 85°F - 75°F = 10°F

Note: Degree Range is less than 15°F, therefore a single stage cooling tower will be selected.

C.F. = 1.4 (From FIGURE 1)
III. Corrected Tons
Corrected Tons = Nominal Tons x C.F.
= 83.3 x 1.4 = 116.6
From TABLE 1 MODEL SCT- 120- 1-3 is selected.

EXAMPLE 2 (Double Stage)

GIVEN:
a) Water Flow Rate = 250 GPM
b) Entering Water Temp. = 100°F
c) Leaving Water Temp. = 85°F
d) Entering Wet bulb Temp. = 70°F
e) Altitude: Sea Level

Solution:
I. Nominal Tons

$$TONS = \frac{250}{3\ GPM/TON} = 83.3$$

II. Correction Factor (C.F.)
Degree Range = 100°F - 80°F = 20°F
Approach Temp. = 80°F - 70°F = 10°F
Note: Degree Range is greater than 15°F

Therefore a double stage cooling tower will be selected.

C.F. = 1.4 (From FIGURE 2)

III. Corrected Tons
Corrected Tons = Nominal Tons x C.F.
= 83.3 x 1.4 = 116.6

From TABLE 1 MODEL SCT-120-1-3 is selected.

EXAMPLE 3 (Above Sea Level):
With increasing altitude above the sea level, the enthalpy of the saturated air increases. At a given temperature, there is more enthalpy change per degree charge in altitude than there will be at sea level. This is because the saturation vapor pressure of water remains nearly constant while the barometric pressure decreases, so the water vapor becomes a larger fraction of the total mixture. At altitude, one pound of dry air can hold more water than it can at sea level [(1)].

Appropriate correction factors must be applied before selecting the unit. Given the same conditions as in EXAMPEL 1 and 2, except with the elevation of 4000 FT, the following modifications must be applied to the calculations:

Correction Factor
From Altitude Correction Factor table
$C.F._{ALT} = 0.97$

Corrected Tonnage:
Nominal Tonnage x C.F. X $C.F._{ALT}$
= 83.3 x 1.4 x 0.97 = 113 Tons.

This example illustrates cooling tower performance enhancement at altitude. A cooling tower properly designed for a sea-level location would exhibit added capability if moved to a higher elevation.

(1) Journal of the Cooling Tower Institute, Vol. 5, No.1, 1984, P. 28

FIGURE 1 (SINGLE STAGE) – CORRECTION FACTOR

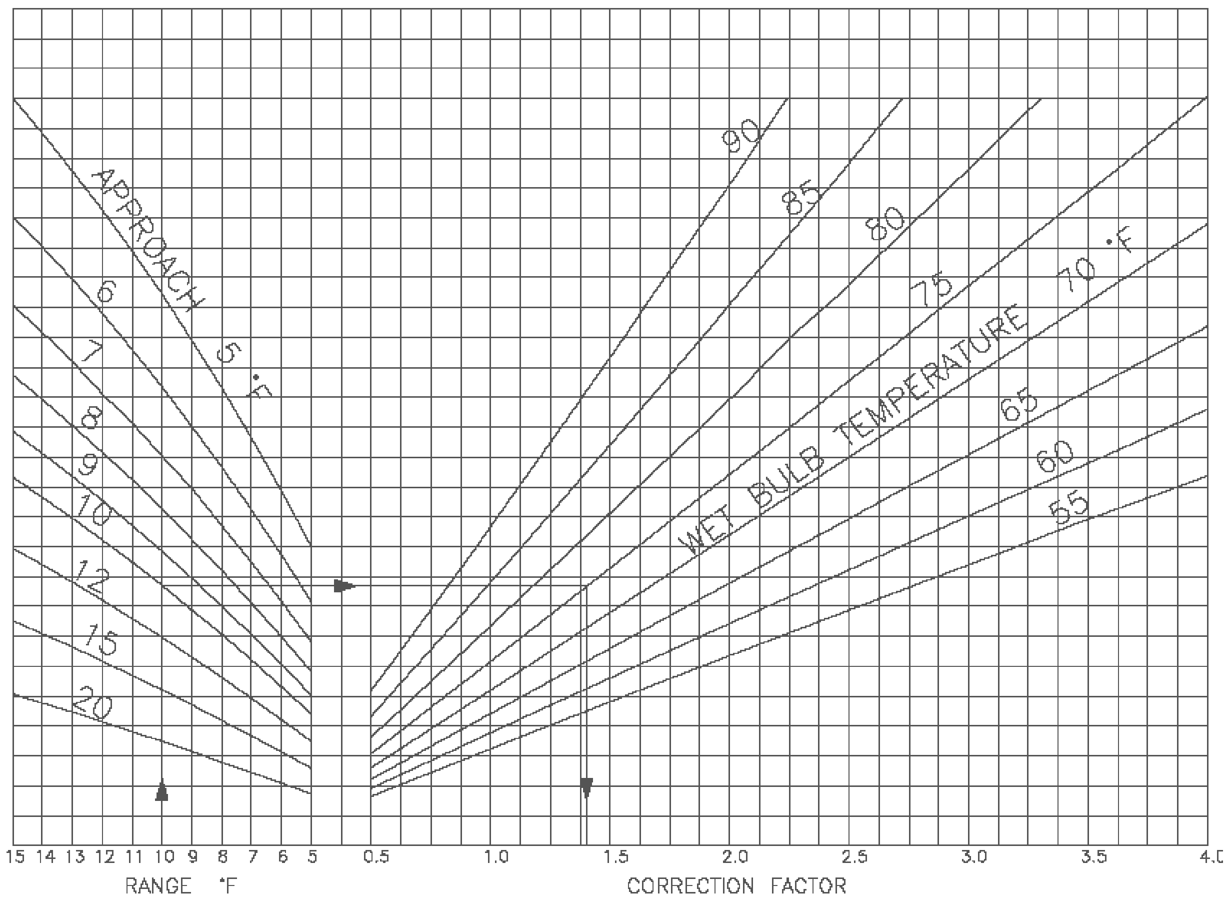
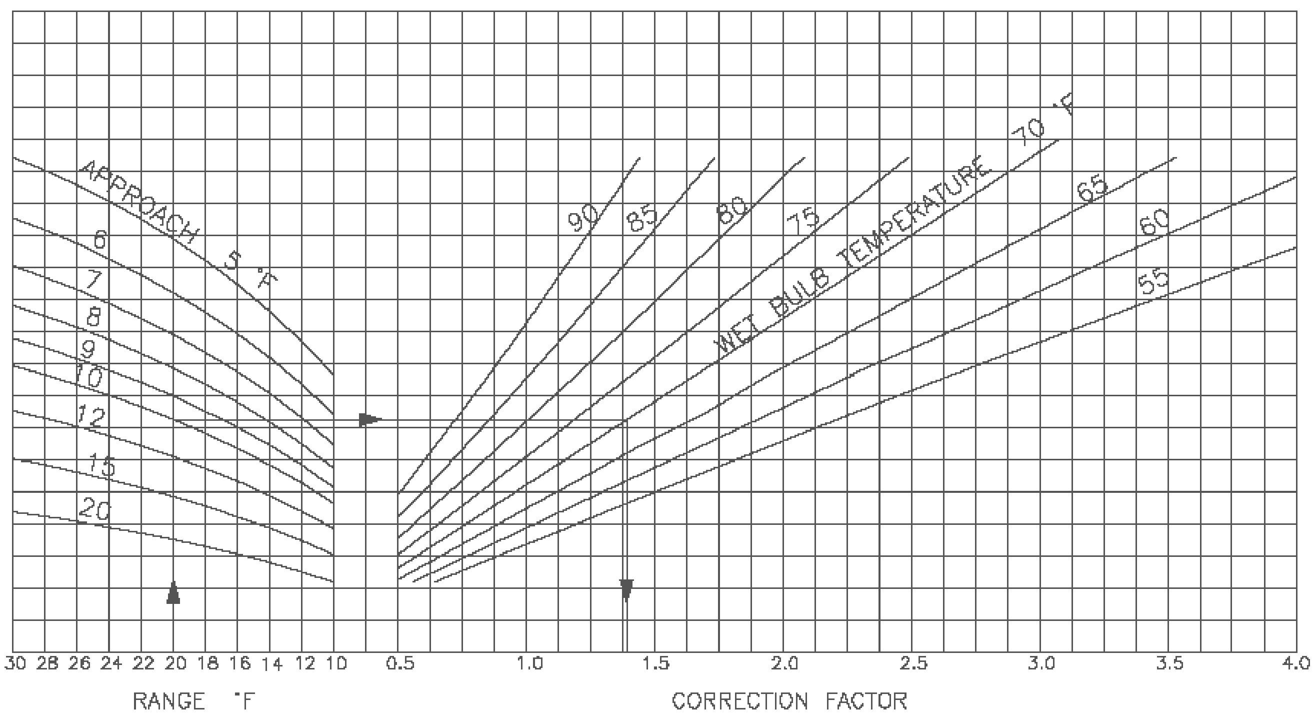


FIGURE 2 (DOUBLE STAGE) – CORRECTION FACTOR



Physical Data

Table 1

MODEL	NOMINAL TONS	WATER LOAD (GPM)	FLOW (CFM)	Tower Head (ft H_2O)	FAN NO.	FAN SIZE (in)	FAN MOTOR NO.	FAN MOTOR (HP)	WIGHT (Kg)	
									NET	OPERATION
SCT 10 - 1 - 1	10	30	2255	22	1	14	1	0.5	240	350
SCT 15 - 1 - 1	15	45	3384	24	1	16	1	1	280	440
SCT 20 - 1 - 1	20	60	4511	22	1	17	1	1.5	330	530
SCT 25 - 1 - 1	25	75	5640	24	1	19	1	1.5	400	650
SCT 30 - 1 - 1	30	90	6769	21	1	22	1	1.5	500	780
SCT 35 - 1 - 1	35	105	7895	22	1	22	1	2	550	900
SCT 40 - 1 - 1	40	120	9024	23	1	22	1	3	590	980
SCT 50 - 1 - 1	50	150	11281	23	1	22	1	5.5	670	1170
SCT 60 - 1 - 1	60	180	13538	24	1	22	1	7.5	830	1590
SCT 75 - 1 - 2	75	225	16921	25	2	22	1	7.5	1210	2310
SCT 90 - 1 - 2	90	270	20306	25	2	22	1	10	1240	2390
SCT 105 - 1 - 2	105	315	23684	25	2	22	1	15	1340	2740
SCT 120 - 1 - 3	120	360	27073	25	3	22	1 1	7.5 3	1740	3490
SCT 140 - 1 - 3	140	420	31578	25	3	22	1 1	10 4	1940	3840
SCT 160 - 1 - 4	160	480	36097	25	4	22	2	7.5	2490	4680
SCT 180 - 1 - 4	180	540	40612	26	4	22	2	10	2550	4950
SCT 220 - 1 - 5	220	660	49637	26	5	22	2 1	7.5 3	2990	5780
SCT 260 - 1 - 6	260	780	58632	25	6	22	3	7.5	3480	6780
SCT 300 - 1 - 7	300	900	67676	26	7	22	3 1	7.5 3	4080	7980
SCT 340 - 1 - 8	340	1020	76710	26	8	22	4	7.5	4570	9070
SCT 340 - 2 - 4	340	1020	76710	26	8	22	4	7.5	4470	8870
SCT 400 - 2 - 5	400	1200	90211	26	10	22	4 2	7.5 3	5270	10770
SCT 450 - 2 - 6	450	1350	101531	25	12	22	6	7.5	6590	12890
SCT 500 - 2 - 6	500	1500	112814	25	12	22	6	7.5	6670	13170
SCT 580 - 2 - 6	580	1740	130833	25	12	22	6 2	7.5 3	7570	15170
SCT 660 - 2 - 8	660	1980	148905	26	16	22	8	7.5	8750	17450
SCT 740 - 2 - 9	740	2220	166963	26	18	22	8 2	7.5 3	9750	19550
SCT 820 - 2 - 10	820	2460	185014	25	20	22	10	7.5	10840	21740
SCT 900 - 2 - 11	900	2700	202951	25	22	22	10 2	7.5 3	11740	23640
SCT 980 - 2 - 12	980	2940	221020	25	24	22	12	7.5	12730	25730
SCT 1060 - 2 - 13	1060	3180	239086	26	26	22	12 2	7.5 3	13830	27830
SCT 1140 - 2 - 14	1140	3420	257149	26	28	22	14	7.5	14720	29820

Sound Power Ratings

Sound Levels
Sound rating data is available for all *SARAVEL* models. When calculating the sound levels generated by a unit, the designer must take into account the effects of the geometry of the tower as well as the distance and direction from the unit to noise-sensitive areas.

Whisper Quiet fans and intake and discharge sound attenuation can be supplied on certain models to provide reduced sound characteristics.

Here are the *SARAVEL* Cooling Towers sound ratings at standard test condition (1 m Distant from the Unit)

Table 2

Sound Ratings in 1 meter			
MODEL	db	MODEL	db
SCT 10 - 1 - 1	66	**SCT 220 - 1 - 5**	76.9
SCT 15 - 1 - 1	69.2	**SCT 260 - 1 - 6**	73.9
SCT 20 - 1 - 1	71.3	**SCT 300 - 1 - 7**	73.8
SCT 25 - 1 - 1	73.9	**SCT 340 - 1 - 8**	73.8
SCT 30 - 1 - 1	73.7	**SCT 340 - 2 - 4**	73.8
SCT 35 - 1 - 1	74.3	**SCT 400 - 2 - 5**	73.7
SCT 40 - 1 - 1	74.4	**SCT 450 - 2 - 6**	73.5
SCT 50 - 1 - 1	78.7	**SCT 500 - 2 - 6**	74.8
SCT 60 - 1 - 1	78.6	**SCT 580 - 2 - 6**	74.8
SCT 75 - 1 - 2	73.5	**SCT 660 - 2 - 8**	74.8
SCT 90 - 1 - 2	77	**SCT 740 - 2 - 9**	75.7
SCT 105 - 1 - 2	73.3	**SCT 820 - 2 - 10**	75.9
SCT 120 - 1 - 3	73.7	**SCT 900 - 2 - 11**	77.7
SCT 140 - 1 - 3	77	**SCT 980 - 2 - 12**	77.7
SCT 160 - 1 - 4	73.7	**SCT 1060 - 2 - 13**	78.7
SCT 180 - 1 - 4	77	**SCT 1140 - 2 - 14**	78.7

Dimensions

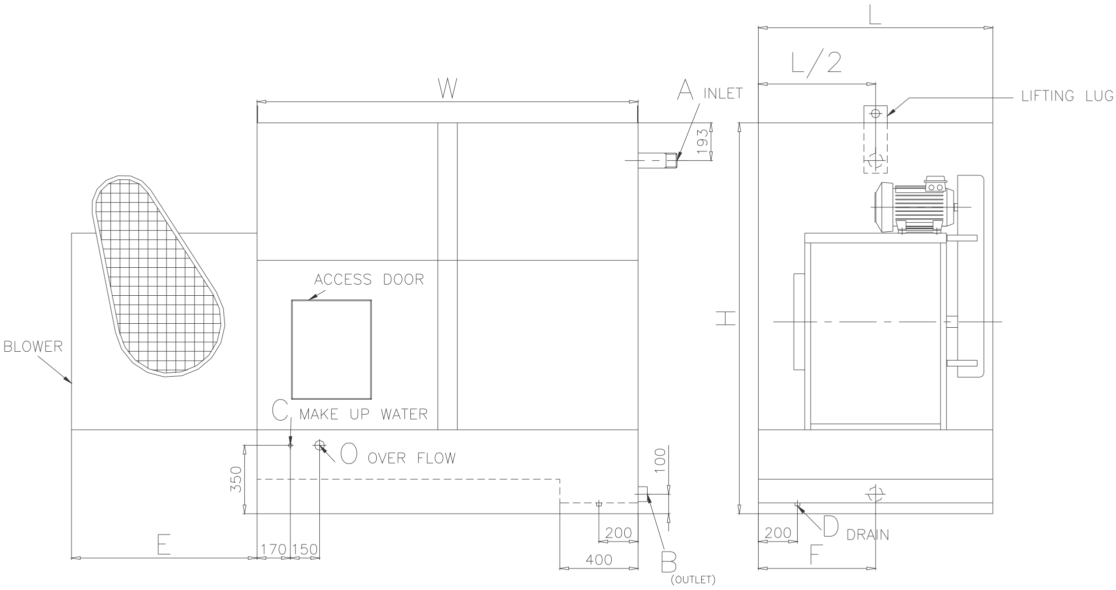


Figure 3

Table 3 (Data of Figure 3)

MODEL	L	W	H	E	A	B	C	D	O
SCT 10 - 1 - 1	550	930	1833	620	2 1/2"	1 1/2"	3/4"	1"	2"
SCT 15 - 1 - 1	720	930	1893	685	2 1/2"	1 1/2"	3/4"	1"	2"
SCT 20 - 1 - 1	930	930	1973	720	2 1/2"	2"	3/4"	1"	2"
SCT 25 - 1 - 1	930	1250	1993	751	2 1/2"	2"	3/4"	1"	2"
SCT 30 - 1 - 1	930	1450	2113	915	3"	3"	3/4"	2"	2"
SCT 35 - 1 - 1	930	1750	2113	915	3"	3"	3/4"	2"	2"
SCT 40 - 1 - 1	930	1930	2113	915	3"	3"	3/4"	2"	2"
SCT 50 - 1 - 1	1200	1930	2113	915	3"	3"	3/4"	2"	2"
SCT 60 - 1 - 1	1450	1930	2763	915	2 × 3"	4"	3/4"	2"	2"

Dimensions

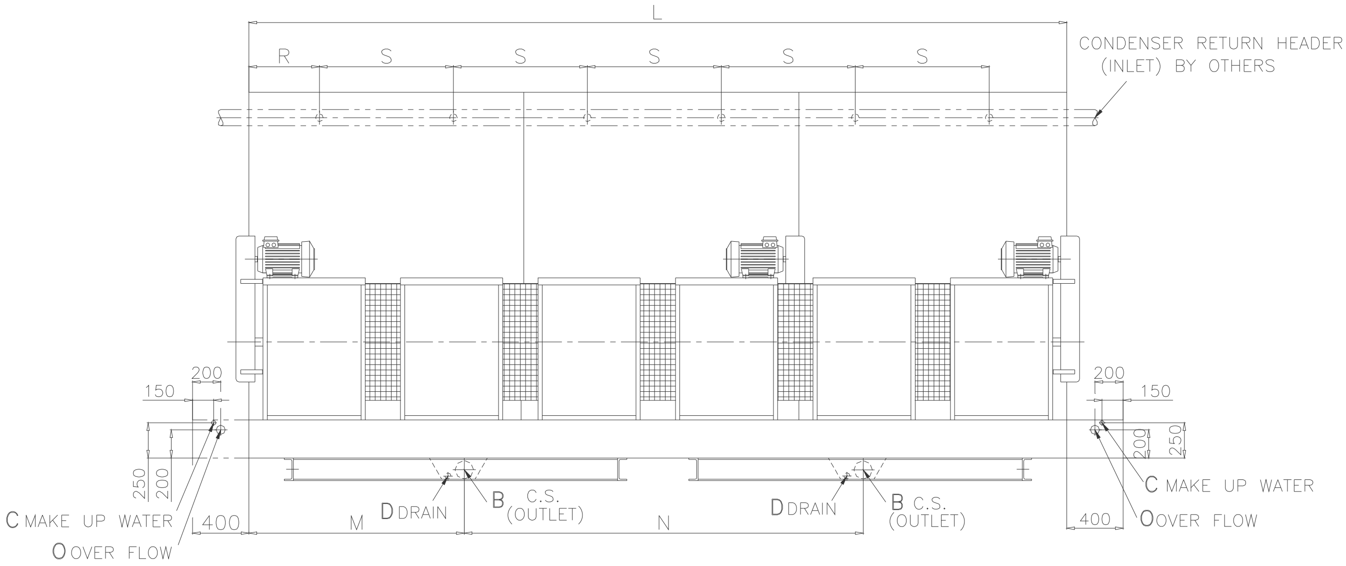


Figure 4

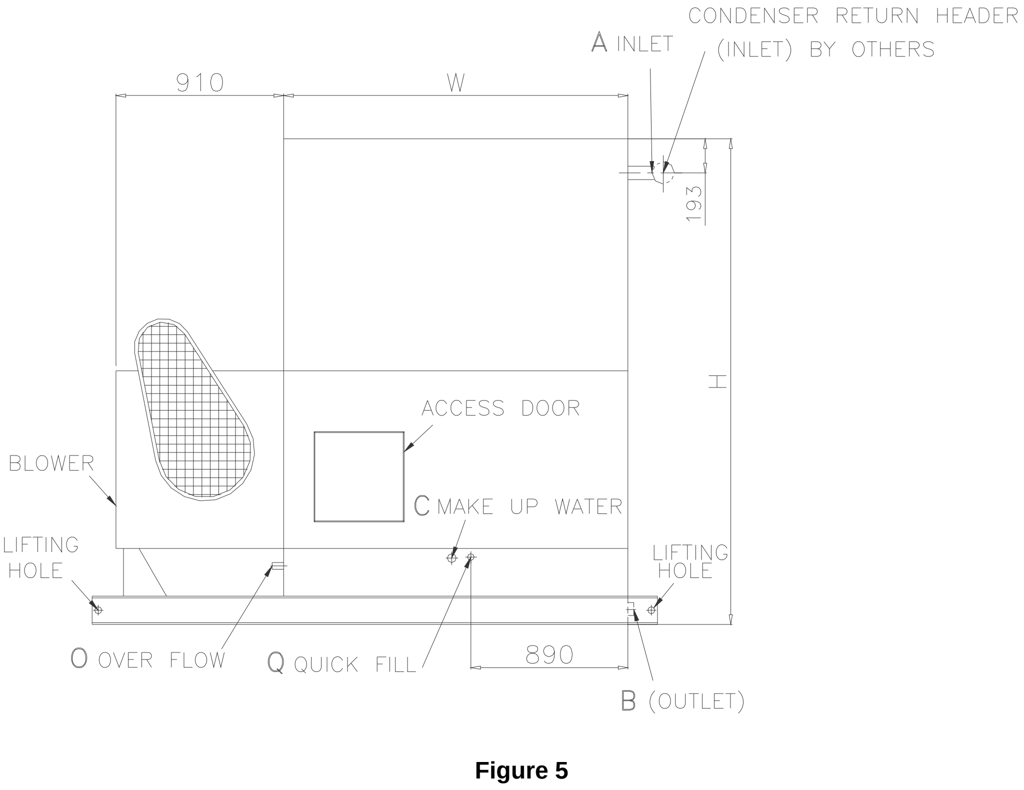


Figure 5

Table 4 (Data of Figure 4 & 5)

MODEL	L	W	H	NO. A	NO. B	NO. C	NO. D	NO. O	Q	M	NO. N	R	NO. S
SCT 75 - 1 - 2	1750	1930	2750	2 × 3"	1 × 4"	1 × 1"	1 × 2"	1 × 2"	1"	875	---	450	1 × 850
SCT 90 - 1 - 2	1930	1930	2750	2 × 3"	1 × 4"	1 × 1"	1 × 2"	1 × 2"	1"	965	---	500	1 × 930
SCT 105 - 1 - 2	2400	1930	2750	3 × 3"	1 × 5"	1 × 1"	1 × 2"	1 × 2"	1"	1200	---	400	2 × 800
SCT 120 - 1 - 3	2874	1930	2750	3 × 3"	1 × 5"	1 × 1"	1 × 2"	1 × 2"	1"	1437	---	487	2 × 950
SCT 140 - 1 - 3	3350	1930	2750	4 × 3"	1 × 5"	1 × 1"	1 × 2"	1 × 2"	1"	1675	---	400	3 × 850
SCT 160 - 1 - 4	3874	1930	2750	4 × 3"	2 × 4"	1 × 1"	2 × 2"	1 × 2"	1"	965	1 × 1939	512	3 × 950
SCT 180 - 1 - 4	4200	1930	2750	5 × 3"	2 × 4"	1 × 1"	2 × 2"	1 × 2"	1"	1090	1 × 2100	400	4 × 850
SCT 220 - 1 - 5	4820	1930	2750	5 × 3"	2 × 4"	1 × 1"	2 × 2"	1 × 2"	1"	1167	1 × 2409	510	4 × 950
SCT 260 - 1 - 6	5820	1930	2750	6 × 3"	2 × 4"	1 × 1"	2 × 2"	1 × 2"	1"	1450	1 × 2909	535	5 × 950

Table 5 (Data of Figure 4 & 5)

MODEL	L	W	H	NO. A	NO. B	NO. C	NO. D	NO. O	Q	M	NO. N	R	NO. S
SCT 300 - 1 - 7	6762	1930	2750	7 × 3"	3 × 5"	2 × 1"	3 × 2"	2 × 2"	2 × 1"	1240	2 × 2160	531	6 × 950
SCT 340 - 1 - 8	7762	1930	2750	8 × 3"	3 × 5"	2 × 1"	3 × 2"	2 × 2"	2 × 1"	1320	2 × 2580	558	7 × 950

Dimensions

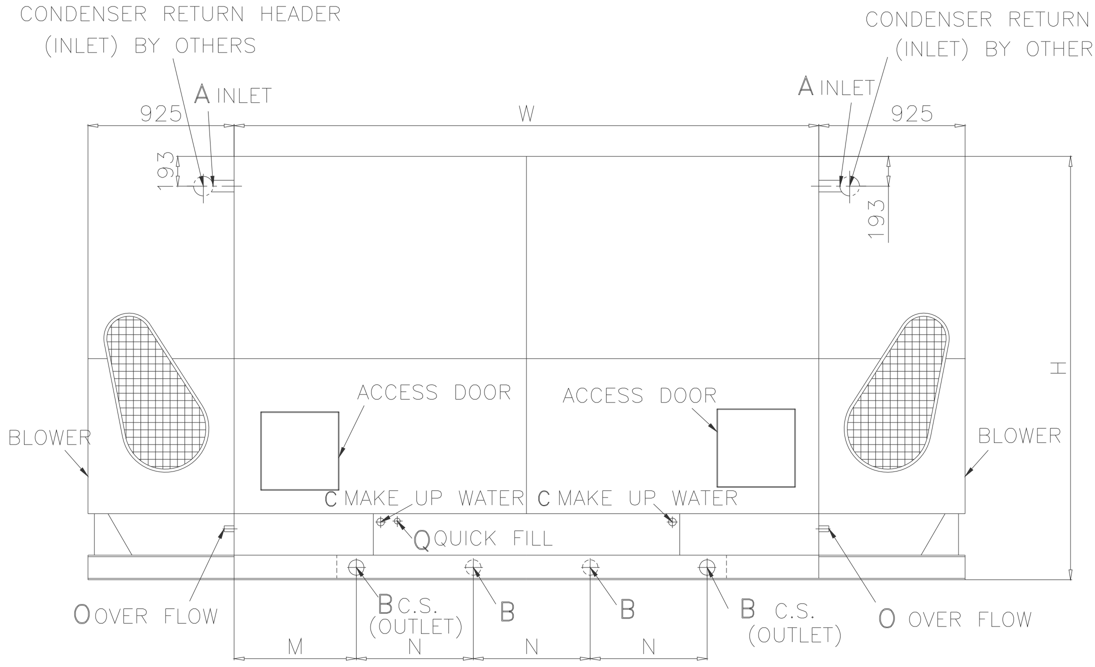


Figure 8

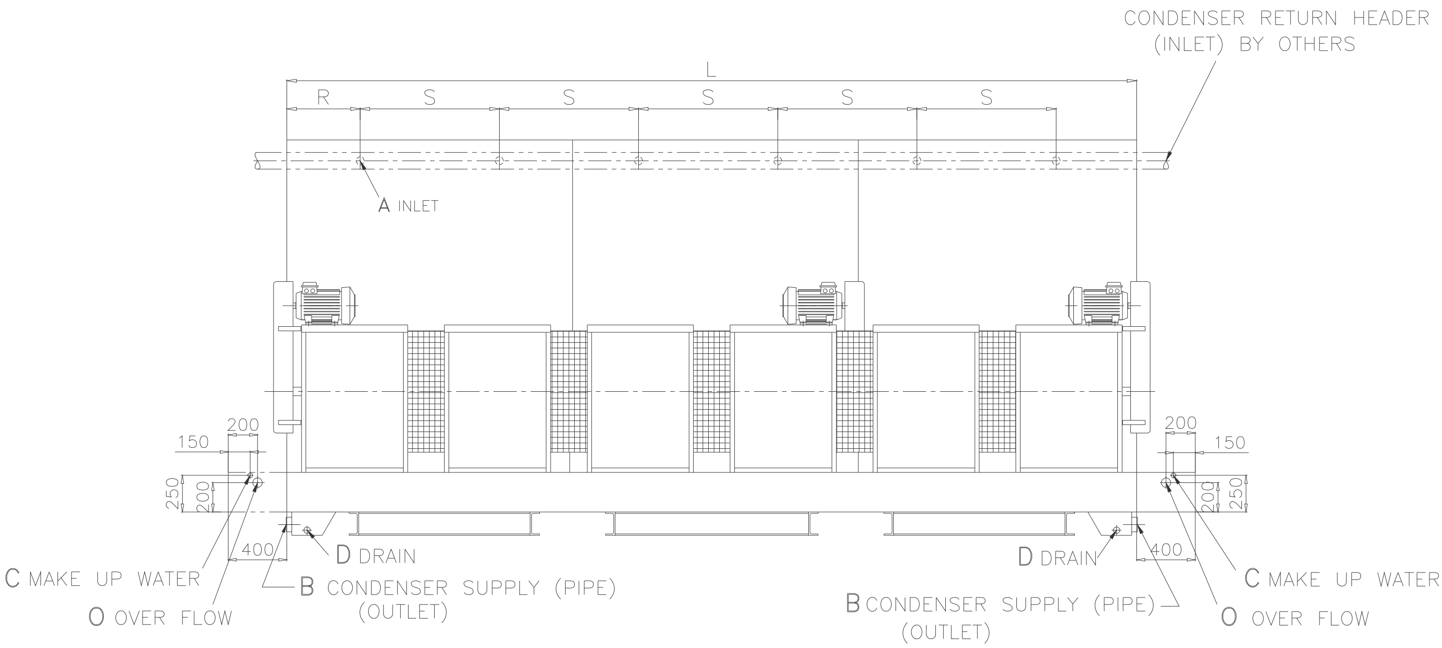


Figure 9

Table 6 (Data of Figure 8 & 9)

MODEL	L	W	H	NO. A	NO. B	NO. C	NO. D	NO. O	Q	M	NO. M	R	NO. S
SCT 340 - 2 - 4	3874	3870	2750	8 × 4"	4 × 4"	2 × 1"	4 × 2"	2 × 2"	2 × 1"	1400	1 × 1000	512	3 × 950
SCT 400 - 2 - 5	4820	3870	2750	10 × 4"	4 × 5"	2 × 1"	4 × 2"	2 × 2"	2 × 1"	1400	1 × 1000	510	4 × 950
SCT 450 - 2 - 6	5700	3858	2750	12 × 4"	4 × 5"	2 × 1"	5 × 2"	2 × 2"	2 × 1"	1400	1 × 1000	475	5 × 950
SCT 500 - 2 - 6	5818	3858	2750	12 × 4"	4 × 5"	2 × 1"	5 × 2"	2 × 2"	2 × 1"	1400	1 × 1000	534	5 × 950
SCT 580 - 2 - 6	6762	3858	2750	14 × 4"	4 × 5"	4 × 1"	5 × 2"	4 × 2"	4 × 1"	1400	1 × 1000	531	6 × 950
SCT 660 - 2 - 8	7762	3858	2750	16 × 4"	4 × 5"	4 × 1"	6 × 2"	4 × 2"	4 × 1"	1400	1 × 1000	556	7 × 950
SCT 740 - 2 - 9	8712	3858	2750	18 × 4"	6 × 5"	4 × 1"	6 × 2"	4 × 2"	4 × 1"	1250	2 × 650	556	8 × 950
SCT 820 - 2 - 10	9706	3858	2750	20 × 4"	6 × 5"	4 × 1"	7 × 2"	4 × 2"	4 × 1"	1250	2 × 650	578	9 × 950
SCT 900 - 2 - 11	10650	3858	2750	22 × 4"	6 × 5"	4 × 1"	7 × 2"	4 × 2"	4 × 1"	1250	2 × 650	575	10 × 950
SCT 980 - 2 - 12	11650	3858	2750	24 × 4"	8 × 5"	4 × 1"	7 × 2"	4 × 2"	4 × 1"	1150	3 × 500	600	11 × 950
SCT 1060 - 2 - 13	12594	3858	2750	26 × 4"	8 × 5"	4 × 1"	8 × 2"	4 × 2"	4 × 1"	1150	3 × 500	597	12 × 950
SCT 1140 - 2 - 14	13594	3858	2750	28 × 4"	8 × 5"	4 × 1"	8 × 2"	4 × 2"	4 × 1"	1150	3 × 500	662	13 × 950

LOCATION
Cooling towers must be located to ensure an adequate supply of fresh air to the air intakes. When units are located adjacent to building wall or in enclosures, care must be taken to ensure that the warm, saturated discharge air is not deflected and short-circulated back to the air intakes. See FIGURE 13.

In instances where for aesthetic reasons a decorative louver is to be placed around the periphery of the cooling tower, adequate distance between adjacent louver elements and distance from the intake of the cooling tower should be specified to prevent intake air deficiency.

Additionally, each cooling tower should be located and positioned to prevent the introduction of its discharge air into the ventilation systems of the building on which the tower is located or into that of adjacent buildings.

PIPING
Piping should be size and installed in accordance with piping practice. In order to prevent over flowing of the tower basin and ensure satisfactory pump operation at startup, all heat exchangers and as much tower piping as possible should be installed below the operation level of the tower. In addition all piping should be supported separately from the unit through the use of pipe hangers or supports.

If more than one inlet connection is required, balancing valves should be installed to property balance flow to each cooling tower cell. See FIGURE 10 & 11. The use of shut-off valves is dictated by the necessity to isolate units for servicing.

When multiple towers are used on a common system, equalizing lines should be installed between the sumps of the separate units to ensure balanced water level in all units. See FIGURE 12.

Provisions must be envisioned in the installation phase to facilitate drainage of the cooling tower for winter season.

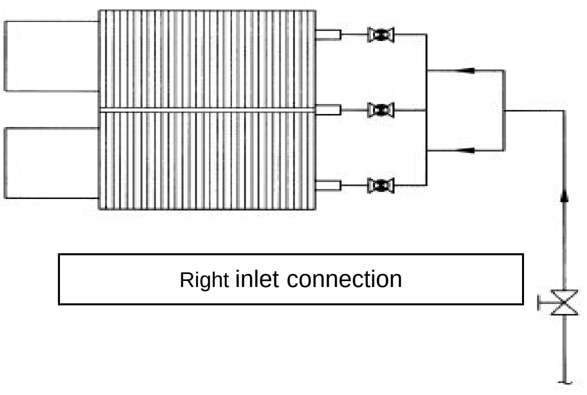


Figure 10

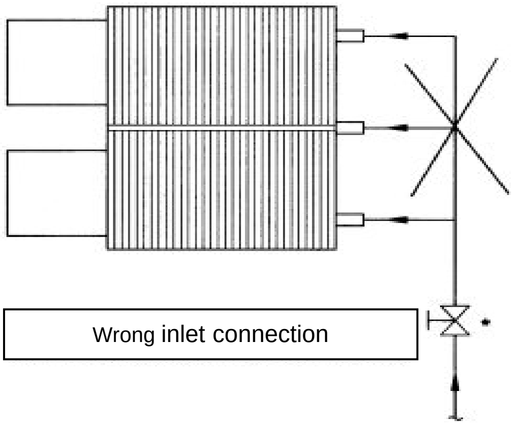


Figure 11

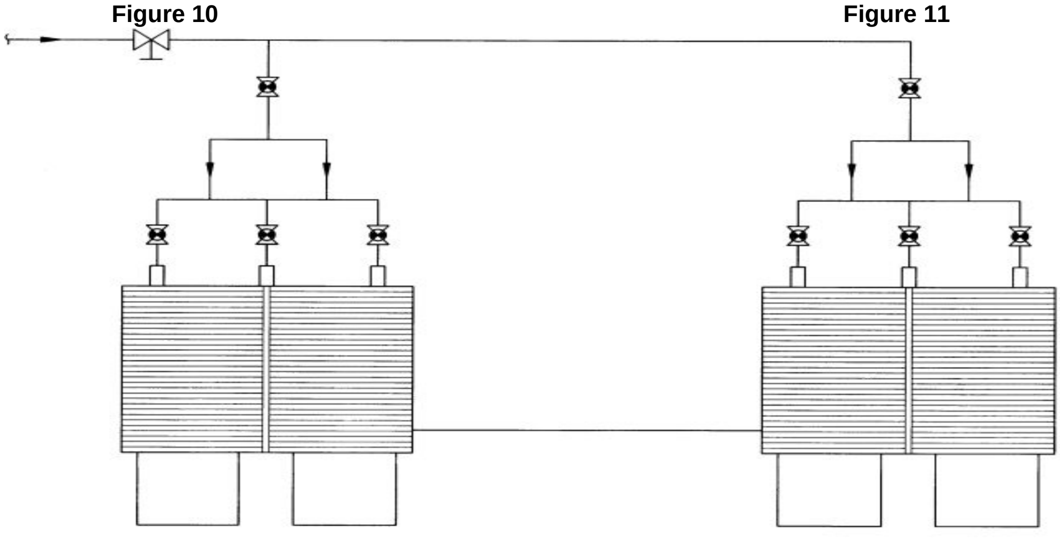


Figure 12

WATER TREATMENT
As water evaporates in a cooling tower, the dissolved solids originally present in the water remain in the system. The concentration of dissolved solids increases rapidly and can reach unacceptable levels.

In addition, airborne impurities and biological contaminants are often introduced into the recirculation water. If impurities and contaminants are not effectively controlled, they can cause scaling, corrosion, sludge or biological fouling. In chiller system this leads to scaling of the condenser tubes and the attendant rise in discharge pressure of the compressor.

Accordingly, a water treatment program should be employed to control all potential contaminants. While in many cases simple bleed-off may be adequate for control of scale or corrosion, it is insufficient to control biological contamination and this subject must be addressed in any treatment program. The treatment program must be compatible with galvanized steel and the PH of the basin water must be maintained between 6.5 and 8.5.

Batch chemical feeding for scale and corrosion control is not recommended since effective mixing may not be achieved in the cooling tower sump.
Water treatment schemes must be based on actual water chemical analysis.

BUT

Fills and Nozzles in *SARAVEL* Cooling Towers are able to operate in corrosive condition as mentions below:

Table 7

Corrosions	Range
PH	5 - 9
Hardness	up to 1000 ppm
Temperature	Up to 80˚C (176˚F) for Fills &Up to 75 ˚C (167˚F) for spray nozzles

BASIN SUPPORT
A grillage of steel or concrete is normally utilized for support of a tower steel basin. Grillages must be designed to withstand the total wet operating weight of the tower and attendant piping, as well as the deal loads contributed by other accessories. It must also accept transient loads attributable to wind, earthquake, and maintenance traffic. Grillage members must be level and of sufficient strength to preclude excess deflection under load.

For details and recommendation for installation, service, and repair of cooling tower do not hesitate to contact *SARAVEL CORP. SALES OFFICE.*

Installation Notes

Under certain wind conditions some portion of the saturated air leaving the tower may be induced back into the tower air intake as show in FIGURE 13 & 14. The orientation of the cooling tower with respect to the wind direction is an important factor in preventing recirculation.

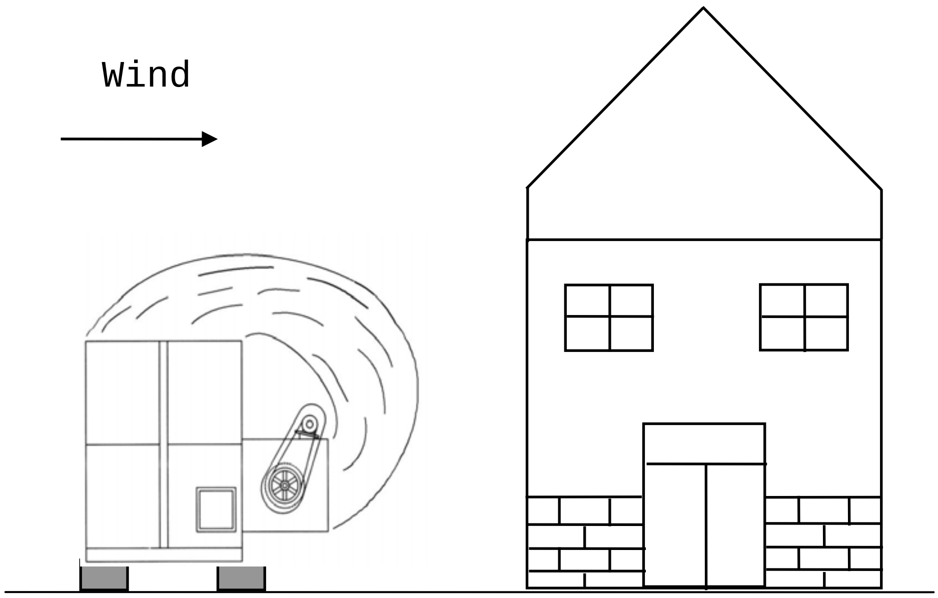


Figure 13

In some instances with multiple cooling tower units as shown in FLGURE 14, the saturated discharge air of one unit contaminates the intake air of the downwind tower. This phenomenon is known as interference and to prevent it, placing tower in mirror image-back to back or side arrangements from one another is recommended.

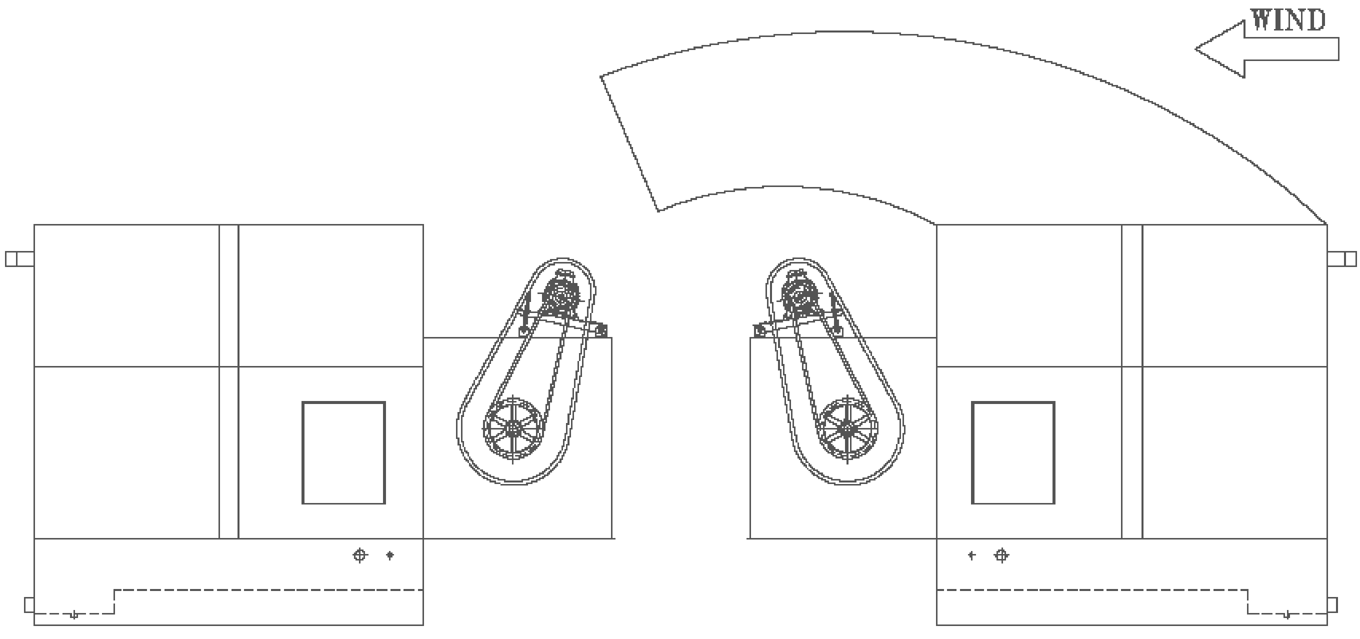


Figure 14

Models SCT-10 through SCT-60 are equipped with lifting lugs and may be hoisted according to FIGURE 15. It is recommended to maintain a height of at least 1.5 m between top of a unit to the apex of lifting cables to avoid interference and overloading of the lifting lugs in the wrong direction.

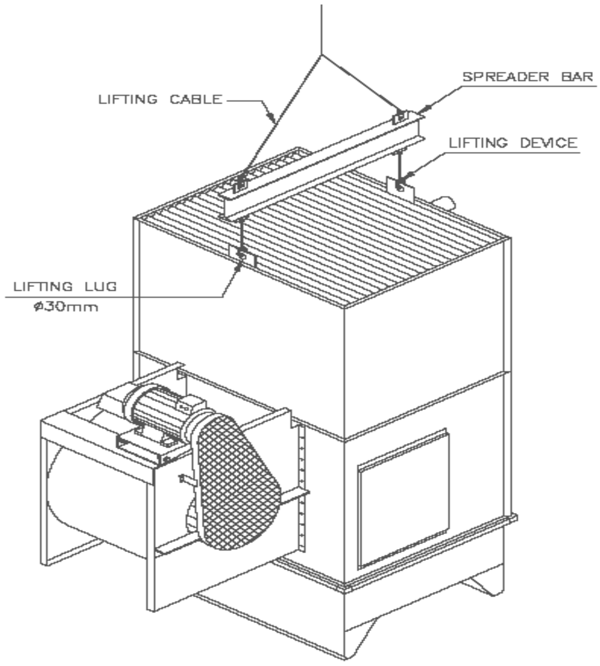


Figure 15

Models SCT –75 through SCT-1140 may be lifted by placing slings through the holes at the base of the unit. FIGURE 16 the spacer bar serves as a stabilizer against unnecessary swinging1 twisting of the unit. Furthermore the hosting cable does not touch the casing to cause damage.

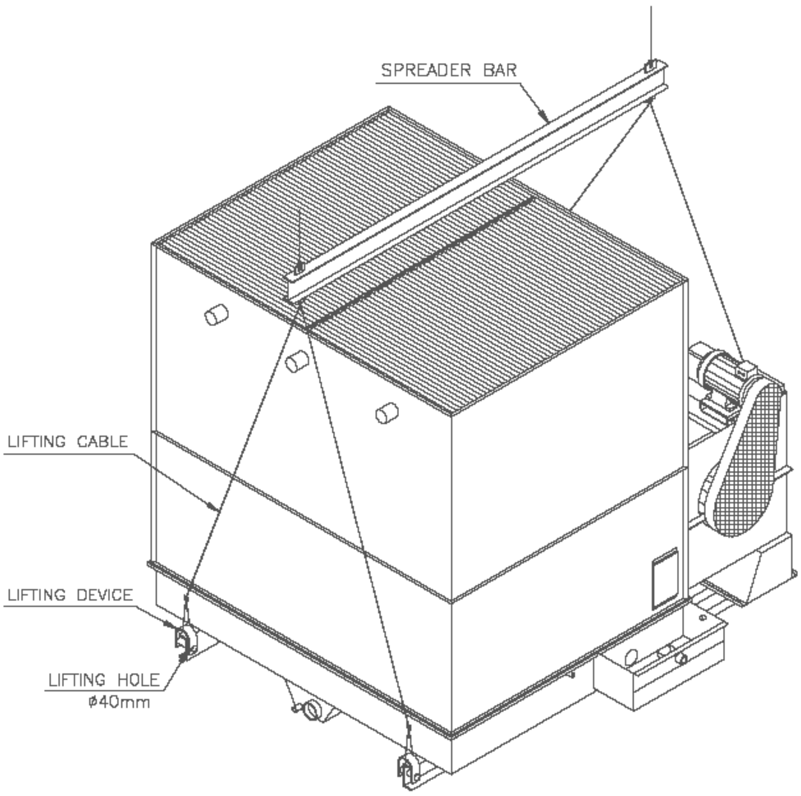


Figure 16

GENERAL
Furnish and install as shown on the plans,
SCT- _________________cooling tower(s) of Non-Clogging forced draft, counter flow, spray filled type with vertical discharge.

The cooling tower(s) shall have the capacity to cool __________ GPM of water from____°F to____°F at ______°F entering air wet bulb temperature with a tower pumping head of _______ feet.

The cooling tower(s) shall include fan(s), casing(s), drift eliminator, fill, spray nozzles, basin, and assorted connections.

FAN
Fan(s) shall be squirrel cage, forward curved, double width-double inlet, centrifugal type. All fan(s) shall be statically and dynamically balanced and constructed of heavy gage galvanized steel sheet.

The steel shaft shall be dynamically balanced.
All fan-(electric) motors shall be squirrel cage, totally enclosed fan cooled (TEFC) with degree of protection of IP-54 and insulation Class F. All motors shall 380V-3Ø-50Hz and operate at 1450 rpm and selected to match the horsepower requirements of the fans.

Drive system shall be of V-belt type, consisting of cast iron pulley and sheave. A belt guard shall protect against motor shaft, pulley, belt, and sheave.

Bearings shall be deep-groove, roller ball, with cast iron pillow block type housing fitted with brass nipple for re lubrication.

CASING
The casing shall be of bolted-paneled type and Constructed of galvanized steel sheets.
Casing shall be completely painted with zinc chromatized aluminum finish as per customer specification. Additional charge will apply. A removable, man-size access door shall be provided.

All units shall be either completely factory assembled or shipped in sections (as per customer specification.)

FILL
Cooling elements shall be fabricated of polypropylene sheets main property of Non-Clogging. The cooling elements shall have the best water to air contact area for removal of heat. Fills assemblies shall be removable.

DRIFT ELMINATOR
Cooling Tower drift eliminators shall be constructed of galvanized steel sheet metal with optimal droplet capture. Eliminator assemblies shall be removable.

SPRAY SYSTEM
Spray system shall consist of Non-Clogging polypropylene nozzles connected to a hot dipped galvanized steel header.

BASIN
The basin shall be fabricated of heavy gage galvanized steel sheet metal with provisions for overflow and make up water sump.

Table 8

	Temperature	
	˚F	˚C
˚F	1	0.56 (X – 32)
˚C	1.8 X + 32	1

Table 9

	Volumetric Flow Rate		
	CFM	m3/Hour	GPM
1 CFM	1	1.67	7.48
1 m^3/Hour	0.59	1	4.04
1 GPM	0.13	0.23	1

Table 10

	Length			
	m	ft	in	mm
1 m	1	3.28	39.37	1000
1 ft	0.3	1	12	304
1 in	0.025	0.083	1	25.4
1 mm	0.001	0.003	0.037	1

SARAVEL **CORP.**

Feb. 2010

Manufacturer reserves the right to make changes in design and construction, without notice.

(Head Office)
No. 43, North Sheikh Bahai Avenue, Tehran 19917, IRAN
Tel: (+98-21) 88046921 (6 lines) Fax: (+98-21) 88046920
E-Mail Address: sales@saravel.com
Web Site: http://www.Saravel.com