Series ACT Layout Guidelines

Open circuit cooling towers, closed circuit cooling towers, and evaporative condensers all depend upon an adequate supply of fresh, ambient air to provide design capacity. Other important considerations such as the proximity to building air intakes or discharges also must be taken into account when selecting and designing the equipment site. Included are the design layout guidelines for evaporative cooling products in several situations typically encountered by designers. These guidelines represent minimum spacing requirements; more open spacing should be utilized whenever possible.

As the size of an installation increases, the total amount of heat being rejected to the atmosphere and the volume of discharge air increase -- to the point where the units can virtually create their own environment. As a result, it becomes increasingly difficult to apply a set of general guidelines for each case. Such installations, and particularly those in wells or enclosures, will recirculate and the problem becomes one of controlling the amount of recirculation and/or adjusting the design wet-bulb temperature to allow for it. Consequently, any job that involves four or more cells should be referred to your local BAC Representative for review.

Axial fan equipment units are not generally suited for indoor or ducted applications. In such situations, a Series V centrifugal fan unit is recommended.

General Considerations:

When selecting the site for a cooling tower, closed circuit cooling tower, or an evaporative condenser, consider the following factors:

1. Locate the unit to prevent the warm discharge air from being introduced into the fresh air intakes of the building(s) served by the unit, intakes of neighboring buildings, or from being carried over any populated area such as a building entrance.

2. Consider the potential for plume formation and its effect on the surroundings, such as large windowed areas, and pedestrian or vehicular traffic arteries, particularly if the unit(s) will be operated during low ambient temperatures.

3. Provide sufficient unobstructed space around the unit(s) to ensure an adequate supply of fresh, ambient air to the air intake. Avoid situations that promote recirculation of unit discharge air, such as units located:
    a. Adjacent to walls or structures that might deflect some of the discharge airstream back into the air intake.
    b. Where high downward air velocities in the vicinity of the air intake exist.
    c. Where building air intakes or exhausts, such as boiler stacks in the vicinity of the unit, might raise the inlet wet-bulb temperature or starve the unit of air.

4. Provide adequate space around the unit for piping and proper servicing and maintenance, as shown in Figure 1.

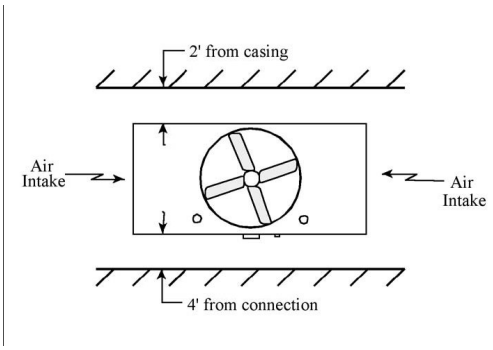

Figure 1: Plan view of recommended unit servicing and maintenance spacing for dual air inlet unit

5. The top of the fan discharge cylinder, velocity recovery stack, or discharge sound attenuation must be at least level with, and preferably higher than any adjacent walls or buildings.

6. When possible, orient the unit so the prevailing summer wind blows the discharge air away from the air intakes of the unit(s).

7. When the unit is installed with intake sound attenuation, the distances given in the tables below should be measured from the face of the intake sound attenuation.

8. On larger unit installations, the problem of ensuring an adequate supply of fresh, ambient air to the tower intakes becomes increasingly difficult.

   Grouping the towers in two cell or three cell groups, spaced at least one tower length between facing end walls to allow fresh air to circulate around each grouping, as shown in Figure 2, below.

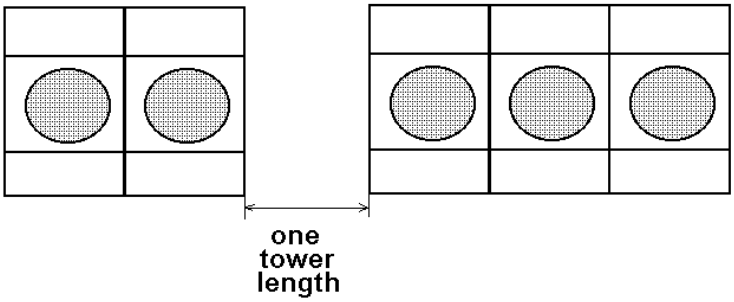

Figure 2

   Including an allowance for recircualtion when specifying the design wet bulb temperature for the installation. In so doing, some recirculation can be tolerated without major adverse effects on the desired tower leaving water temperature.

   Note, however, this approach is not effective in reducing the potential for frosting or icing of the air intakes due to recirculation when operating in ambient temperatures well below freezing.

9. If the installation does not meet the recommended guidelines, the units will have a greater tendency to recirculate and the design conditions should be altered to include an allowance for the recirculation. For instance, if the design conditions are 95° F/85° F/78

° F and it was estimated that the allowance for recirculation rate was 1° F, then the new design conditions would be 95° F/85° F/79° F and the units should be reselected based on the new design conditions.

The "Layout Guidelines" describe several typical site layouts for BAC's cooling towers. If these guidelines do not cover a particular situation or if the layout criteria cannot be met, please refer the application to your BAC Representative for review. Please indicate prevailing wind direction, geographic orientation of the unit(s), and other factors such as large buildings and other obstructions that may influence layout decisions.

Section A: Installations Adjacent to a Building or Solid Wall(s)

1. Unit Orientation
   When a unit is located near a building wall, the preferred arrangement is to have the unit situated with the cased end or blank-off side (unlouvered side) facing the adjacent wall or building.

2. The top of the fan discharge cylinder must be level with or higher than any adjacent walls or buildings.

3. Air Inlet Requirements:
   Should it be necessary to install a unit with the air intake facing a wall, provide at least distance "d" between the air intake and the wall, as illustrated in Figures 3.

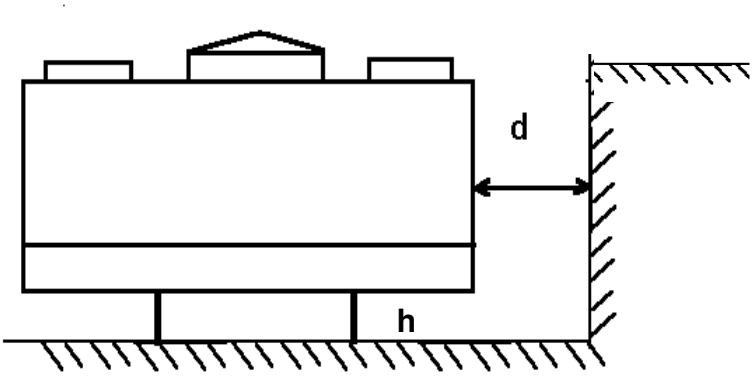

Figure 3: Section view of unit adjacent to a wall

Table 1: Minimum Acceptable Air Inlet Distance "d" (meter) to Soild Wall

	One Cell			Two Cell			Three Cell			Four Cell		
Elevation h	**0**	**0.6**	**1.2**	**0**	**0.6**	**1.2**	**0**	**0.6**	**1.2**	**0**	**0.6**	**1.2**
Model Number												
ACT-08161	0.90	0.85	0.75	1.50	1.35	1.25	1.90	1.75	1.65	2.20	2.05	1.95
ACT-08162	1.00	0.95	0.85	1.65	1.55	1.45	2.10	2.00	1.85	2.45	2.30	2.20
ACT-09172	1.20	1.10	1.00	1.90	1.80	1.65	2.45	2.30	2.15	2.80	2.65	2.50
ACT-09173	1.25	1.15	1.05	2.05	1.90	1.80	2.60	2.45	2.30	3.05	2.85	2.70
ACT-09174	1.35	1.25	1.15	2.25	2.10	1.95	2.85	2.70	2.55	3.28	3.11	2.96
ACT-10184	1.55	1.45	1.35	2.55	2.40	2.25	3.25	3.50	2.90	3.75	3.60	3.40
ACT-10185	1.60	1.50	1.40	2.65	2.50	2.35	3.45	3.25	3.10	4.00	3.80	3.65
ACT-11205	1.85	1.70	1.60	2.95	2.80	2.65	3.80	3.60	3.40	4.35	4.20	4.00
ACT-11206	1.80	1.70	1.60	2.95	2.80	2.65	3.80	3.60	3.45	4.40	4.25	3.98

ACT-13216	2.00	1.90	1.80	3.25	3.10	2.95	4.10	3.95	3.75	4.75	4.55	4.40
ACT-13217	2.00	1.85	1.75	3.25	3.10	2.95	4.15	3.95	3.80	4.80	4.65	4.45
ACT-14237	2.20	2.10	1.95	3.55	3.40	3.25	4.50	4.30	4.15	5.20	5.00	4.85

Note: Elevating the tower more than 1.2 meter is considered no effect on the "d" dimension.

4. On multiple-cell installations, position the towers end-to-end, similar to the standard two-cell arrangement listed in the catalog, whenever possible. If the units must be situated with air inlets facing one another, the spacing between units must be no less than "2d", as obtained from Table 1.

Section B: Well Installations

1. Unit Orientation
   Center the tower within the enclosure so the supply air flows uniformly to both tower air inlets.

2. The top of the fan discharge cylinder must be level with or higher than any adjacent walls or buildings.

3. Minimum End Clearance Dimensions
   Reserve minimum end clearance dimensions for piping requirements and proper access to the tower.

4. Air Inlet Requirements
   To satisfy air inlet requirements in a well enclosure, maintain distance "d" between the tower air inlets and wall as illustrated in Table 2 and Figure 4.

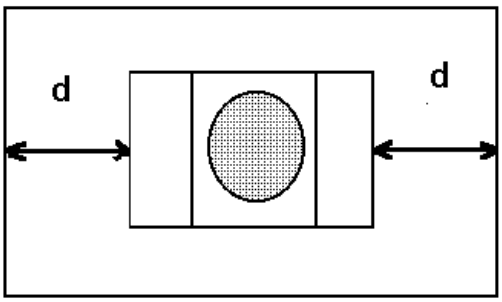

Figure 4

Table 2: Minimum Acceptable Air Intake Distance "d" (meter)

Model Number	One Cell	Two Cell	Three Cell	Four Cell
ACT-08161	1.45	2.00	2.30	2.50
ACT-08162	1.70	2.40	2.75	2.95
ACT-09172	2.00	2.70	3.05	3.25
ACT-09173	2.25	3.05	3.45	3.65
ACT-09174	2.60	3.50	3.95	4.25
ACT-10184	2.95	3.90	4.35	4.60
ACT-10185	3.30	4.30	4.80	5.10
ACT-11205	3.60	4.60	5.10	5.35
ACT-11206	3.75	4.80	5.30	5.55
ACT-13216	4.00	5.05	5.50	5.75
ACT-13217	4.30	5.40	5.90	6.20

ACT-14237	4.60	5.70	6.15	6.40

Note: Elevating the tower has no effect on these "d" dimensions.

Section C: Louver Well Installations

Check to see if the layout meets the requirements for a well installation. If the criteria for the well installation are met, the layout is satisfactory. If the layout does not satisfy the criteria for the well installation, analyze the layout as follows:

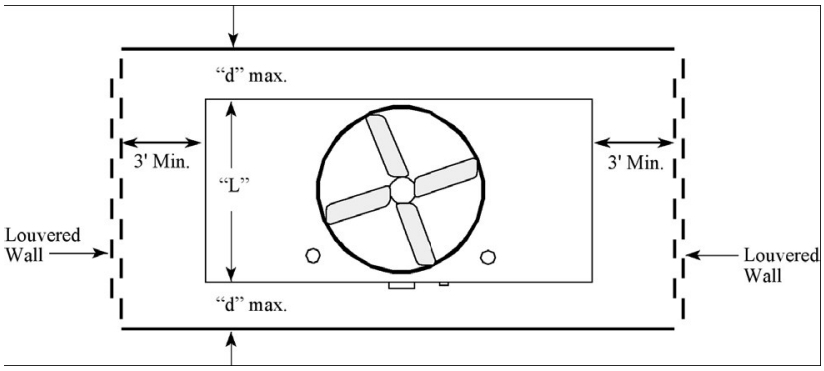

Figure 5: Plan view of a dual air intake unit in enclosure with louvered walls

1. Unit Orientation
   Center the tower within the enclosure so the supply air flows uniformly to both tower air inlets.

2. The top of the fan discharge cylinder must be level with or higher than any adjacent walls or buildings.

3. Air intake requirements:

   Units should be arranged within the enclosure such that:
   a. The air intake directly faces the louver or slot locations as shown in Figure 5
   b. Maintain a distance of at least three feet (3'-0") between the unit air intake(s) and the louvered or slotted wall for uniform air distribution.
   c. If the available space does not permit the unit can be arranged with the air intakes facing the louvered or slotted walls and the enclosure cannot be modified to permit such an arrangement, consider the alternative illustrated in Figure 6. This arrangement should be restricted to one-cell or two-cell installations. The effective area of the louvers is only the length extending beyond the width of the tower.

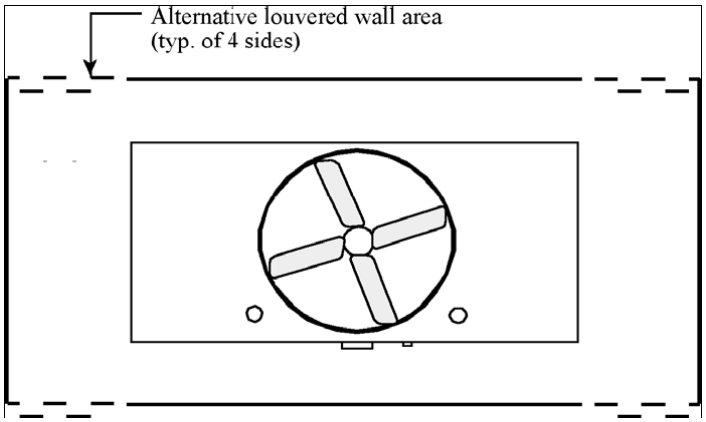

Figure 6: Plan view of dual air inlet unit in enclosure with alternate louver arrangement

4. Louver Requirements:

   a. Louvers must provide at least 50% net free area to ensure that the unit airflow is not reduced due to friction or dynamic losses and that sufficient air is drawn through the openings and not downward from above.

   b. The required total louver or slot area is based on drawing the total unit airflow through the net free area of the louvers at a velocity of 600 FPM or less.

   c. Locate the louver area in the walls of the enclosure such that air flows uniformly to the air intakes.

   d. If the unit is elevated to ensure the discharge is at the same level or above the top of the enclosure, it is acceptable to extend the louvered or slot area below the base of the units up to 2 feet if needed to achieve the minimum gross louver area. To calculate air velocity through the louver, the useable louvered or slot area may extend beyond the ends of the unit, by 4' maximum

Calculate the louver velocity as follows:

Louver Velocity = Total Unit Airflow /(% Louver Free Area x Useable Louver Area) < 600 fpm

The "Layout Guidelines" describe several typical site situations ACT towers. If these guidelines do not cover a particular situation or if the layout criteria cannot be met, please refer the application to your local BAC Representative for review. Please indicate prevailing wind direction, geographic orientation of the unit(s), and other factors such as large buildings and other obstructions that may influence layout decisions.