ChillerKLEAN®

Chilled 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 YOUR NEW ChillerKlean® SYSTEM. PLEASE CONTACT TOWERKLEAN LLC 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

ChillerKlean O&M Manual Index

TOWERKLEAN LLC, A BANCROFT TECHNOLOGIES COMPANY
ChillerKlean® 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 warranty 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 SYSTEM OPERATES UNDER PRESSURE. **DO NOT EXCEED THE MAXIMUM WORKING PRESSURE OR 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.

ChillerKlean®

TOWERKLEAN LLC

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

Your **ChillerKlean®** system is designed and manufactured for years of service. The fluidized media which is the heart of the system, creates an environment in your water supply which keeps biological growth, scale production, and corrosion, in check. With proper preventive maintenance, your system will keep your chilled water supply clean and healthy.

Your **ChillerKlean®** 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

ChillerKlean® **Manufacturer's Warranty Registration**

Model Number: _____ Serial Number: _____

Company Name: _____

Address: _____

City: _____ State: _____ Zip: _____

Contact Person: _____

Phone: _____ Date of Installation: _____

CHILLERKLEAN®

TOWERKLEAN LLC

Getting to Know Your Cooling Water Treatment System.

MAIN COMPONENT DESCRIPTION

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 corrosion. 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.

In the standard system, the column will be installed in the chilled water process loop, with a bypass valve to allow throttling of system water thru the column. Approximately 20 gallons per minute flow will be necessary to fluidize the reaction column media bed. If 20 gpm is not available, the optional pump will be necessary to maintain this flow.

BAG FILTER (OPTIONAL)

The optional bag filter is available for chilled water systems which do not have an existing filtration system, and is necessary for removal of scale and debris which will become entrained in the water as a result of the media reaction with system water. The bag filter, if purchased from TowerKlean LLC, includes (50) spare bags. Filters should be checked regularly and replaced when flow is limited due to plugged bags.

PUMP (OPTIONAL)

If you do not want to install the ChillerKlean system in your process loop, the pump option will allow the system to operate as a side-stream treatment device, taking water from the chilled water reservoir, pumping thru the reaction column(s), and returning to tank.

SKID (OPTIONAL)

The basic ChillerKlean system is shipped as separate components, i.e. column, bag filter, pump (should those options be purchased with the system) For convenience, an optional mounting skid can be purchased and all components will be mounted to the skid, as a system.

SHUT-DOWNS

The **ChillerKlean**® 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 column(s) 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 **ChillerKlean**® cooling water treatment system, the following cooling system preparation instructions should be followed.

A) Carefully inspect the Chiller 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. If any water in the system is exposed to direct sunlight, algae growth can be accelerated. Shading of areas exposed to direct sunlight is recommended.

B) Disconnect and remove all treatment chemical drums and metering pump feed systems. NOTE THAT GLYCOL SHOULD NOT BE USED IN CONJUNCTION WITH THE CHILLERKLEAN SYSTEM!

C) Draining the pump tank and refilling with fresh water, is the preferred method of elimating the residual chemicals in the cooling system.

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

See installation drawing Page 15

ChillerKlean®

TOWERKLEAN LLC

INSTALLATION INSTRUCTIONS

STEP 1. LOCATION OF THE SYSTEM

- Place the **ChillerKlean®** Cooling Water Treatment column on a firm level surface ***adjacent*** to (within15 feet of) the cooling water reservoir. The **ChillerKlean®** 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 water reservoir, accessibility and serviceability. If the system 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**

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

1. **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.**

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

3. **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).**

4. **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.**

5. **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 15). 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.**

6. **Plumb the bypass line from the chilled water return to the reservoir, and install a valve inline to adjust flow through column.**

Electrical Connections (optional)

Optionally, your ChillerKlean system can be equipped with a motor and pump. All pump equipped 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.

C. (Optional) 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.

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ChillerKlean®
START UP PROCEDURE

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

WARNING

THE SYSTEM IS DESIGNED TO WITHSTAND WATER TEMPERATURES UP TO 120°F/49°C. SHOULD A MALFUNCTION OCCUR WITH YOUR CHILLER, ISOLATE THE CHILLERKLEAN SYSTEM BEFORE TEMPERATURES RISE TO THESE LEVELS.

ChillerKlean®
REACTION COLUMN START UP PROCEDURE

- With the bypass open fully, slowly open the reaction column isolation 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.
- 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.

MAINTAINANCE

DAILY

1. 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, and reajust the flow control valve.

2. 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.

3. Check (optional) filter bag and replace if dirty.

4. Check all plumbing connections for leaks.

Monthly

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

Note that (1) year of monthly water testing service is included in the purchase of your ChillerKlean system. After the first year, you will receive a notice regarding the continuation of testing services, with several purchase options. It is highly recommended that you continue testing for optimum performance of your system.

MAINTAINANCE 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

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.

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

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 **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. 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 ChillerKlean® system. The ChillerKlean® 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:

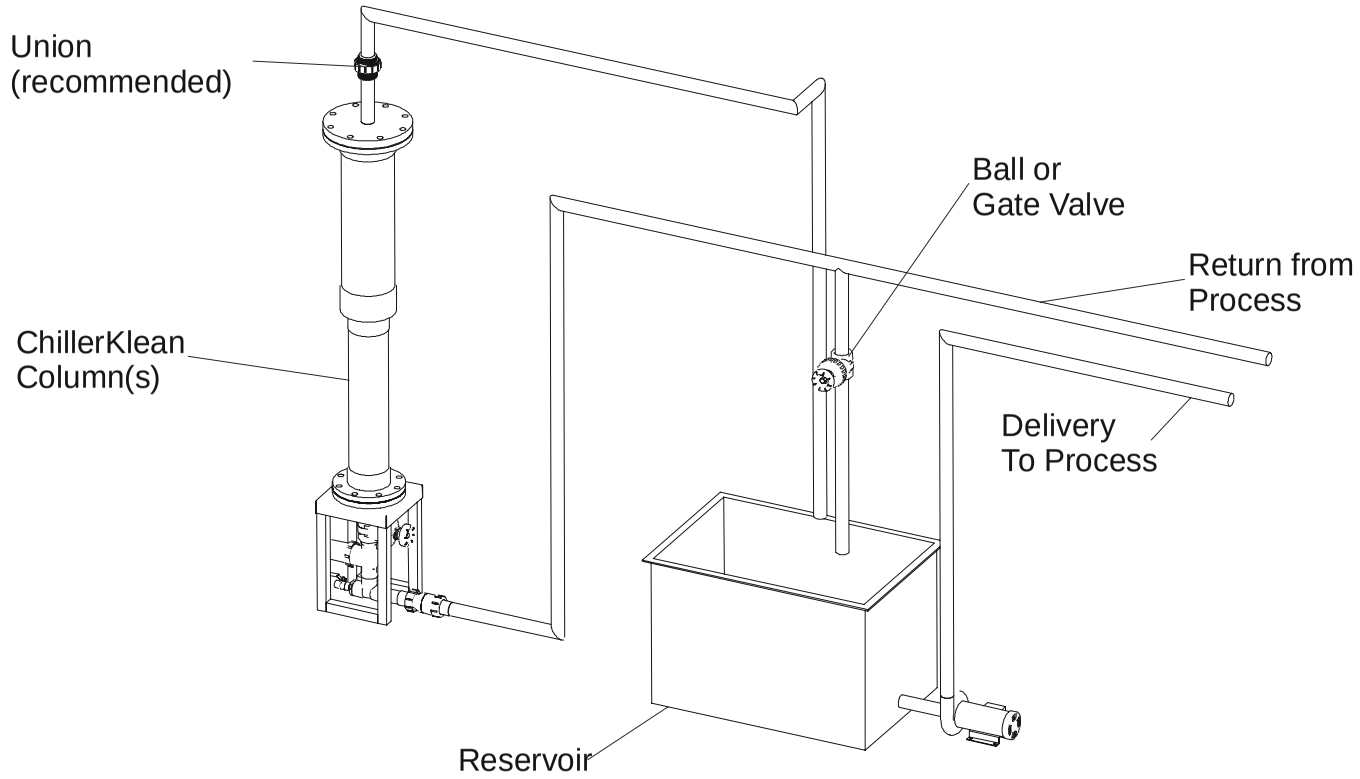
1500 KDF Drive
Three Rivers, MI 49093

On the following schedule,

- Five Days after startup

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

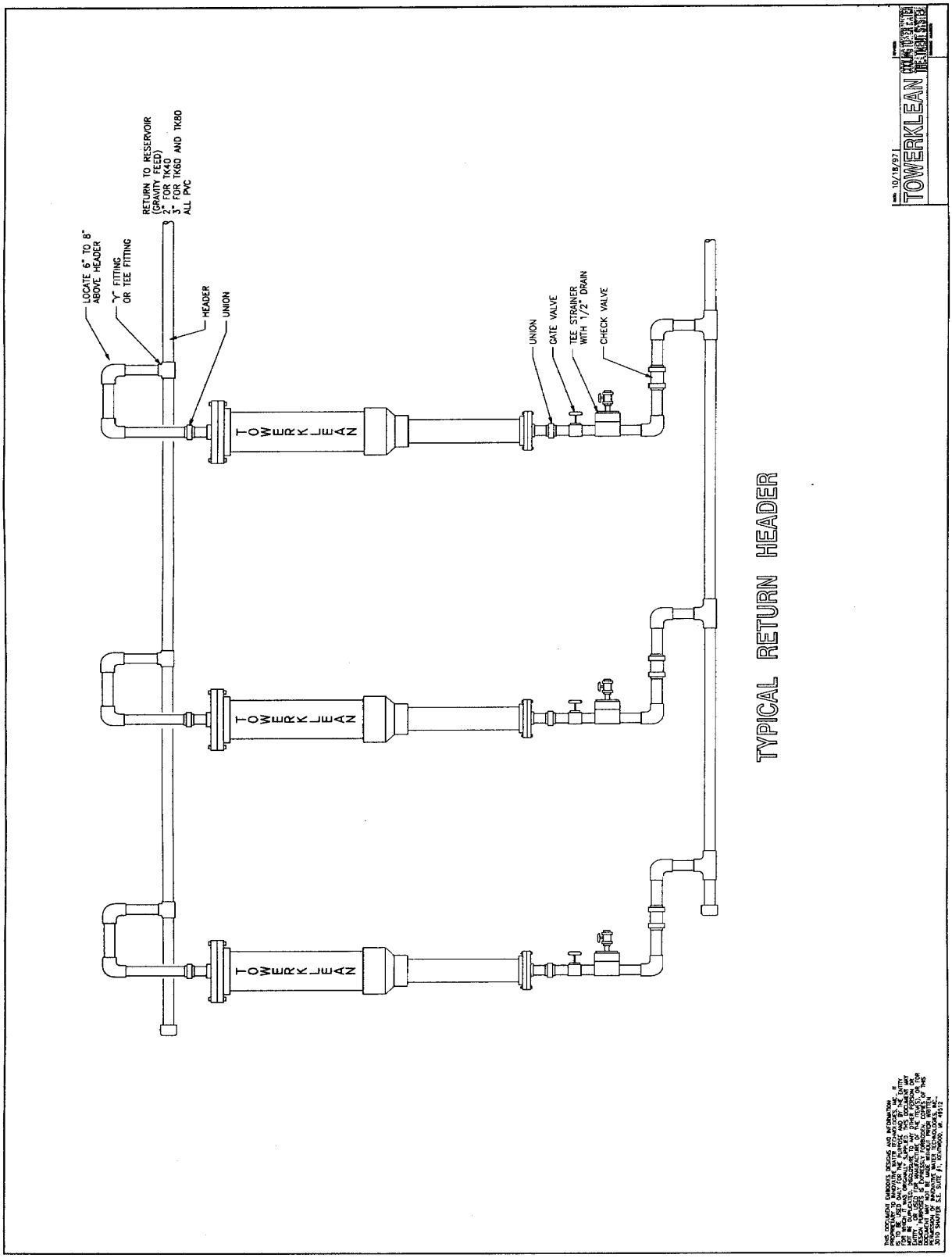
After the end of the first year we recommend continued testing of your water on a monthly basis. Please contact us for our water-testing program.



PROPRIETARY AND CONFIDENTIAL THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF BANCROFT TECHNOLOGIES LLC. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF BANCROFT TECHNOLOGIES LLC IS PROHIBITED. DO NOT SCALE DRAWING	UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES: +/- 1/32" FRACTIONAL%%p .02 ANGULAR: MACH%%p 1 BEND %%p TWO PLACE DECIMAL %%p.02 THREE PLACE DECIMAL %%p.010 MATERIAL FINISH	TOWERKLEAN A Bancroft Technologies Company TITLE: Typical ChillerKlean Installation SIZE A | DWG. NO. TKC1-1001 | REV SCALE:NONE | 8-4-04 | SHEET 1 OF 1

5 4 3 2 1

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.