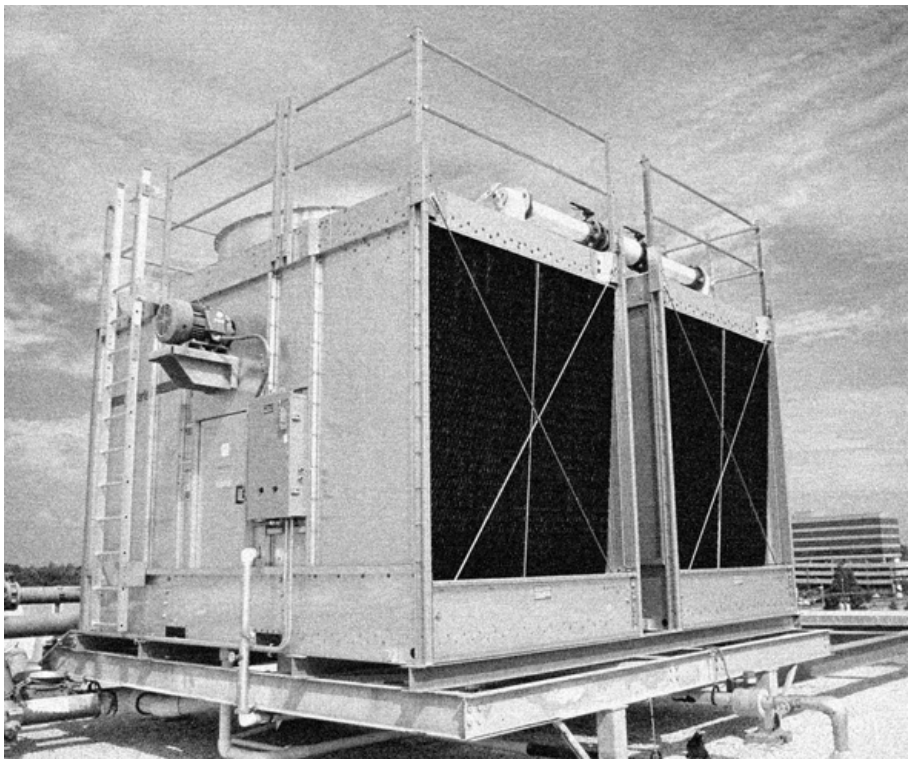
Series Quiet Cooling Tower

Galvanized



April 2004

COOL-PRC002-EN

Contents

Base

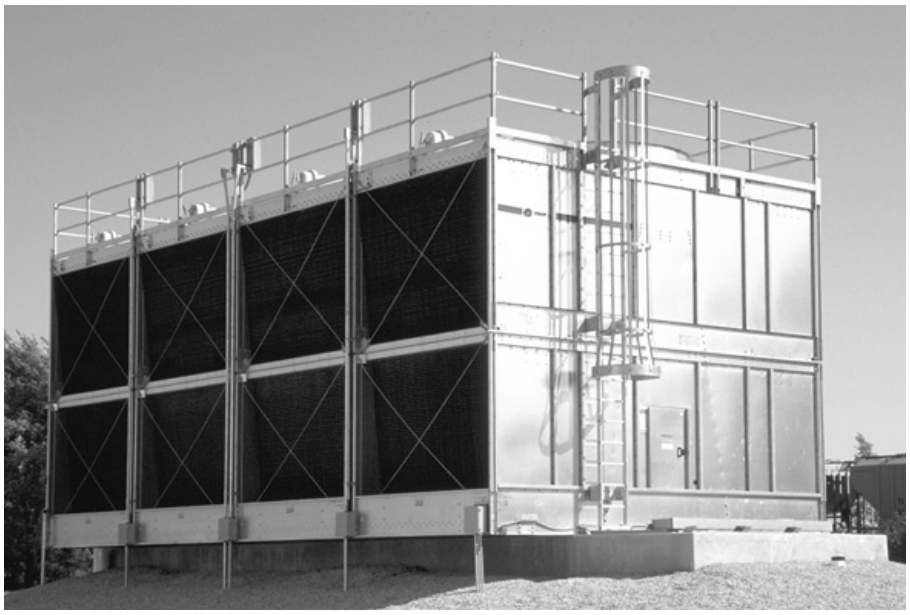
Series Quiet towers are galvanized steel, factory assembled, crossflow cooling towers, designed to serve air conditioning and refrigeration systems as well as light to medium industrial process loads on clean water. They evolve from a factory-assembled concept of towers, and incorporate all of the design advancements that our customers have found valuable. The Series Quiet has been designed specifically for sound control and tonnage density and represents the current state of the art in this cooling tower category.

This booklet not only relates the language to use in describing an appropriate Series Quiet cooling tower — but also defines why certain items and features are important enough to specify with the intention of insisting upon compliance by all bidders. The left hand column of pages 5 thru 21 provides appropriate text for the various specification paragraphs, whereas the right hand column comments on the meaning of the subject matter and explains its value.

Pages 5 thru 11 indicate those paragraphs which will result in the purchase of a basic cooling tower — one that accomplishes the specified thermal performance, but which will lack many operation — and maintenance-enhancing accessories and features that are usually desired by those persons who are responsible for the continued and continuing operation of the system of which the tower is part. It will also incorporate those standard materials which testing and experience has proven to provide acceptable longevity in normal operating conditions.

Pages 12 thru 21 provide paragraphs intended to add those features, components, and materials that will customize the tower to meet the user's requirements.

Space does not permit definition and explanation of all of the possible options that can be applied to the Series Quiet. Trane realizes that you, the purchaser, must be happy with the tower's characteristics, and we are prepared to provide — or provide *for* — any reasonable enhancement that you are willing to define and purchase. Your needs will become part of Trane's continuing evolution of this product line.



Base

Specifications

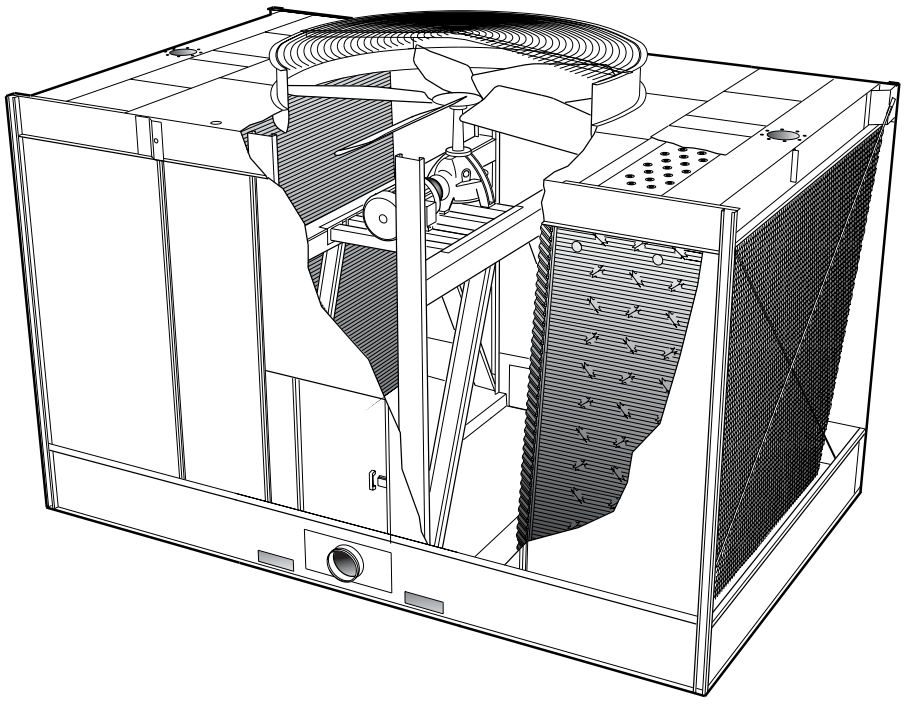
1.0 Base:

1.1 Provide an induced draft, crossflow type, f actory assembled, film fill, industrial duty, galvanized steel cooling tower situated as shown on the plans. The limiting overall dimensions of the tower shall be _____ wide, _____ long, and _____ high. Total operating horsepower of all fans shall not exceed ____ hp, consisting of ___ @ _____ hp motor(s). Tower shall be similar and equal in all respects to Trane Model _____.

Specification Value

Your specification base establishes the type, configuration, base material, and physical limitations of the cooling tower to be quoted. During the planning and layout stages of your project, you will have focused your attention on a cooling tower selection that fits your space allotment, and whose power usage is acceptable. Limitations on physical size and total operating horsepower avoid the introduction of unforeseen operational and site-related influences. Specifying the number of cells, and the maximum fan hp/cell will work to your advantage.

The benefit of crossflow towers is that they are inherently easy to operate, access, and maintain. Unlike counterflow towers, crossflow towers have a spacious plenum between banks of fill for easy access to all of the tower's internal components, and the water distribution system is adjacent to the fan deck.



Performance

Specifications

2.0 Thermal Performance:

2.1 The tower shall be capable of cooling _____ GPM (L/s) of water from ____ °F (°C) to _____ °F (°C) at a design entering air wet-bulb temperature of _____ °F (°C), and its thermal rating shall be Certified by the Cooling Tower Institute.

3.0 Performance Warranty:

3.1 CTI Certification notwithstanding, the cooling tower manufacturer shall guarantee that the tower supplied will meet the specified performance conditions when the tower is installed according to plan. 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.

4.0 Design Loading:

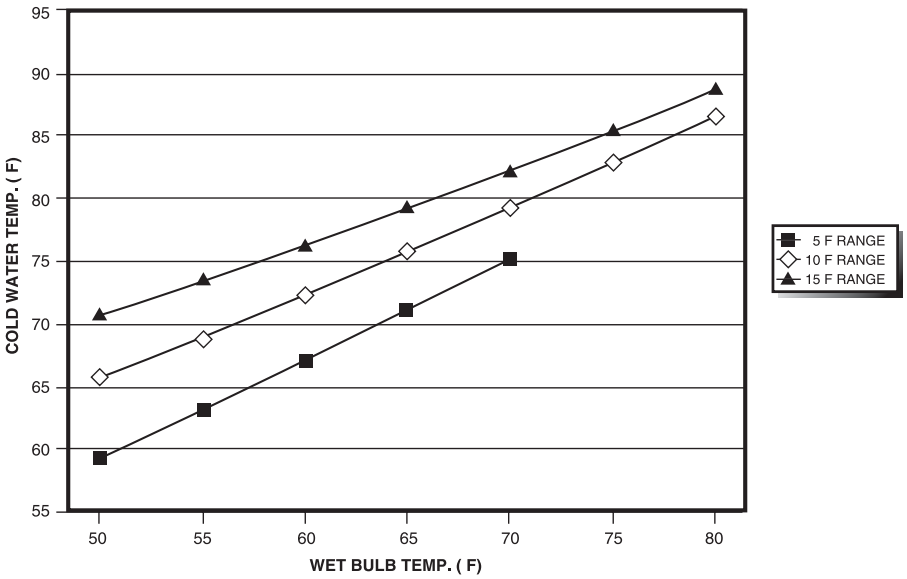
4.1 The tower and all its components shall be designed to withstand a wind load of 30 psf (1.44kPa), as well as a .3g seismic load. It shall be designed to withstand shipping and hoisting loads of 2g horizontal and 3g vertical. The fan deck and hot water basin covers shall be designed for 50 psf (2.42 kPa) live load or a 200 lb. (91 kg) concentrated load. Handrails, where specified, shall be capable of withstanding a 200 lb. (890 N) concentrated live load in any direction, and shall be designed in accordance with OSHA guidelines.

Specification Value

CTI Certification means that the tower has been tested under operating conditions and found to perform as rated by the manufacturer under those circumstances. It assures the buyer that the tower is not intentionally or inadvertently undersized by the manufacturer.

However, CTI certification alone is not sufficient to assure you that the tower will perform satisfactorily in your situation. Certification is established under relatively controlled conditions, and towers seldom operate under such ideal circumstances. They are affected by nearby structures, machinery, enclosures, effluent from other towers, etc. Responsible and knowledgeable bidders will take such site-specific effects into consideration in selecting the tower — however the specifier must insist by the written specification that the designer/manufacturer guarantee this "real world" performance. Any reluctance on the part of the bidder should cause you some concern.

The indicated design values are the minimum allowables under accepted design standards. They give you assurance that the tower can be shipped, handled, hoisted — and ultimately operated in a normal cooling tower environment. Most Series Quiet models will withstand significantly higher wind and seismic loads. If your geographic location dictates higher wind load or seismic load values, please make the appropriate changes, after discussion with your Trane sales representative.



Construction

Specifications

5.0 Construction:

5.1 Except where otherwise specified, all components of the cooling tower shall be fabricated of heavy-gauge steel, protected against corrosion by G-235 galvanizing. The tower shall be capable of withstanding water having a pH of 6.5 to 8.0; a chloride content (NaCl) up to 500 ppm; a sulfate content (SO_4) up to 250 ppm; a calcium content ($CaCO_3$) up to 500 ppm; silica (SiO_2) up to 150 ppm; and design hot water temperatures up to 125°F (51.7°C). The circulating water shall contain no oil, grease, fatty acids, or organic solvents.

5.2 The specifications, as written, are intended to indicate those materials that will be capable of withstanding the above water quality in continuing service, as well as the loads described in paragraph 4.1. They are to be regarded as minimum requirements. Where component materials peculiar to individual tower designs are not specified, the manufacturers shall take the above water quality and load carrying capabilities into account in the selection of their materials of manufacture.

5.3* The tower shall include all design and material modifications necessary to meet the fire rating requirements of Factory Mutual. The product proposed shall be listed in the FM Approval Guide, latest edition.

*Most Series Quiet models. See Specification Value at right.

Specification Value

In the history of cooling towers, no other coating for carbon steel has exhibited the success and longevity of galvanization in exposure to the normal cooling tower water quality defined at left. No paints or electrostatically-applied coatings, however exotic they may be, can approach galvanization's history of success.

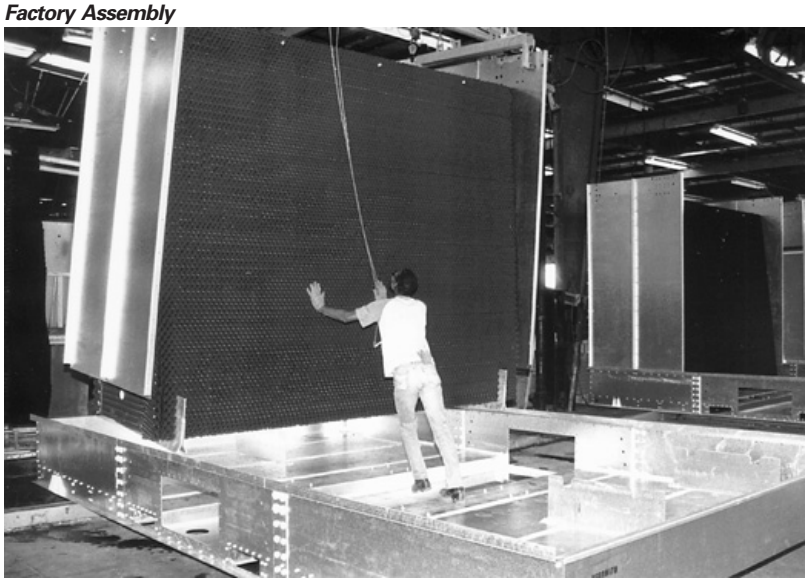
Except for those unusual operating situations where the circulating water may be so laden with suspended solids, algae, fatty acids, product fibers, active organisms reflected in BOD, and the like that plugging of the fill is a probability, reasonable attention to the construction materials and/or their coatings is all that is normally required.

If extended longevity of the tower is required — or unusually harsh operating conditions are expected — consider specifying stainless steel as either the base construction material, or the material utilized for specific components of your choice. See Stainless Steel Options on page 12.

This could have a very beneficial effect upon your fire insurance premiums. Towers not able to meet FM requirements may require the inclusion of a fire protection sprinkler system to achieve a comparable level of insurance premium cost. 123 Series Quiet models are FM approved — check with your Trane sales representative for approved models.

FM APPROVED

Factory Assembly



Mechanical Equipment

Specifications

6.4 Mechanical Equipment:

6.1 Fan(s) shall be propeller-type, incorporating heavy aluminum alloy blades and electrogalvinized hubs. Blades shall be individually adjustable. Fan(s) shall be driven through a right angle, industrial duty, oil lubricated, geared speed reducer that requires no oil changes for the first five (5) years of operation.

(alternate)* 6.1 Fan(s) shall be propeller-type, incorporating heavy aluminum alloy blades and electrogalvinized hubs. Blades shall be individually adjustable. Fan(s) shall be driven through a one-piece multi-groove, solid back V-type belt, pulleys, and tapered roller bearings. Bearings shall be rated at an L_{10} life of 40,000 hours, or greater.

*Currently available on Models TQ8304 through TQ8309.

6.2 Motor(s) shall be ____ hp maximum, TEFC, 1.15 service factor, variable torque, and specially insulated for cooling tower duty. Speed and electrical characteristics shall be _____ RPM, single-winding, ___ phase, ____ hertz, ____ volts. Motor shall operate in the shaft-horizontal position, and nameplate horsepower shall not be exceeded at design operation.

6.3 The complete mechanical equipment assembly for each cell shall be supported by a rigid, welded, hot dip galvanized steel structural support that resists misalignment between the motor and the gear reducer. The mechanical equipment assembly shall be warranted against any failure caused by defects in materials and workmanship for no less than five (5) years following the date of tower shipment. This warranty shall cover the fan, speed reducer, drive shaft and couplings, and the mechanical equipment support. The electric motor shall carry a manufacturer's warranty of at least one year.

Specification Value

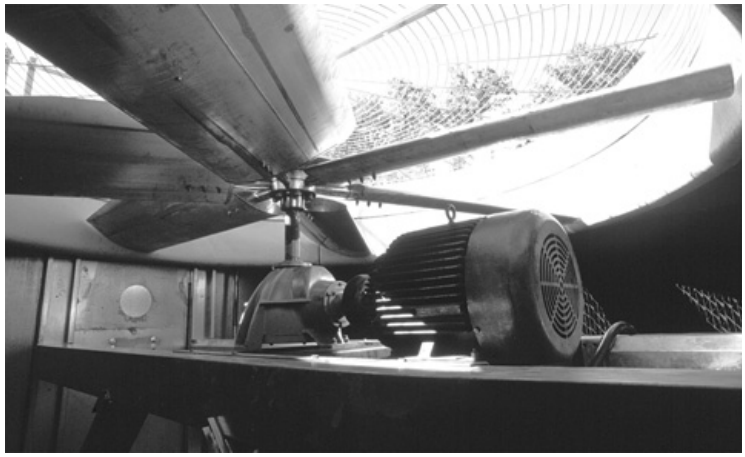
Propeller-type fans require only half the operating hp of blower-type fans. However, they should be readily adjustable to permit compensation for jobsite conditions that may tend to overload the motor. The fans of one manufacturer require the purchase of special positioners for each increment of fan blade pitch.

With Series Quiet, the choice is yours. The Geareducer requires no oil changes for five years, offering you unmatched reliability and low maintenance. Currently available on 49 Series Quiet models, the Trane Power Belt drive system features all-aluminum sheaves, power band belts, and long-life bearings for dependable service.

To reduce cost, some manufacturers may use TEAO motors, whose only source of cooling is the flow of air produced by the cooling tower fan. They are sometimes applied at horsepowers significantly beyond their nameplate rating.

Unless otherwise specified, motor speed will be 1800 RPM in 60 Hertz areas and 1500 RPM in 50 Hertz areas on standard models. Low noise models will use motor speeds appropriate for the specific model. If you prefer the operating flexibility of two-speed operation, please specify two-speed, single-winding motors which offer full and half speeds for maximum energy savings. Incidentally, two speed motors are a far better choice than separate "pony" motors which simply double the problems indicated above.

The value of a 5 year mechanical equipment warranty speaks for itself. Except for the motor, virtually all of the mechanical equipment on a Trane tower. Cooling tower vendors who purchase commercial fans, gear reducers, driveshafts, etc. may require that you deal directly with those commercial suppliers for warranty satisfaction.



Fill, Louvers and Drift Eliminators

Specifications

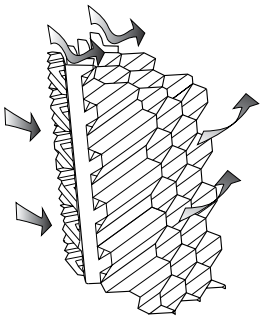
7.0 Fill, Louvers and Drift Eliminators:

7.1 Fill shall be film type, thermoformed of 15 mil (0.38 mm) thick PVC, with louvers formed as part of each fill sheet. Fill shall be suspended from hot dip galvanized structural tubing supported from the 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.

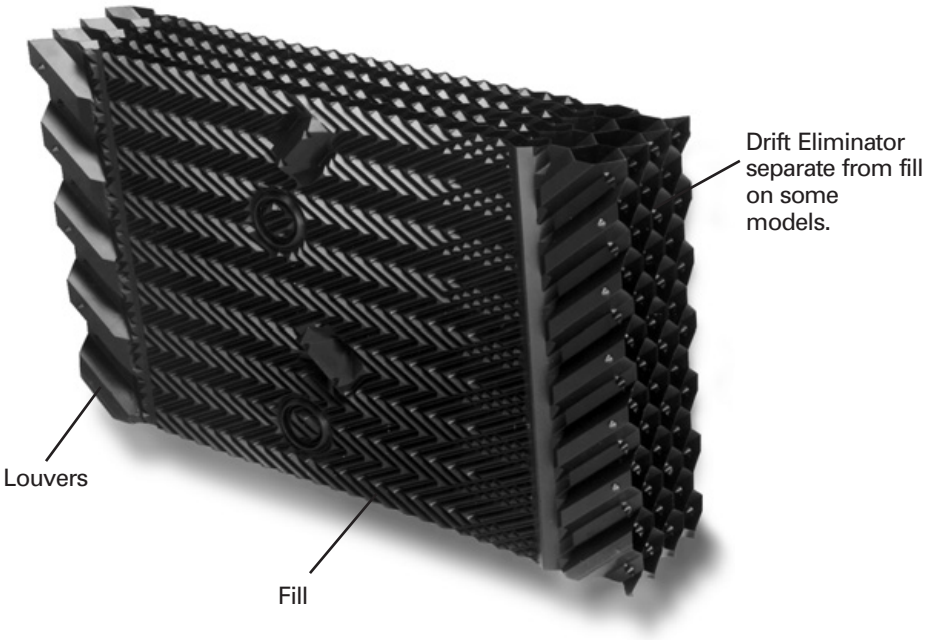
7.2 Drift eliminators shall be PVC, triple-pass, and shall limit drift losses to no more than 0.010% of the design GPM flow rate.

Specification Value

Louvers integral with the fill keep the flowing water within the confines of the fill. The separate external louvers used by others permit water to escape the fill and form ice or produce an unsightly situation adjacent to the tower. If you plan to use your tower in the wintertime, particularly for free cooling, integral louvers will put your operating concerns to rest.



Drift rate varies with design water loading and air rate, as well as drift eliminator depth and number of directional changes. The indicated rate of 0.005% is easily achievable without premium cost. If a lower rate is required, please discuss with your Trane office or representative.



Hot Water Distribution System

Specifications

8.0 Hot Water Distribution System:

8.1 Two open basins (one above each bank of fill) shall receive hot water piped to each cell of the tower. These basins shall be installed and sealed at the factory, and shall be equipped with removable, galvanized steel covers capable of withstanding the loads described in paragraph 4.1.

8.2 Each basin shall include an inlet hole and bolt circle to accept a 125# flange connection per ANSI B16.1. Removable, interchangeable polypropylene nozzles installed in the floor of these basins shall provide full coverage of the fill by gravity flow. Heavy-duty flow-regulator valves shall be provided at the hot water inlet connections. These valves shall be disc-type, with cast iron bodies and stainless steel operating stems. There shall be a locking handle to maintain the valve setting in any position. Valves shall be right-angle configuration, precluding the need for inlet elbows.

9.0 Casing, Fan Deck, and Fan Guard:

9.1 The casing and fan deck shall be heavy-gauge galvanized steel, and shall be capable of withstanding the loads described in paragraph 4.1. The top of the fan cylinder shall be equipped with a conical, non-sagging, removable fan guard, fabricated of welded 5/16" (8mm) and 7 gauge rods, and hot dip galvanized after fabrication. Fan cylinders 5'-0" in height and over shall not be required to have a fan guard.

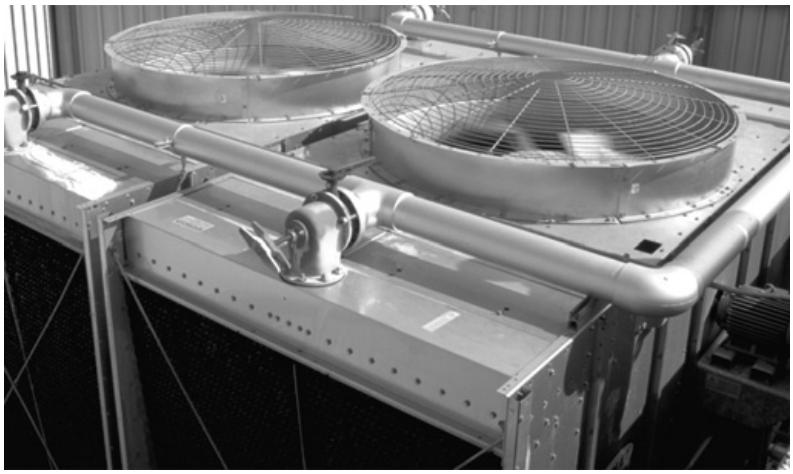
Specification Value

Gravity-flow distribution basins are a feature of crossflow type towers, resulting in operating pump heads of from 10 to 20 feet less than that encountered in counterflow towers with pressurized spray systems. Also, these basins are out where they can be easily inspected — even maintained — while the tower is in operation. Spray systems of counterflow towers, sandwiched between the top of the fill and the drift eliminators, are extremely awkward to access and maintain.

Also, the plastic basin covers offered by some manufacturers are incapable of supporting the loads imposed in maintenance. They will, therefore, tell you that it is really unnecessary for you to ever go to the top of their towers and — if you do have to — that it is better for you to work from the top of a portable ladder!

Trane flow-control valves remain servicable for the life of the tower, and provide a continuing means of flow-regulation between hot water basins — and between cells of multicell towers as well.

Manufacturers who use materials other than heavy-gauge steel for fan decks may be unable to meet your specified loading requirements, and may discourage you from attempting to use the top of the tower as a working platform. See remarks Handrail and Ladder on page 14.



Access

Specifications

10.0 Access:

10.1 A large galvanized steel access door 30" (762mm) wide and a minimun of 33" (838mm) high shall be located on both endwalls for entry into the cold water basin and fan plenum area. Access doors shall be operable from inside as well as outside the tower.

11.0 Cold Water Collection Basin:

11.1 The cold water basin shall be heavy-gauge galvanized steel, and shall include the number and type of suction connections required to accommodate the outflow piping system shown on the plans. Suction connections shall be equipped with galvanized debris screens. A factory installed, float operated, mechanical make-up valve shall be included. A 4" (102mm) diameter PVC pipe overflow shall be provided in each cell of the tower. The basin shall include a depressed center section into which accumulated silt can be flushed and overflow standpipes shall be removable to permit flush-out cleaning of the basin. The basin floor adjacent to the depressed section shall slope toward the depressed section to prevent build-up of silt under the fill area. Towers of more than one cell shall include steel flumes for flow and equalization between cells.

Specification Value

The access doors on TQ8301 and TQ8302 towers are 30" (762mm) wide by 33" (838mm) high. On TQ8303 thru TQ8312 the access doors are 48" (1219mm) high. Access doors on other manufacturer's towers may be 18" (457 mm) wide or smaller, which is unreasonably small for a human being. Specifying the size of the door will cause those bidders to take exception, alerting you to a potential maintenance headache. Two doors are standard on all Series Quiet towers — one in each endwall.

Trane offers side-suctions, side-outlet sumps, and bottom outlets to accommodate a significant variety of piping schemes. Unless so specified, the tower you may be asked to approve may only be available with one type of suction connection, requiring you to redesign your piping layout.

The removable-standpipe type of overflow is valuable because it provides a way to achieve flush-out cleanability. Other drains may be as little as 1" (25mm) diameter, making flush-out cleaning impractical at best.

Stainless Steel Cold Water Basin

Stainless Steel Options

Stainless Steel Cold Water Basin:

Para. 11.1: Replace this paragraph with the following: The cold water basin shall be heavy-gauge Series 300 stainless steel, and shall include the number and type of suction connections required to accommodate the outflow piping system shown on the plans. Suction connections shall be equipped with stainless steel debris screens. A factory-installed, float-operated, mechanical make-up valve shall be included. A 4" (102mm) diameter PVC pipe overflow shall be provided in each cell of the tower. The basin shall include a depressed center section into which accumulated silt can be flushed and overflow standpipes shall be removable to permit flush-out cleaning of the basin. The basin floor adjacent to the depressed section shall slope toward the depressed section to prevent build-up of silt under the fill area. Towers of more than one cell shall include stainless steel flumes for flow and equalization between cells. All steel items which project into the basin (columns, diagonals, anchor clips, etc.) shall also be made of stainless steel.

Stainless Steel Hot Water Basins:

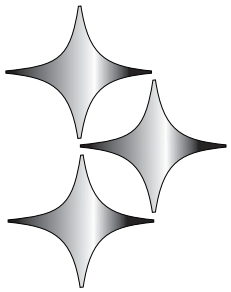
Para. 8.1: Replace this paragraph with the following: Two stainless steel open basins (one above each bank of fill) shall receive hot water piped to each cell of the tower. These basins shall be installed and sealed at the factory, and shall be equipped with removable, stainless steel covers capable of withstanding the loads described in paragraph 4.1. All components of these basins, with the exception of the nozzles, shall be stainless steel.

All Stainless Steel Tower:

Specification Value

The cold water basin is the only part of the tower that is subject to periods of stagnant water, concentrated with treatment chemicals and customary contaminants. It is also the most expensive and difficult part of any tower to repair or replace. For these reasons, many customers — particularly those who are replacing older towers — choose to specify stainless steel cold water basins.

Also, see the notes on page 11 regarding the standard Cold Water Collection Basin. They apply equally well to the stainless steel basin.

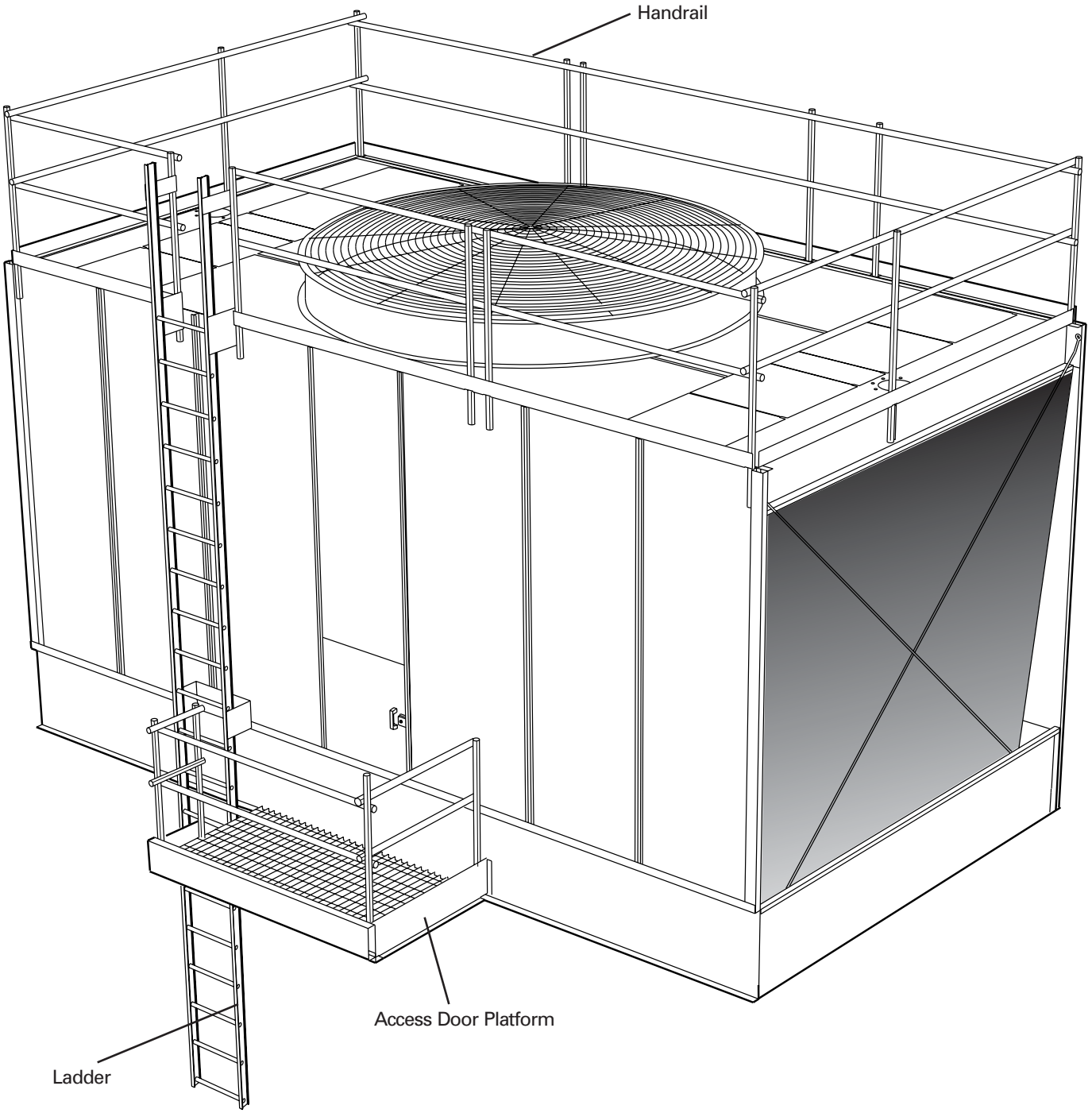


The corrosion potential of contaminated water increases with temperature — and these basins see the hottest water in the tower. If your design hot water temperature is over 125°F (52°C), or if your operating system can produce excursions beyond that point, you would be well advised to consider this option.

It would also be advisable to change the fill support tubes in Para. 7.1 from galvanized structural tubing to 300 stainless steel structural tubing. See notes regarding Section 8.0 on page 10.

Where water quality falls outside the limits indicated in Paragraph 5.1, an all-stainless tower is worthy of your consideration, and Trane makes an all-stainless version — the Series Quiet. Please ask your Trane office or representative for a copy of SPEC SS-NC.

Stainless Steel Cold Water Basin



Handrail and Ladder

Specifications

Convenience and Safety Options

Handrail and Ladder:

Para. 10.2: Add the following paragraph in the Access section: The top of the tower shall be equipped with a sturdy handrail, complete with kneerail and toeboard, designed according to OSHA guidelines. Handrails and kneerails shall consist of 1.66" (42mm) O.D. x 15 gauge galvanized structural tubing, the handrail of which shall be capable of withstanding a 200 pound (890N) concentrated live load in any direction. Posts are 2" x 2" (51mm x 51mm) square structrual tubing and shall be spaced on centers of 8'-0" (2438mm) or less. A 1'-6" (457mm) wide aluminum ladder with 3" (76mm) I-beam side rails and 1.25" (32mm) diameter rungs shall be permanently attached to the endwall casing of the tower, rising from the base of the tower to the top of the handrail.

Ladder Extension:

Para. 10.2: Add the following to the end of the above paragraph: Provide a ladder extension for connection to the foot of the ladder attached to the tower casing. This extension shall be long enough to rise from the roof (grade) level to the base of the tower. The installing contractor shall be responsible for cutting the ladder to length; attaching it to the foot of the tower ladder; and anchoring it at its base.

Ladder Safety Cage:

Para. 10.3: Add the following paragraph in the Access section: A heavy gauge galvanized steel safety cage shall surround the ladder, extending from a point approximately 7'-0" (2.134m) above the foot of the ladder to the top of the handrail surrounding the fan deck.

Specification Value

Good maintenance practice requires periodic access to the top of the tower to inspect the distribution basins as well as the structural integrity of the fan deck, fan guard, fan cylinder and fan — especially the fan blade securing hardware. There are no induced-draft steel cooling tower designs that are immune to this need! See NOTE on page 14.

For the comfort and safety of your operating personnel, we recommend that you specify a ladder and handrail — and that you require it of all bidders! Portable ladders and other “make-do” access means are inappropriate for equipment of this size and complexity. Also, fixed ladders without fan deck handrails invite unsafe maintenance practices and must not be allowed.

Many towers are installed such that the base of the tower is 2'-0" (610 mm) or more above the roof or grade level. This makes it difficult to get up to the foot of the attached ladder. The ladder extension alleviates this problem. Trane's ladder extensions are available in standard 5'-0" (1.524m) and 11'-0" (3.353m) lengths.

To meet OSHA guidelines, towers whose fan decks are 20'-0" (6.096m) or more above roof or grade, and which are equipped with ladders, should have safety cages surrounding the ladders, but with approximately 7'-0" (2.134m) clear headroom.

Access Door Platform

Specifications

Convenience and Safety Options

Access Door Platform:

Para. 10.4: Add the following paragraph in the Access section: There shall be an access platform at the base of the tower extending from the vertical ladder to the endwall access door. The platform shall be galvanized steel bar grating, supported by galvanized steel framework attached to the tower. The platform shall be surrounded by a handrail, kneerail, and toeboard.

Mechanical Equipment Removal System:

Para. 6.6: Add the following paragraph in the Mechanical Equipment section: The top of the tower shall be equipped with a galvanized monorail track and trolley system above the fans, designed for use with the owner's motorized hoist or chain fall. System shall have a 1500 lb (680.4 kg) capacity and shall extend 6'-0" (1.829m)outward beyond the tower's endwall.

Plenum Walkway:

Para. 10.5: Add the following paragraph in the Access section: Provide a factory-installed, galvanized steel bar grating walkway extending from one endwall access door to the other endwall. This walkway shall be supported by a galvanized steel framework, and the top of the grating shall be at or above the cold water basin overflow level.

Interior Mechanical Equipment Access Platform: TQ8303 thru TQ8309

Para. 10.5: Add the following to the *Plenum Walkway* paragraph: A factory-installed, elevated galvanized bar grating platform convenient to the care and maintenance of the tower's mechanical equipment shall be provided.

Specification Value

Where towers are installed on an elevated grillage or piers, it is often difficult to get to — and through — the access door conveniently. This platform provides easy, safe, and comfortable access to that door. It also extends beyond the door to provide ready access to the optional Control System. See drawing on page 13 and photo on page 16.

This is **not** an option that is normally required during a Trane tower's service life. It is, however, convenient for those unusual situations where a fan, Geareducer, or motor may need replacement and the tower is located where access by a rigging device is difficult or impossible. It may be installed when needed, or left permanently attached. Ask for a copy of Trane drawing 94-4689.

Note: OSHA and other concerned authorities are in the process of developing guidelines regarding the safety procedures and protective equipment that should be provided maintenance personnel who are required to go inside cooling towers. Trane feels it advisable to provide for as much maintenance as possible from outside the cooling tower and, to that end, offers such options as Handrail and Ladder — pg 14, Ladder Extension — pg 14, Ladder Safety Cage — pg 14, Access Door Platform — pg 15, Mechanical Equipment Removal System — pg 15, and Motor out of the Airstream — pg 19. Such interior convenience options as Plenum Walkway — pg 15, that are offered are not meant as an invitation to perform inside maintenance. They are intended solely to maximize the comfort and safety of maintenance personnel during the performance of whatever inside work may become necessary.

Interior Mechanical Equipment Access Platform

Specifications:

Interior Mechanical Equipment Access Platform: TQ8310 thru TQ8312

Para. 10.5: Add the following to the *above* paragraph: An internal ladder shall extend upward from the plenum walkway to an elevated galvanized bar grating platform convenient to the care and maintenance of the tower's mechanical equipment. The platform shall be surrounded by a sturdy handrail and kneerail system.

Control Options

Control System:

Para. 6.4: Add the following paragraph in the Mechanical Equipment section: Each cell of the cooling tower shall be equipped with a UL listed control system in a NEMA 3R or 4X outdoor enclosure capable of controlling single-speed or two-speed motors as required, and designed specifically for cooling tower applications. The panel shall include a main fused disconnect with an external operating handle, lockable in the off position for safety. Across-the-line magnetic starters or solid state soft-start starters as required shall be controlled with a thermostatic or solid state temperature controller. Door mounted selector switches shall be provided to enable automatic or manual control and wired for 120VAC control. Control circuit to be wired out to terminal blocks for field connection to a remote vibration switch and for access to extra 120VAC 50VA control power, overload trip alarms and remote temperature control devices. The temperature controller shall be adjustable for the required cold water temperature. If a thermostatic controller is used it shall be mounted on the side of the tower with the temperature sensing bulb installed in the cold water basin using a suspension mounting bracket. If a solid state temperature controller is used the controller will be door mounted on the control panel. The temperature controller will display two temperatures, one for outgoing water and the other for set point. Water temperature input shall be obtained using a three-wire RTD with dry well in the outlet water piping and wired back to the solid state temperature controller in the control panel.

Specifiation Value

If it is your opinion that the control system for the cooling tower should be part of the tower manufacturer's responsibility, we are in wholehearted agreement with you. Who better to determine the most efficient mode and manner of a tower's operation — and to apply a system most compatible with it — than the designer and manufacturer of the cooling tower?

Trane variable speed drives are also available for the ultimate in temperature control, energy management, and mechanical equipment longevity. See specifications on page 18.

Vibration Limit Switch

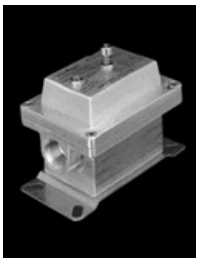
Vibration Limit Switch:

Para. 6.5: Add the following paragraph in the Mechanical Equipment section: A single-pole, double-throw vibration limit switch in a NEMA 4 housing shall be installed on the mechanical equipment support for wiring into the owner's control panel. The purpose of this switch will be to interrupt power to the motor in the event of excessive vibration. It shall be adjustable for sensitivity, and shall require manual reset.

Basin Heaters:

Para. 11.2: Add the following paragraph in the Cold Water Basin section: Provide a system of electric immersion heaters and controls for each cell of the tower to prevent freezing of water in the collection basin during periods of shutdown. The system shall consist of one or more stainless steel electric immersion heaters installed in threaded couplings provided in the side of the basin. A NEMA 4 enclosure shall house a magnetic contactor to energize heaters; a transformer to provide 24 volt control circuit power; and a solid state circuit board for temperature and low water cut-off. A control probe shall be located in the basin to monitor water level and temperature. The system shall be capable of maintaining 40°F (4.4°C) water temperature at an ambient air temperature of _____ °F (____ °C).

Specification Value



Unless specified otherwise, a Metrix switch will be provided. A double-pole, double-throw model is also available. If purchased in conjunction with the Control System, it is also factory-wired. The requirement for manual reset assures that the tower will be visited to determine the **cause** of excess vibration.

The basin heater components described at left represent Trane's recommendation for a reliable automatic system for the prevention of basin freezing. They are normally shipped separately for installation at the jobsite by the installing contractor. When purchased in conjunction with the enhanced Control System option, however, they are customarily factory-mounted and tested.

Submerged in basin water, in which zinc ions are present, copper immersion heaters must not be used. Insist upon stainless steel.

The ambient air temperature that you insert in the specifications should be the lowest 1% level of winter temperature prevalent at site.

Variable Speed Drive

Specifications

Variable Speed Drive:

Para. 6.4: Add the following paragraph in the Mechanical Equipment section: Each cell of the cooling tower shall be equipped with a UL listed control system in a NEMA 3R or 4X outdoor enclosure capable of controlling single-speed or two-speed motors as required, and designed specifically for cooling tower applications. The panel shall include a main fused disconnect with an external operating handle, lockable in the off position for safety. Across-the-line magnetic starters or solid state soft-start starters as required shall be controlled with a thermostatic or solid state temperature controller. Door mounted selector switches shall be provided to enable automatic or manual control and wired for 120VAC control. Control circuit to be wired out to terminal blocks for field connection to a remote vibration switch and for access to extra 120VAC 50VA control power, overload trip alarms and remote temperature control devices. The temperature controller shall be adjustable for the required cold water temperature. If a thermostatic controller is used it shall be mounted on the side of the tower with the temperature sensing bulb installed in the cold water basin using a suspension mounting bracket. If a solid state temperature controller is used the controller will be door mounted on the control panel. The temperature controller will display two temperatures, one for outgoing water and the other for set point. Water temperature input shall be obtained using a three-wire RTD with dry well in the outlet water piping and wired back to the solid state temperature controller in the control panel.

Specification Value

If it is your opinion that the control system for the cooling tower should be part of the tower manufacturer's responsibility, we are in wholehearted agreement with you. Who better to determine the most efficient mode and manner of a tower's operation — and to apply a system most compatible with it — than the designer and manufacturer of the cooling tower?

Motor Out of the Airstream

Miscellaneous Options

Motor out of the Airstream:

Para. 6.1: Add the following to the end of this paragraph: The motor shall be mounted outside the casing of the tower, and shall be connected to the gear reducer by a dynamically-balanced, stainless steel tube and flange driveshaft.

Fan Cylinder Extensions:

Para. 9.1: Insert the following after the first sentence: Fan cylinder extensions shall be provided to elevate the fan discharge to a height of ___ ft (___ m) above the fan deck level.

Equalizer Flume Weir Gates:

Para. 11.2: Add the following paragraph under Cold Water Collection Basin: The interconnecting flume between cells shall be equipped with a removable cover plate to permit the shutdown of one cell for maintenance purposes, or to permit independent cell operation.

Specification Value
Trane cooling tower electric motors were located outside the fan cylinders, that exists inside the tower plenum.

Although improved motor designs (insulation, bearings, seals, and lubricants) have now made it feasible for us to locate the motor inside the tower in close-coupled proximity to the Geareducer (page 8), many users still prefer the motor to be located outside the humid airstream. If you are among those users — or are among those who see the wisdom of their thinking — please specify this option. If you do, however, please require it of all bidders**.** See graphic on page 13.

Extensions are available in 1'- 0" (305mm) increments to a maximum height equal to the diameter of the fan. Such extensions may be considered necessary in order to elevate the discharge beyond the bounds of an enclosure. Discuss applicability with your local Trane office or representative.

Where it is your intention to be able to operate both cells of the tower while the flume cover plate is installed, separate outlet connections, float valves, and overflows must be provided for each cell. Likewise, this would require separate sensors and controls for basin heater systems, if installed.

Sound Control

Specifications

Miscellaneous Options

Sound Control:

Para. 1.2: Add the following paragraph under Base: The cooling tower shall be quiet operating, and shall produce an overall level of sound no higher than ____ dBA, measured at the critical location indicated on the plans.

Specification Value

Sound produced by a standard Series Quiet tower operating in an unobstructed environment will meet all but the most restrictive noise limitations — and will react favorably to natural attenuation. Over 100 Series Quiet models are designated as low noise selections and should fit situations where sound is a concern. 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 5 or 6 dBA each time the distance doubles. Where noise at a critical point is likely to exceed an acceptable limit, you have several options — listed below in ascending order of cost impact:

- Where only a slight reduction in noise will satisfy — and the source of concern is in a particular direction — merely turning the tower may be the answer. Less sound emanates from the cased face of the tower than does from the air intake face.
- 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; and 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.)
- Variable speed drives automatically minimize the tower's noise level during periods of reduced load and/or reduced ambient 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 even at the highest design wet-bulb temperature. Typical sound reductions are 7 dBA at ⅔ fan speed or 10 dBA at ½ fan speed, but larger reductions are often possible.
- Extreme cases may require special fans or 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.

With 184 models to choose from, 103 models designed specifically for low noise applications, your Trane sales representative will be able to help you meet your sound requirements.

Single Hot Water Inlet Connection

Miscellaneous Options

Single Hot Water Inlet Connection per Cell:

Para. 8.2: Replace this paragraph with the following: Each cell of the tower shall include a single hot water inlet connection located as shown on the plans. An internal system of piping shall deliver water equally to the distribution basins without the need for balancing valves. This internal piping system shall require no scheduled maintenance, and shall be located such that it does not interfere with normal maintenance access. Removable, interchangeable polypropylene nozzles installed in the floor of these basins shall provide full coverage of the fill by gravity flow.

Specification Value

This option reduces what might otherwise be a complex hot water piping layout to a simple, single connection per cell. It also avoids an unsightly (perhaps unsafe) maze of pipe exposed above the top deck of the tower.

The single inlet connection can be located either in the tower's endwall casing, or below the cold water basin. The endwall entry point is suitable for single-cell towers, and for those that might be installed in groups of two cells each. Bottom inlet piping lends itself to close-spaced, multicell installations, and to those situations where it is appropriate to keep all pipework below the level of the tower.

Trane
A business of American Standard Companies
www.trane.com

Literature Order Number	COOL-PRC002-EN
File Number	PL-RF-000-COOL-PRC002-EN-404
Supersedes	New
Stocking Location	Electronic Only

For more information, contact your local sales office or e-mail us at comfort@trane.com.