TowerKlean®

Cooling Tower Water Treatment Systems

PATENTED

OPERATION & MAINTENANCE MANUAL

DATA PRESENTED HEREIN IS THE BEST AVAILABLE AT THE TIME OF PUBLICATION. TOWERKLEAN LLC AND/OR ITS REPRESENTATIVES ASSUME NO LIABILITY FOR ITS USE OR ABUSE.

PLEASE REVIEW THIS MANUAL COMPLETELY *BEFORE* INSTALLING OR OPERATING YOU NEW TowerKlean® SYSTEM. PLEASE CONTACT IWT WITH ANY QUESTIONS YOU MAY HAVE.

TOWERKLEAN®
A Bancroft Technologies Company
6650 Highland Road, Suite 201
Waterford, MI 48327
(248) 666-9200 - Fax (248) 666-9202
www.towerklean.com

TowerKlean O&M Manual Index

TOWERKLEAN LLC, A BANCROFT TECHNOLOGIES COMPANY

TOWERKLEAN® Limited Warranty

Warrant only to _____,
the original retail purchaser, that the products which are manufactured and assembled by TOWERKLEAN LLC, a Bancroft Technologies company are free from defects in material and/or workmanship for a period of twelve months from the date of documented installation provided installation occurs within 30 days from delivery or, in absence of documented installation date, 12 months from the date of factory shipment. The warranty registration card in this manual MUST be completed and returned to TOWERKLEAN LLC, a Bancroft Technologies company in order to establish the date of installation and extend the warranty period. If, within the period provided by this warranty, any such product shall prove defective, it shall be either repaired or replaced.

For repair/replacement, the original purchaser shall contact the manufacturer, as soon as possible after discovery of the defect, but in all events prior to the expiration date of the warranty. Upon notification, the manufacturer, TOWERKLEAN LLC, a Bancroft Technologies company 6650 Highland Road, Suite 201, Waterford, MI 48327, will advise the purchaser of the address to which the defective item may be shipped; the serial number and the date of purchase of the item must be included. UPS ground cost for shipping replacement parts(s) to the customer will be borne by TOWERKLEAN LLC; shipping other than regular service will be at the customer's expense. Customer is responsible for cost of shipping defective part(s) back to TOWERKLEAN LLC.

EXCLUSIONS

1. This warranty shall not apply to any failures resulting from: negligence, abuse, misuse, misapplication, improper installation, alteration or modification, chemical corrosion, or improper maintenance due to misapplication of the operation & maintenance manual.

2. Any items manufactured by other companies and used by TOWERKLEAN LLC in its products may carry warranties by the original manufacturers.

3. TOWERKLEAN LLC, a Bancroft Technologies company is not liable for incidental or consequential damages, loss of time, inconvenience, incidental expenses, labor or material charges in connection with operation of, removal of or replacement of the equipment.

TowerKlean LLC is not responsible for any implied warranties or representations by others, and the foregoing warranty is exclusive and in lieu of all warranties provided herein.

IMPORTANT

Read and fully understand the WARNING labels on the equipment. DO NOT OPERATE this unit if any unsafe conditions exist.

WARNING

THE FILTER SYSTEM OPERATES UNDER PRESSURE. DO NOT OPEN THE BAND CLAMP WHILE PUMP IS RUNNING AND/OR UNTIL ALL PRESSURE IS RELEASED THROUGH AIR RELIEF VALVE. SECURELY TIGHTEN VESSEL AND STRAINER CLAMP ASSEMBLIES ACCORDING TO MANUFACTURER'S INSTRUCTIONS. RAISE PRESSURE SLOWLY. **DO NOT EXCEED THE MAXIMUM WORKING PRESSURE OF THE FILTER VESSEL OR EXCEED THE MAXIMUM FLOW CAPACITY OF THE REACTION COLUMN.**

DANGER! EXTREME CARE MUST BE TAKEN DURING PRESSURE TESTS. FAILURE TO FOLLOW THESE INSTRUCTIONS EXPLICITLY CAN RESULT IN PERSONAL INJURY.

TOWERKLEAN®

TOWERKLEAN LLC

Congratulations on your selection of a **TOWERKLEAN®** Cooling Tower Water Treatment System by **TowerKlean LLC**

Your **TOWERKLEAN®** system is designed and manufactured for years of service.

Your **TOWERKLEAN®** system is covered by a limited warranty as stated on the previous page. This warranty is for 12 months from the date of documented installation provided installation occurs within 30 days from delivery or, in the absence of documented installation date, 12 months from the date of factory shipment. **In order to receive the maximum warranty benefit, you must complete and return the Warranty Registration Card below within 10 days of installation to register your warranty and ensure your rights.**

For Your Records

Date of Installation: _____ Date Warranty Registration Card Mailed: _____

Complete the card below. Cut along dotted line. Return to:

TowerKlean LLC
6650 Highland Road, Suite 201 - Waterford, MI 48327

TOWERKLEAN® Manufacturer's Warranty Registration

Model Number: _____ Serial Number: _____

Company Name: _____

Address: _____

City: _____ State: _____ Zip: _____

Contact Person: _____

Phone: _____ Date of Installation: _____

TOWERKLEAN®

TOWERKLEAN LLC

Getting to Know Your Cooling Tower Water Treatment System.

MAIN COMPONENT DESCRIPTION

A. SAND FILTER

This high-rate sand filter is a vertical pressure vessel with a special influent baffle in the top of the tank, a bed of filter sand and an underdrain system which collects the filtered water and directs it to the return piping. The filter operates under pressure. When closed properly and operated without air in the water system, this filter will operate safely. The system is equipped with a manual high-flow air release valve, an automatic pressure relief valve set at 35 psi. With influent and effluent pressure gauges mounted on the control panel support stand.

B. ACTUATED CONTROL VALVE ASSEMBLY

The valves are 24 volt, electric actuated, CPVC Three way diverting valves.

C. PUMP AND MOTOR

The pump has a cast brass impeller, motor bracket, and volute with stainless steel fasteners to resist corrosion. The drip-proof, cool running, mechanical seal virtually eliminates burnout and provides easy access for replacement. The pump is self-priming. The totally enclosed motor with its external fan-cooled construction allows for operation in noncombustible, dusty, dirty atmospheres. It is double shielded with pre-lubricated ball bearings on both ends, has a NEMA 56C frame, and high tensile steel shaft, enclosed in a heavy gauge rolled steel case. Motors are UL approved and CSA stamped.

D. STRAINER

The pump suction strainer assembly is fabricated of fiberglass reinforced noryl with a total capacity of 440 cubic inches and is rated for a maximum operating pressure of 50 psi. It has a clear lexan lid for viewing the integral cycolac strainer basket. The lid is held in place by a stainless steel band clamp and includes an o-ring gasket for positive seal. The pump strainer on TK -80 systems does not have the clear lexan lid. Extra care should be taken during installation to provide a shut off valve in the inlet line to the pump (close to the pump) so frequent inspections of the basket strainer can be made.

E. MEDIA SAND

Filter media is shipped with the unit for field installation. The filter media is quartzite of silica with a relative size of **.45 to.55 mm & 1.7 uniform co-efficient.** Clean filter media will remove particles 20 microns in size and larger. Accumulated material on the top of the media bed, called a filter cake, contributes to finer particle removal as the filter becomes "dirtier". Removal of over 99% of 10 micron particles and 90% of 5 micron particles can be expected over the course of a filter cycle.

F. REACTION MEDIA & REACTION COLUMN

The reaction column contains a ***patented*** high purity redox media. The media is a blend of two dissimilar metals in a 50:50 ratio. The naturally occurring electrical potential between these dissimilar metals creates an electron exchange effecting the crystal structure of and preventing the formation of hard scale while creating an unfavorable environment for bacteria ,algae and corrision. The reaction column has been specifically designed to provide a controlled, up-flow pattern of the process water through the reaction media while retaining the media within the column.

G. CONTROL PANEL

The control panel provides all controls for flow monitoring and automatic backwash operations. The control panel is UL Listed, and includes the following standard items: NEMA 3R enclosure; motor starter with thermal overload protection; transformer to convert supply to 24 and 110 VAC control power; power disconnect; differential pressure switch to initiate backwash (external to enclosure); adjustable timing controls; manual on/off switch; self-powered flow monitor and manual backwash initiation switch. The sequence of the adjustable timing controls is described under the Operation section of this manual. The controls automatically stop the system's pump whenever valves are to be shifted which prevents water hammer and pipe flexing.

H. SHUT-DOWNS

The TOWERKLEAN® system is designed to provide full effective operation, 24 hours per day, 7 days per week. If the system is to be shut down for any more than 5 days you should drain the reaction columns of water. This can be accomplished by opening the ½" drain valve slightly.

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PRE - INSTALLATION INSTRUCTIONS

- Prior to the installation and start up of your new **TOWERKLEAN®** cooling tower water treatment system, the following cooling system preparation instructions should be followed.

A) Carefully inspect the cooling tower and reservoir for any algae growth, which might be present. If algae is present, completely remove and clean all surfaces before installation and start-up.

- Cleaning and removing existing algae growth may require shocking the cooling system with a strong algaecide and manually scrubbing all surfaces where algae have established a base growth. A cover for the cooling tower distribution pan or shading of areas exposed to direct sunlight is recommended.

B) Disconnect and remove all treatment chemical drums and metering pump feed systems.

C) Draining the pump tank and refilling with fresh water, is the preferred method of elimating the residual chemicals in the cooling system. If this can not be accomplished you should discontinue the use of all chemicals at least 5 days prior to starting the TowerKlean system and increase the blow down to purge the system of chemicals.

D) Inspect the cooling system for heavy scale deposits. These deposits should be removed prior to the start up of your **TOWERKLEAN®** system. The TOWERKLEAN system will remove the old scale. More frequent cleaning of strainers be May necessary.

See installation drawing Page 29

TOWERKLEAN®

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INSTALLATION INSTRUCTIONS

STEP 1. LOCATION OF THE SYSTEM

- Place the **TOWERKLEAN®** Cooling Tower Water Treatment System on a firm level surface ***adjacent*** to (within15 feet of) the cooling tower reservoir. The **TOWERKLEAN®** system does not need to be anchored, unless required by local code or if the reaction column stand is separate from the filtration skid. Select a location close to the cooling tower for convenience, accessibility and serviceability. If the filter is to operate year-round, exposure to winter conditions should be considered

Open all crates and check for the following components.

1. **Reaction column(s)**
   a. **8, ¾ x 4 bolts /column**
   b. **8, ¾ x 5 bolts /column**
   c. **16, ¾ nuts /column**
   d. **32, ¾ flat washers /column**
   e. **16, ¾ lock washers/column**
   f. **1, 1 ½ dia. screen /column**
   g. **1, tee strainer clear bowl/column**
   h. **1, 53 lb can of IWT media/column**
   i. **1, 8" blind flange with 2" female npt thread/column**
   j. **1, 8" flange gasket/column**

2. **TowerKlean® filter assembly**
   a. **1, strainer housing**
   b. **1, strainer basket**
   c. **1, clear strainer lid**
   d. **1, 6" O-ring**
   e. **1, mounting gasket**
   f. **1, Tensioning clamp**
   g. **1, high flow air/pressure relief valve**
   h. **1, ¾ id drain hose with mounting Clips**
   i. **4, pump strainer mounting bolts**
   j. **Sand 150 lbs Tk20, 250lbs TK40, 400 lbs TK60 and TK80**

After unpacking and checking for all components locate the system as close to the cooling tower reservoir as possible.

1. **Mount the pump strainer basket and gasket to the pump.**

2. **Plumb the pump suction line be sure to use an isolation valve between the pump tank and the TowerKlean® system. Plumb the isolation valve within 2 feet of the strainer basket if possible. Plumb a union immediately before the pump strainer basket to allow for future service. Make sure to place the suction line in a location where it will not pick up air returning from the tower.**

3. **Mount the column(s) to the column stand(s); Use the ¾ x 4 bolts for mounting the bottom flange to the stand. Be sure to place the TowerKlean® sticker towards the front of the system.**

4. **Load the TowerKlean® media into the column(s) (1 Can of media per column).**

5. **Clean off any excess media from the top flange. Place the 8" gasket on the top flange of the column. Place the Blind flange on the gasket. Use the ¾ x 5 bolts to mount the blind flange to the top of the column(s).**

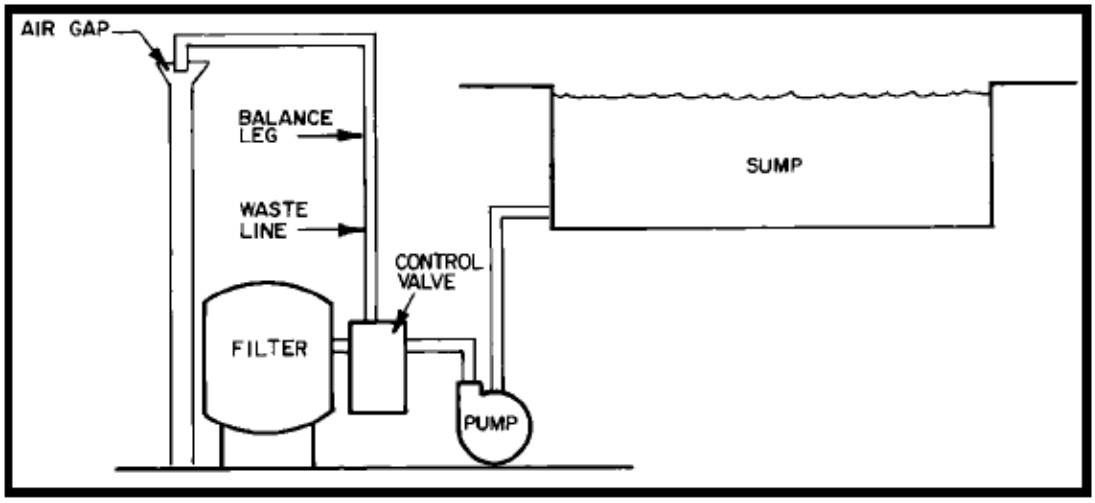
6. **Thread a 2" male thread adaptor into the 2" female NPT hole in the top of the blind flange. Within 6" of the top flange plumb a 2" union to allow for future service.**

7. **Plumb a 2" line back to the pump tank. If you are installing a multiple column unit you may want to plumb the column return lines in a header. If you do, the header should be 3" line. See drawing (page 29). Do not plumb the return line below the water line of the pump tank; if you do you will not be able to drain the column(s) during media change out.**

8. **Locate the closest drain capable of handling the flow of the back wash for the filter.**
    a. **TK20 35 GPM/ 3 minutes.**
    b. **TK40 65 GPM/ 3 minutes.**
    c. **TK60 100GPM/ 3 minutes.**
    d. **TK80 100 GPM/3 minutes.**

    If the drain will not handle the flow you may have to add a surge tank to allow the filter to backwash at the proper flow rate. The surge tank should be large enough to handle the total volume of back wash. Once the back wash has taken place the tank can be allowed to gravity feed to the drain over a longer period of time.

9. **Plumb a 2" drain line, be sure to use a siphon break so if the power fails during a backwash the pump tank does not drain. See Air gap drawing on page 10**



Balance Leg with Air Gap to prevent gravity drain of basin

10. **Plumb the bypass line from the TowerKlean® system back to the pump tank see drawing Page 29.**

11. **Load the sand into the filter vessel. Remove the band clamp from the filter tank, add enough water to cover the filter laterals, slowly pour the sand in the vessel 150lbs/TK20, 250lbs TK40, 400lbs TK60and TK80. Clean all sand from the sealing surface, Make sure the O-ring is in place, set the cover on the filter vessel place the band on. Tighten the spring nut while GENTLY tapping on the band clamp to insure uniform tension, DO NOT OVER TIGHTEN**

Electrical Connections

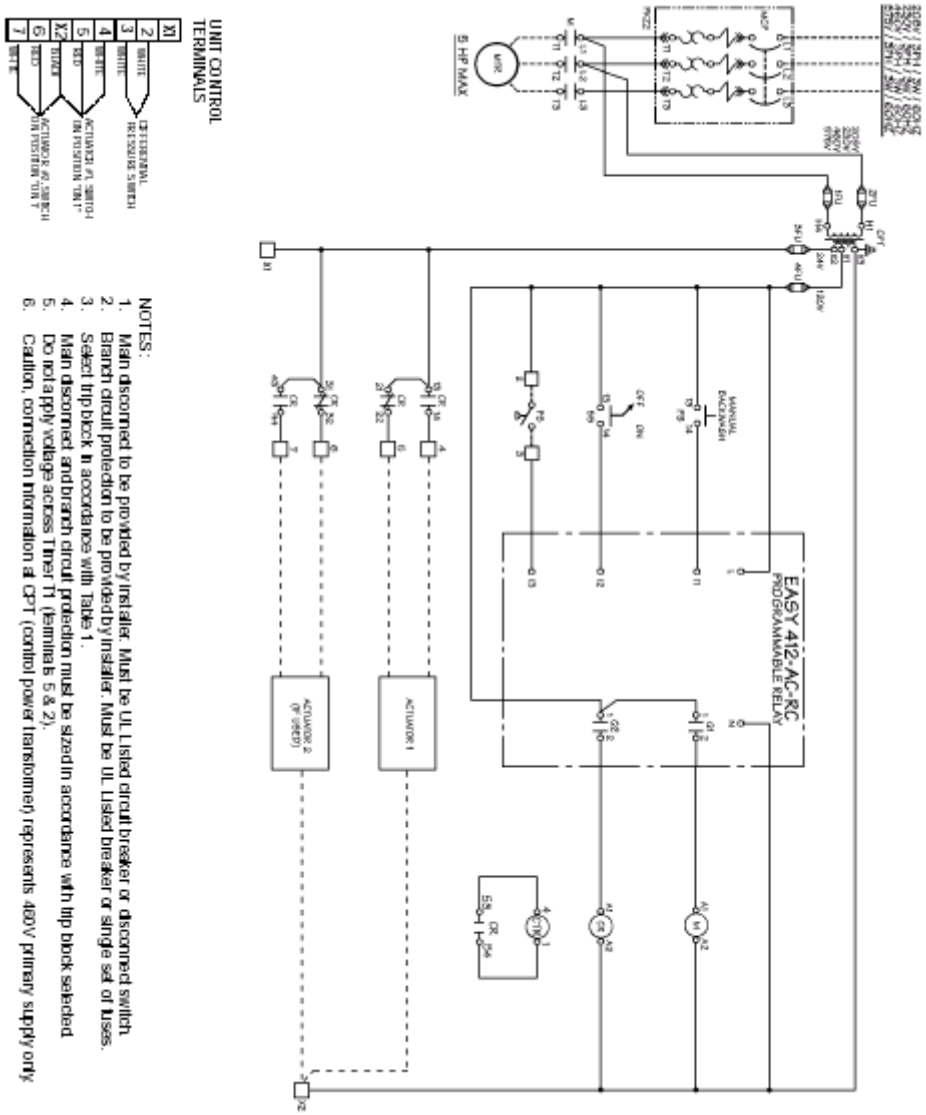
All systems are factory prewired and require only field connections to power source. Proceed as follows:

- **ALL WIRING CONNECTIONS MUST FOLLOW ALL STATE AND LOCAL CODES.**

A) Check power supply wiring and related components for compatibility with the system making sure ***all*** code requirements are met.

B) Make all contacts according to the appropriate phase/voltage wiring schematic found within this manual

TowerKlean Electrical Drawing



TOWERKLEAN®
FILTER START UP PROCEDURE
(Flooded Suction Installations)

- Close the reaction column(s) flow control valve(s) and completely open “bypass to reservoir” valve.

- Place the clear plastic drain hose from the high flow air relief valve, in a drain or bucket.

- Open the isolation valve from the reservoir. Open high flow air relief valve at the top of the filter chamber by turning it ¼ turn to its full open position. Allow air to escape from the filter chamber until water flows from the air relief valve. Close the air relief valve.

- Check all fittings for leaks.

  Note: Insure that the strainer basket is full of water before attempting to start pump motor. Running the pump without water in the basket will cause failure of the pump seals.

- Make sure pump on/off switch is in the off position, Turn main disconnect switch to the on position.

- Turn pump on/off quickly to check for proper pump motor rotation according on the arrow on the pump. Correct if necessary.

- After verifying pump motor rotation, turn the system panel switch on and allow the pump to run.

- Open high flow air relief valve once again until you achieve a steady stream of water. Close the valve.

- Press manual backwash button on the control panel.

  The following sequence will occur:
  Pump will pause for 30 seconds while the two automatic valves rotate 180°.
  Note: Valves must rotate simultaneously in the same direction. If they do not, check the toggle switches on the valve motor housings to insure that both switches are in the ON1 position.
  Pump will restart and run for 3 minutes. During this time, check the discharge from the filter to the drain.
  Pump will then shut down for 30 seconds while the valves return to the run position.
  After a brief time delay the pump will restart.
  Check the backwash counter to insure that the number has increased by one.

- The filter is now operational.

WARNING

THE SAND FILTER OPERATES UNDER PRESSURE AND SHOULD NEVER BE OPENED UNTIL THE PUMP IS SHUT OFF AND THE PRESSURE IS BLED OFF THROUGH THE AIR RELIEF VALVE. NEVER OPERATE THE SAND FILTER AT PRESSURES OVER 30 PSI. SUCH PRESSURES COULD INDICATE THE NEED FOR CLEANING OR A MALFUNCTION IN THE SAND BED. THE FILTER SYSTEM IS DESIGNED TO WITHSTAND WATER TEMPERATURES UP TO 120°F/49°C.

The factory preset time interval for back washing is 12 hrs do not lengthen this interval without approval of TowerKlean LLC. Failure to comply can result in solidifying sand.

TOWERKLEAN®
REACTION COLUMN START UP PROCEDURE

- With the filter in operation and the bypass open fully, slowly open the reaction column isolation valve(s) fully followed by the reaction column control valve(s)fully.
- During this initial adjustment run the flow rate thru the column(s) at the lower portion of the flow range sticker.
- If the column flow is lower than the lower portion of the flow range sticker slowly close the bypass valve until the proper flow rate is achieved for each column. The reaction column control valves may need to be adjusted in multiple column systems to properly balance the flow. .
- Allow the system to operate at this rate for 24 hours. After that time, verify that the system has backwashed at least 2 additional times, as indicated on the backwash counter.
- The system is now ready for the full process flow rate. Slowly turn the bypass valve toward the closed position until the flow is ¾ of the way up the flow range sticker. On multiple column systems it will be necessary to adjust the reaction column control valves to properly balance the flow to the individual columns.
- The system is now fully operational.

WARNING

THE REACTION COLUMN(S) OF THIS SYSTEM, EACH HAVE A MAXIMUM RATED FLOW CAPACITY OF *25 GALLONS PER MINUTE PER COLUMN*. OPERATING THE REACTION COLUMN(S) AT A FLOW RATE GREATER THAN ITS DESIGNED PARAMETERS MAY RESULT IN THE LOSS OF REACTION MEDIA, AND WILL REDUCE THE SYSTEMS EFFICIENCY.

MAINTENANCE

DAILY

1) Release trapped air in the sand filter through the air release valve located on the top of the sand filter lid. Placing the clear tubing in a bucket or to a drain, open the air release valve a 1/4 turn, allowing the air to be purged from the filter chamber. Once the air has been purged, close the air release valve.

2) Inspect the pump **strainer basket and the in-line strainer** assemblies for any foreign material. If cleaning is necessary, turn system off, close pump feed supply valve, the reaction column flow adjustment and isolation valve(s) and the flow bypass valve. Release pressure from the filter by opening the air release valve.

- **Strainer Basket Cleaning** requires removing strainer lid. Clean basket, replace basket and lid following recommended safety procedures, and restart system following the Start-up Procedure.

- In order to clean the **In-Line Strainer Assembly,** close the column isolation valve and the column flow control valve. Remove the screen and clean it. After cleaning the screen, make sure the gasket is in place when replacing the bowl and screen. Open the column isolation valve, turn pump on and reajust the flow control valve.

3) Observe flow of media in the reaction column to insure proper up-flow movement of the media bed. Observe flow rate as indicated on the flow indication “Operating Range” sticker on the column,

4) Check all plumbing connections for leaks.

Monthly

Send water sample to: TOWERKLEAN
LABORATORY SERVICES
1500 KDF Dr
Three Rivers MI 49093

MAINTENANCE CONTINUED

QUARTERLY

1) Remove sand filter top for inspection of the sand bed. Turn the system off, close the pump feed valve, the reaction column flow adjustment valve(s) and the flow bypass valve.

- **Open the air relief valve located on the top of the filter chamber to relieve any pressure. This should be done any time you are working on the system to assure your safety.**

  Drain the water from the sand filter by removing the drain plug located in the bottom discharge pipe from the filter vessel. Remove the tank top by loosening the perimeter band clamp.

  Inspect the sand, removing any trapped solids that may have accumulated on the bed surface. The sand should be tested by thoroughly probing the sand bed with your hand, all the way to the bottom of the filter, checking for any solidification that may have occurred. **Remove any bound sand replace with new.**

MAINTENANCE CONTINUED

YEARLY

- **NOTE: AT A MINIMUM, AN ANNUAL CHANGE OF THE REACTION MEDIA IS REQUIRED TO INSURE PROPER PERFORMANCE OF THE SYSTEM. PRIOR TO THE ANNIVERSARY OF YOUR SYSTEM START UP DATE, REPLACEMENT MEDIA SHOULD BE ORDERED. CONTACT TOWERKLEAN LLC FOR PRICING AND DELIVERY.**

1) Shut the system off, turn power supply disconnect to off position, and release pressure from sand filter by opening the air relief valve located on the top of the filter vessel.

2) Close the isolation valve from the reservoir, flow bypass valve and reaction column flow adjustment valve(s).

3) Open reaction column drain valve ***slightly,*** allowing the water in the column(s) to ***slowly*** drain the column without plugging the strainer screen with reaction media. Note that the union in the reaction column discharge return line should be opened to prevent siphoning.

4) Once the reaction column has completely drained, disconnect the unions at the Bottom feed and discharge points (top).

5) Remove the complete reaction column carefully from the column stand. Lay the reaction column on a level surface and remove distribution assembly at the base of the column. Remove the old media and replace the four laterals per column. Reassemble the reaction column(s) and remount to the column stand.

6) Load one complete can of media (53lbs) into each column

7) Clean gasket sealing surfaces and replace the bottom plate assembly and the flange

8) Reassemble plumbing and restart system following the start up procedure section of this manual.

9) Check backwash counter and observe valve operation.

Carefully follow the start-up procedure to remove trapped air from the media and return the system to normal operation.

Backwash Timer Adjustment Procedure

To adjust the length of the back wash timer on TowerKlean systems equipped with the programmable relay follow the steps listed below.

1) Locate the programmable relay within the control panel.

2) From the main screen press OK

3) Use the diamond key to scroll down until the word parameter is flashing.

4) Press OK

5) T4 will appear.

6) use the diamond key to scroll down to T5

7) Use the diamond key to scroll left until the time is flashing.

8) Adjust the time by pressing the diamond key up or down on the flashing number.

9) Repeat step 7 and 8 until the proper time is shown.

10) Once the proper time is shown press OK to enter the value

11) Press ESC twice to return to the main menu and return the system to service.

Note: This timer should not be changed from the factory setting (12 hours) Unless instructed to do so by TOWERKLEAN LLC.

TOWER TERGE

Detergent Cleaner for Oil & Grease Contamination

DIRECTIONS FOR USE:

NOTE: Oil and grease contamination indicates a problem that requires corrective action. Locate and identify the source of the contamination and take appropriate measures prior to cleaning to insure that it is corrected. Possible sources are hydraulic heat exchanger leaks, airborne sources, new metal piping, etc.

When cooling systems become contaminated with oil and grease, the **TowerKlean**® reaction media can become coated and insulated from the reactions necessary for proper performance. In order to restore performance to the reaction media, it is necessary to clean the contamination from the media and the entire system.

TowerTerge has been formulated specifically to remove petroleum based oil and grease contamination and restore performance. **TowerTerge** is a combination of a strong surfactant combined with a foam suppressant and an emulsifying polymer. The foam suppressant is present in a controlled dosage and is effective in the control of *excessive* foam. The use of additional foam suppressant will diminish the effectiveness of the product.

For each column on your **TowerKlean**® or **ChillerKlean**® system:

1. Mix one pint of **TowerTerge** in five gallons of hot water and stir to mix.

2. Pour the solution into the cooing water reservoir and allow it to recirculate throughout the entire system for two (2) hours.

3. After two hours, it is important to purge the system of emulsified oils and grease from the system. If possible, dump the entire system and rinse the reservoir prior to refilling. As an acceptable alternative, you may dump as much of the water as possible and manually activate the filter backwash, every 30 minutes for a period of four hours insuring that water clarity has returned. Failure to completely purge the system will result in a breakdown of the emulsifier and redeposition of the oil.

After the system has been cleaned, you may notice that the scale removal rate has increased and adequate precautions should be taken.

For serious contamination that involves visible oil films the procedure may require more than one treatment, along with physically cleaning tanks, etc. Contact TowerKlean LLC for instruction at (248) 666-9200.

TowerKlean ®
Water Testing Program

TowerKlean LLC provides one year of water testing with the sale of each TowerKlean® system. The TowerKlean® performance guarantee is only valid if the TowerKlean LLC water-testing program is followed. The end user will receive a supply of labeled sample bottles. The customer should take reservoir water samples and ship them to: TowerKlean Laboratory Services:

1500 KDF Drive
Three Rivers, MI 49093

On the following schedule,

- Five Days after startup

- Every thirty (30) days thereafter for a one-year period

After the end of the first year we recommend continued testing of your water on a monthly basis. Please contact us for our water-testing program.

TROUBLE SHOOTING

The trouble shooting pages are provided in order to give you the ability to locate and possibly remedy problems that may occur during normal operation of your TOWER-FLO® Water Filter System. If you are unable to solve the problem, please do not hesitate to contact us.

PROBLEM	POSSIBLE CAUSE	SOLUTION
PUMP STOPS	A Pump motor or circuit	A Check circuit breakers, wire connections (loose, broken or incorrect), thermal protector in motor starter tripped. Allow motor to cool, then try to restart[1]
WATER LEVEL DROPS IN BASIN	A Gravity draining of basin; filter installed below static water level of basin and power interrupted to pump during backwash	A Prevent gravity draining by following the warning instructions under Installation, Step 1., on page 7.
BACKWASHES TOO OFTEN OR CONSTANT BACKWASH	A Differential pressure switch adjusted too low; virtually constant closure	A Using bench air, check ΔP set at 10 psi. If at 10 psi, increase setting by two to three psi
	B Differential pressure switch stuck closed	B Check switch for continuity with no pressure on system
	C Backwash control circuit failure	C Check circuit breakers, wire connections (loose, broken or incorrect), timers, and fuses,
	D High pressure drop through filter due to clogging	D Inspect filter bed for foreign material and contaminated or caked sand and remove from tank. Replace with same volume of clean, new silica sand
BACKWASHES TOO INFREQUENTLY OR NEVER	A Differential pressure switch adjusted too high for backwash initiation or	A Using bench air, check ΔP set at 10 psi. If at 10 psi, decrease setting by two to three psi
	B Differential pressure switch malfunction	B Check switch for continuity with no pressure on system
	C No water flow	C Check for 1. Loss of pump prime 2. Clogged strainer basket
	D Low pressure drop through filter due to channeling	D Inspect filter bed for foreign material and contaminated or caked sand and remove from tank. Replace with same volume of clean, new silica sand
PUMP LOSES PRIME	A Strainer cover leaking	A Check lid and O-ring for defects; tighten lid clamp
	B Water level too low	B Add water
	C Suction line clogged or leaking	C Inspect and repair as needed
	D Horizontal run over 18" in suction line	D See warning under Installation, Step 1., on page 7.
UNUSUAL NOISES	A Plumbing vibration	A Ensure all plumbing anchored properly
	B Bad motor bearings	B Repair or replace motor
	C Pump 1. Cavitation 2. Foreign objects in pump 3. Impeller out of adjustment	C 1. See A, B, and C directly above 2. Check volute and impeller 3. Adjust impeller by loosening the three set screws in the shaft extension and repositioning the impeller to center of pump volute
SAND BEING DRIVEN TO TOWER	A Cracked or broken lateral(s)	A Replace cracked or broken laterals

[1]If motor re-starts after cooling, check amperage draw at the motor and compare to Full Load Amp Draw (FLA) as noted in Your Filter's Specifications on page 4. If amp draw is above noted FLA draw, reduce flow on discharge side of pump.

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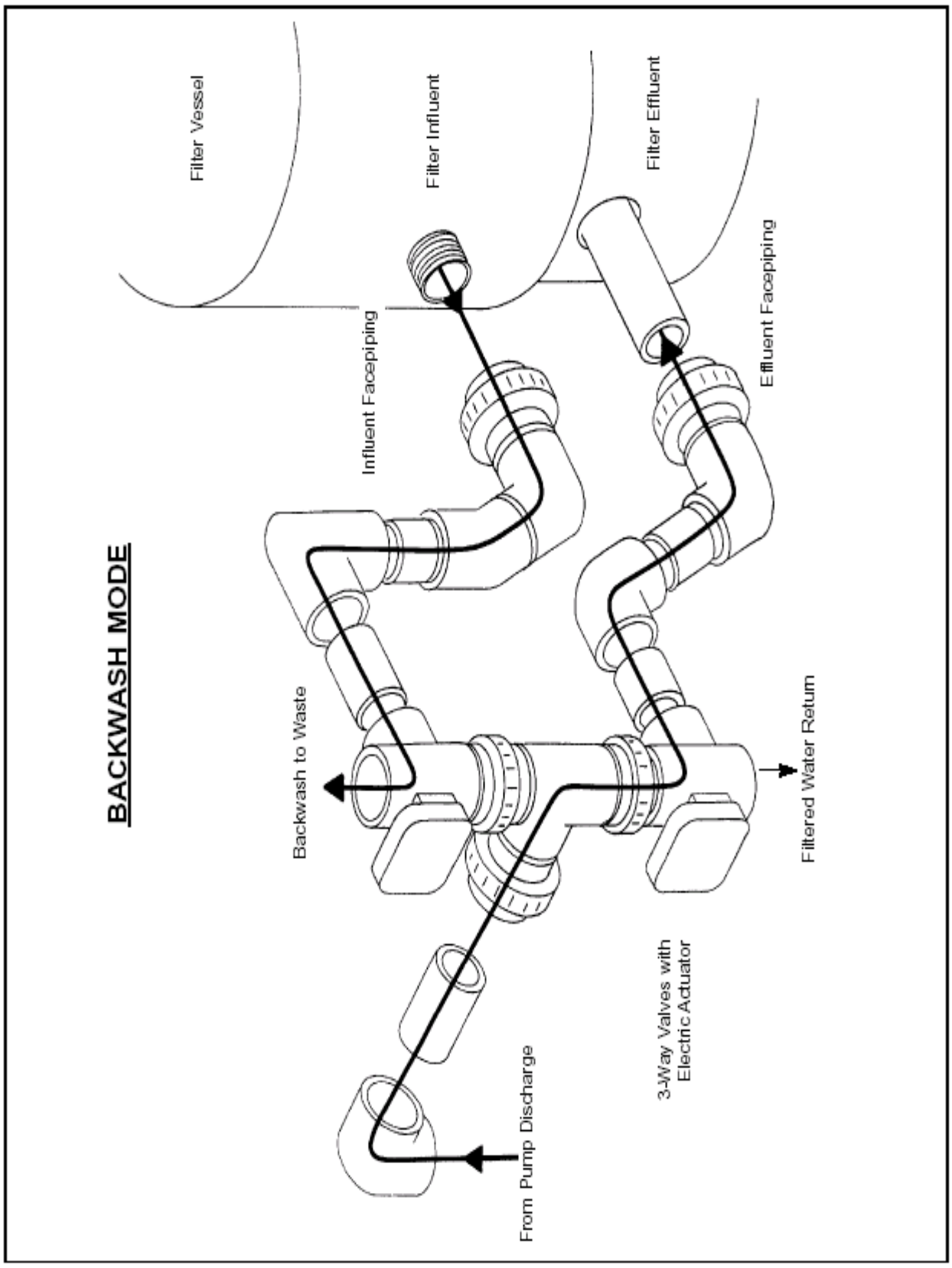
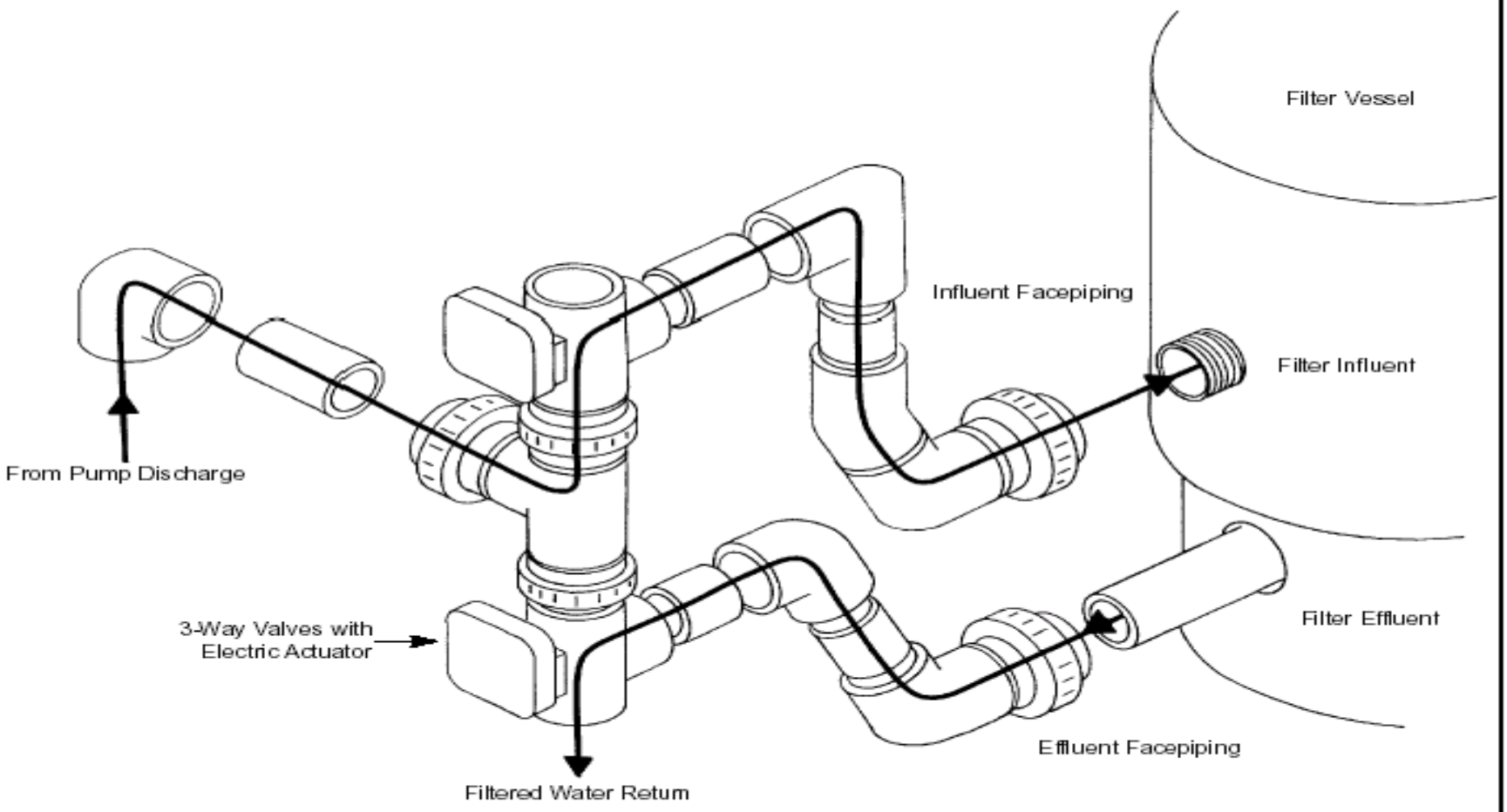
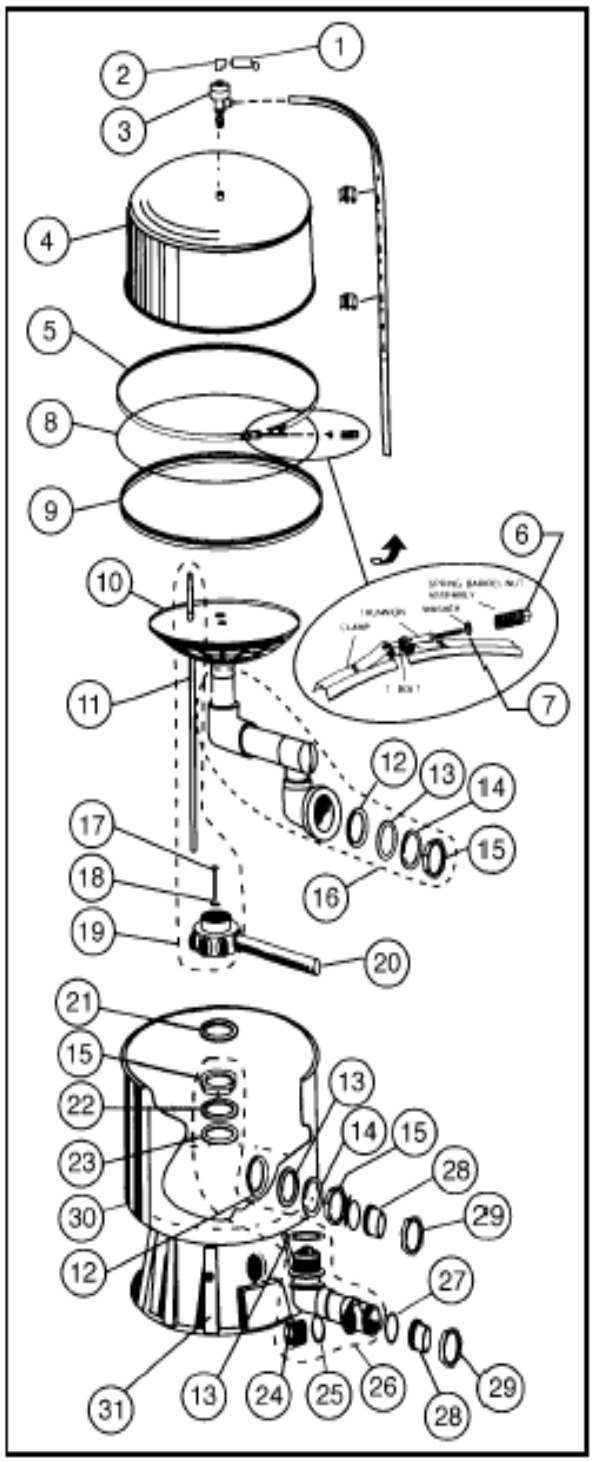

BACKWASH MODE
Filter Vessel
Filter Influent
Filter Effluent
Influent Facepiping
Effluent Facepiping
Backwash to Waste
Filtered Water Return
From Pump Discharge
3-Way Valves with Electric Actuator

FILTER MODE


Filter Vessel
Influent Facepiping
Filter Influent
From Pump Discharge
3-Way Valves with
Electric Actuator
Filter Effluent
Effluent Facepiping
Filtered Water Return

TK-20 Filter assembly and Parts List

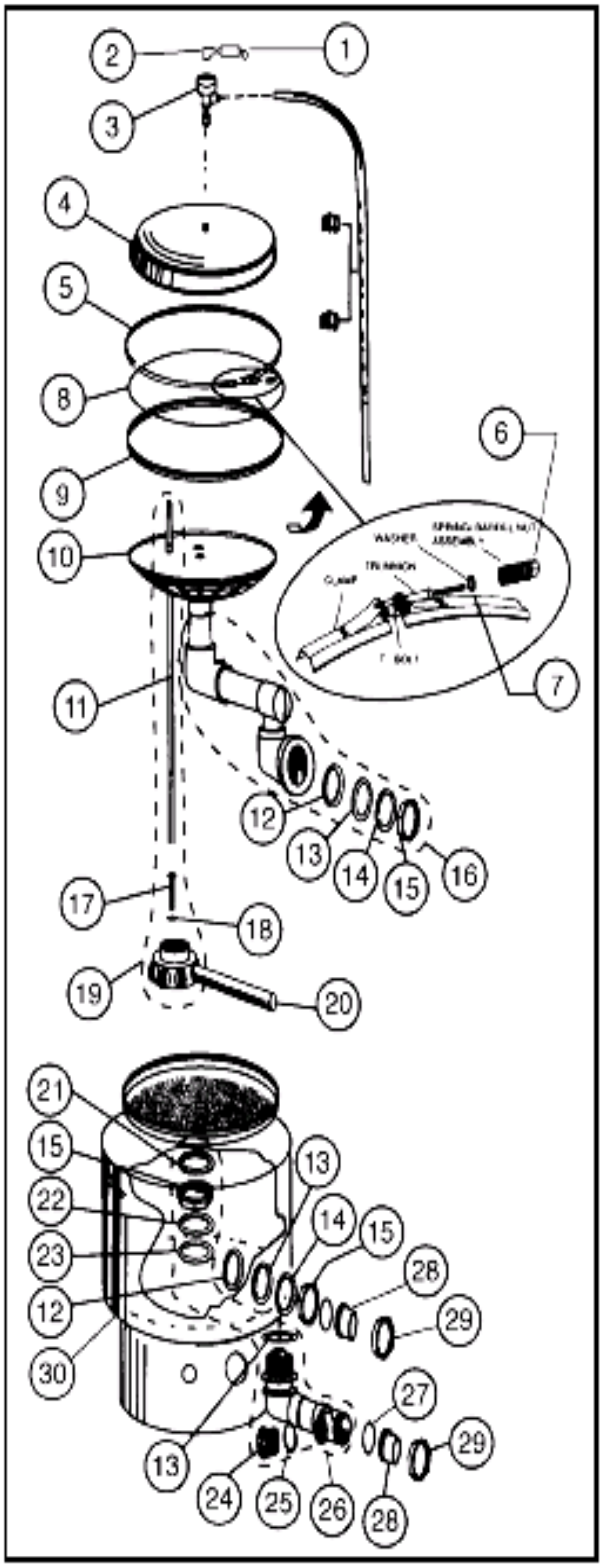


Item	Part #	Description	Qty
1	M871812	Valve, pressure relief	1
2	M902520	Elbow, brass, street, 90°, 1/4"	1
3	M871817	Valve, air relief, hi-flo w/hose & clips	1
	M871818	Valve only, air relief, hi-flo	1
4	P331091	18" Tank lid AFT 11-94	1
5	P330542	Clamp, trsn cntrl, AFT 11-94	1
6	P330550	Spring/barrel nut assy AFT 11-94	1
7	P330555	Washer	1
8	P331139	O-ring, 18" tank B4 11-94	1
	P330544	O-ring, 18" tank AFT 11-94	1
9	P330546	Backup ring, 18" tank AFT 11-94	1
10	P331129	Overdrain	1
11	P331133	Service Kit, Air Tube B4 5-95	1
12	P331124	Gasket, bulkhead (interior)	1
13	P331148	Gasket, bulkhead (exterior)	1
14	P331116	Spacer, concave	1
15	P331149	Locknut, bulkhead	2
16	P331119	Inlet pipe assembly, 18" vessel	1
17	P331166	Screw, hub, stainless steel	1
18	P331167	Washer, 1/4" stainless steel	1
19	P331190	Hub with air bleed tube, 18"	1
20	P331154	Lateral, 18" vessel (7" long)	8
21	P331138	Gasket, hub	1
22	P331195	Washer, bulkhead	1
23	P331196	Gasket, bulkhead	1
24	P331096	Plug, 1-1/2" drain with o-ring	1
25	P331097	O-ring, drain plug	1
26	P331162	Outlet pipe assembly, 18" vessel	1
27	P331147	O-ring B4 1-1-90	1
	P331172	O-ring AFT 1-1-90	1
28	P331108	Body union, 1-1/2 male	2
29	P331117	Nut	2
30	P331092	Tank bottom, 18" vessel	1
31	P331090	Base, tank, 18" vessel	1

Not Shown

P283938	Gauge panel assembly	1
P181036	Gauge, 0-60psi, 2.5", liquid filled	2
P181115	Backwash sightglass	1

TK-40 Filter Assembly

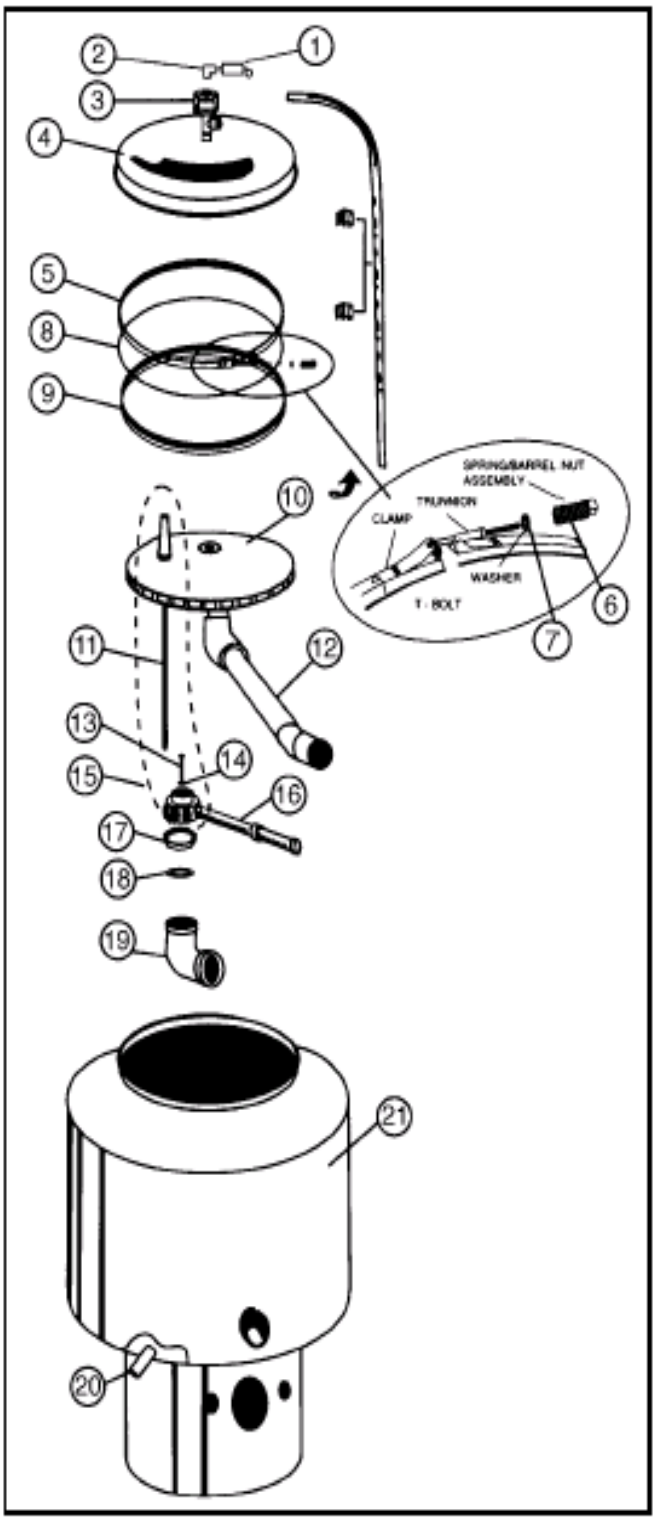


Item	Part #	Description	Qty
1	M871812	Valve, pressure relief	1
2	M902520	Elbow, brass, street, 90°, 1/4"	1
3	M871817	Valve, air relief, hi-flo w/hose & clips	1
	M871818	Valve only, air relief, hi-flo	1
4	P331093	24" Tank lid AFT 11-94	1
5	P330542	Clamp, trsn cntrl, AFT 11-94	1
6	P330550	Spring/barrel nut assy AFT 11-94	1
7	P330555	Washer	1
8	P331127	O-ring, 24" tank B4 11-94	1
	P330544	O-ring, 24" tank AFT 11-94	1
9	P331114	Backup ring, 24" tank AFT 11-94	1
10	P331129	Overdrain	1
11	P331133	Service Kit, Air Tube B4 5-95	1
12	P331124	Gasket, bulkhead	1
13	P331148	Gasket, bulkhead	1
14	P331116	Spacer, concave	1
15	P331149	Locknut, bulkhead	2
16	P331122	Inlet pipe assembly, 24" vessel	1
17	P331166	Screw, hub, stainless steel	1
18	P331167	Washer, 1/4" stainless steel	1
19	P331192	Hub with air bleed tube, 24"	1
20	P331153	Lateral, 24" vessel (10" long)	8
21	P331138	Gasket, hub	1
22	P331195	Washer, bulkhead	1
23	P331196	Gasket bulkhead	1
24	P331096	Plug, 1-1/2" drain with o-ring	1
25	P331097	O-ring, drain plug	1
26	P331163	Outlet pipe assembly, 24" vessel	1
27	P331147	O-ring B4 1-1-90	1
	P331172	O-ring AFT 1-1-90	1
28	P331108	Body union, 1-1/2 male	2
29	P331117	Nut	2
30	P331094	Tank bottom, 24" vessel	1

Not Shown

	P283938	Gauge panel assembly	1
	P181036	Gauge, 0-60psi, 2.5", liquid filled	2
	P181115	Backwash sightglass	1

TK-60 and TK-80 Filter Assembly



Item	Part #	Description	Qty
1	M871812	Valve, pressure relief	1
2	M902520	Elbow, brass, street, 90°, 1/4"	1
3	M871817	Valve, air relief, hi-flo w/hose & clips	1
	M871818	Valve only, air relief, hi-flo	1
4	P331031	30" Tank lid AFT 11-94	1
5	P330542	Clamp, Tension Cntrl, AFT 11-94	1
6	P330550	Spring/barrel nut assy AFT 11-94	1
7	P330555	Washer	1
8	P331139	O-ring, 30" tank B4 11-94	1
	P330544	O-ring, 30" tank AFTER 11-94	1
9	P330546	Back-up ring, AFTER 11-94	1
10	P331129	Overdrain	1
11	P331133	Service Kit, Air tube B4 5-95	1
12	P331177	Overdrain line assembly	1
13	P331156	Screw, hub	1
14	P331157	Washer, 1/4" stainless steel	1
15	P331194	Hub with air bleed tube, 30"	1
16	P331135	Lateral, 30" vessel (13" long)	8
17	P331132	Nut, lock, 2" brass	1
18	P331178	Gasket, Hub	1
19	P331155	Elbow, 2", 90° t x t, sch 80	1
20	P331142	Drain assembly	1
21	P331032	Tank bottom, 30" vessel	1
		Not Shown	
	P283938	Gauge panel assembly	1
	P181036	Gauge, 0-60psi, 2.5", liquid filled	2
	P181115	Backwash sightglass	1
	P331143	O-ring, drain, 30" tank	1

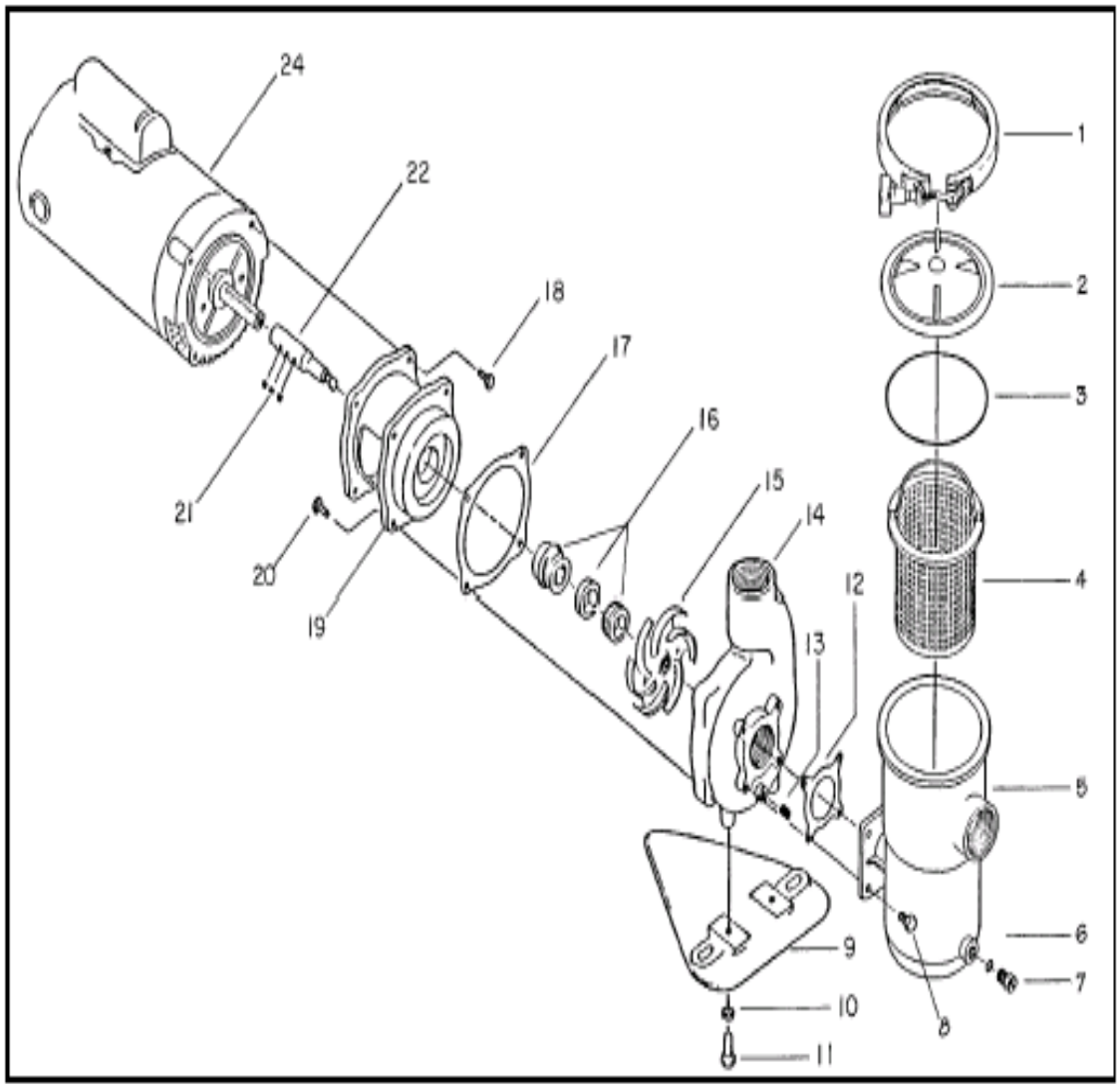
Pump Assemblies

Common Part Numbers for TFD-18,-24, and -30

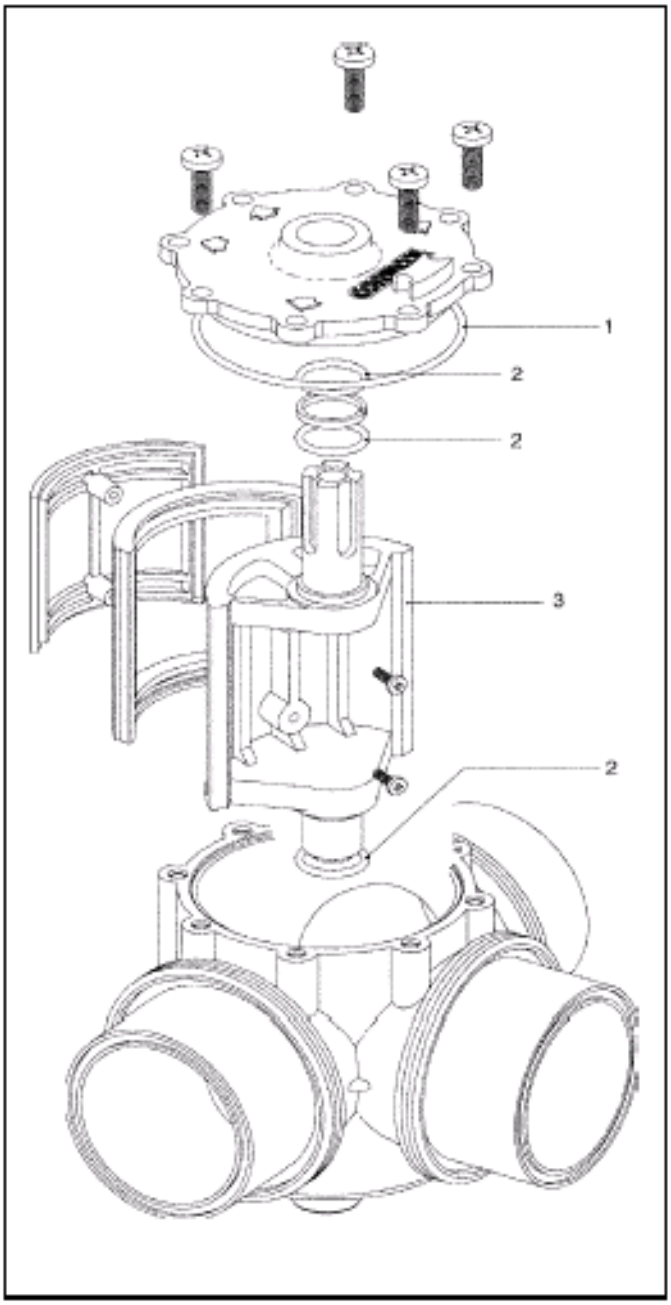
Item	Part #	Description	Qty.	Item	Part #	Description	Qty.
1	P171962	Clamp 6"	1	11	P171920	Hex bolt 5/16-18 x 3/4	2
2	P171908	Lid, lexan 6"	1	12	P170415	Gasket, trap to volute	1
3	P171925	O-ring 6"	1	13	P170416	Volute plug	1
4	P172023	Basket, strainer 6"	1	14	P170417	Volute	1
5	P172803	Trap body, 6" x 2"	1	16	P171976	Seal	1
6	P171905	Plug O-ring	1	17	P171974	Gasket, volute	1
7	P171914	Plug	1	18	P171903	Hex bolt, 3/8-16 x 5/8	4
8	M808698	Bolt, trap to volute	4	19	P170420	Bracket	1
8A	P171893	Strainer assembly (1-7)	1	20	P171902	Hex bolt, 5/16-18 x 5/8	8
9	P171915	Pump base	1	21	P171901	Screws, set	3
10	P171917	Lockwasher	2	22	P171904	Shaft extension	1

Uncommon Part Numbers

	TFD-18	TFD-24	TFD-30		
15	P171971	P171972	P171973	Impeller	1
23	P171922	P171938	P171983	Pump assembly, (items 9-22)	1
24	P171545	P171548	P171537	Motor, single phase, TEFC	1
24	P171548	P171549	P171542	Motor, single phase, TEFC after 6/99	1
24	P171941	P171942	P171944	Motor, three phase, TEFC	1
24	P171942	P295056	P171541	Motor, three phase, TEFC after 6/99	1

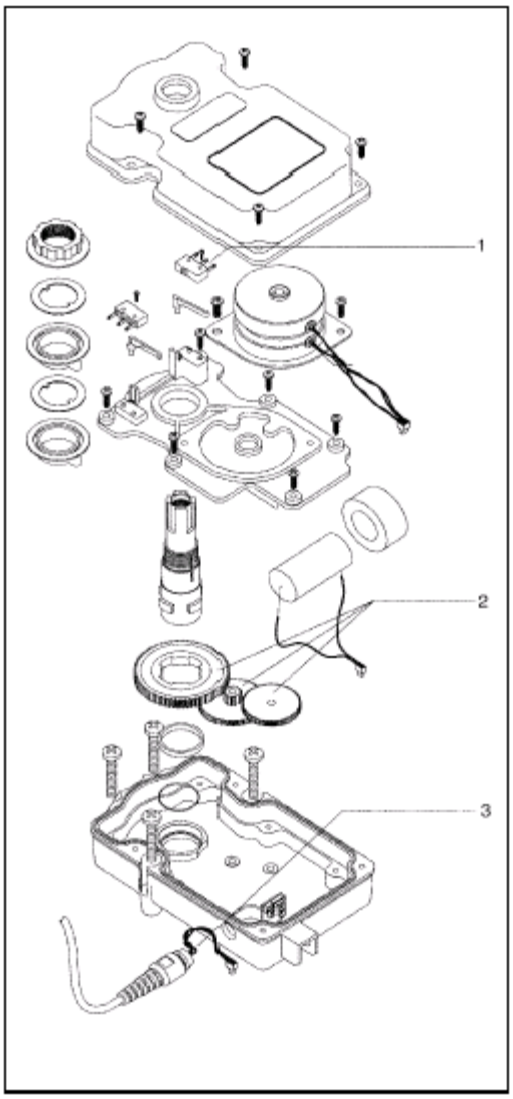


Valve Assembly



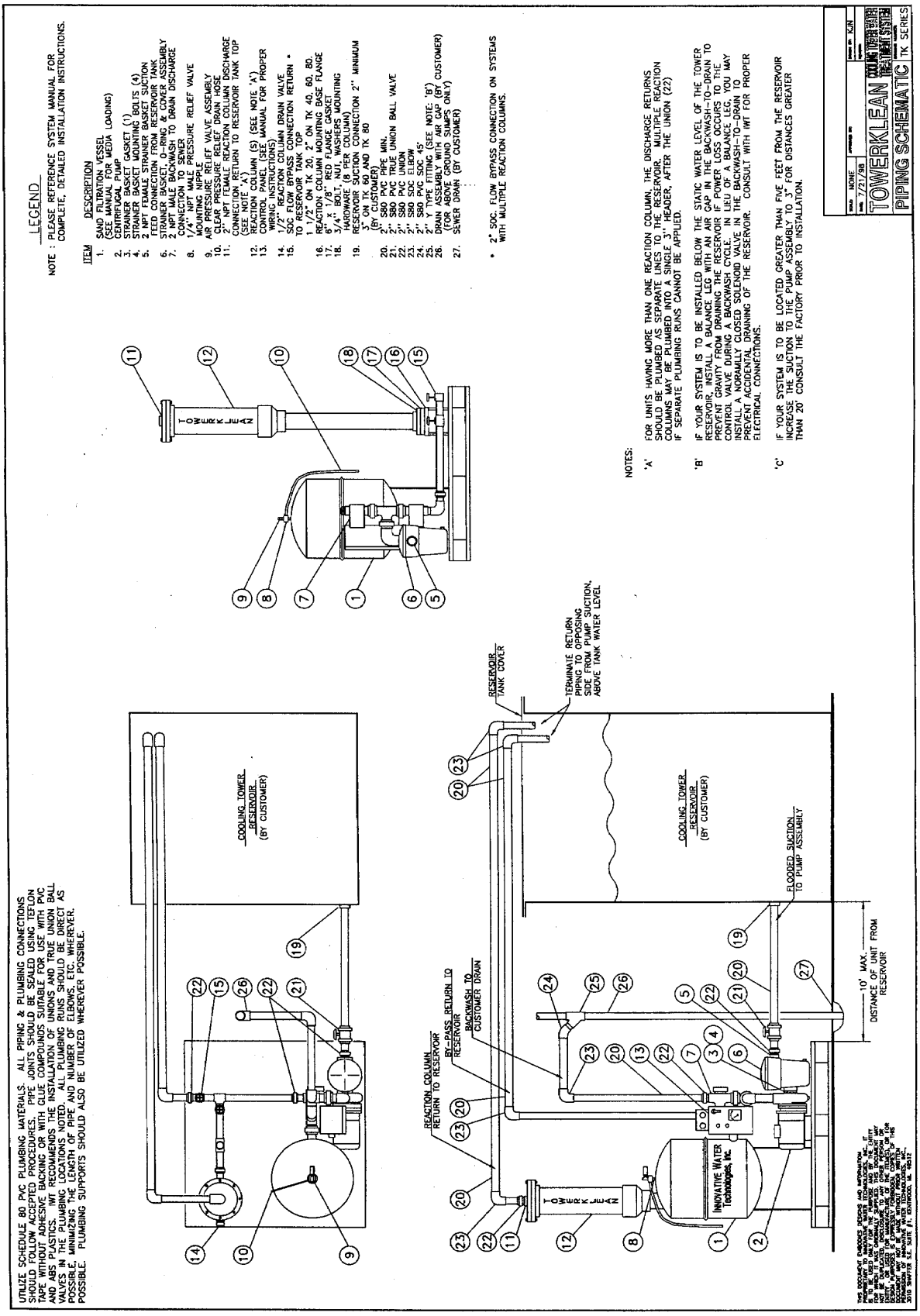
Item	Part #	Description	Qty
	M870460	Valve, 3-way, CPVC, 2" w/ actuator	1
	M870462	Valve Only, 3-way, CPVC, 2"	1
1	M870465	O-Ring, cover, 3" X 0.1	1
2	M870466	O-Ring, shaft, 3/4" X 0.103	3
3	M870470	Diverter Assembly	1

Actuator Assembly

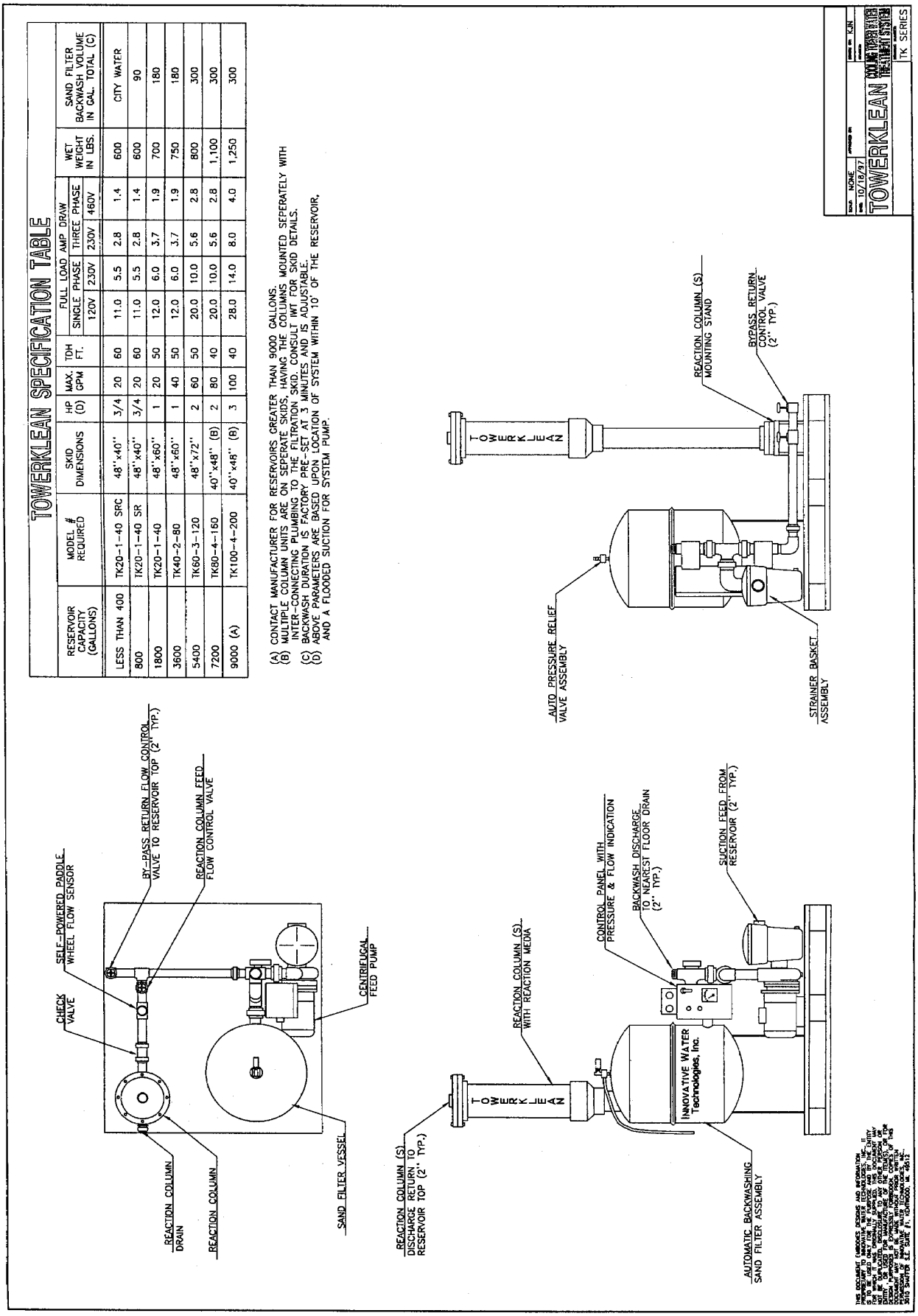


Item	Part #	Description	Qty
	M870460	Valve, 3-way, CPVC, 2" w/ actuator	1
	M870461	Actuator Only, 24 VAC	1
1	M870477	Switch, actuator	1
2	M870480	Gear, actuator	3
3	M870482	Cord, actuator	1

INSTALLATION DRAWING



TK-20 DRAWING

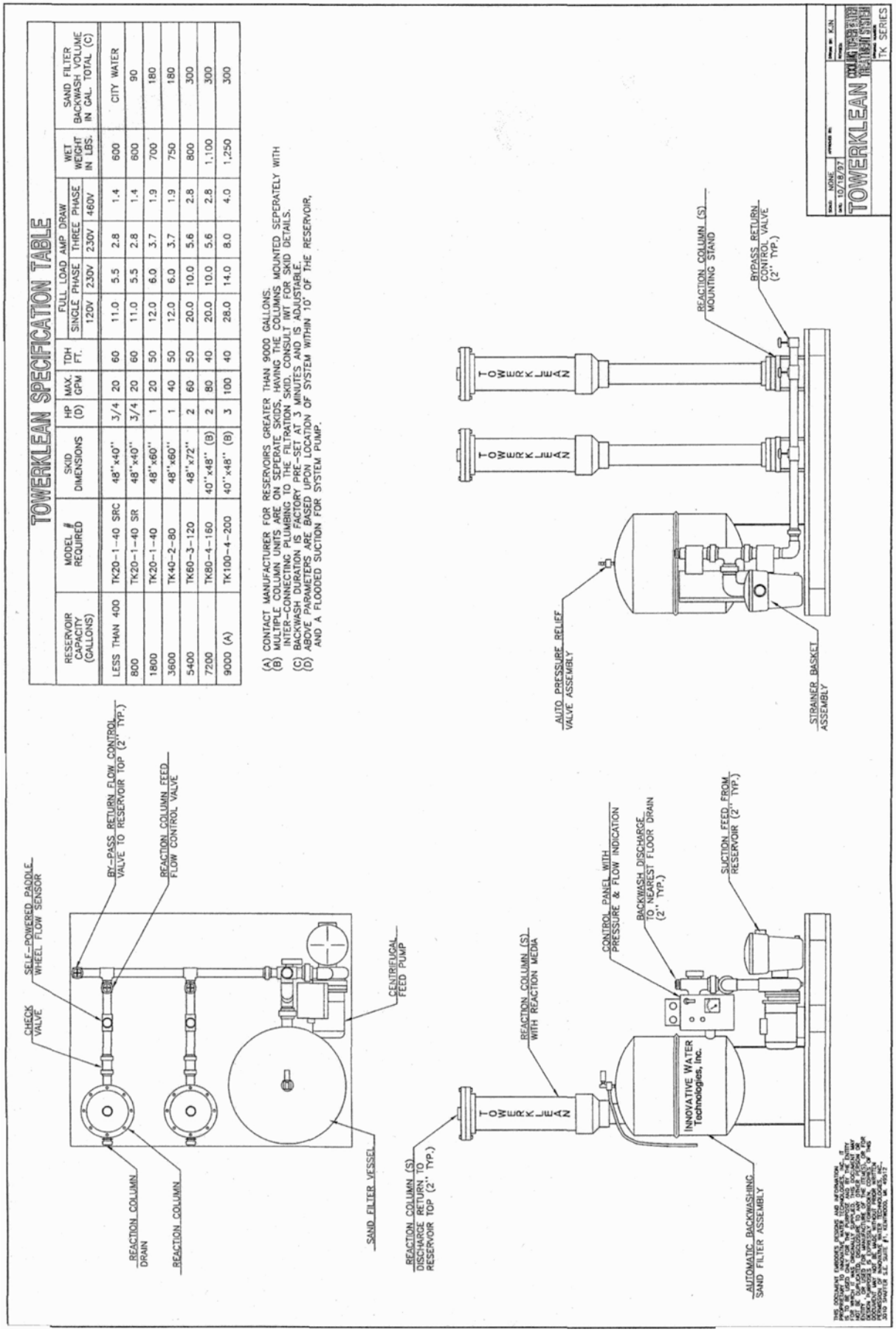


TK-40 DRAWING

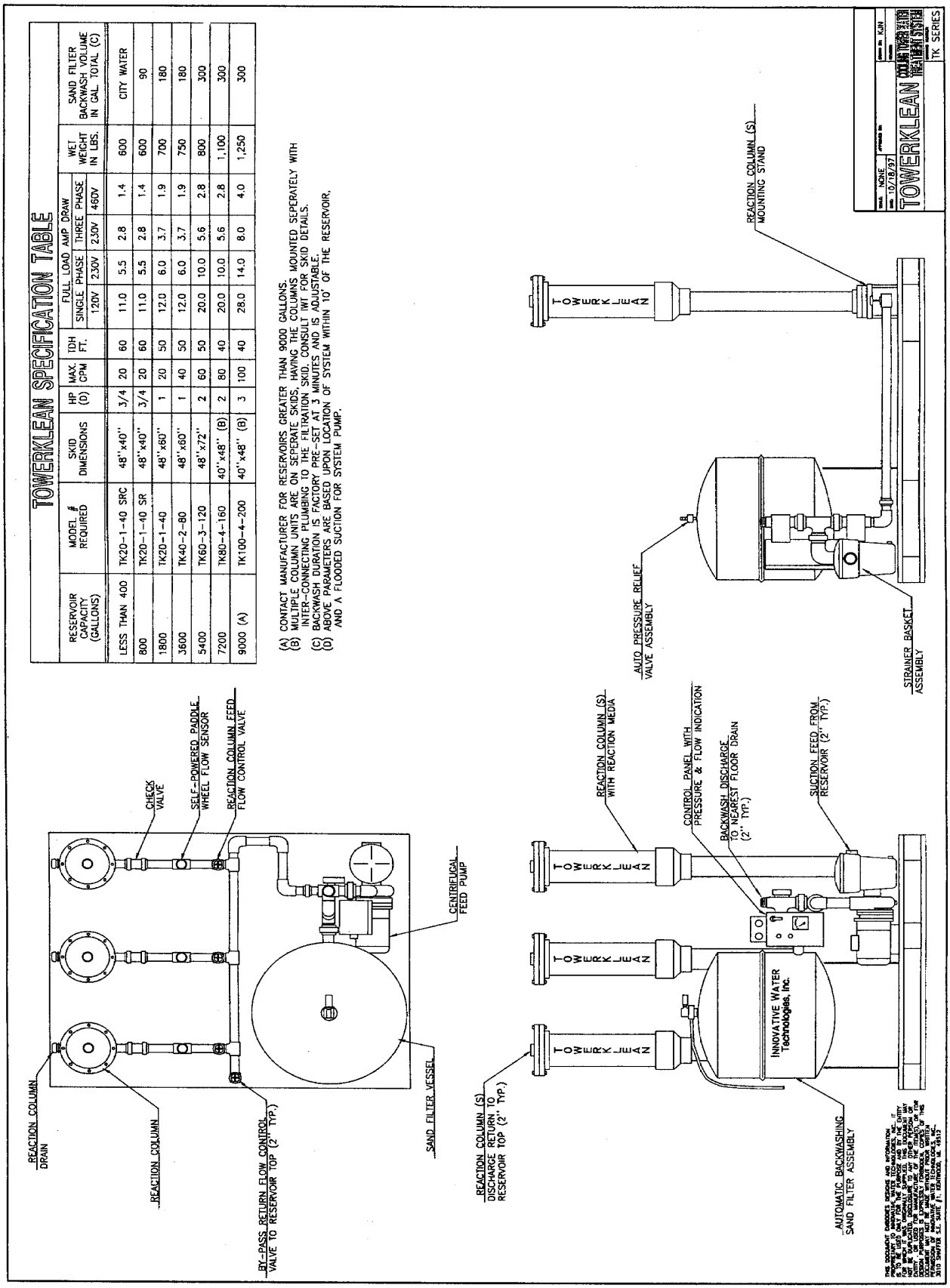
TOWERKLEAN SPECIFICATION TABLE

RESERVOIR CAPACITY (GALLONS)	MODEL # REQUIRED	SKID DIMENSIONS	HP (D)	MAX. GPM	TDH FT.	FULL LOAD AMP DRAW SINGLE PHASE 120V	SINGLE PHASE 230V	THREE PHASE 230V	THREE PHASE 460V	WET WEIGHT IN LBS.	SAND FILTER BACKWASH VOLUME IN GAL. TOTAL (C)
LESS THAN 400	TK20-1-40 SRC	48"x40"	3/4	20	60	11.0	5.5	2.8	1.4	600	CITY WATER
800	TK20-1-40 SR	48"x40"	3/4	20	60	11.0	5.5	2.8	1.4	600	90
1800	TK20-1-40	48"x60"	1	20	50	12.0	6.0	3.7	1.9	700	180
3600	TK40-2-80	48"x60"	1	40	50	12.0	6.0	3.7	1.9	750	180
5400	TK60-3-120	48"x72"	2	60	50	20.0	10.0	5.6	2.8	800	300
7200	TK80-4-160	40"x48" (B)	2	80	40	20.0	10.0	5.6	2.8	1,100	300
9000 (A)	TK100-4-200	40"x48" (B)	3	100	40	28.0	14.0	8.0	4.0	1,250	300

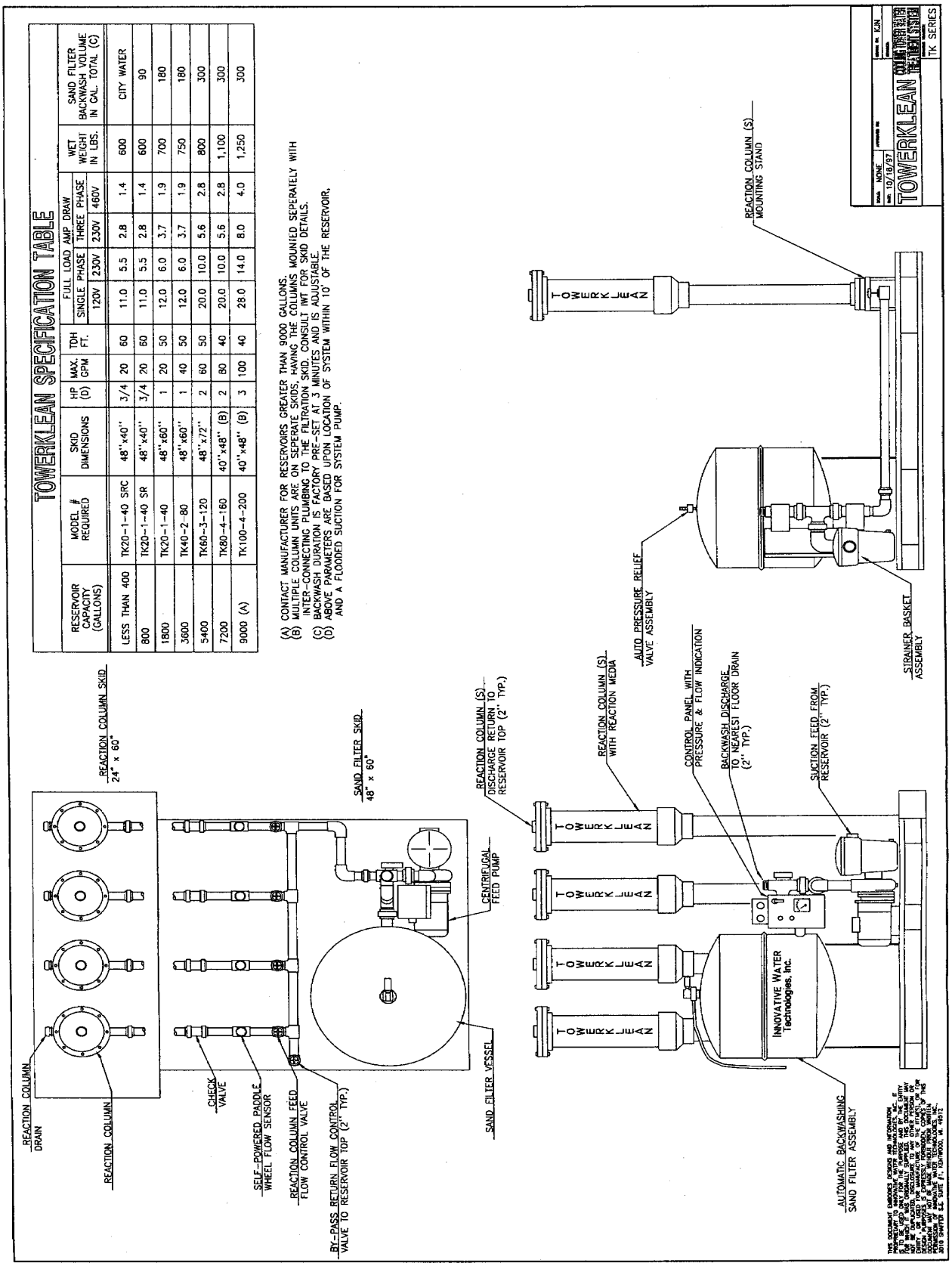
(A) CONTACT MANUFACTURER FOR RESERVOIRS GREATER THAN 9000 GALLONS.
(B) MULTIPLE COLUMN UNITS ARE ON SEPERATE SKIDS, HAVING THE COLUMNS MOUNTED SEPERATELY WITH INTER-CONNECTING PLUMBING TO THE FILTRATION SKID. CONSULT IWT FOR SKID DETAILS.
(C) BACKWASH DURATION IS FACTORY PRE-SET AT 3 MINUTES AND IS ADJUSTABLE.
(D) ABOVE PARAMETERS ARE BASED UPON LOCATION OF SYSTEM WITHIN 10' OF THE RESERVOIR, AND A FLOODED SUCTION FOR SYSTEM PUMP.



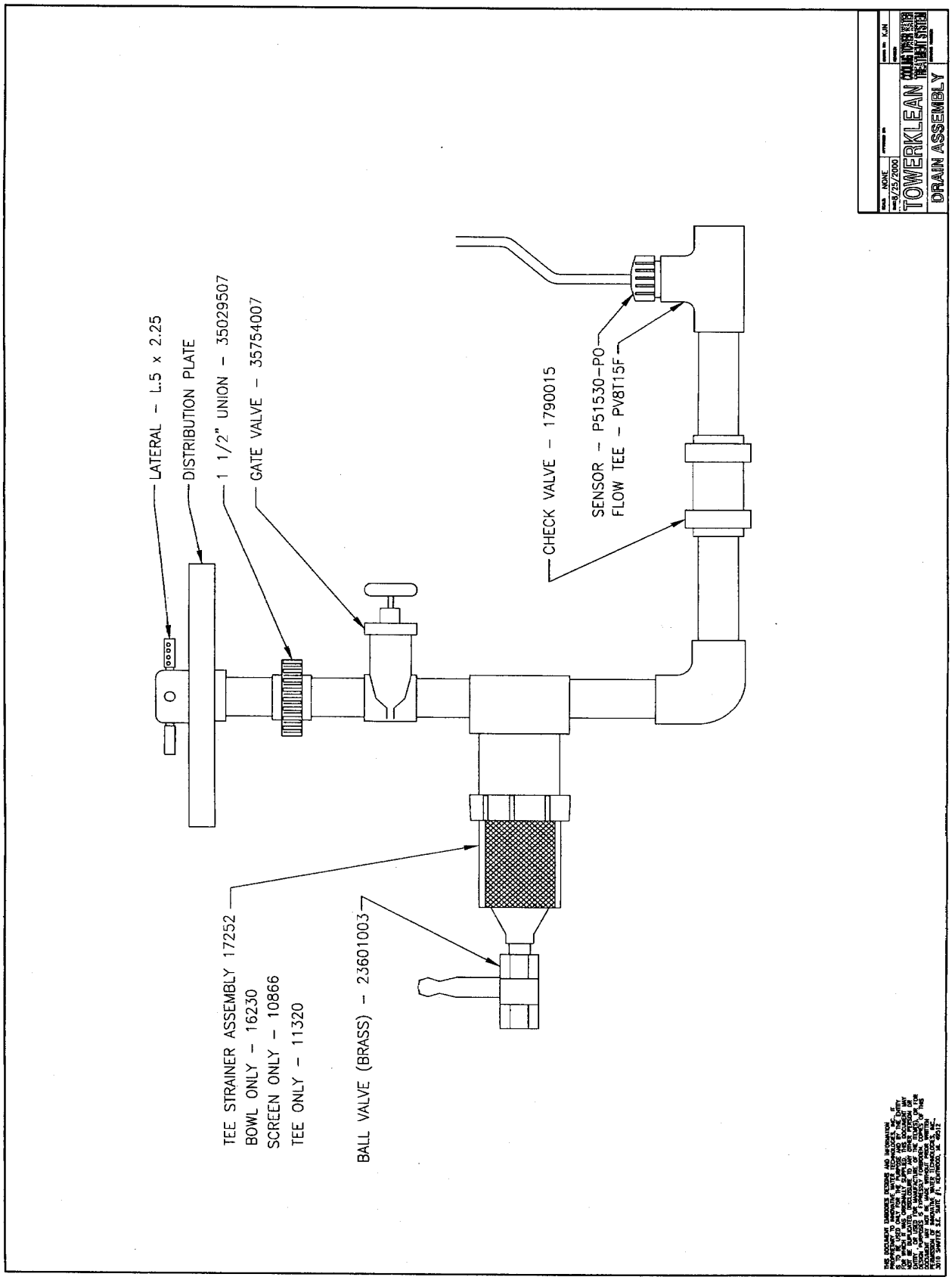
TK-60 DRAWING



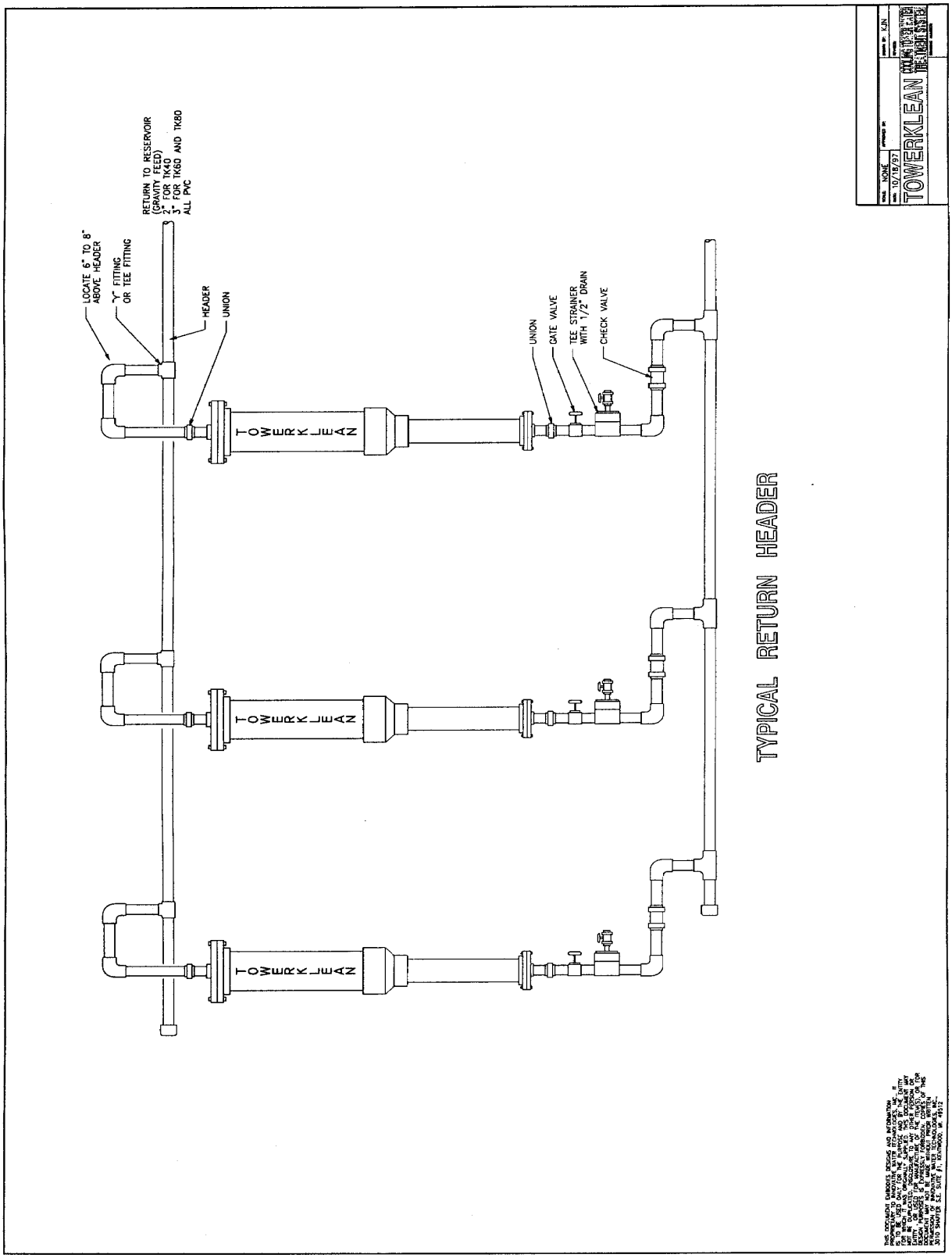
TK80 DRAWING



Flow distribution manifold



TYPICAL RETURN HEADER



Material Safety Data Sheet

HAVILAND®

TOWER TERGE

SECTION I - IDENTIFICATION

MANUFACTURER'S NAME .....Haviland Products Company
MANUFACTURER'S ADDRESS .....421 Ann St., N.W., Grand Rapids, MI 49504
PHONE NUMBER..... (616) 361-6691
EMERGENCY PHONE NUMBER.....CHEMTREC (800) 424-9300
EFFECTIVE DATE.....1/17/03
TRADE NAME.....**TOWER TERGE**
CHEMICAL FAMILY.....Miscellaneous Blend

SECTION II - HAZARDOUS INGREDIENTS

HAZARDOUS INGREDIENTS	OSHA PEL	TLV (Units)	CAS NUMBER
**See NOTE under "References" at end of MSDS.	OSHAPEL	TLV	PCASNUM

SECTION III - PHYSICAL DATA

BOILING POINT.....>300°F
FREEZING POINT .....Not Established
VAPOUR PRESSURE.....Not Established
VAPOUR DENSITY (air=1) .....Not Established
SOLUBILITY IN H20.....Soluble
ODOUR AND APPEARANCE .....Cloudy Colorless Liquid
SPECIFIC GRAVITY 1.0
pH.....Not Applicable

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASHPOINT AND METHOD OF DETERMINATION.....>300°F
LOWER EXPLOSIVE LIMIT (% by Volume) Undetermined
UPPER EXPLOSIVE LIMIT (% by Volume) Undetermined
MEANS OF EXTINCTION.....Water spray, foam, CO2, dry chemical.
SPECIAL FIRE FIGHTING PROCEDURES.....Wear positive pressure, self-contained breathing apparatus and full personal protective equipment when this material is involved in fire. Use water sprays to cool fire exposed surfaces and protect fire-fighting personnel.
UNUSUAL FIRE HAZARD.....None Currently Known

SECTION V - HEALTH HAZARD DATA

CARCINOGENICITY, REPRODUCTIVE EFFECTS.....None
NTP?.....No
IARC MONOGRAPHS?.....No
OVER EXPOSURE EFFECTS.....Contact with skin or eyes may cause irritation.
PRIMARY ROUTE(S) OF ENTRY.....Ingestion
SPECIFIC FIRST AID PROCEDURES.....In case of eye contact: Immediately flush eyes with plenty of water for at least 15 minutes. In case of skin contact: Immediately wash skin with soap and plenty of water. Remove contaminated clothing and wash

Material Safety Data Sheet

	before reuse. If irritation persists, consult a physician. Ingestion: Do not induce vomiting. Call a physician immediately.
EXPOSURE AGGRAVATED MEDICAL CONDITIONS	None Currently Known

SECTION VI - REACTIVITY DATA

CHEMICAL STABILITY	Stable
CONDITIONS TO AVOID	Strong oxidizing material can cause a reaction.
INCOMPATIBLE MATERIALS	Strong oxidizers.
HAZARDOUS DECOMPOSITION PRODUCTS	Thermal decomposition may produce carbon mono/dioxides.
HAZARDOUS POLYMERIZATION	Will Not Occur
POLYMERIZATION AVOID	Not Applicable

SECTION VII - SPILL OR LEAK PROCEDURE

LEAK AND SPILL PROCEDURES	Use absorbent material to collect and contain for disposal. Contain large spill and pump into a suitable tank. Wash area with suitable detergent and thoroughly rinse.
WASTE DISPOSAL	All local, state, and federal regulations concerning health and pollution should be reviewed to determine approved disposal procedures.

SECTION VIII - SPECIAL PROTECTION

RESPIRATORY PROTECTION	None should be needed.
VENTILATION	Mechanical ventilation is recommended.
PROTECTIVE GLOVES	Wear rubber gloves.
EYE PROTECTION	Splash proof chemical goggles.
OTHER PROTECTIVE EQUIPMENT	For operations where spills or splashing may occur, use an impervious body covering and boots. A safety shower and eye bath should be available.
HANDLING PROCEDURES AND EQUIPMENT	Store in a well-ventilated area below 120°F. Do not reuse containers. Slippery conditions may exist if material is spilled.

SECTION IX - SPECIAL PRECAUTIONS

HAZARD CLASS	None
DOT SHIPPING NAME	NON-REGULATED
UN NUMBER	None
REPORTABLE QUANTITY (RQ)	None

REFERENCES	TOWER TERGE

NOTE Other components of this product are being withheld as trade secret in accordance with OSHA Hazard Communication Standard 29 CFR 1910.1200(I). In medical emergency, health professionals may obtain identity of components by calling CHEMTREC – (800) 424-9300 in accordance with 29 CFR 1910.1200(I)(2). Otherwise 29 CFR 1910.1200(I)(3) and (4) apply.

MSDS FOR KDF® 55 PROCESSES MEDIUM
KDF 55C PROCESS MEDIUM
KDF 55F PROCESS MEDIUM
KDF 5503 PROCESS MEDIUM

SECTION I - GENERAL INFORMATION

NAME: BRASS POWDER

TRANSPORTATION EMERGENCY: CHEMTREC: 800-424-9300

MANUFACTURER: KDF FLUID TREATMENT, INC.

300 Frankfort Road
Monaca, PA 15061
412-774-1020

Fourth Street
Palmerton, PA 18071
610-826-8692

TRADE NAME AND SYNONYMS: None

CHEMICAL FAMILY: Metal Alloy Powder **CAS NO.:** See Below

FORMULA: Cu/Zn

DOT REGULATORY STATUS: Shipment by motor vehicle, rail cars or aircraft: Not regulated when transported in non-bulk packages**.**

Shipment by vessel: Marine Pollutant – use description: Environmentally hazardous substance, solid, N.O.S. (copper metal powder), class 9, UN3077, P.G. III, Marine Pollutant.

ISSUE DATE: 03/15/88 **REVISION DATE:** 10/30/98

SECTION II - INGREDIENTS

MATERIAL	CAS NO.	%
COPPER	7440-50-8	48-51
ZINC	7440-66-6	49-52

*KDF product as delivered is not regulated.

MSDS FOR KDF® 55 PROCESSES MEDIUM
KDF 55C PROCESS MEDIUM
KDF 55F PROCESS MEDIUM
KDF 55 PROCESS MEDIUM

SECTION III - PHYSICAL DATA

BOILING POINT (760 MM HG): N/A

MELTING POINT: 1585 - 1610° F

SPECIFIC GRAVITY: 8.25

EVAPORATION RATE (=1): N/A

VAPOR DENSITY (air = 1): N/A

SOLUBILITY IN WATER: Insoluble

PERCENT VOLATILE BY VOLUME (%): N/A

VAPOR PRESSURE 20° C: N/A

APPEARANCE AND ODOR: Brass-colored metallic particles with no odor.

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT: N/A

NFPA FIRE RATING

FLAMMABLE LIMITS: LEL: N/A
UEL: N/A

HEALTH: 0
FLAMMABILITY: 0
REACTIVITY: 0

EXTINGUISHING MEDIA: N/A

SPECIAL FIRE FIGHTING PROCEDURES: N/A

UNUSUAL FIRE AND EXPLOSION HAZARDS: N/A

SECTION V - HEALTH HAZARD DATA

MATERIAL	FORM	OSHA - PEL TWA mg/M3	OSHA - PEL STEL mg/M3	ACGIH - TLV TWA mg/M3	ACGIH - TLV STEL mg/M3
COPPER	Dust	1.0	--	1.0	--
	Oxide Fume	0.1	--	0.2	--
ZINC	Oxide Fume	5		5	10

ROUTES OF ENTRY

PRIMARY: Inhalation if the dust has become airborne.

SECONDARY: Ingestion

MSDS FOR KDF® 55 PROCESS MEDIUM
KDF 55C PROCESS MEDIUM
KDF 55F PROCESS MEDIUM
KDF 5503 PROCESS MEDIUM

EFFECTS OF SHORT TERM OVEREXPOSURE:

COPPER (FUME): Excessive inhalation of copper fumes can produce an acute reaction known as "metal fume fever". Symptoms consists of chills and fever (very similar to and easily confused with flu symptoms) which come on a few hours after large exposures.

ZINC: Inhalation of high levels of zinc vapor (zinc oxide fumes) may result in tightness of chest, metallic taste, cough, dizziness, fever, chills, headache, nausea, and dry throat. Overexposure may produce symptoms known as metal fume fever or "zinc shakes"; an acute, self-limiting condition without recognized complications. Symptoms of metal fume fever include: chills, fever, muscular pain, nausea and vomiting.

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE: Inhalation of dust may be an irritant to pre-existing respiratory conditions.

EMERGENCY AND FIRST AID PROCEDURES: Symptoms resulting from inhalation overexposure usually disappear within 24 hours. Symptomatic treatment, such as bed rest and possibly aspirin is recommended to provide relief from fever and chills. Eye contact - flush areas with copious amounts of water. Skin contact - thoroughly wash affected areas with water. In all cases, consult physician for medical attention.

EFFECTS OF LONG TERM OVEREXPOSURE:

COPPER (FUME): Chronic exposure to copper may result in anemia, but chronic poisoning does not occur.

ZINC: Chronic exposure to zinc may cause respiratory tract irritation with nasopharyngitis and laryngitis.

CARCINOGENIC ASSESSMENT:

NTP? No **IARC MONOGRAPH?** No **OSHA?** No

SECTION VI - REACTIVITY DATA

STABILITY: () Unstable
(X) Stable

CONDITIONS TO AVOID: N/A

INCOMPATIBILITY (MATERIALS TO AVOID): Avoid contact with oxidizers.

HAZARDOUS DECOMPOSITION PRODUCTS: None

HAZARDOUS POLYMERIZATION: () May occur
(X) Will not occur

MSDS FOR KDF® 55 PROCESS MEDIUM
KDF 55C PROCESS MEDIUM
KDF 55F PROCESS MEDIUM
KDF 5503 PROCESS MEDIUM

SECTION VII - SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: Avoid dusting; metal should be contained for recycling.

WASTE DISPOSAL METHOD: Contain in a dry, closed container. Material may be recycled or disposed of in accordance with Federal, State and Local Environmental Regulations. This material may be regulated under CERCLA, TSCA, SARA, and /or RCRA Regulations.

SECTION VIII - SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (SPECIFY TYPE): Use NIOSH/MSHA approved type respirator against dusting conditions.

VENTILATION: **Local** exhaust or other ventilation that will reduce dust concentrations to less than permissible exposure limits.

PROTECTIVE GLOVES: Recommended to prevent skin irritation.

EYE PROTECTION: Use safety eyewear for protection against airborne particulate matter.

OTHER PROTECTIVE EQUIPMENT: Barrier creams may help prevent skin irritation in hypersensitive individuals.

SECTION IX - SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING: Store in a cool, dry, well-ventilated space, separate from acids and alkalis.

OTHER PRECAUTIONS: Practice good personal hygiene when working in areas where this material is used.

DISCLAIMER: **As the conditions or methods of use are beyond our control, we do not assume any responsibility and expressly disclaim any liability for any use of this material. Information contained herein is believed to be true and accurate, but all statements or suggestions are made without any warranty, express or implied, regarding accuracy of the information, the hazards connected with the use of the material or the results to be obtained from the use thereof.**