PRODUCT PURCHASE CONTRACT

THIS CONTRACT (Contract) is made and entered into by and between the CITY OF FRESNO, a California municipal corporation (City), and ATEC Water Systems, LLC (Contractor), as follows:

1. CONTRACT DOCUMENTS. The “Proposal” from ATEC Water Systems, LLC and “General Conditions” are hereby incorporated into and made a part of this Contract and shall be known as the Contract Documents.

2. PRICE. For the monetary consideration of ONE HUNDRED NINETY-ONE THOUSAND SIXTEEN DOLLARS AND SIXTY-TWO CENTS ($191,016.62), as set forth in the Proposal, the Contractor promises and agrees to furnish or cause to be furnished, in a new and working condition, and to the satisfaction of the City, and in strict accordance with this agreement, all of the items as set forth in the Contract Documents.

3. PAYMENT. The City accepts the Contractor's Proposal as stated and agrees to pay the consideration stated, at the times, in the amounts, and under the conditions specified in the Contract Documents. The Contractor agrees to accept electronic payment from the City.

   This section shall survive termination or expiration of this Contract.

4. INDEMNIFICATION: To the furthest extent allowed by law, the Contractor shall indemnify, hold harmless and defend the City and each of its officers, officials, employees, agents, and volunteers from any and all loss, liability, fines, penalties, forfeitures, costs and damages (whether in contract, tort or strict liability, including, but not limited to personal injury, death at any time and property damage) incurred by the City, the Contractor or any other person, and from any and all claims, demands and actions in law or equity (including reasonable attorney's fees, litigation expenses, and costs to enforce this Contract), arising or alleged to have arisen directly or indirectly out of performance of this Contract. The Contractor's obligations under the preceding sentence shall apply regardless of whether the City or any of its officers, officials, employees, agents, or volunteers are passively negligent, but shall not apply to any loss, liability, fines, penalties, forfeitures, costs or damages caused by the active or sole negligence, or by the willful misconduct, of the City or any of its officers, officials, employees, agents, or volunteers.

   If the Contractor should subcontract all or any portion of the work to be performed under this Contract, the Contractor shall require each subcontractor to indemnify, hold harmless and defend the City and each of its officers, officials, employees, agents, and volunteers in accordance with the terms of the preceding paragraph.

   This section shall survive termination or expiration of this Contract

5. The City Manager, or designee, is hereby authorized and directed to execute and implement this Agreement. The previous sentence is not intended to delegate any

authority to the City Manager to administer the Agreement, any delegation of authority must be expressly included in the Agreement.

[Signatures follow the next page.]

IN WITNESS WHEREOF, the parties have executed this Contract on the day and year here below written, of which the date of execution by the City shall be subsequent to that of the Contractor's, and this Contract shall be binding and effective upon execution by both parties.

CITY OF FRESNO,
a California municipal corporation

By: _____
Brock D. Buche, PE, PLS
Director of Public Utilities

Dated: _____

APPROVED AS TO FORM:
ANDREW JANZ
City Attorney

By: Signed by: Christine Charitar 66086C14193B4E5... 9/4/2024
Christine C. Charitar Date
Deputy City Attorney

ATTEST:
TODD STERMER, CMC
City Clerk

By: _____
Date
Deputy

Address:
CITY:
City of Fresno
Attention: Cassie L. Scholz, PE
Licensed Engineer Manager
1626 E Street
Fresno, CA 93706
Phone: (559) 621-1602
E-mail: cassie.scholz@fresno.gov

ATEC Water Systems, LLC

By: Signed by: Lee Odell 6D80065F7E11442...
Name: Lee Odell

Title: Chief Operating Officer
(If corporation or LLC., Board Chair, Pres. or Vice Pres.)
Dated: 9/4/2024

By: Signed by: Scott Slater B8BF579047594A2...
Name: Scott Slater

Title: Chief Executive Officer
(If corporation or LLC., CFO, Treasurer, Secretary or Assistant Secretary)
Dated: 9/4/2024

CONTRACTOR:
ATEC Water Systems, LLC
Attention: Lee Odell, COO
Address: 1690 Lana Way #A,
Hollister, CA 95023
Phone: (971) 285-7926
E-mail: lodell@atecwater.com

Attachments:

Exhibit A – General Conditions

Exhibit B – Proposal

Exhibit A

GENERAL CONDITIONS

1. DEFINITIONS: Wherever used in the agreement, or any of the Contract Documents, the following words shall have the meaning herein given, unless the context requires a different meaning.

(a) "Bidder" shall mean and refer to each person or other entity submitting a proposal, whether or not such person or entity shall become a Seller by virtue of award of a Contract by the City.

(b) "City," “Buyer,” “Owner,” "Vendee" and "City of Fresno" shall each mean and refer to the City of Fresno, California.

(c) "Contract" and "Contract Documents" shall each mean and refer to these Specifications, including the Proposal and any addenda thereto, the Agreement and other standard Specifications, City's Specifications and other papers and documents incorporated by reference into or otherwise referred to in any of the foregoing documents, whether or not attached thereto.

(d) "Contractor," Seller,” "Supplier" and "Contractor" shall each mean and refer to each person or other entity awarded a Contract hereunder and named or to be named in the Agreement with the City to furnish the goods or services, or both, to be furnished under the Contract.

(e) "Council" and "City Council" shall each mean and refer to the Council of the City.

(f) "Goods" and "Merchandise" shall each mean and refer to the equipment, material, article, supply or thing to be furnished by the Seller under the Contract.

(g) "Purchasing Manager" shall mean and refer to the Purchasing Manager of the City.

(h) "Specifications" shall mean and refer to all of the Contract Documents.

(i) “Working day” shall mean and refer to City regular business day.

2. INSURANCE REQUIREMENTS:

(a) Throughout the life of this Agreement, CONTRACTOR shall pay for and maintain in full force and effect all insurance as required herein with an insurance company(ies) either (i) admitted by the California Insurance Commissioner to do business in the State of California and rated no less than “A-VII” in the Best’s Insurance Rating Guide, or (ii) as

may be authorized in writing by CITY'S Risk Manager or his/her designee at any time and in his/her sole discretion. The required policies of insurance as stated herein shall maintain limits of liability of not less than those amounts stated therein. However, the insurance limits available to CITY, its officers, officials, employees, agents and volunteers as additional insureds, shall be the greater of the minimum limits specified therein or the full limit of any insurance proceeds to the named insured.

(b) If at any time during the life of the Agreement or any extension, CONTRACTOR or any of its subcontractors fail to maintain any required insurance in full force and effect, all services and work under this Agreement shall be discontinued immediately, and all payments due or that become due to CONTRACTOR shall be withheld until notice is received by CITY that the required insurance has been restored to full force and effect and that the premiums therefore have been paid for a period satisfactory to CITY. Any failure to maintain the required insurance shall be sufficient cause for CITY to terminate this Agreement. No action taken by CITY pursuant to this section shall in any way relieve CONTRACTOR of its responsibilities under this Agreement. The phrase “fail to maintain any required insurance” shall include, without limitation, notification received by CITY that an insurer has commenced proceedings, or has had proceedings commenced against it, indicating that the insurer is insolvent.

(c) The fact that insurance is obtained by CONTRACTOR shall not be deemed to release or diminish the liability of CONTRACTOR, including, without limitation, liability under the indemnity provisions of this Agreement. The duty to indemnify CITY shall apply to all claims and liability regardless of whether any insurance policies are applicable. The policy limits do not act as a limitation upon the amount of indemnification to be provided by CONTRACTOR. Approval or purchase of any insurance contracts or policies shall in no way relieve from liability nor limit the liability of CONTRACTOR, vendors, suppliers, invitees, contractors, sub-contractors, subcontractors, or anyone employed directly or indirectly by any of them.

1. PRODUCTS LIABILITY INSURANCE: CONTRACTOR shall maintain, and provide the City of Fresno with verification of, manufacturer's products liability insurance policy in excess of $1,000,000 by providing a certificate of insurance on said Bid Item(s) equipment. Certificates shall be issued by an insurance company meeting the requirements to conduct business in the state of California. City of Fresno is required to be an additional insured with primary and non- contributory coverage in favor of the City on this General Liability Policy.

If the scope of work includes delivery and/or installation, the requirements below apply in addition to the above requirements.

Coverage shall be at least as broad as:

1. The most current version of Insurance Services Office (ISO) Commercial General Liability Coverage Form CG 00 01, providing liability coverage arising out of your business operations. The Commercial General Liability policy shall be written on an occurrence form and shall provide coverage for "bodily injury," "property damage" and "personal and advertising injury" with coverage for premises and operations (including the use of owned and non-owned equipment), products and completed operations, and contractual liability (including, without limitation, indemnity obligations under the Agreement) with limits of liability not less than those set forth under "Minimum Limits of Insurance."

2. The most current version of ISO *Commercial Auto Coverage Form CA 00 01, providing liability coverage arising out of the ownership, maintenance or use of automobiles in the course of your business operations. The Automobile Policy shall be written on an occurrence form and shall provide coverage for all owned, hired, and non-owned automobiles or other licensed vehicles (Code 1- Any Auto).

3. Workers' Compensation insurance as required by the State of California and Employer's Liability Insurance.

MINIMUM LIMITS OF INSURANCE

CONTRACTOR shall procure and maintain for the duration of the contract, and for 5 years thereafter, insurance with limits of liability not less than those set forth below. However, insurance limits available to CITY, its officers, officials, employees, agents and volunteers as additional insureds, shall be the greater of the minimum limits specified herein or the full limit of any insurance proceeds available to the named insured:

1. COMMERCIAL GENERAL LIABILITY

(i) $1,000,000 per occurrence for bodily injury and property damage;

(ii) $1,000,000 per occurrence for personal and advertising injury;

(iii) $2,000,000 aggregate for products and completed operations; and,

(iv) $2,000,000 general aggregate applying separately to the work performed under the Agreement.

2. COMMERCIAL AUTOMOBILE LIABILITY

$1,000,000 per accident for bodily injury and property damage.

3. Workers' Compensation Insurance as required by the State of California with statutory limits and EMPLOYER'S LIABILITY with limits of liability not less than:

(i) $1,000,000 each accident for bodily injury;

(ii) $1,000,000 disease each employee; and,

(iii) $1,000,000 disease policy limit.

UMBRELLA OR EXCESS INSURANCE

In the event CONTRACTOR purchases an Umbrella or Excess insurance policy(ies) to meet the "Minimum Limits of Insurance," this insurance policy(ies) shall "follow form" and afford no less coverage than the primary insurance policy(ies). In addition, such Umbrella or Excess insurance policy(ies) shall also apply on a primary and non-contributory basis for the benefit of the CITY, its officers, officials, employees, agents and volunteers.

DEDUCTIBLES AND SELF-INSURED RETENTIONS

CONTRACTOR shall be responsible for payment of any deductibles contained in any insurance policy(ies) required herein and CONTRACTOR shall also be responsible for payment of any self-insured retentions.

OTHER INSURANCE PROVISIONS/ENDORSEMENTS

(i) All policies of insurance required herein shall be endorsed to provide that the coverage shall not be cancelled, non-renewed, reduced in coverage or in limits except after thirty (30) calendar days written notice has been given to CITY, except ten (10) days for nonpayment of premium. CONTRACTOR is also responsible for providing written notice to the CITY under the same terms and conditions. Upon issuance by the insurer, broker, or agent of a notice of cancellation, non-renewal, or reduction in coverage or in limits, CONTRACTOR shall furnish CITY with a new certificate and applicable endorsements for such policy(ies). In the event any policy is due to expire during the work to be performed for CITY, CONTRACTOR shall provide a new certificate, and applicable endorsements, evidencing renewal of such policy not less than fifteen (15) calendar days prior to the expiration date of the expiring policy.

(ii) The Commercial General and Automobile Liability insurance policies shall be written on an occurrence form.

(iii) The Commercial General and Automobile Liability insurance policies shall be endorsed to name City, its officers, officials, agents, employees and volunteers as an

additional insured all ongoing and completed operations. Additional Insured endorsements under the General Liability policy must be as broad as that contained in ISO Forms: GC 20 10 11 85 or both CG 20 10 & CG 20 37.

(iv) The Commercial General and Automobile Liability insurance shall contain, or be endorsed to contain, that CONTRACTOR'S insurance shall be primary to and require no contribution from the City. Primary and Non Contributory language under the General Liability policy must be as broad as that contained in ISO Form CG 20 01 04 13. These coverages shall contain no special limitations on the scope of protection afforded to City, its officers, officials, employees, agents and volunteers.

(v) Should any of these policies provide that the defense costs are paid within the Limits of Liability, thereby reducing the available limits by defense costs, then the requirement for the Limits of Liability of these polices will be twice the above stated limits.

(vi) All insurance policies required herein shall contain, or be endorsed to contain, a waiver of subrogation as to CITY, its officers, officials, agents, employees and volunteers.

PROVIDING OF DOCUMENTS

CONTRACTOR shall furnish CITY with all certificate(s) and applicable endorsements effecting coverage required herein. All certificates and applicable endorsements are to be received and approved by the CITY'S Risk Manager or his/her designee prior to CITY'S execution of the Agreement and before work commences. All non-ISO endorsements amending policy coverage shall be executed by a licensed and authorized agent or broker. Upon request of CITY, CONTRACTOR shall immediately furnish CITY with a complete copy of any insurance policy required under this Agreement, including all endorsements, with said copy certified by the underwriter to be a true and correct copy of the original policy. This requirement shall survive expiration or termination of this Agreement. All subcontractors working under the direction of CONTRACTOR shall also be required to provide all documents noted herein.

SUBCONTRACTORS

If CONTRACTOR subcontracts any or all of the services to be performed under this Agreement, CONTRACTOR shall require, at the discretion of the CITY Risk Manager or designee, subcontractor(s) to enter into a separate Side Agreement with the City to provide required indemnification and insurance protection. Any required Side Agreement(s) and associated insurance documents for the subcontractor must be reviewed and preapproved by CITY Risk Manager or designee. If no Side Agreement is required, CONTRACTOR will be solely responsible for ensuring that it's subcontractors maintain insurance coverage at levels no less than those required by applicable law and is customary in the relevant industry. 4. WORKMANSHIP GUARANTY: The workmanship of the goods or services provided to the City by the Contractor will be in

accordance with generally accepted standards.

5. WARRANTY: For the purchase of equipment and material, the Contractor, unless otherwise provided in the Specifications, shall guarantee all items furnished in accordance with the standard guarantee offered by the manufacturer to cities and consumers of the product. The Contractor shall be responsible for all warranty costs, including the transportation costs to and from the repair station.

6. CONTRACT DOCUMENTS: Upon award of the Contract, the Contractor shall execute and submit all required documents to the Purchasing Manager, 2101 G Street, Bldg. A, Fresno, CA 93706 in a form acceptable to the City of Fresno within 15 calendar days (except in the event federal funding is applicable to this Contract, then 10 working days) from the date of Notice of Award.

7. ASSIGNMENT OF PAYMENT: Contractor hereby agrees it will not assign the payment of any monies due it from the City under the terms of this Contract to any other individual(s), corporation(s) or entity(ies). The City retains the right to pay any and all monies due Contractor directly to Contractor.

8. PATENTS: For the purchase of equipment and material, the Contractor shall hold the City of Fresno, its officers and employees, harmless from any and all liability for damages arising out of the use of any patented material, equipment, device or process incorporated into or made a part of or required by the manufacturer's specifications to be used on or in connection with the material, equipment or supplies purchased by the City pursuant to these Specifications, and Contractor agrees, by submission of a proposal hereunder, to defend the City, at Contractor's sole expense, in any action or suit for damages or injunctive relief on account of any allegedly unauthorized use of or infringement of patent rights on any patented material, equipment, device or process, if the City is named as a defendant in any such action or suit.

9. OSHA COMPLIANCE: For the purchase of equipment and material, the items covered by this Contract must conform with the Safety Orders of the State of California, Division of Industrial Safety, pursuant to the California Occupational Safety and Health Act, and the Federal Standards established by the Occupational Safety and Health Act of 1970, and their present and future amendments during the term of this Contract. In the event of a conflict between such Safety Orders and Federal Standards, the items shall conform to the respective Order or Standard which is more restrictive.

10. RECYCLING PROGRAM: In the event Contractor maintains an office or operates a facility(ies), or is required herein to maintain or operate same, within the incorporated limits of the City of Fresno, Contractor at its sole cost and expense shall:

(i) Immediately establish and maintain a viable and ongoing recycling program, approved by City's Solid Waste Management Division, for each office and facility. Literature describing City recycling programs is available from City's Solid Waste Management Division and by calling City of Fresno Recycling Hotline at (559) 621-1111.

(ii) Immediately contact City's Solid Waste Management Division at (559) 621-1452 and schedule a free waste audit, and cooperate with such Division in their conduct of the audit for each office and facility.

(iii) Cooperate with and demonstrate to the satisfaction of City's Solid Waste Management Division the establishment of the recycling program in paragraph (i) above and the ongoing maintenance thereof.

11. DELIVERY AND EXTENSIONS: Unless otherwise provided in the Proposal, delivery shall be made F.O.B. the specified place of delivery within the City of Fresno or environs.

If Contractor is delayed making delivery by any conditions or events beyond the reasonable control of Contractor and without its fault or negligence such as acts of God or the public enemy, acts of City in its contractual capacity or otherwise, illegal strikes, boycotts or like illegal obstructive action by employee or labor organizations, illegal general lockouts or other defensive action by employers, whether general or by organizations of employers, fires, floods, epidemics, quarantine restrictions, and delays of common carriers; Contractor shall have no claim for damages against City for any such cause of delay, but shall in such cases be entitled to such extension of time as shall reasonably compensate for actual loss of time occasioned thereby, upon application to said City Manager for such extension; provided, that no such extension of time shall be granted unless Contractor shall have notified the Purchasing Manager in writing, of the condition or event which is expected to cause a delay in delivery and the actual or estimated number of days of delay anticipated on account thereof, within one week after the commencement or occurrence of the condition or event. Contractor shall remedy such occurrence with all reasonable dispatch, and shall promptly give written notice to the Purchasing Manager of the cessation of such occurrence. The decision of said City Manager as to the number of additional days, if any, to be allowed for completion of delivery on account of such condition or event, shall be given in writing to Contractor.

12. PAYMENT: Unless otherwise provided in the Proposal, payment of the Contract price shall be made by City to Contractor in lawful money of the United States by warrant of City issued and delivered to Contractor in the ordinary course of City business promptly after completion of delivery of the specified item(s) and their acceptance by City.

13. TERMINATION FOR CONVENIENCE: The City reserves the right to terminate this Contract upon 60 calendar days prior written notice to the Contractor. In the event of such termination, the Contractor shall be paid for satisfactory service performed to the date of termination.

14. TERMINATION FOR NON-PERFORMANCE: If Contractor shall (i) materially breach any of its obligations under this Contract (including, without limitation, the failure to meet quality standards or to complete delivery, within the time specified herein, of all or any part of the materials, equipment, supplies or services to be provided under the Contract), and (iii) fail to commence and diligently pursue reasonable efforts to cure such breach within 5 calendar days after written notice by the City specifically describing the

breach; the City Manager or his/her designee, acting for and on behalf of the City, may at any time after the expiration of the time for delivery, terminate the Contract as to the whole thereof, or in the event partial delivery has been made and accepted, as to such items or service to be furnished which have not been delivered or accepted prior to such termination. Such termination shall be effective upon receipt by Contractor of written notice of termination from said City Manager or his/her designee, which notice shall be deemed to have been received by Contractor, if mailed, within forty-eight hours to Contractor's address as contained in the Contractor's Proposal or, if personally delivered, upon the delivery thereof to Contractor, the authorized representative of Contractor, or to the Contractor's said address.

The Contractor may terminate this Contract if City materially breaches any of its obligations under this Contract and fails to commence and diligently pursue reasonable efforts to cure such breach within 30 calendar days after written notice by the Contractor specifically describing the breach. Such termination shall be effective upon receipt by City of written notice of termination from Contractor, which notice shall be deemed to have been received by City, if mailed, within forty-eight hours to City's address as contained on the signature page of the Contract or, if personally delivered, upon the delivery thereof to the authorized representative of City or to City's said address.

15. NOTICES: Except as otherwise expressly provided in the Proposal, any notice required or intended to be given to either party under the terms of this Contract shall be in writing and shall be deemed to be duly given if delivered personally or sent by United States registered or certified mail, with postage prepaid, return receipt requested, addressed to the party to which notice is to be given at the party's address set forth in the Proposal in the case of the Contractor and at the address set forth on the signature page of the Contract in the case of the City, or at such other address as the parties may from time to time designate by written notice. Notices served by United States mail in the manner above described shall be deemed sufficiently served or given at the time of the mailing thereof.

16. BINDING: Subject to the following section, once this Contract is signed by all parties, it shall be binding upon, and shall inure to the benefit of, all parties, and each parties' respective heirs, successors, assigns, transferees, agents, servants, employees and representatives.

17. ASSIGNMENT: The Contract is personal to the Contractor and there shall be no assignment, transfer, sale, or subcontracting by the Contractor of its rights or obligations under the Contract without the prior written approval of the City. Any attempted assignment, transfer, sale or subcontracting by the Contractor, its successors or assigns, shall be null and void unless approved in writing by the City.

18. COMPLIANCE WITH LAW: In providing the services required under this Contract, Contractor and its subcontractors shall at all times comply with all applicable laws of the United States, the State of California and City, and with all applicable regulations promulgated by federal, state, regional, or local administrative and regulatory agencies, now in force and as they may be enacted, issued, or amended during the term of this

Contract.

19. WAIVER: The waiver by either party of a breach by the other of any provision of this Contract shall not constitute a continuing waiver or a waiver of any subsequent breach of either the same or a different provision of this Contract. No provisions of this Contract may be waived unless in writing and signed by all parties to this Contract. Waiver of any one provision herein shall not be deemed to be a waiver of any other provision herein.

20. HEADINGS: The section headings in this Contract are for convenience and reference only and shall not be construed or held in any way to explain, modify or add to the interpretation or meaning of the provisions of this Contract.

21. SEVERABILITY: The provisions of this Contract are severable. The invalidity, or unenforceability of any one provision in this Contract shall not affect the other provisions.

22. INTERPRETATION: The parties acknowledge that this Contract in its final form is the result of the combined efforts of the parties and that, should any provision of this Contract be found to be ambiguous in any way, such ambiguity shall not be resolved by construing this Contract in favor of or against either party, but rather by construing the terms in accordance with their generally accepted meaning.

23. ATTORNEY'S FEES: If either party is required to commence any proceeding or legal action to enforce or interpret any term, covenant or condition of the Contract, the prevailing party in such proceeding or action shall be entitled to recover from the other party its reasonable attorney's fees and legal expenses.

24. EXHIBITS: Each exhibit and attachment referenced in this Contract is, by the reference, incorporated into and made a part of this Contract.

25. CUMULATIVE REMEDIES: No remedy or election hereunder shall be deemed exclusive but shall, wherever possible, be cumulative with all other remedies at law or in equity.

26. NO THIRD PARTY BENEFICIARIES: The rights, interests, duties and obligations defined within this Contract are intended for the specific parties hereto as identified in the preamble of this Contract. Notwithstanding anything stated to the contrary in this Contract, it is not intended that any rights or interests in this Contract benefit or flow to the interest of any third parties other than expressly identified within this section. The parties do intend that in the event that the State of California is funding the purchase hereunder, that the State of California be a third party beneficiary under this Contract and all rights, interest and benefits of this Contract accrue to the State.

27. FUNDING: This Contract is contingent on the appropriation of funds by City. Should funds not be appropriated, this Contract may be terminated by City upon prior written notice to Contractor notwithstanding any other provision of these General Conditions.

28. GOVERNING LAW AND VENUE: The Contract shall be governed by, and

construed and enforced in accordance with, the laws of the State of California, excluding, however, any conflict of laws rule which would apply the law of another jurisdiction. Venue for purposes of the filing of any action regarding the enforcement or interpretation of the Contract and any rights and duties hereunder shall be Fresno County, California.

29. EXTENT OF CONTRACT: Each party acknowledges that they have read and fully understand the contents of this Contract. This Contract represents the entire and integrated agreement between the parties with respect to the subject matter hereof and supersedes all prior negotiations, representations or agreements, either written or oral.

30. MODIFICATIONS AND CHANGE ORDERS: This Contract may be modified only by written instrument duly authorized and executed by both City and Contractor in accordance with City's current applicable contract change order resolution, as may be revised. The City reserves the right to add, modify or delete items from the Contract. Any such changes shall be made only by means of a formal change order signed by both the City and the Contractor.

Exhibit B

QUOTATION

Date	12/13/2023
Quotation #	230921101
Customer ID	Fresno

ATEC Water Filters

1690 Lana Way #A
Hollister, CA 95023
Phone: 971.285.7926
SALES@ATECWATERFILTERS.COM

Quotation for:
CITY OF FRESNO
PS 347.1
IRON AD MANGANESE REMOVAL
400 GPM CAPACITY

ATEC
A Cadiz Solution

Salesperson	P.O. Number	Ship Date	Ship Via	F.O.B. Point	Terms
Maddie Odell	230921101	ASAP			

Quantity	Description		Unit Price	Taxable?	Amount
1	Model 1+06-60-48	8-36" Dia Vessels with 4" Header Piping, 42" Pyrolox Media, Controller, Valves, Underdrains, and Victaulic Connections to Owner's piping.	$175,000.00	T	$175,000.00
1	Estimated Shipping to Fresno	Tanks and Media	$1,900.00	T	$1,900.00
				Subtotal	$176,900.00
				Tax Rate	7.98%
				Sales Tax	$14,116.62
				Other	
				Total	**$191,016.62**

If you have any questions concerning this quotation contact Lee:
971.285.7926 or lodell@atecwaterfilters.com.

Thank you!

ATEC
A Cadiz Solution

ATEC Water Systems

Trusted solutions for treating groundwater — providing clean, reliable, and affordable water for people

ATEC by the Numbers:

450+

Systems installed to date in 10 Western States, Canada and Sri Lanka

50

Systems operating in California

Cost-Effective

- 1/3 of the cost of typical horizontal filtration systems
- A cost of entry as low as $10,000

Scalable

to meet range of ground-water treatment needs:

- Small Community Water Systems (1 well, 20 homes)
- Large Public Utility Treatment Plant (60 MGD)

Treatment Focus

ATEC provides a complete line of testing solutions for common groundwater quality

- Iron & Manganese
- Arsenic
- Chromium/Chromium-6
- PFAS
- Nitrates
- Hydrogen Sulfide
- Ammonia
- Perchlorate
- Aeration and Degassing

ATEC partners with a broad range of stakeholders including community leaders, engineering firms, and water municipalities to deliver and maintain complete groundwater treatment solutions.

Unmatched Experience and Expertise

Operating since 1982 and serving municipalities since 1996 – ATEC started by pioneering the technology to provide high-rate removal of iron and manganese and adapted to meet the changing needs of groundwater treatment across the U.S. Innovating for over 30 years - ATEC's team of experts have solved some of the toughest groundwater treatment challenges.

Cost-Effective and Scalable In-House Manufacturing

~1/3 of the cost of typical horizontal filtration systems, ATEC solutions are engineered to be scalable, eliminating the typical need for economies of scale to achieve equitable affordability. Our systems range from serving small communities, with filters down to 14" in diameter at 10 gallons per minute (GPM), to large public utility treatment plants that can deliver up to 60 million gallons per day (MGD). (Low cost of entry, as low as $10,000). All systems are custom-made by our expert engineers at our 20,000 sq ft facility in Hollister, California.

Innovative and Sustainable Technology

To design and build systems that are unique to every customer's needs, our team of expert engineers engages directly with customers from the start. ATEC performs on-site evaluations of your treatment process, conducts pilot testing, and then designs a system to address the specific challenges at each location. Our unique design reduces the footprint on the environment produced by horizontal filtration systems by 50%.

Simple Installation and Minimal Maintenance

ATEC delivers groundwater filtration systems fully packaged and pre-assembled - ready to install with less infrastructure and construction required. On-site maintenance requirements are minimal as all systems are monitored remotely 24/7.

Pioneering Groundwater Treatment Solutions

Developed the first municipal iron and manganese removal system that uses manganese dioxide media for iron and manganese

Designed the first U.S. installation for arsenic removal using granular ferric hydroxide

Developed a simplified reduction—oxidation—filtration (RCF) process for Chromium-6 removal that reduces the cost of this treatment by over 50%

Developed the leading high-rate biological ammonia removal process

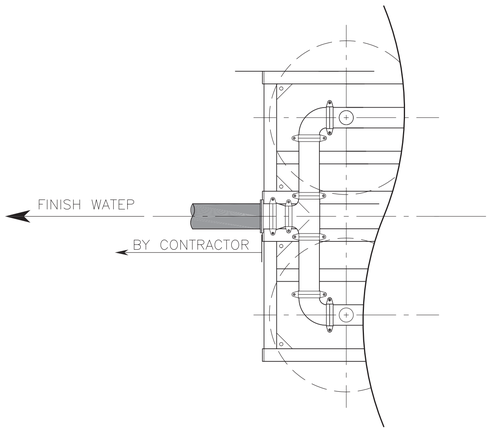
Led the process design for the largest drinking water nitrate removal plant in the U.S.

ATEC is poised to address our growing water treatment challenges, especially for those most at risk within small, disadvantaged, rural communities.

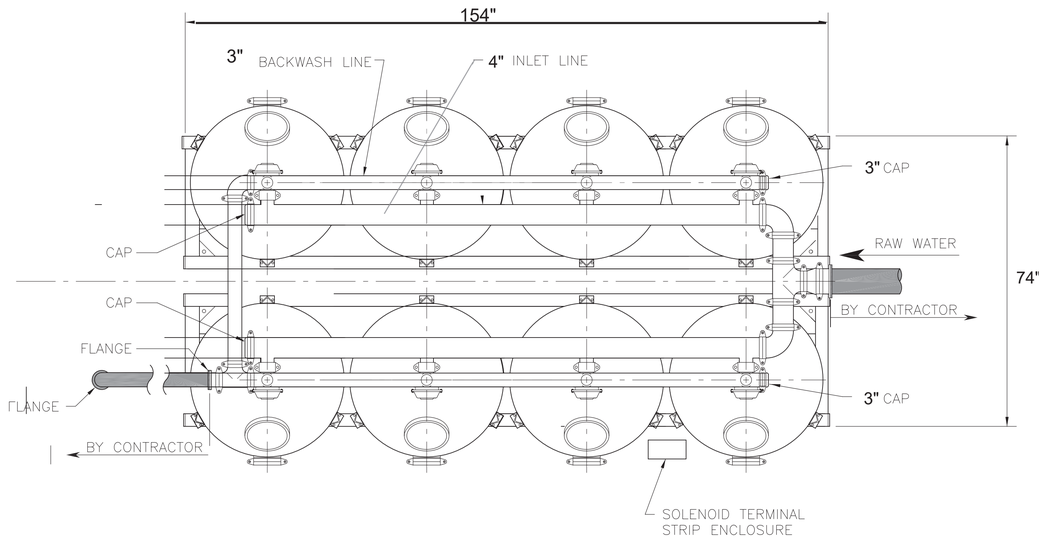
ATEC is dedicated to delivering clean, reliable, and affordable water for all people.

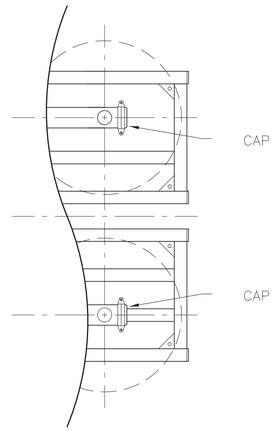
For more information visit **ATECwater.com** or email us at **info@ATECwater.com**

ATEC
A Cadiz Solution

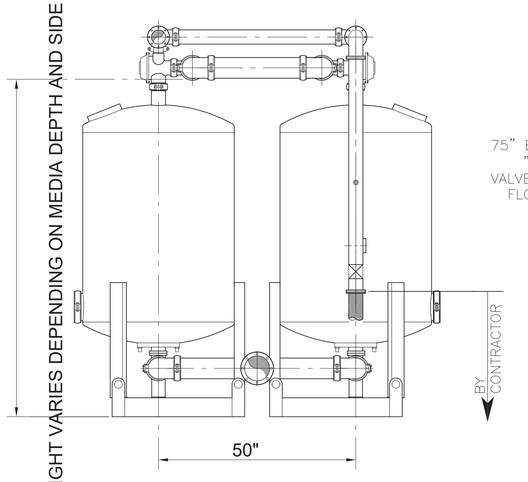


LEFT SIDE, FILTERS REMOVED

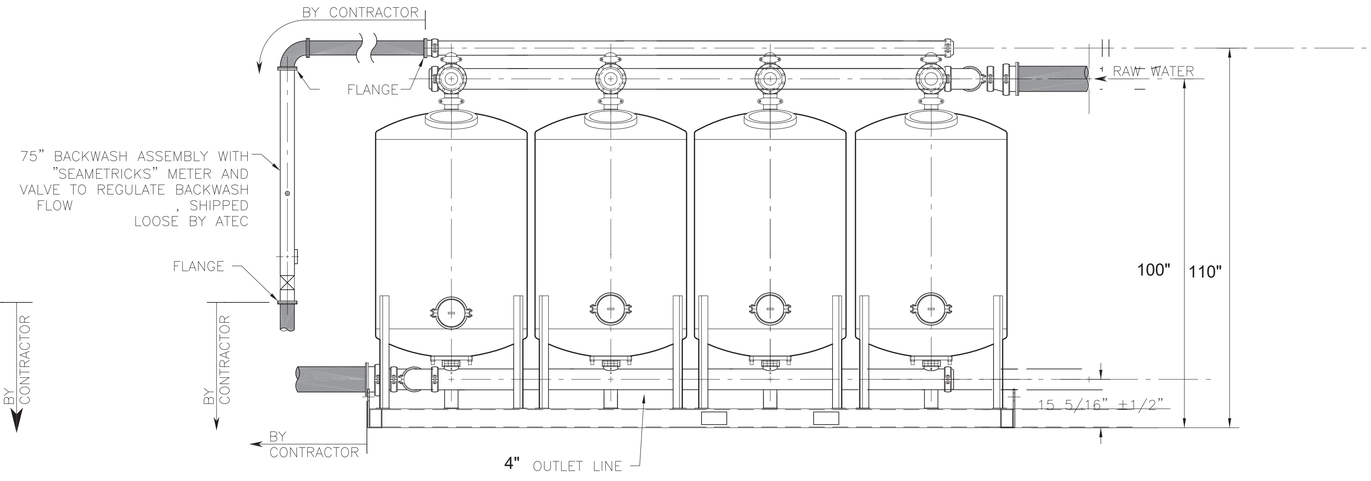


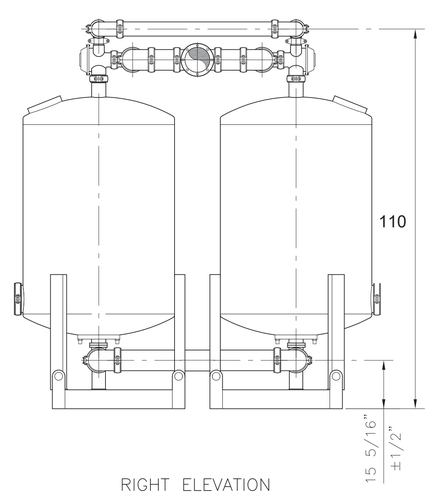


RIGHT SIDE, FILTERS REMOVED



LEFT ELEVATION





RIGHT ELEVATION

NOTES:

[A] THE FILTER SYSTEM IS DELIVERED ON TWO SKIDS

[B] AIR RELIEF/VACUUM RELIEF VALVE WILL BE SUPPLIED FOR INSTALL ON 2" COUPLING ON INLET LINE.

[C] SHADED PIPING BY CONTRACTOR.

[D] FILTER PIPING CONNECTIONS WILL BE PROVIDED TO SUIT FIELD CONDITIONS.

ATEC SYSTEMS, LLC
1690 LANA WAY #A
HOLLISTER CA
(831) 637-9264

DESIGN BY:	.
DRAWN BY:	.
CHECKED BY:	.
APR'D BY:	.

NO.	DATE		BY	APVD

0 2 4

SCALE IN FEET
NOTE: CHECK SCALE
SCALEABLE IN 22x34 - 1/2" = 1'-0"
SCALEABLE IN 11x17 - 1/4" = 1'-0"

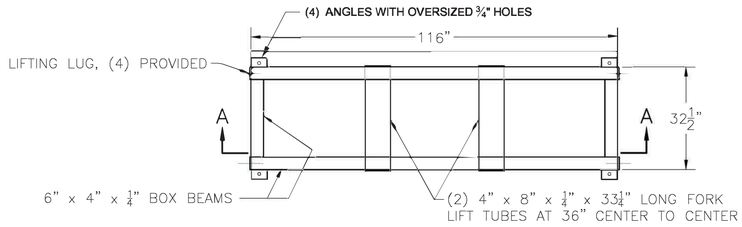
MODEL 08-60-36

36 - INCH SYSTEM

ATEC TREATMENT SYSTEM

FILTER DETAILS

SHEET NO.	1 of 2
DWG. NO.	
DATE:	1-4-2013
FILE:	Standard 10 - Filter 48



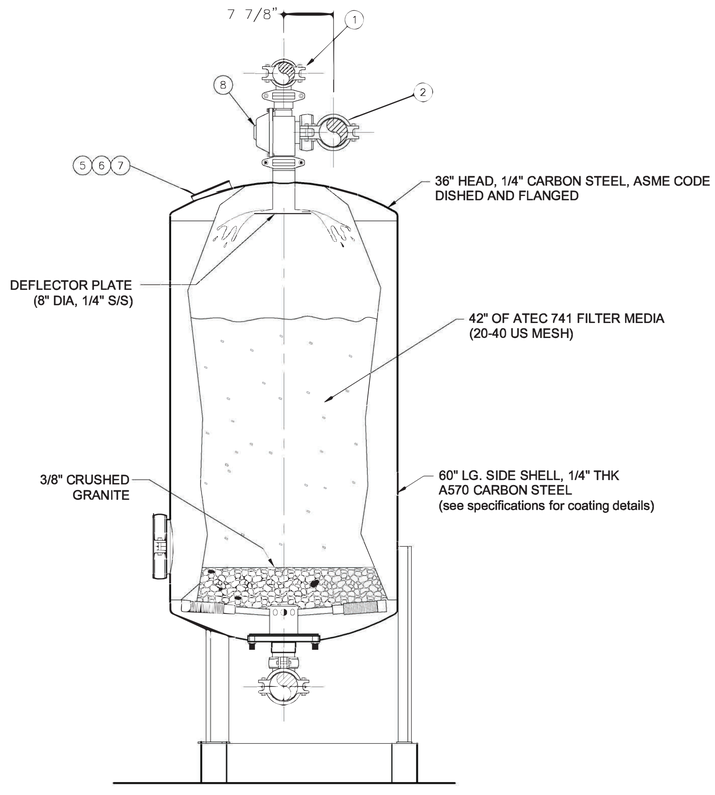
3 FILTER SKID PLAN
2 REQUIRED

0 2 4

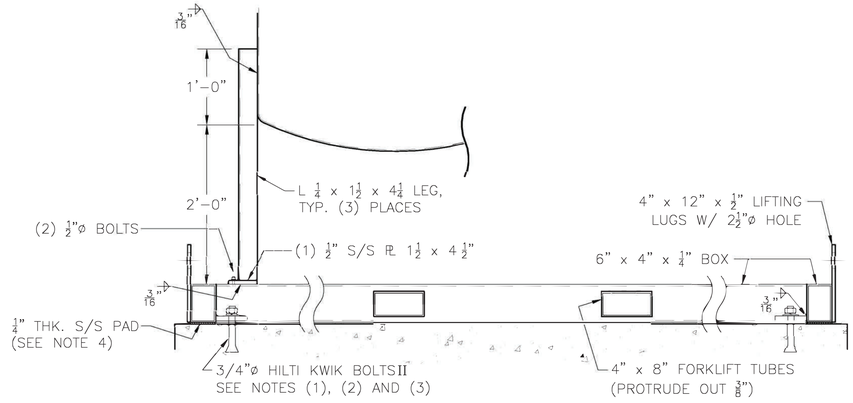
SCALE IN FEET
NOTE: CHECK SCALE
SCALEABLE IN 22x34 - 1/2" = 1'-0"
SCALEABLE IN 11x17 - 1/4" = 1'-0"

BILL OF MATERIAL			
ITEM	QTY	PART NO.	DESCRIPTION
1	1	PFS-CPL03	3" GROOVED COUPLING, CAST IRON W/ BOLTS & GASKET
2	3	PFS-CPL04	4" GROOVED COUPLING, CAST IRON W/ BOLTS & GASKET
3	1	PFS-CAP08	8" GROOVED END CAP
4	1	PFS-CPL08	8" GROOVED COUPLING, CAST IRON W/ BOLTS & NUTS
5	1	PFS-HHP11	11"x15" HAND HOLE PLATE
6	1	PFS-HHG11	11"x15" HAND HOLE GASKET
7	1	PFS-HHGS11	11"x15" HAND HOLE BOLT SET
8	1	PFS-HHCR11	11"x15" HAND HOLE HOLD DOWN CRAB
9	1	V-BF4	3"x3"x3" SERIES 350 BERMAD BACKWASH VALVE
10	1	UA SS48	UNDER-DRAIN ASSEMBLY 316L SS W/ SCH 80 CPVC CAP COMPLETE

NOTE: QUANTITIES FOR ONE (1) TANK



SECTION THRU TANK
SCALE 1" = 1'-0"



SECTION A-A
SCALE 1" = 1'-0"

NOTES:
(1) DESIGNER SHALL DETERMINE NO. AND DEPTH OF ANCHOR BOLTS TO SUIT LOCAL CODE REQUIREMENTS. FOUR BOLTS ARE REQUIRED AS A MINIMUM AT EXTERIOR GUSSETS.

(2) ANCHOR BOLT HOLES ARE TO BE DRILLED INTO CONCRETE FOUNDATION THROUGH OVERSIZED DRILL HOLES IN GUSSETS IN SKID ASSEMBLY BY INSTALLATION CONTRACTOR.

(3) 1/4" THICK S/S PADS ARE PROVIDED UNDER SKIDS FOR CLEARANCE BETWEEN SKIDS AND CONCRETE FOUNDATION. SIX PADS ARE PROVIDED FOR 2 & 3 FILTER SKIDS, EIGHT PADS FOR 3-14 FILTER SKIDS

ATEC WATER SYSTEMS LLC
1690 LANA WAY, BLDG-A
HOLLISTER, CA 95023

DESIGN BY:	.
DRAWN BY:	.
CHECKED BY:	.
APR'D BY:	.

NO.	DATE		BY	APVD

0 2 4

SCALE IN FEET
NOTE: CHECK SCALE
SCALEABLE IN 22x34 - 1/2" = 1'-0"
SCALEABLE IN 11x17 - 1/4" = 1'-0"

36" FILTER
ATEC TREATMENT SYSTEM

FILTER DETAILS

SHEET NO. 2 of 2
DWG. NO.
DATE: 03-01-2023
FILE: Rolling Hills-Glencairn 36" 2 x 3

SECTION 46 10 00 – IRON AND MANGANESE PACKAGED TREATMENT SYSTEM

PART 1 GENERAL

1.1 REFERENCES

A. The following is a list of standards which may be referenced in this section:

1. American Society of Mechanical Engineers (ASME): Section VIII, Division 1, Boiler and Pressure Vessel Code.

2. American Water Works Association (AWWA): B100, Filtering Material.

3. American Welding Society (AWS): D1.1, Structural Welding Code-Steel.

4. Underwriter's Laboratory Inc. (UL).

5. NACE International

1.2 SUMMARY

A. The proposed system is designed to treat up to 400 gpm of water produced by the Well. The expected influent raw water quality for the WTP is shown in Table The performance standards contained herein are based on pilot tests conducted by the City and assumes that the production level and source water quality will remain substantially constant.

B. The filters must fit within the area shown on the accompanying layout drawing and the maximum backwash rate must be less than 270 gpm.

Table 1: Expected Influent Raw Water Quality

Parameter	Value
pH (S.U.)	
Temperature (^{o}C)	
Total Dissolved Hardness (mg/L)	
Total Hardness (mg/L as $CaCO_3$)	
Total Iron (mg/L)	
Total Manganese (mg/L)	
Calcium (mg/L)	
Alkalinity (mg/L as $CaCO_3$)	
Silica (mg/L)	
Chloride (mg/L)	
Sulfate (mg/L)	

The normal operating pressure of the proposed system is <100 psig. The filter requirements are summarized in Table 2.

Table 2: Filter Equipment Requirements

City of Fresno PS 345-1 & PD 347-1		
Iron & Manganese Removal Treatment Plant		
Equipment Design Criteria Summary		
Well	**345-1**	**347-1**
Maximum Capacity, MGD	0.6	0.5
Maximum Plant Capacity (gpm)	400	365
Iron, mg/L	1.10	1
Manganese, mg/L	0.13	1
Filters		
Diameter of Vessels, in	36	36
Diameter of Vessels, ft	3	3
Surface areas, per vessel, sq ft	7.07	7.07
Number of Vessels	8	8
Loading Rate, gpm/sq ft	7.08	6.46
Media type	Advantage	Advantage
Media Depth, in	42	43
Meda,Cubic ft	197.82	203
EBCT, min	23,700	24,265
Backwash		
Backwash Loading Rate gal/sq ft		
Backwash Flow Rate, Each Vessel	141	141
Backwash Frequency, Hrs	24	24
Backwash Duration (min)	5	5
Backwash Volume, Gal/BackWash	5,652	5,652
Number of Backwashes Per Day	1	1
Backwash % of Production	1.0%	1.1%
Recycle Rate, gpm	20	20
Backwash Tank Volume, Gal	5,000	5,000
Settling Time (min)	1,157	1,157
Backwash recycle time, min/day	283	283

1.3 DELIVERY

A. The delivery dates will be established by the Owner and are anticipated in 2024. Delivery will be no more than 16 weeks after approval of shop drawing submittals. The Owner may elect to have the filters shipped to the job site or to their storage yard.

1.4 ALTERNATIVE DESIGN

A. If the Manufacturer suggests a significantly different filter system than described here, the scope and cost of design services shall be included in the Manufacturer's price for the filter system.

1.5 OTHER DOCUMENTS

A. A Drawing of the proposed system, enclosed, is incorporated into this specification for reference. The Drawing is intended to provide a general layout of the facility. If there is a conflict between the Drawing and this specification, this specification governs.

1.6 SUBMITTALS

A. Action Submittals:

1. Drawings showing dimensions, weights, and details of components, piping connections, and wiring for installation and operation.

2. Product data for equipment, components, and accessories, including valves and solenoids.

3. Seismic anchorage and bracing drawings and cut sheets.

4. Samples: Submit sample of media following delivery of shipment.

B. Informational Submittals:

1. Manufacturer's Certificate of Compliance

2. Manufacturer's written installation instructions

3. Manufacturer's Certificate of Proper Installation for equipment units

4. Statement of Qualification:

   a. Equipment Manufacturer
   b. Manufacturer's representative

5. Seismic anchorage and bracing calculations.

6. Operation and Maintenance Data.

7. Test Reports:

   a. Sieve analysis on a representative sample of filter media prior to loading and shipment.

   b. Factory inspection reports.

   c. Performance test log.

   d. Coating inspection report by a certified NACE inspector.

PART 2 PRODUCTS

2.1 FILTER TANKS

A. Tanks shall be of electric welded pressure vessel quality low carbon steel construction rated for (<125 normally) psig working pressure and hydrostatically tested at 100 percent in excess of the working pressure. Sidewalls shall be built of Grade A-570 or A-572A steel and tank heads and hand-holes shall comply with ASME Code requirements. Sidewalls shall be at least ¼" gauge and heads shall be at least ¼" gauge.

B. Tanks shall have coated steel grooved coupling connections on the service inlet and outlet. Manifolds shall have a flanged connection on the system inlet and outlet.

C. Access opening for tanks shall include one 11" x 15" manway in the top head and one 8" circular access ports in lower sidewall of tank as close to lower head as possible to allow for under drain servicing or media removal.

D. Each tank shall have a 1” air relieve valve mounted on the top access port cover of the tank to eliminate air bubbles from the filters.

E. Support for tanks shall be structural steel angle legs welded to lower section of the sidewall. The support and anchoring of filter vessels and accessories shall be designed by a Structural Engineer licensed in the state of Washington, and stamped drawings must be submitted to the owner and accepted by the permitting agency prior to installation of the filters.

F. Two or Three filter vessels shall be mounted to a common 4" x 6" x ¼" tubular steel frame (skid) with forklift brackets and four crane lifting hooks. Filter vessels shall be mounted so that they can be removed individually with the use of standard hand tools and a forklift or similar lifting device. The skids shall be sandblasted and epoxy coated. There will be a minimum of six 2" x 4" x ¼" stainless steel plates mounted on the underside of each skid to maintain a separation between the skid and the concrete floor of at least 1/8 of an inch.

G. Seismic anchorage shall be provided and integral to the filter skids. Anchors shall be placed in the general locations shown on the drawings. Anchor plates shall be welded to the skids and factory coated with the exterior coating system described in Section 2, below. Provide a copy of the Washington State licensed structural engineer’s report prior to shipment.

2.2 COATINGS

A. Immersed steel surfaces on tanks of all diameters shall be sand blasted to a near white metal surface finish per (SSPC-SP10) finish. Non-immersed steel surfaces shall be Commercial Blast Cleaned as per SSPC-SP6.

B. All filter vessel immersion service surfaces and manifold immersion surfaces shall be coated with 3M Corporation ScotchKote 134, a fusion bonded epoxy coating, certified to ANSI/NSF Standard 61 for contact with potable water, applied in accordance with the manufacturer's recommendations.

C. All exterior surfaces of the filter tanks, the support skids, all other support members, and manifold pipes coating shall be a sprayed-on coating system consisting of the following:

1. One coat of an Epoxy Primer for Ferrous Metal applied at a minimum 2.5 MDFT.
2. Two coats of an Aliphatic Acrylic Polyurethane applied at a minimum 4 MDFT.

D. The following list of manufactures can supply the above described exterior coating system:

1. Carboline
2. Sherwin Williams
3. TNEMEC
4. Devoe Coatings

E. Surface preparation and coatings shall be inspected by a NACE certified painting inspector before and after the coating application.

F. Interior and exterior coating thicknesses will be inspected by the owner on delivery and if minimum thicknesses are not achieved, the equipment supplier will be required to provide additional epoxy coating prior to installation of the filters.

G. Touch up paint shall be supplied for all coating systems and colors used. Paint shall be in sealed containers from the manufacturer clearly labeled with the color, system, location to be used, and shelf life expiration date. Touch up paint shall be compatible with the coating systems and be able to be field applied without special tools, knowledge or equipment.

2.3 INTERNAL DISTRIBUTION

A. The filter system shall be a "down-flow" type with untreated water entering the top of the filter and flow through the filter tank and out the bottom of the tank.

B. The upper distribution system shall be of the baffle type to evenly distribute the water over the entire media surface area.

C. The lower distribution system shall be of a proven design to provide a uniform backwash flow across all of the filter media. For 48-inch diameter filters, the under drain will be constructed with twelve individual stainless-steel wedge wire radial outlets with openings of not more than 0.010". The radial arms shall be secured to a stainless-steel hub-base by nipples threaded into stainless steel pipe couplings welded

to the hub. Each radial arm shall have adequate outlet orifices for the stated flow located beneath the wedge wire. The distribution system shall be embedded in a layer sub-fill of 3/8" x 3/4" washed gravel support the filter bed. The filters will be shipped to the site with the underdrains and support gravel installed.

2.4 MAIN OPERATING VALVES

A. The main operating valve on each tank shall be an industrial automatic multi-port diaphragm type, slow opening and closing, free of water hammer. The diaphragm assembly shall be fully guided on its perimeter when pressure activated from one position to another to assure a smooth reliable shut-off without sticking. There shall be no contact of dissimilar metals within the valve and no special tools shall be required to service the valve. The valve shall be capable of being operated hydraulically. A connection shall be provided between the untreated water, pilot control valves, and main operating valves for hydraulic operation. The operating pressure shall be equal to the filter inlet system pressure. Main operating valves shall be Bermad IR-4x4-350-P. Substitutions will not be allowed.

2.5 PIPE AND FITTINGS

A. Raw (10”), finished (10”), and backwash (4”) water manifolds and piping shall be Schedule 40 steel with a wall thickness of 0.25 inches or greater. Pipe sizes shall be as shown on the plans. Immersed portions of manifolds shall be coated with ScotchKote 134, certified to ANSI/NSF Standard 61 in the same manner specified for filter vessels in Section 2, except that manifolds with diameters smaller than 3" may be made of Type 316L stainless steel and left uncoated.

B. Tubing between the main operating valves and the pilot control valves shall be ¼” OD and rated for 300 psi as manufactured by Parker or approved equal.

C. A 2” threaded connection shall be provided on the inlet manifold as shown for 2” ball valve and an air relief valve.

2.6 FLOW CONTROL

A. An adjustable backwash flow control valve, to assure proper backwashing, shall be included. Backwash flow will be provided internally to the system (i.e. no additional flow from the well or distribution system shall be used during backwash). Proper filter bed fluidization during backwashing shall be required. Backwash flow rates shall be determined at system start-up.

2.7 CONTROLS

A factory-mounted and wired cycle controller shall incorporate an adjustable time switch with multi-ported pilot valves to control all steps of automatic backwash.

Provision for push-button initiated backwash shall be included, as will provisions to accommodate remote initiation of backwash. The controller to be used is an Alex-Tronic F-24, or similar, which requires a 120 VAC connection which provides a local panel indication of backwash status and alarm.

The multi-ported pilot control valve shall be pre-connected to automatically pressure activate the operating control valve through the steps of backwash and return to service. The control panel shall always indicate the cycle of operation. In case of power failure, a complete backwash cycle can be performed by manual operation of the pilot control valve.

Electrical lockouts to prevent more than one unit from backwashing at the same time, except when the system is manually overridden are included.

Electrical time switch control shall be fully adjustable to initiate backwash at regular frequencies from hourly to once every 48 hours and at a set pressure differential. The capability for backwash, initiated from a remote location, by an electrical signaling device shall be included.

6.1 FILTER MEDIA

A. The filter media shall be NSF/ANSI Standard 61 listed manganese dioxide media. The size of the media shall be 0.42 mm to 0.85 mm (20 to 40 US Mesh). The media shall be Pyrolox Advantage. Iron and manganese shall be removed to a level below one half of the established maximum contaminant level (MCL). Particle retention shall be ten (10) micron and larger for particles other than iron and manganese.

B. Chlorine will be injected prior to the pyrolusite filters to maintain a minimum free chlorine residual of 0.5 mg/L.

6.2 ACCESSORIES

A. Liquid filled pressure gauges with +/- 0.5 % full scale accuracy in corrosion resistant frames shall be provided (0-100 psig) for inlet and outlet manifold of the system. Gauges shall be 4½" in diameter with integral surge suppression snubbers and will be mounted above the control panel.

B. Sampling ports shall be provided for the product water from each filter vessel as well as composite sampling ports for raw and finished water. A sampling port shall also be included for sampling backwash effluent.

C. Two ¾" threaded half couplings shall be provided on the inlet and outlet manifold for such use as the customer may deem appropriate. These shall be plugged at time of delivery.

D. One pressure relief valve shall be provided with each filter bank of 24 tanks. Pressure relief valves shall be ASME and shall be set to 25 psig above the maximum working pressure.

E. A site glass will be provided for the backwash discharge line for each filter bank of _ vessels.

F. Air relieve valves shall be provided on the inlet piping header for each filter bank of _ filters, and on the head of each pressure vessel.

6.3 INSTRUCTIONS

A. Three complete printed and bound sets of the equipment supplier's Installation, Operating, and Maintenance Manual (O&M Manual) shall be included with the treatment system. A copy of the O&M Manual shall also be provided on CD in a searchable Adobe PDF format. The O&M Manual shall include schematics of controls.

6.4 GUARANTEES

A. The manufacturer shall guarantee all equipment, coatings, valves, and controls for three (3) years against defects in workmanship or materials. Any part proving defective will be replaced or repaired, at our option, within this period in accordance with our standard guarantee.

B. The manufacturer shall guarantee that, under actual operating conditions: (1) the media shall not be washed out of the system during the service run or backwashing period; and, (2) the under-drain system, gravel, and media shall not become fouled, either with turbidity or by other particles, while operating as specified by the manufacturer.

PART 7 EXECUTION

7.1 FIELD SERVICE

A. The services of a factory authorized service representative shall be made available to supervise, inspect and provide operator training initial start-up and as required for system operation for up to two days' time during installation, and for up to five days during acceptance testing of the equipment.

END OF SECTION

BID FORM

In compliance with the Invitation, Special Conditions, Specifications, and Bid Form and subject to all terms and conditions hereof, the undersigned offers and agrees if this bid be accepted within thirty (30) calendar days from the date of opening, to deliver at the point as specified, the following equipment for the bid price of:

DESCRIPTION	QTY.		UNIT PRICE
Filters Iron & Manganese Removal Packaged Treatment System (1 filter train with 5 filter vessels, internal tank distribution system, skids and seismic anchoring, connecting piping and fittings on skid, coatings, media, valves and accessories, field services, and all items as described herein)	Lump Sum		$_____
	Total		$_____

ADDITIONAL INFORMATION REQUIRED

1. Prices firm through Quoted Delivery _____Yes _____No _____Other
2. Comply with 16 week Delivery _____Yes _____No _____Other
3. Manufacturer Brand Name of equipment bid _____
4. Compliance with Utility Guarantee/Warranty_____Yes _____No _____Other
5. State Manufacturer Warranty if Other _____
6. Compliance with Factory Service Engineer Allowance _____Yes _____No _____Other
7. Original and one copy of all information enclosed _____Yes _____No

FIRM_____

BY (signature)_____

PRINTED NAME_____

TITLE_____

ADDRESS_____

CITY _____ STATE _____ ZIP _____

PHONE _____ FAX _____

EMAIL: _____

END OF SECTION

atec systems inc.

Submittal

Iron and Manganese Treatment Equipment

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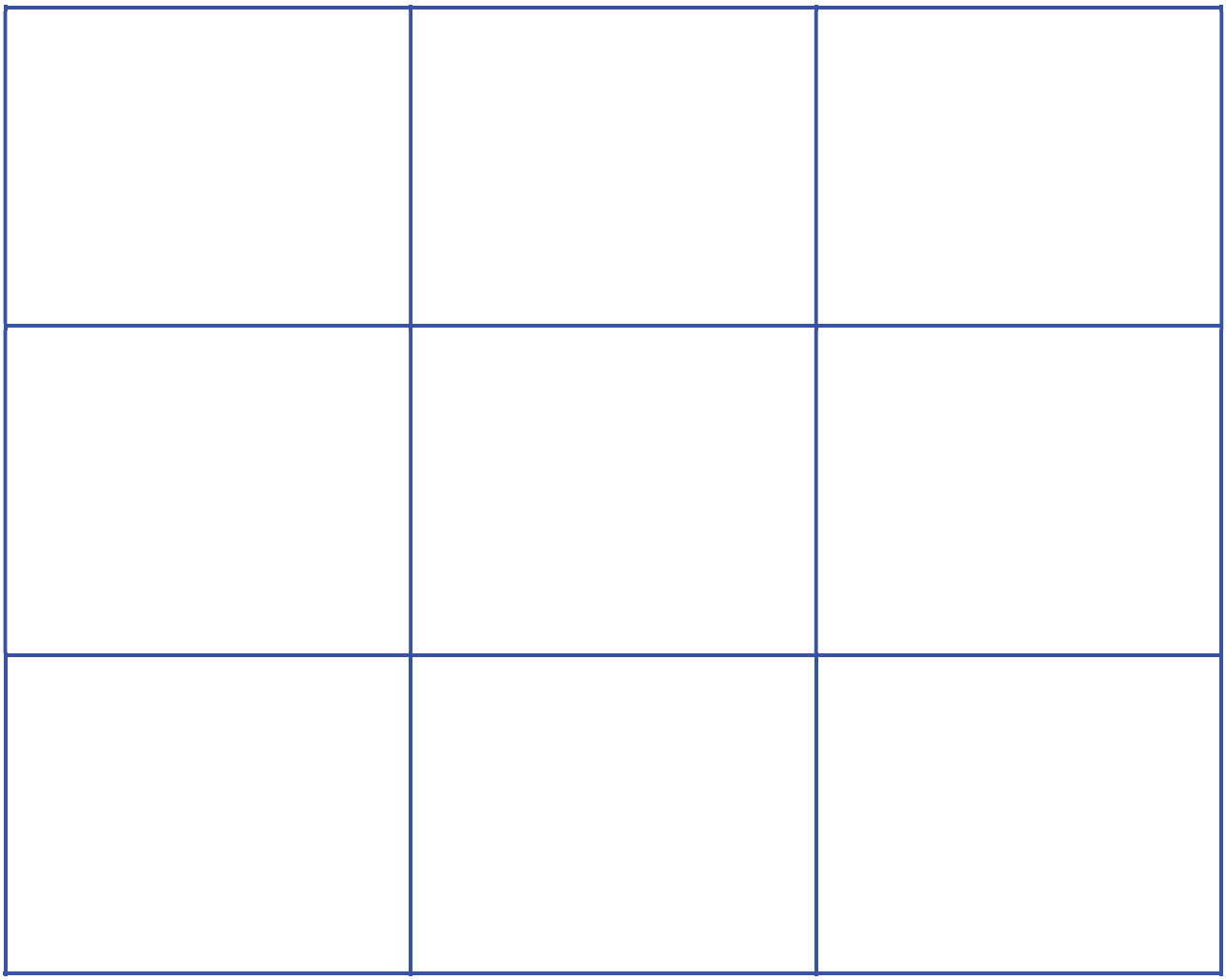
IRON AND MANGANESE REMOVAL SYSTEM



This section describes the basic system operation for the ATEC high rate iron and manganese removal system.

The ***ATEC Iron and Manganese Removal System***[1] is an in-line, pressure filter system that typically uses *ATEC* AS-741M Filter Media[2] or (Pyrolox Advantage Filter Media - a manganese coated media) a granular manganese dioxide (MnO_2) with a pyrolusite base, as the filtration media. The typical system contains three to twenty filter vessels with common inlet and outlet manifolds.

The media-bed usually consists of a single 36"-to-48" layer of *ATEC Systems* 741M Filter Media. For this system, Pyrolox Advantage media is being used. An anthracite cap is not used over the filter media. The use of a mono- media filter bed, combined with the physical properties of the media, simplifies the backwash operation.

Iron and manganese are relatively abundant in the earth's crust and find their way into many ground and surface water supplies. These metals can result in discolored water, growth of autotrophic bacteria called *ctenophores*, increase chlorine demand, tubercle formation and taste and odors in potable water supplies.

Removal Mechanisms

Two of the most commonly used removal mechanisms for iron and manganese removal include:

- Oxidation, precipitation and filtration, and
- Adsorption.

Iron and manganese found in groun dwater systems are predominantly found in their reduced forms: ferrous iron (Fe^{2+}) and m anganous manganese (Mn^{2+}). Oxidation of these reduced forms results in formation of ferric iron (Fe^{3+}) and manganic manganese (Mn^{4+}) sometimes Mn^{3+} is formed as well.

Adsorption removal mechanisms sorb dissolved iron and manganese onto manganese dioxide and has also been reported to act as an oxidizing contact medium and filtration medium. Adsorption kinetics are much faster than oxidation kinetics. In laboratory tests performed by Knocke (1990) manganese concentrations of up to 1. 0 mg/L found most uptake occurred in the top 6 inches of the media. Thi s finding was also repeated in full-scale plants at Durham N.C.

Knocke's (1991) later findings included:

1. The sorption of Mn (II) by MnOx(s)-coated filter media is very rapid. Both sorption kinetics and sorption capacity increase with increasing pH or surface MnOx concentration.
2. In the absence of a filter-applied oxidant, Mn (II) removal is by adsorption alone.
3. When free chlorine is present, the oxide surface is continually regenerated, promoting efficient Mn (II) removal over extended periods of time.

Media used for adsorption includes pyrolusite; the material from which AS-741M Filter Media are derived. To maintain efficient uptake kinetics, a continuous application of chlorine adequate to yield a free chlorine residual in the range of 0.5 to 1.0 mg/L in the product water is provided as a continuous regenerant.

---

[1] ATEC Systems LLC, 1690 Lana Way, Hollister, CA 95023

[2] ATEC Systems 721M and 741M Filter Media is certified by NSF to ANSI/NSF Standard 61.

Iron and manganese are removed by adsorbing partially the reduced forms of the compound onto AS741M filter media.

This process differs from most iron and manganese removal processes in that iron and manganese are purposely ***not precipitated*** during the process. By avoiding precipitation, loading rates of 7 to 16gpm/ft^2 are commonly achieved.

In order to optimize and maintain removal, chlorine is used to maintain the media in a highly oxidized state. Chlorine is introduced into the water supply at the wellhead or other injection point immediately before the water enters the filters at a level adequate to maintain a free chlorine residual in the treated water. If iro n or m anganese bacteria are p resent, a free chlorine residual of at least 1 .0 mg/L is recommended to control the bacteria. This oxidat ion of th e manganese dioxide media maintains the adsorption capacity and is effectively a continuous regeneration process.

Application Rates

Typical service flow rates (also referred to a s application or loa ding rates) range from 7 to 16gpm/ft^2. These rates vary depending on water quality. The normal interval between backwash cycles is from 12- to -24 hours under most operating conditions. Operating pressure loss through the filter system at flow rates of 15-gpm or less p er square foot of filter surf ace area is less than 3 p sig. The system normally overrides the time setting on the backwash controller when the pressure differential exceeds 5 psig.

Refer to the ATEC Systems, Treatment System Summary Table for the application rate information for your specific system. The application rate for your system may be exceeded during backwash, when all of the well's water output is being run through one less filter.

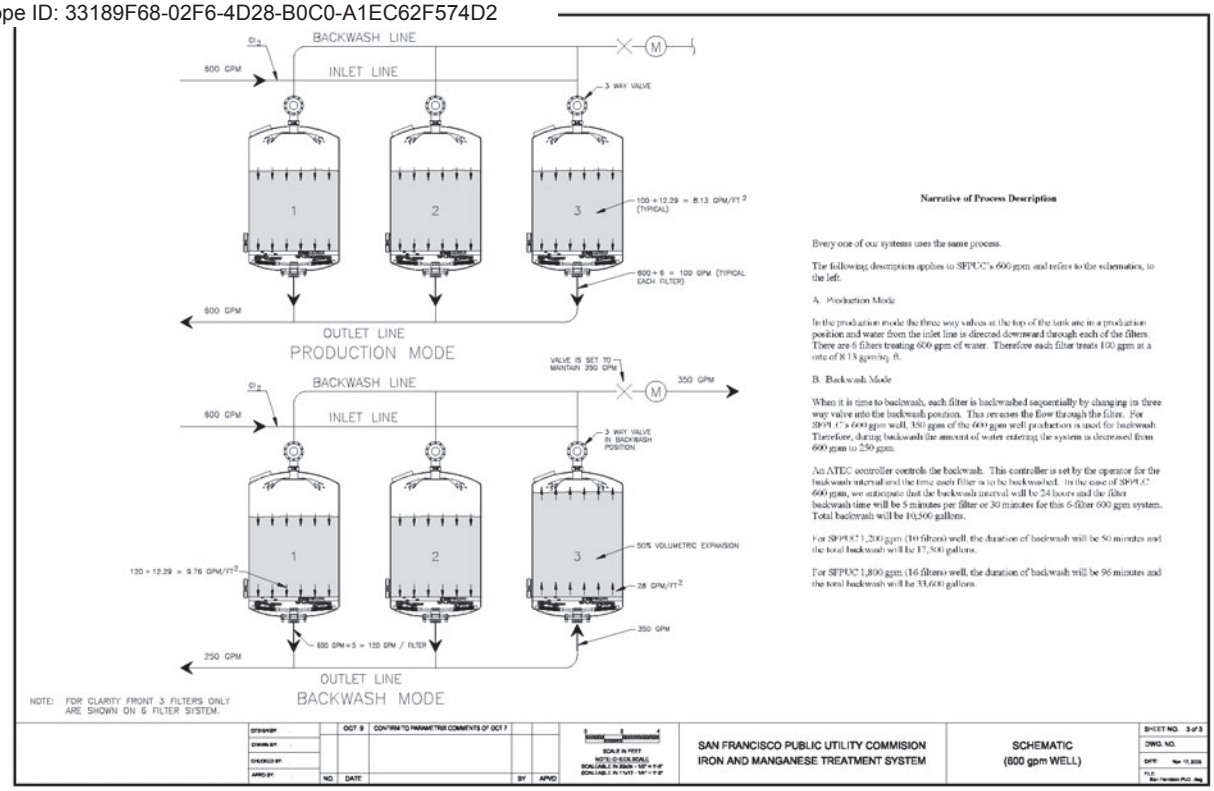
Backwashing to Maintain Removal Characteristics

After a spe cified period of adsorption, the vessels are backwashed to remov e the ad sorbed iron a nd manganese from the m edia. In the event that water quality a dversely changes, the m edia will be backwashed when the pressure differential exceeds 5 psig. Backwash is normally performed with filtered system water but the system can be set up to backwash with water from an external source if necessary or desired. Unless required by the specific characteristics of a particular installation, the system remains on-line during backwash. The controller can interface with the customer's SCADA system if desired.

As mentioned above, much of the adsorption takes place in the top of the filter media bed. It follows that it is ea sier and more efficient to backwash the media before the iron and manganese that is being removed from the source water penetrates to the lowest sections of the media bed. For thi s reason, we recommend backwashing at least once every twenty-four hours of production and preferably every twelve hours, particularly at the outset. Refer to the ATEC Systems, Treatment System Summary Table for the backwash rate and duration for your specific system.

Proper backwashing is a critical and controllable variable in the treatment process and merits significant operator attention. In excess of 98% of the calls *ATEC Systems* receive from customers having problems with removal, whether it be iron and manganese or particulate matter, are ultimately found to be related to improper backwash operations.

The *ATEC Iron and Manganese Removal System* contains multiple vessels. The backwash controller operates only one backwash valve at a time. This design normally allows for the vessels to be backwashed with finished water, without the need for an extra source of backwash water from a storage tank and without the need for special backwash pumps. Th e illustration below shows how the filters operate under normal conditions and while backwashing.



Backwash Variables

Proper backwashing is one of th e single most important variables in maintaining successful longterm system operation. There are three important components to backwashing including:
(1) backwash frequency; (2) backwash flow or volume; and, (3) backwash duration.

Backwash Frequency

If the filter system is not backwashed often enough (frequency), the product water quality will be adversely affected by the pre sence of unwanted contaminants in the product water and, over time, the media bed will become progressively more contaminated. Ultimately contaminants will be driven deep into the media bed and become increasingly more difficult to remove.

Backwash Flow Rate

To successfully clean th e media bed, it must be expanded until it is fluidized, all owing the contaminants to be removed with the backwash. If the backwash flow rate is too low, the media bed will not fluidize. If the backwash flow rate is excessively high, the filter bed will expand to the point that media will be expelled with the backwash effluent. Neither condition is acceptable.

Generally speaking, Pyrolox Advantage Filter Media will fluidize at about 12 gpm/ft^2 and at a rate of 14-16-gp m/ft^2 will have expanded on the order of 50%. The flow rate is high enough to effectively shear the bond between the media and the iron and manganese that have been removed from the source water, allowing it to be rapidly backwashed to waste without the need for air-scour or other backwash aids at a relatively conservitive flow rate.

If each filter vessel backwash cycle does not continue for long enough (duration), insufficient time will have passed to allow the media bed to fully expand and the contaminants to be flushed out, cleaning the media bed. Properly setting and maintaining this backwash function will help assure successful filter operation over the life cycle of a filter system.

Time/Pressure Differential Backup

The backwash operation is activated by a controller that is located either on the filter vessel legs or premounted on polyboard for remote installation. The controller initiates backwash by one of four methods:

- A Timer that is integrated into the controller
- Manually initiated by the operator
- A Pressure Differential switch that is integrated into the controller, or
- Externally through a SCADA system

The controller is designed to normally backwash by initiation of the timer located on the controller or via remote initiation by the SCADA system. The timer can be adjusted by the operator. The controller has programable settings that control the backwash:

- The ***Periodic Flush*** dsets the backwash interval in days, hours and minutes.
- The ***Backwash Time*** sets the backwash time for an individual vessels in minutes and seconds
  - The ***Dwell Time*** sets the time between backwashing individual vessels.
- The ***Pressure Differential (pd)*** sets the pressure for initiating backwash if the pd exceeds the desired .amount (typically 8 - 10 psi.

Refer to the ATEC Systems, Treatment System Summary Table for the initial settings information for your specific system. The typical initial settings for most systems are shown in the Table below:

Periodic Flush	12 hours
Backwash Time (Upper)	5 minutes
Backwash Time (Lower) Dwell	0 seconds
	0 seconds

)LJXUH

The backwash controller keeps track of time only when power is available to the controller. Normally, the controller is powered by a “switched” circuit that is energized only while the well pump is operating.

As a backup measure, the controller will also automatically backwash when the pressure differential switch is activated by exceeding a pre-determined level. The pressure differential switch can be adjusted. The pressure differential is normally set to 5 to 8 psig. A time delay, to avoid initiation of a pressue differential induced backwash, can be set from 0-to-180 seconds—it is recommended that the time delay be set for at least 180 seconds to av oid initiation of a PD backwash as the result of a transient PD condition. To adjust the pressure differential activation pressure, manually turn the knob on the switch until the silver indicator points towards the desired pressure.

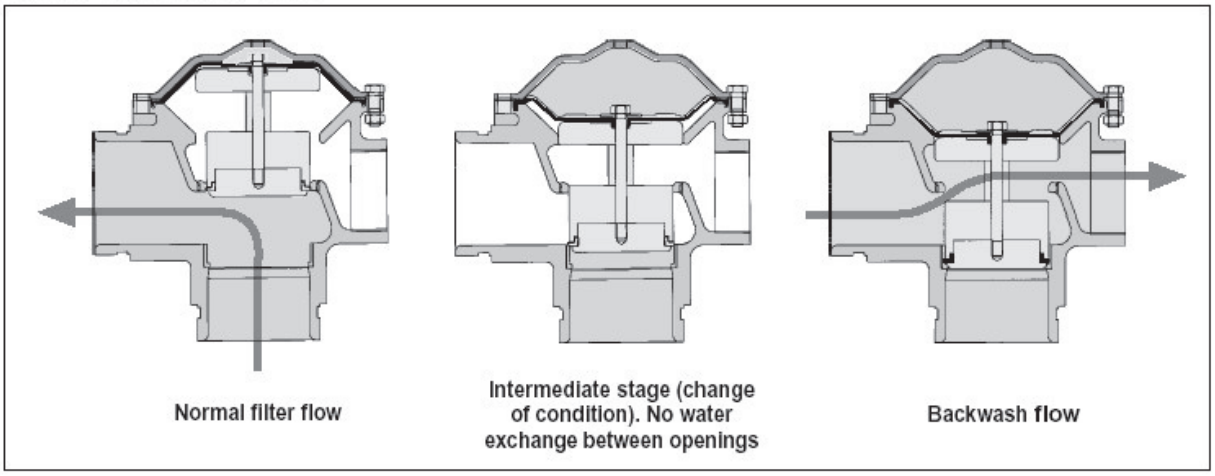
In the event of a power failure, the backwash controller has the ability to resume a backwash cycle at the station that was backwashing at the time of the power failure. When the solenoids are without power, the backwash control valve on each vessel remains in the normal (or filter) operating position.

Backwash Sequence

When a backwash cycle is indicated, the controller energizes the solenoid valve operating the first backwash valve, initiating the backwash cycle. The first filter vessel is backwashed for the time specified after which the first solenoid valve is ed-energized returning vessel number 1 to normal operation. The process is repeated with vessel number 2 and so on, until all of the filters have been backwashed.

Backwash Valve

A drawing of a typical backwash valve in normal operating mode, in backwash mode, and in an intermediate stage is shown in figure 3. As you can see, the valve is a three-way valve. In normal mode the water supply is directed into the filter and the backwash port is closed. During backwash, the water supply is closed and the backwash port is opened. Because water follows the course of least resistance, flow is reversed in the filter being backwashed and the backwash effluent is discharged to atmosphere. To properly backwash, the filters require at least 30 psi to system. If this i s not available, one may need to consider installing a (normally open, or) pressure sustaining valve to obtain the necessary pressure to insure proper backwash flow.



Integration with SCADA system

The system can be externally monitored, or the backwash can be externally activated through a Supervisory Control and Data Acquisition (SCADA) system. An internal alarm from the controller can be monitored by attaching a relay to the alarm output on the controller.

To initiate backwashing from a SCADA system, a relay is used to initiate the backwash by bypassing the periodic flush timer on the controller. The SCADA system can then initiate backwash based on time or on flow. This is achieved by completing an electrical circuit wired to the back of the manual backwash initiation button. (This is a momentary closed dry contact circuit.)

SPECIAL REQUIREMENTS

This section covers some special design considerations including supplementing backwash flow, using special valves and providing adequate back-pressure.

Supplementing Backwash Water Supply

Supplementing backwash water flow can normally be avoided by proper design and selection of the correct ATEC System for your installation. However, in some cases supplemental backwash flow i s needed for a particular installation. In these cases, a separate backwash pump can be installed or the system can be backwashed with treated water from the distribution system.

Use of Normally Open / Normally Closed Solenoid Operated Valves in Backwash

One method of ensuring adequate backwash in some special cases is to place a normally opened valve on the finished water discharge manifold of the system that closes during backwashing to ensure that all of the water treated by the *ATEC Iron and Manganese Removal System* is available for backwashing. The normally opened valve can be actuated by attaching a relay to the master control output on the backwash control panel.

In some cases a normally closed valve will be included in the design. The normally closed valve may be connected to the discharge side of a distribution booster pump or some other source of water supply. When backwashing occurs, the normally closed valve opens and additional water supply is available for backwashing. This is typically controlled by an electrically actuated solenoid valve.

Pressure Sustaining Valves (Backpressure Valves)

Pressure sustaining valves are often used under one or a combination of more than one of three different conditions: (1) where there is not adequate back-pressure to smoothly operate the backwash valves; (2)

 ly to sustain full backwash flow is made available to the vessels as discussed above; or, (3) when the filters are located above a clear well or other storage facility to prevent the filters from draining when the are not operating.

Hydraulically Actuated Backwash Valves

The backwash valves are set-up to change position using water (hydraulic) actuated valves by connecting a ¼" line from the a pressurized water source.

OPERATING THE ATEC IRON AND MANGANESE REMOVAL SYSTEM

The operation of the ATEC Iron and Manganese Removal System is relatively simple. There a re, however, several variables that need to be monitored and settings that need to be closely followed. The most important of these are summarized below:

- **$SSOLFDWLRQ5DWHV**
  The application rate (hydraulic loading rate) for this project may be found in the ATEC Systems, Treatment System Summ ary Table. This rate sh ould not be exceeded except during system backwash when it will normally increase because the system is filtering with one less vessel.

- **6HWWLQJ&KORULQH/HYHOLQ3URGXFW:DWHU**
  Sodium hypochlorite should be dosed to yield a minimum recommended free chlorine residual of 0.5 mg/L in the produ ct water for most systems, and 0.6 mg/L with systems containing ammonia or hydrogen sulfide. This should be regularly monitored at least on a weekly, and, preferably, on a daily basis. The chlori ne residual should be maintained within 0.1 mg/L of this re commended level.

- **6HWWLQJ%DFNZDVK3DUDPHWHUV**
  The backwash frequency and duration will be initially set by *ATEC Systems* during start-up. The backwash frequency will normally ra nge from 1 2 to 24 hours. The backwash duration will normally range from 4.0 to 5.0 minutes per vessel. The typical recommended starting backwash frequency is once every 12 hours with duration of 4.5 minutes per vessel.

- **0RQLWRU3UHVVXUH/RVV**
  A typical *ATEC Iron and Manganese Removal System* will operate with a head-loss, or pressure differential between the water supply and discharge of a bout 2-psig. It i s good practice to regularly monitor head-loss because it can be both a predictor and an indicator of filter condition. If the pressure loss exceeds 5-psig on a regular basis, the filter bed is fouled and should be checked immediately.

Sample Ports and Water Quality Testing

Sample ports for raw and finished water are provided on most systems 24" diameter or larger. Please refer to the system design drawings for the location of the sample ports. During the first few months of operation, it is good practice to regularly test system performance daily paying particularly close attention to chlorine residual and manganese and iron removal. After the system operators have developed a familiarity with the system, iron and manganese monitoring can be reduced to a weekly or twice weekly routine. **Chlorine should be monitored daily**.

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The filters can be shut down and kept off-line for prolonged periods. The media can be kept either wet or dry. The normal procedure is to simply take the well pump off line. Assuming that the source water is adequately chlorinated, there should be no other action required to shut down. No special actions are

 ample when shutting d own a treatment system located outside, to prevent freezing in the winter months.

START-UP AFTER PROLONGED PERIOD OUT-OF-SERVICE

To start-up the filters after draining or more than 1 month off-line, use the following procedures.

1. If the filter vessels were drained, fill the vessels with water slowly; follow the start-up procedure to eliminate air from the vessels.
2. Filter to waste for at least one hour, providing the required chlorine dose and residual. ***or***
1. Add one quart (32 fluid ounces) of 6% sodium hypochlorite to each tank, fill the vessels with water and hold for 6 hours.
2. Backwash the system two times in immediate succession.
3. Check chlorine residual.
4. Place on-line.

These procedures are derived from and intended to meet AWWA Standard C653-03, (latest revision), Disinfection of Water Treatment Plants.

Certain maintenance procedures must be observed for proper filter operation. The procedures discussed below should be implemented with the initial operation of the filters and on a regular basis thereafter. The following maintenance should be used as a guide rather than as a comprehensive list of every maintenance item that might require attention.

Controller ■ The controller needs to be kept dry. If it is properly installed at the outset, the controlle r circuit board will provide reliable service for a long time. If it is damaged by a power surge, struck by lightning, is submerged, or similarly damaged, the repair is to replace the circuit board and wiring. Other than replacing a pressure differential switch, fuse o r making sure that all circuits are properly terminated, there is no on-going maintenance for this component.

Backwash Control Valves

■ Backwash control valves normally require very little maintenance. The recommended practice for Iron and Manganese Removal System installations is to rebuild or exchange the valves on a fiveyear cycle. In ca se of emergency repairs or replacement, backwash control valves are always maintained in inventory and can be shipped for next day arrival.

Solenoid Valves

■ Peter-Paul Model 73 3-Way Solenoid Valves are used to control the water or air that actuates the 3-Way Backwash Control Valves. Parts are available to rebuild the solenoid valves or the valves can be sent to *ATEC Systems* for rebuilding. The maintenance and cleaning procedures for the solenoid valves are shown in the manufacturer's materials provided.

Backwash Restrictor Valves

■ Fully open and close the backwash restrictor valve on an annual basis. Remember to reset the backwash restrictor valve to allow the required backwash flow after exercising.

- Inspect all line and valve connections for tightness and leaks. If leaks are observed, tighten coupling. If this does not stop the leak, remove the coupling and inspect the gasket. If the gasket is worn or damaged, replace. When installing a gasket, it should be coated with a light lubricant.

Control Tubing

- Inspect all pneumatic or hydraulic tubing for leaks and restrictions or damage. If tubing is crimped or damaged, it should be replaced.

Sight Glass

- Many ATEC Iron and Manganese Removal Systems are shipped with a cast brass and acrylic sight glass to allow for easy observation of the backwash discharge. Overtime, this will discolor. The easiest way to clean the site tube is to remo ve it and soak it for fifteen minutes in a 5% solution of ascorbic acid and then wipe it clean with a soft cloth. Replacement sight glasses are available.

Media and Checking Media Levels

- It is recommended that the media level in all filters be checked and recorded approximately once each six months. If the media is below the recommended level for your system, enough of the appropriate media should be added to bring the level back to the recommended media bed depth. The recommended media depth should be maintained. The easiest way to maintain the appropriate depth is to open the access hatch (on the depressurized vessels) on the top head and measure and record the distance from a fixed point on the access port to the top of the media at initial system start -up and at regular intervals thereafter. The media should be maintained within 1 inch of the initial media depth.

Paint ■ Water Treatment Plants are typically corrosive environments. It is, therefore, important that any rust be removed and paint be regularly touched up to protect the filter vessels and manifolds as well as other metal components in the facility. Touch-up paint kits are available from *ATEC Systems* or, if you prefer, paint can be ordered directly from Cardinal Industrial Finishes. The color and number is included in to the ATEC Systems, Treatment System Summary Table.

The ***ATEC Iron and Manganese Removal System*** is designed to provide years of trouble free service if you follow the installation and maintenance procedures outlined above. Nonetheless, from time to time, problems may occur as the result of powe r surges, lightning, unexpected changes in water conditions, failure to follow operating, particularly chlorination and backwash, and maintenance procedures outlined above or for a variety of other reasons. The *Trouble Shooting Guide* (on the following page) is designed to help you identify, trace and resolve the more common problems that have been reported to us over the years. Please review your problem and the *Trouble Shooting Guide* carefully before seeking outside help. Usually your filter system will be back in operation m uch more quickly if you follow the steps outlined in the *Trouble Shooting Guide* and the rest of this manual before you call for assistance. That said; do not hesitate to call for help at any time. The earlier problems are identified and resolved, the less potential there is for service interruption.

3RRU,URQDQG0DQJDQHVH5HPRYDO" 1. Improper chlorine dose 2. Insufficient backwash flow or frequency 3. Inadequate media volume	1. Check chlorine residual; consider increasing it to 1.0 mg/L. 2. Check restrictor valves. Backwash more often. 3. Add media to reach proper level or volume. This problem may be caused by excessive backwash flow rate. (See Backwash Flow Control)
&RQVLVWHQWO\+LJK3UHVVXUH'LIIHUHQWLDO" 1. Excessive contaminant load restricts flow through filters and prevents sufficient flow to properly backwash filters. 2. Insufficient backwash flow. 3. Sand in media bed.	1. Drain tanks, remove hand-hole access covers and remove any excessive or caked contaminants on the media bed surface. Add media to proper level. 2. Adjust backwash control valve to allow for increased backwash flow. 3. Sample raw water for sand content.
%DFNZDVK9DOYHV/HDN" 1. Obstruction in valve seat. 2. Rubber poppet is worn or damaged 3. Diaphragm is damaged (leaking from bleed port of diaphragm chamber at rear of valve.	1. Remove obstruction. 2. Replace rubber poppet. 3. Replace diaphragm. Install pressure regulator is necessary to control problem.
:DWHU+DPPHU" 1. Long backwash line causing vacuum. 2. Air in tanks.	1. Install vacuum breaker on backwash line. 2. Bleed off trapped air. Check for leaks in pump suction. Air bleed off valve may help.
,QFUHDVLQJ)UHTXHQF\RI%DFNZDVK&\FOH" 1. Duration of backwash or flow is inadequate to flush filter bed of contaminants. 2. Insufficient media volume. 3. Increased levels of contaminants in water supply. (Possibly seasonal problem.)	1. Readjust backwash flow. 2. Add media to achieve proper level. Check backwash flow. 3. Install Additional filter tank(s) to system.
$XWRPDWLF%DFNZDVK)DLOVWR&\FOH" 1. Controller power off or circuit breaker tripped. 2. Improper setting of pressure differential switch. 3. Insufficient system pressure to actuate valves. 4. Solenoid(s) malfunctioning.	1. Turn power on. Assure that wiring is properly connected. Re-set circuit breaker. 2. Adjust as required. 3. Check system for pressure leaks (break in irrigation line, cracked pressure control tubing, etc). 4. Check connections. Clean parts. Check filter screen on high pressure control line for damaged screen and replace if necessary.
'HFUHDVLQJLURQRUPDQJDQHVHUHPRYDO" 1. Improper backwashing 2. Improper chlorine residual 3. Change in raw water quality	1. Check backwashing rate, frequency and duration. Make sure all valves are operating. 2. Check chlorine residual on a daily basis. 3. Check raw water iron and manganese concentrations
6WHDGLO\LQFUHDVLQJKHDGORVV" 1. Sand in raw water 2. Improper backwashing	1. Check raw water for sand content. 2. Check backwashing rate, frequency and duration.