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TECHNICAL DATA DOCUMENT

ADVANTAGE®

PUMP TANK STATIONS for CHILLED OR TOWER WATER SYSTEMS POLYETHYLENE or STEEL TANKS

Information for all Advantage Water System Products is available on our web site: www.AdvantageEngineering.com

APPLICATIONS... **ADVANTAGE** Pump Tank Stations are used in central water distribution systems for tower or chiller systems. **ADVANTAGE** pump tanks provide process water for a wide variety of applications, including plastic injection molding, thermoforming, extrusion, hydraulic cooling, die cooling, roll cooling, heat exchangers, rubber processing, printing, calendering, laminating, chemical processing and many other industrial process cooling applications.

ENGINEERING SERVICE & WATER SYSTEM DESIGN... **ADVANTAGE** staffs a complete CAD based engineering department with experienced water system designers. For each application, working from customer supplied facility and process information, **ADVANTAGE** analyzes flow, pressure and temperature requirements. For pump tank applications, standard pump sizes are adequate for the majority of applications. However, if a standard pump is not suitable, **ADVANTAGE** will select the proper impeller, motor and piping size combinations to provide the most efficient output. The purchase of a central water system includes water distribution piping drawings suitable for contractor bidding and installation work.

CAPACITIES... **ADVANTAGE** Pump Tank stations are suitable for tower systems (**PTS**) up to 1000 tons and central chilled water systems (**CPTS**) up to 1200 tons. Mild and stainless steel, tank sizes are offered in 275, 400, 600, 750, 1000, 1250, 1500, 2000, 2500, and 3000 gallons (***Figure A***). In rotational molded polyethylene, tank sizes are offered in 450, 850, 1600 and 3200 gallons (***Figure B***). Standard tank sizes can be combined to facilitate larger capacities.

CHOICE OF TANK CONSTRUCTION MATERIALS...
Pump tank stations from **ADVANTAGE** are offered in three materials: polyethylene, mild steel and stainless steel. Polyethylene tanks are rotational molded from linear low density polyethylene. Steel tanks are offered in mild and stainless steel. Generally, polyethylene tanks offer the lowest capital expenditure.

TTK-1600 shown in Conventional configuration with the following optional features:
- Standby pump and manifold
- Central control console
- Pressure and temperature alarm system
- Electric water make-up system
- CheckMate™ control panel

FIGURE B

PTS-2000 shown with the following optional features:
- Standby pump and manifold
- Central control console
- Pressure and temperature alarm system
- Electric water make-up system
- CheckMate™ control panel

FIGURE A

RESERVOIR CONSTRUCTION...

TOUGH TANK® POLYETHYLENE TANKS... The **ADVANTAGE TOUGH TANK®** pump tank is a seamless one-piece tank, rotational molded from linear low density polyethylene (***Figure C***). The ***patent pending*** design includes a rectangular base to allow for straight-line pump attachments, unlike the tangential attachments of competitive models. The rectangular base also offers greater stability and the ability to expand tank capacity by in-line plumbing of additional tanks and pumps. The cylindrical shape of the reservoir area offers structural strength, without the need for perimeter belting. A polyethylene baffle plate is provided for true 'hot-cold' operation. All process ports are molded into the tank to offer structural support, including an overflow port and ports for temperature and pressure gauges and sensors. A drain port with installed ball valve is provided. On chilled water systems, 3/8" dense foam insulation is applied to the outside of the polyethylene tank to prevent sweating and heat gain. The standard service cover has cut-outs for distribution piping and an inspection opening. Polyethylene tanks cost less than steel tanks and offer excellent prevention of corrosion and tank-contributed contamination.

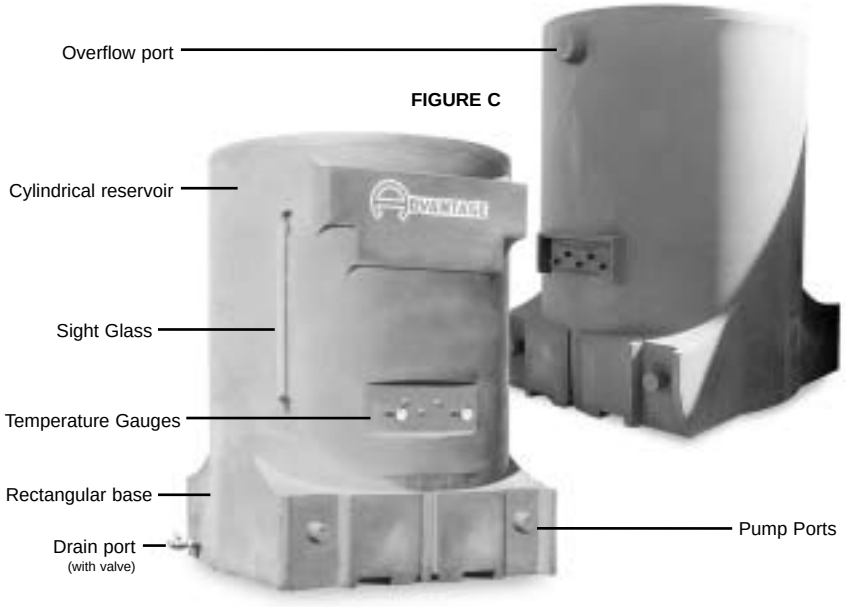


FIGURE C

STEEL TANKS... 10 gauge stainless or 7 gauge mild steel sheets are welded to form the tank assembly (***Figure D***). The interior of mild steel tanks are sandblasted to prepare the surface for a 2 part epoxy coating that is applied to prevent corrosion. Angle iron perimeter belting is added to the circumference of the tank to increase tank rigidity. A partition is set inside the tank to serve as a hot and cold section divider. The tank assembly is set onto a structural steel base. The base area not immediately underneath the tank is decked with sheet metal and becomes the pump platform. On chilled water systems, 3/8" dense foam insulation is applied to the outside of the tank to prevent sweating and heat gain. A drain port with installed ball valve and overflow port is provided. Other tank features include an overflow port and spare pump ports. Options include tank service covers and spare pump ports.

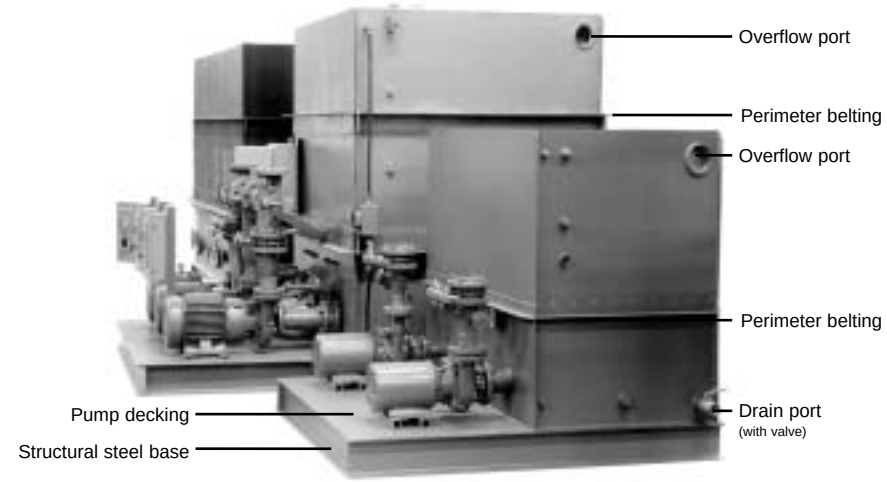


FIGURE D

STANDARD SYSTEM CONFIGURATION... the standard system configuration is shown at right and is available for polyethylene and steel tanks (***Figure E***). The standard system includes all components necessary for a complete and workable system at an economical cost. Prewired individual motor starters are included as well as temperature and pressure gauges and mechanical water make-up valve. Tower systems include tower fan and tower pump thermostats for matching system capacity to the load.

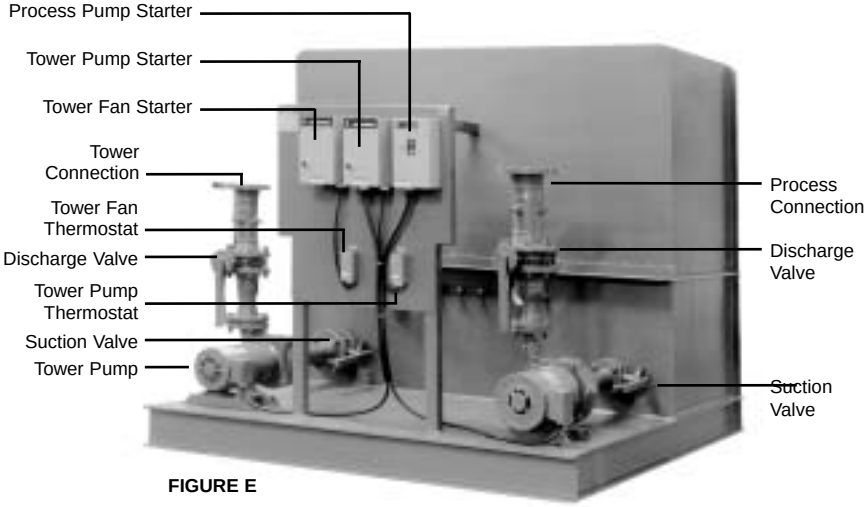


FIGURE E

PUMPS... careful consideration to service, efficiency and motor protection are central to the design and selection of the best pump for your application. Each pump is equipped with suction and discharge service valves (***Figure J***). Each pump is toggled on and off by individual operators and wired from a dedicated motor starter with overload protection. Single pump systems are available. Dual pump systems are preferred for most applications (***Figure K***). In a dual pump system, the ***PROCESS PUMP*** distributes water at full capacity through the plant. For tower systems, the ***TOWER PUMP*** circulates water to the tower cell at the correct flow of normally 3 gpm per ton. For chilled water systems, the ***EVAPORATOR PUMP*** circulates water at the correct flow of normally 2.4 gpm per ton through the chiller evaporators. In a dual pump system, the pumps operate independently of each other and allow for greater control of water temperature, flow and pressure.

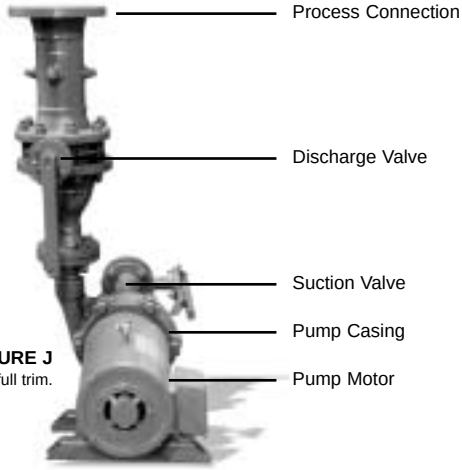


FIGURE J
Pump shown with with full trim.

OPTIONAL STANDBY PUMP CONFIGURATION... prewired standby pumps and preplumbed manifolds are offered for the process and tower or evaporator pumps. A standby pump is useful when service is required on the primary pump but continued operation is necessary (***Figure L***). Installation costs are higher for systems that must have field supplied manifolds, compared to systems with factory supplied manifolds.

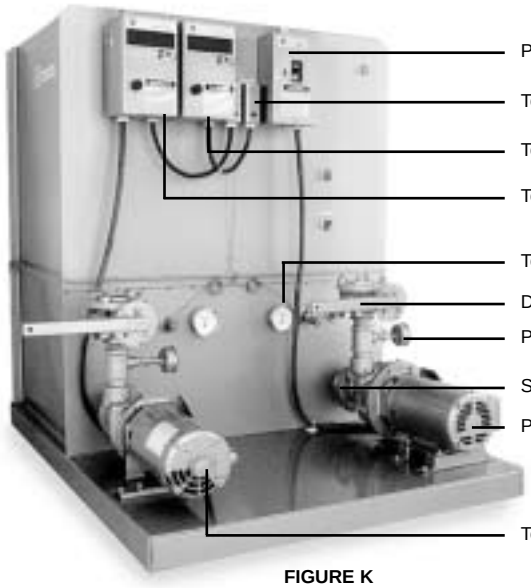


FIGURE K
Dual pump system shown with manual pump and tower fan starters.

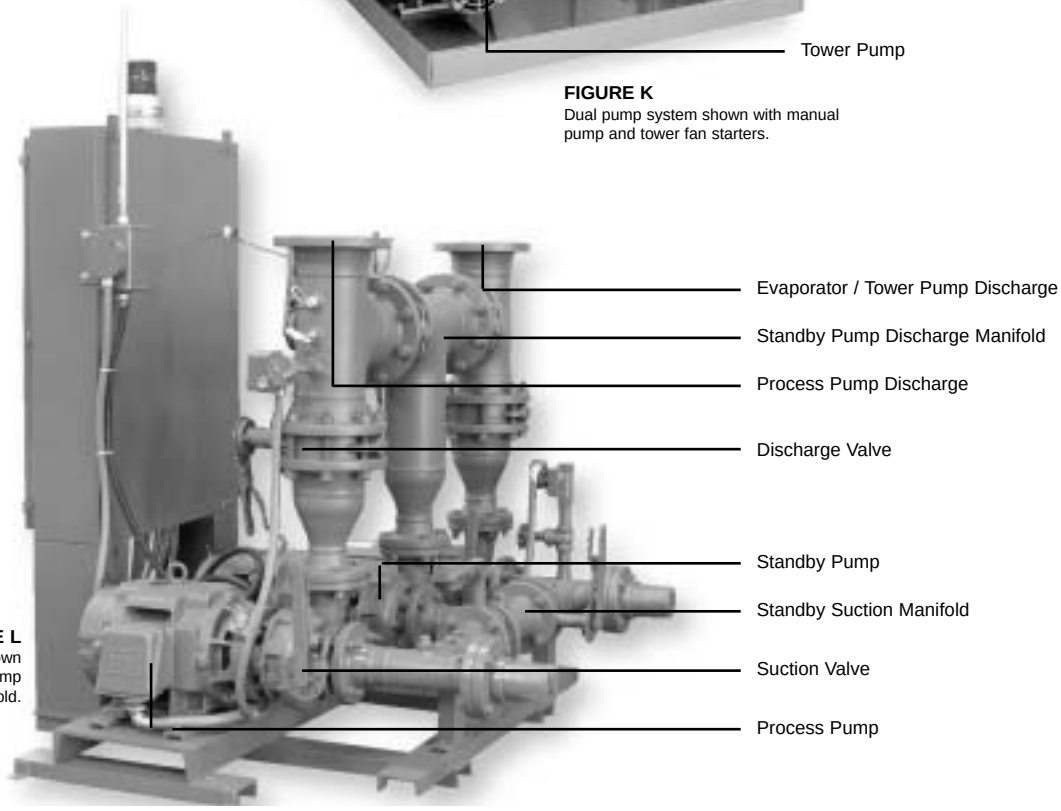


FIGURE L
Dual pump system shown with optional standby pump and manifold.

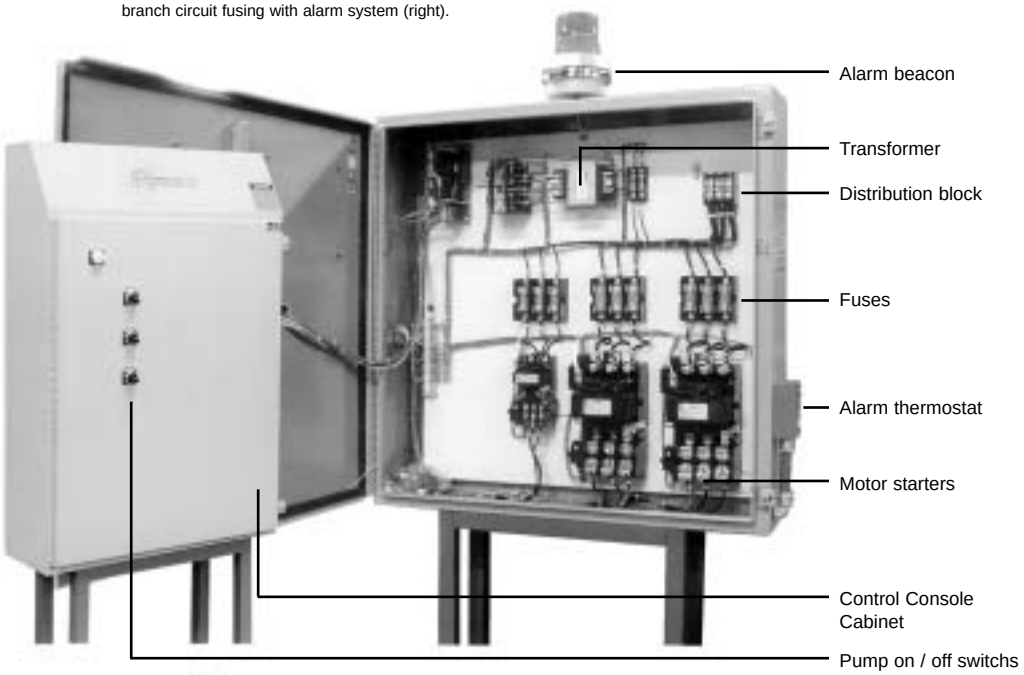
OPTIONAL CENTRAL CONTROL CONSOLE...

provide easier and less costly installation and operator convenience (***Figure M***). The control console includes a Nema 12 cabinet. A single power (208, 230, 460, 575 volt) connection is required. A control transformer is mounted and wired to provide 115 volt control power to required use points. Pump motor starters are protected with branch circuit fusing. Wiring from the cabinet to the motors is protected in seal tight conduit. A 'power on' light and off/on selector switches are mounted on the cabinet for operator convenience. See ***Figures N and O*** for pictures of the Central Control Console with optional CheckMate™ cooling tower system control and monitoring Instrument.

OPTIONAL TEMPERATURE AND PRESSURE ALARM SYSTEM...

with the optional alarm system, pump pressure and fluid temperatures are constantly monitored. A pressure switch is mounted in the process pump discharge stream (***Figure P***) and a thermostat monitors water temperature in the tank. An out-of-spec condition will activate the beacon alarm.

FIGURE M - Optional Control Console cabinet shown with indication lights and pump controls (left) and branch circuit fusing with alarm system (right).



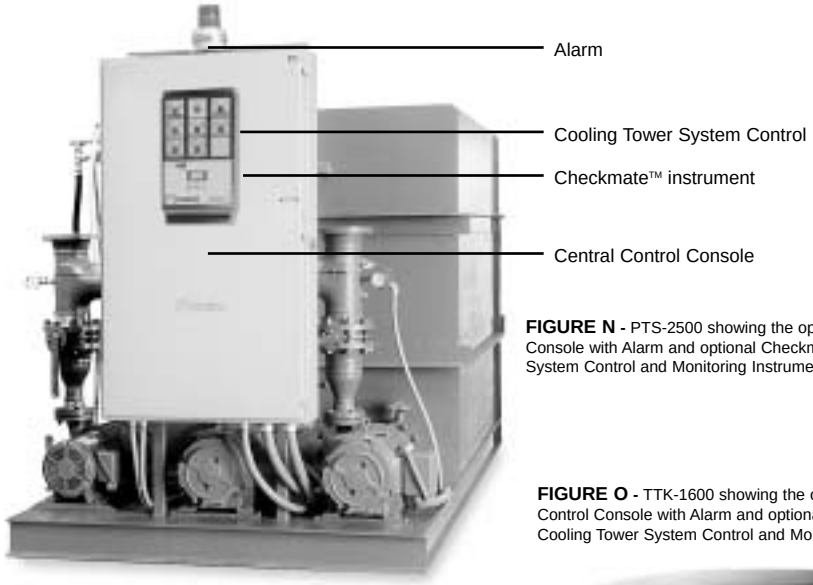


FIGURE N - PTS-2500 showing the optional Central Control Console with Alarm and optional Checkmate™ Cooling Tower System Control and Monitoring Instrument.

FIGURE O - TTK-1600 showing the optional Central Control Console with Alarm and optional Checkmate™ Cooling Tower System Control and Monitoring Instrument.

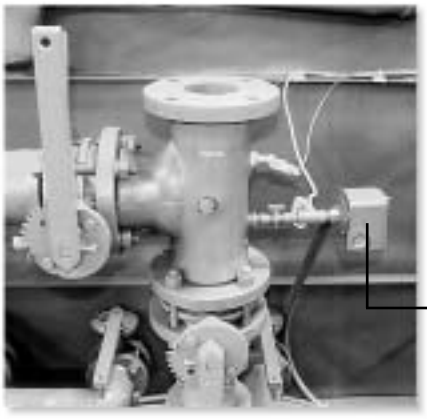


FIGURE P - Typical alarm pressure switch location on the process pump discharge.

OPTIONAL WATER LEVEL CONTROL (electric)... **ADVANTAGE** pump tanks can be equipped with an automatic electric water level control system in lieu of the standard mechanical float valve (***Figure Q & R***). This system uses a float activated solenoid valve to feed water to the tank from plant supplies. The float is mounted in a small enclosed tank external to the main tank. Positioned at the proper operating water level, the water inside the float tank is not subject to turbulence that may exist inside the main tank. Water level can be visually sighted by the clear sight tube on **Tough Tank**® reservoirs (***Figure S***).

CLOSED CIRCUIT SYSTEMS... plate heat exchangers isolate tower water from the water in contact with your processing equipment to keep your processing equipment clean and maintenance to a minimum (see ***Figure T***) for a typical drawing). Plate heat exchangers (***Figure U***) consist of a number of stainless steel transfer plates that are held in place between a fixed plate and a movable pressure plate to form a complete unit. Each heat transfer plate has a gasket arrangement that provides two separate channel systems. The arrangement of the gaskets results in through flow in single channels, so that the primary and secondary media are in counter-current flow. The media cannot mix because of the gasket design. The plates are corrugated, which creates turbulence in the fluids as they flow through the unit. **ADVANTAGE** plate heat exchangers allow for plate cleaning without disconnecting process piping.

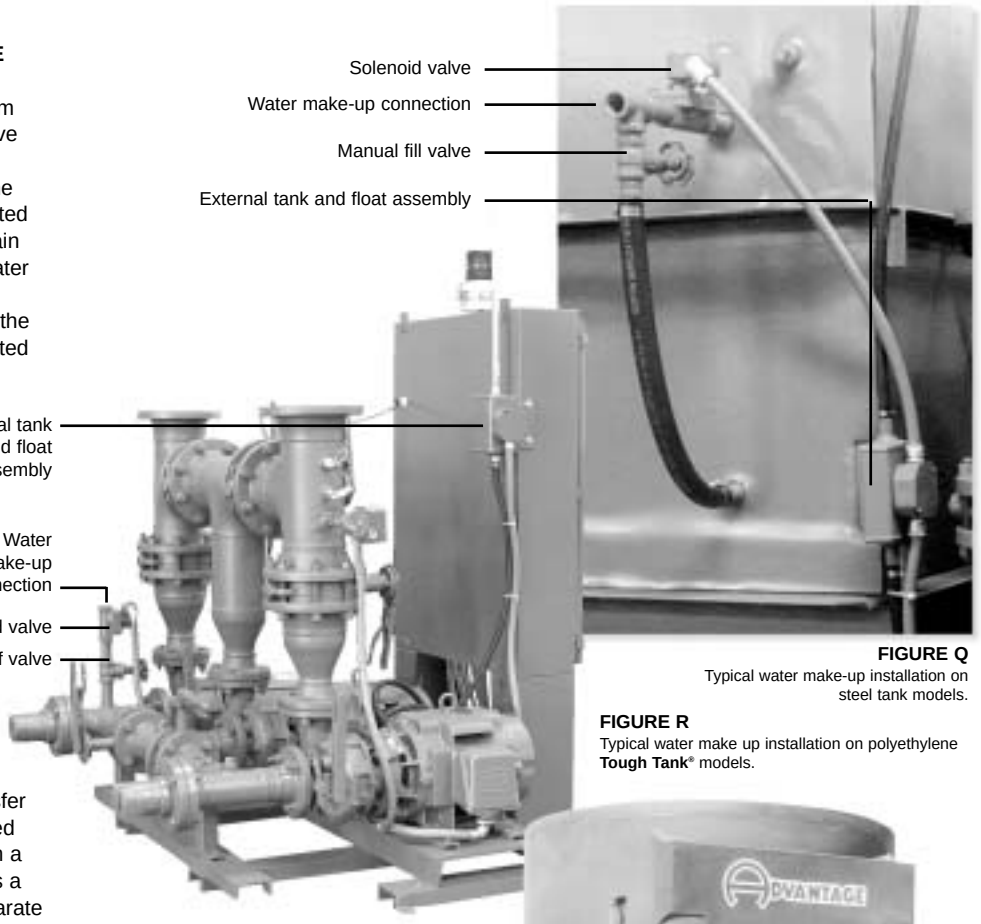


FIGURE Q
Typical water make-up installation on steel tank models.

FIGURE R
Typical water make up installation on polyethylene **Tough Tank**® models.

FIGURE S
Sight glass on polyethylene **Tough Tank**® reservoirs.

FIGURE U

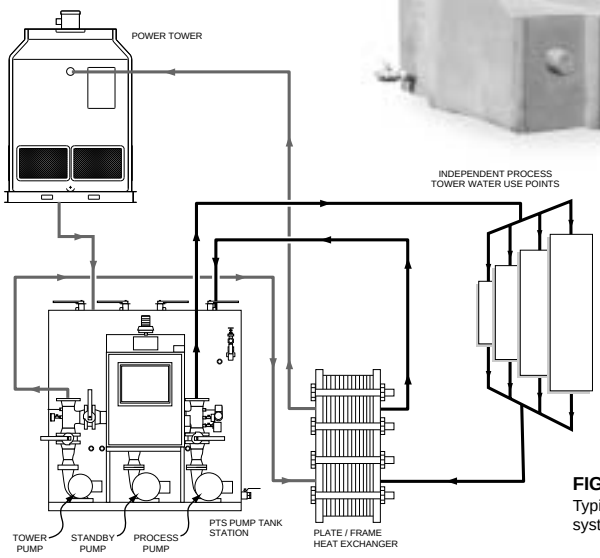


FIGURE T
Typical closed loop tower system water circuit.

SPACE SAVING SYSTEMS... offered as an option for **ADVANTAGE Tough Tank®** pump tank systems. The **Tough Tank®** reservoir is set on top of the pump deck (***Figure V***). All varieties of pump configurations, from single, dual and standby pumps with manifolds are designed to occupy space underneath the tank (***Figure W***). A 270 ton space saving tower system pump tank assembly occupies only 68 square inches of floor space. The optional electrical cabinet and controls are mounted in the pump assembly area.

SERVICE... **ADVANTAGE** staffs a service department with over 58 years of cumulative field experience. A nationwide network of service contractors provides fast and efficient service to our customers. The Parts Department is stocked with all service parts, most are available for same day shipping.

WARRANTY... a one year parts and labor warranty is included with each **PUMP TANK** purchase. The **Tough Tank®** rotational molded polyethylene reservoir is covered by a 10 year tank failure warranty.

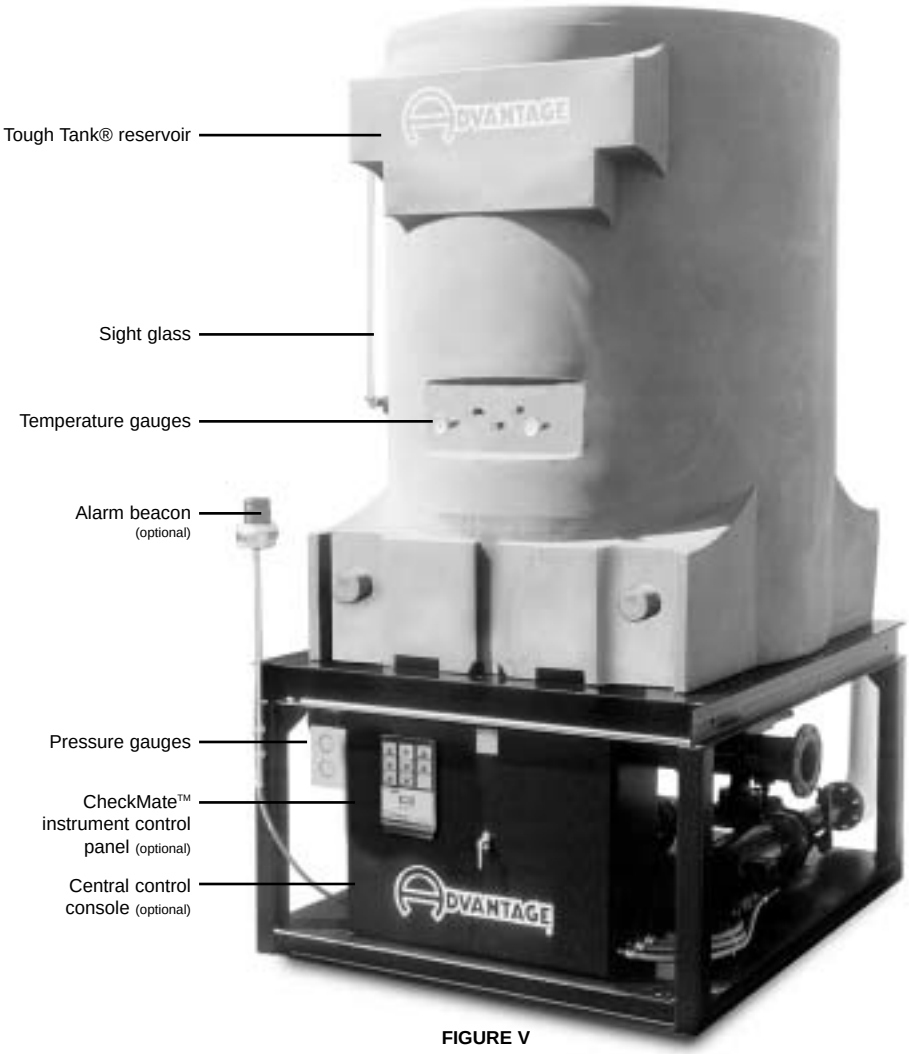


FIGURE V

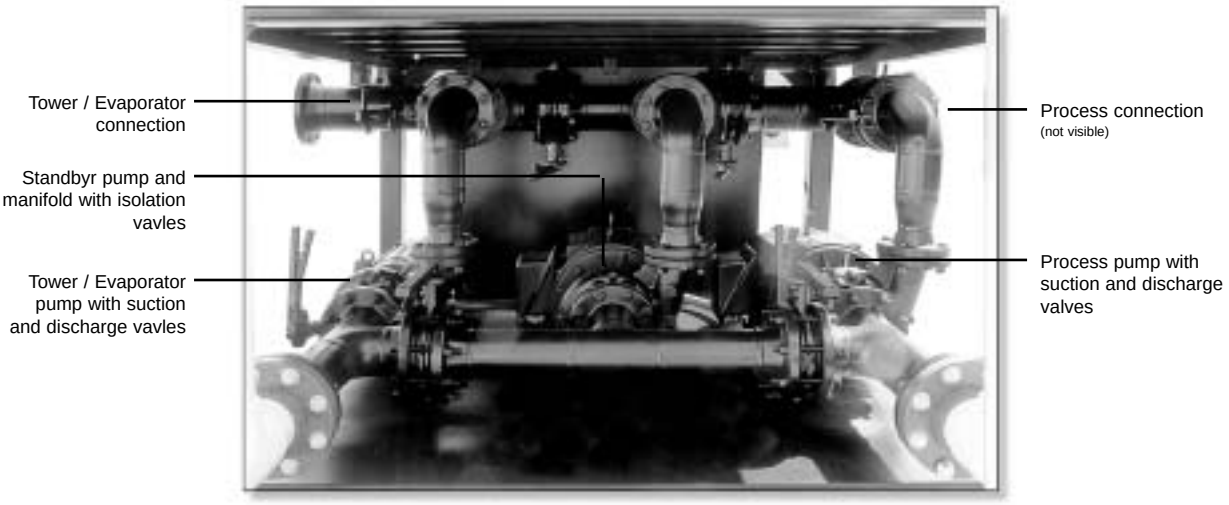


FIGURE W

CONTROLS FOR TOWER WATER SYSTEMS... most systems with tower fans, tower pumps and alarms use the CheckMate™ ***(Figure F***) system control panel, CheckMate™ staging board ***(Figure G***), or a multistage electronic temperature control thermostat ***(Figure H***). The controllers stage tower fans and tower pumps to match system capacity to the cooling load. A consistent water temperature is maintained regardless of load and ambient conditions. The electronic thermostat features a digital set point and a digital readout of actual water temperature. A single set point value is entered and offsets stage fans, pumps and alarms appropriately.... no need to set individual thermostats.

OPTIONAL CHECKMATE™ COOLING TOWER SYSTEM CONTROL AND MONITORING INSTRUMENT... this exclusive ADVANTAGE feature displays performance, status of all motors, alarms and temperatures. The CheckMate™ display panel works in conjunction with the CheckMate™ staging board to stage pumps and fans to match system capacity to current load. Up to six temperatures can be displayed at the "Temperature Status" screen including to process, from process and evaporator in and evaporator out (on evaporative cooling tower systems. Additional information is accessed on display screens for "Water Status", "Set Up", "Error Log" and "Accumulated Run Time".

Exclusive Top Operator™ switches ***(Figure I***) provide motor and overall system control. A main power on/off switch engages power to the system. An emergency stop button kills power to all motors if required. Process and evaporator (on chilled water systems) pumps are activated with an on/off switch with integral LED light that is green when the pump is running and red if the pump is off due to an overload condition (motor is using more amps than it is rated for). Tower pumps and fans (on evaporative cooling tower systems) use on/off/auto switches. When placed in the auto position, the CheckMate™ temperature control board stages the pump(s) and fan(s) to match system capacity to cooling requirements in order to maintain consistent water temperature. When placed in the "on" position, the pump or fan motor will run continuously. This feature is valuable as a manual system override or in case the temperature control board experiences a problem. All Top Operator™ pump and fan motor switches include integral LED lights that are green when the pump or fan is running and red if the pump or fan is off due to an overload condition (motor is using more amps than it is rated for). An alarm active / inactive switch is provided to silence the audible alarm while diagnosis and system repairs are made ***(Figure J***).

When more than 6 pumps (3 process & 3 staged tower pumps) and more than 4 fan stages are used on a system, individual motor lights and operators along with an independent digital temperature readout often replaces the CheckMate™ system controller to provide a clearer operator interface ***(Figure K***). This operator interface may also be used when certain options are selected such as variable speed drive packages.

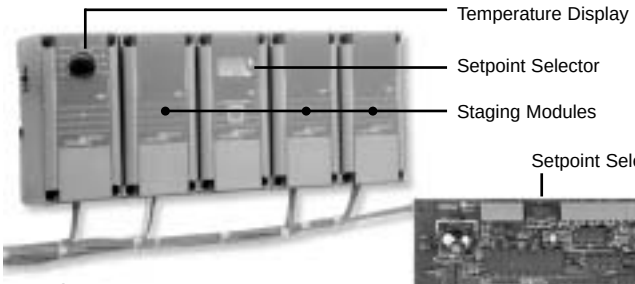


FIGURE H

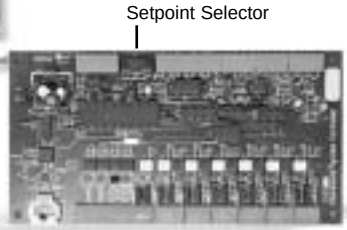


FIGURE F

FIGURE G

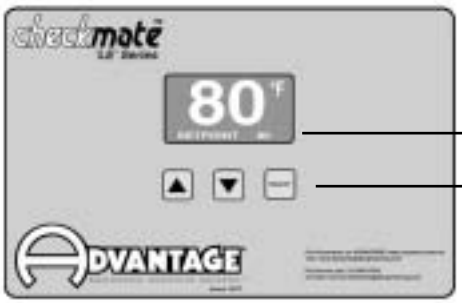
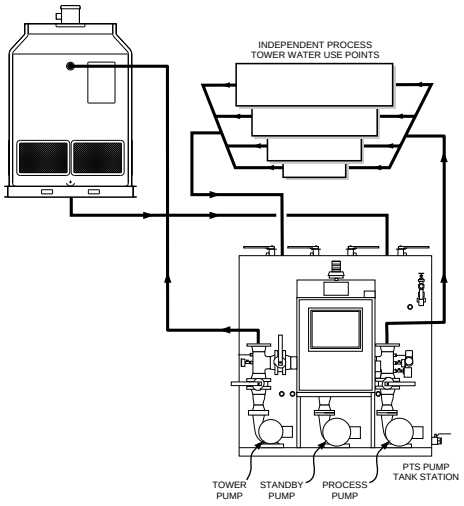


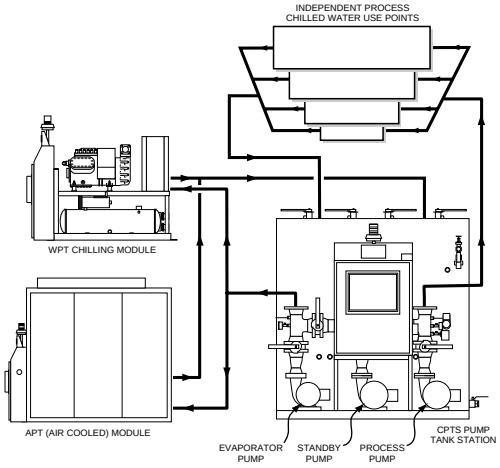
FIGURE I

FIGURE K

FIGURE J

SCHEMATICS... typical tower and chilled water system schematics are shown below. Contact the factory for additional information.





TOWER SYSTEM COMPONENT SELECTION

The chart below indicates the standard tank and pump configurations for **ADVANTAGE** cooling tower systems. All pumps have been selected based on 3 gpm/ton. Tower capacity is based on cooling water from 95°F to 85°F at a 78°F wet bulb temperature. Tank capacity is based on a minimum 1 minute turnover rate with a 2 pump system.

SYSTEM MODEL#	CAPACITY TONS	TOWER CELL	PUMP TANKS STEEL	PUMP TANKS POLY	PROCESS PUMP MODEL	PROCESS PUMP GPM	PROCESS PUMP PSI	TOWER PUMP MODEL	TOWER PUMP GPM	TOWER PUMP PSI	TYPICAL PIPE SIZE
ATS-20-2P	20	TC-20	PTS-275	TTK-450	PP-3	60	60	TP-2	60	30	2"
ATS-30-2P	30	TC-30	PTS-275	TTK-450	PP-5	90	58	TP-3	90	30	2.5"
ATS-45-2P	45	TC-45	PTS-400	TTK-450	PP-7.5	135	60	TP-5	135	30	3"
ATS-50-2P	50	TC-50	PTS-400	TTK-450	PP-7.5	150	56	TP-5	150	30	3"
ATS-75-2P	75	TC-75	PTS-600	TTK-450	PP-15	225	65	TP-7.5	225	30	4"
ATS-85-2P	85	TC-85	PTS-600	TTK-850	PP-15	255	63	TP-7.5	255	30	4"
ATS-100-2P	100	TC-100	PTS-600	TTK-850	PP-15	300	60	TP-7.5	300	30	4"
ATS-105-2P	105	TC-105	PTS-750	TTK-850	PP-20	315	60	TP-10	315	30	4"
ATS-125-2P	125	TC-125	PTS-750	TK-850	PP-20	375	60	TP-10	375	30	6"
ATS-135-2P	135	TC-135	PTS-1000	TTK-850	PP-20	405	60	TP-10	405	30	6"
ATS-150-2P	150	TC-150	PTS-1000	TTK-1600	PP-25	450	60	TP-15	450	30	6"
ATS-160-2P	160	TC-160	PTS-1000	TTK-1600	PP-25	480	60	TP-15	480	30	6"
ATS-170-2P	170	TC-170	PTS-1250	TTK-1600	PP-25	510	60	TP-15	510	30	6"
ATS-175-2P	175	TC-175	PTS-1250	TTK-1600	PP-25	525	60	TP-15	525	30	6"
ATS-200-2P	200	TC-200	PTS-1250	TTK-1600	PP-30	600	60	TP-20	600	30	6"
ATS-210-2P	210	TC-210	PTS-1250	TTK-1600	PP-30	630	60	TP-20	630	30	6"
ATS-270-2P	270	TC-270	PTS-2000	TTK-1600	PP-40	810	60	TP-20	810	30	8"
ATS-405-2P	405	TC-405	PTS-2500	TTK-3200	PP-60	1215	60	TP-30	1215	30	8"

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ADVANTAGE® MAKING WATER WORK™

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