



A.B.E.
Environmental Technologies Inc.
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Reverse Osmosis (RO) Preventive Maintenance

RO Maintenance – Troubleshooting

Industrial Water Purification

Reverse Osmosis (RO) is a well-established process. Water is forced under pressure through a semi-permeable membrane, leaving dissolved and particulate impurities behind. RO systems are compound assemblies consisting of multiple technologies, each of which does a necessary job and has specific maintenance requirements. For an RO system to work reliably and economically, the unit and associated equipment ***must be routinely maintained.***

RO Preventive Maintenance

A.B.E.Environmental Provides Economical RO Preventive Maintenance

Experienced A.B.E. Technicians routinely visit RO systems of any size or manufacturer to monitor unit performance and maintain the pretreatment system at peak efficiencies. During these service visits, they make any necessary adjustments, add chemical to feeder tanks, change filters, and schedule any necessary repairs. At the end of each visit, A.B.E. Technicians update maintenance logs and provide complete documentation of work done. Technicians are available **24/7** at **519-780-2371**.

With an A.B.E. RO preventive Maintenance Agreement, your RO unit will consistently provide the optimum quality and quantity of product water within the design limits of the system. As an option, A.B.E. will also maintain auxiliary system components such as permeate storage tanks, pumps, softeners, carbon filters, or deionizers.

RO Maintenance Checklist

RO units, large or small need consistent and timely maintenance

A Typical RO PM Checklist:

- Test RO feed water TDS, chlorine and water hardness content
- Check and set pretreatment filter and water softener clocks
- Log RO pump pressure, flow rate and temperature
- Test RO product water TDS and log flow rates
- Test RO reject water TDS and log flow rates
- Log Recovery %
- Log Rejection %
- Log pressure gauge readings. Change RO pre-filters
- Check salt/ chemical tank levels and add as needed. Repair any minor leaks. Update PM Logs



RO Service Logs

All maintenance activities, routine or otherwise, are logged. Maintenance activities are logged no matter how mundane. When troubleshooting, the more information available on the routine operation of the system the better.

Setting Up an RO PM Service

Establishing Component Baseline Performance

- A.B.E. Technicians start an RO evaluation by meeting with customer personnel familiar with the operation of the water purification system to get their ideas and review requirements.
- Our personnel inspect the RO system from the raw water inlet to the pure water outlet. They take measurements, make sketches, take pictures where allowed, record all pertinent data including part numbers, descriptions, model numbers, and voltages.
- They perform a 7 point general mineral water analysis on RO feed, brine and product water.
- Our personnel review the installation to assess the probable long-term performance capability, and report any problems found during the inspection phase to the customer.
- With this data and other tests, we provide our customer with a **System Evaluation** report on the current performance level of all of the equipment in the system.
- As an option, we develop an **"As-Built" AutoCAD drawings** of the system from observations, measurements and photographs.
- We use the drawing and notes to write a **Maintenance Manual**, specific to the system, which outlines a PM schedule, service frequency, and all activities necessary to keep the RO system in top operating condition. The **PM Service Checklist** is then generated.

A.B.E. Environmental Technologies: RO PM Service Checklists and Agreements

Standard Service Visit

- Analyze City water TDS, pH, temperature and pressure, hardness, chlorine or chloramines
- Function of water softener or sequestering agent feeder
- Function of carbon filter or reducing agent feeder
- Check all controls and adjust if necessary
- Check for hardness and chlorine in RO feed water
- RO pump pressure
- RO product water TDS, temperature and pressure, flow rate
- RO Brine TDS, pressure, and flow rate
- Recovery %
- Rejection %
- Add salt to the water softener brine tank as required
- Add sequestering agent to feeders as required
- Add reducing agent to feeders as required
- Change filters on a schedule or as needed
- General system inspection

Optional Full Pure Water System Maintenance

A Full RO System Maintenance Service Would Include:

- RO Preventive Maintenance service as described above
- Sequentially cleaning RO elements at A.B.E, or if system capable, clean and sanitize membranes in place, as needed
- Replace RO elements, as needed
- Change U.V. lights every 6 months, 9 months or yearly, depending on performance
- Replace sub-micron filters, replace carbon media when required
- Change vent filter on storage tank every 6 months
- Periodic full system sanitization including storage tanks and loops every 3, 6, or 12 months, depending on requirements and results of microbiological test procedure
- Any other water purification service required that is system specific

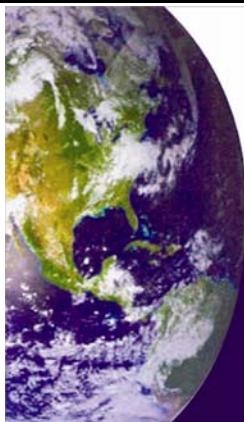
RO-DI System Trouble Shooting

NOTE: With an A.B.E Maintenance Agreement in place, problems can usually be avoided or at least predicted, making emergency troubleshooting unnecessary. One of the more valuable benefits of implementing an A.B.E. Maintenance Agreement is the capability of our Service Technicians to provide complete system troubleshooting. This is especially so at the beginning of a PM service contract. A.B.E. technicians are experienced in troubleshooting a wide variety of water purification products and equipment.

With over **50 years of experience**, A.B.E. technicians and engineers can repair, maintain, and upgrade almost any Reverse Osmosis unit, regardless of manufacturer.

New Customer Problems Solved by A.B.E. Water Service Technicians:

- Insufficient water was being produced by the system
- Insufficient water pressure before/after the system
- The RO pump was drawing too much current
- The RO product water quality was below specification
- The final water quality was below specification
- Bacteria or other Organics were interfering with the process
- Filters were plugging too rapidly
- Hard water was getting to the RO Membranes
- Chlorine was present in the RO feed
- The Recovery rate of the RO was too low
- The water system became contaminated within days of sterilization
- *Your Problem?*



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**For More Information Please Call
519-780-2371**

Limited Warranty: A.B.E. Environmental Technologies Inc. warrants service labor and material for 1 year from the date of work. In case of defect in material, labor, or service, A.B.E.'s sole responsibility is for the replacement or repair of the specific defect and cannot be held liable for losses of any kind arising from the defect. (Please see Terms and Conditions of Service)

Example Maintenance Schedule

Multimedia Filter

Maintenance: _____ Frequency:

- | | | |
|----|-----------------------------|-------------|
| 1. | Check Pressure Drop | every visit |
| 2. | Back wash filter | as needed |
| 3. | Check and adjust Controller | as needed |

Carbon Filter

Maintenance: _____ Frequency:

- | | | |
|----|-----------------------------|-------------|
| 4. | Test for chlorine | every visit |
| 5. | Back wash filter | as needed |
| 6. | Check and adjust Time Clock | as needed |

Water Softener

Maintenance: _____ Frequency:

- | | | |
|-----|-----------------------------|-------------|
| 7. | Check Hardness | every visit |
| 8. | Fill Brine Tank | as needed |
| 9. | Regenerate Softener | as needed |
| 10. | Check and adjust Time Clock | as needed |

5 Micron Cartridge Pre-Filters

Maintenance: _____ Frequency:

- | | | |
|-----|----------------------------|-------------|
| 11. | Check Pressure Drop | every visit |
| 12. | Log and replace cartridges | as needed |

Sequestering Agent Solution Feeder

Maintenance: _____ Frequency:

- | | | |
|-----|------------------------------|-------------|
| 13. | Log Chemical level | every visit |
| 14. | Log Chemical addition | every visit |
| 15. | Repair/rebuild chemical pump | as needed |

Reverse Osmosis Unit

Maintenance: _____ Frequency:

- | | | |
|-----|---|-------------|
| 16. | Log Product water profile* | every visit |
| 17. | Log Feed profile* | every visit |
| 18. | Log Brine profile* | every visit |
| 19. | Log Inspection Report | every visit |
| 20. | Log and Report Action Alerts
(Profile: TDS, pH, Temperature, Pressure, Hardness,
Rejections Rate, Recovery Rate, etc) | every visit |

Ultraviolet Sterilizers

Maintenance: _____ Frequency:

- | | | |
|-----|---|--------------------|
| 21. | Log U.V. intensity reading | every visit |
| 22. | Replace U.V. lamps | scheduled or at X% |
| 23. | Micro-bio testing, giving the time and date | |

Sub Micron Cartridge Filters

Maintenance: _____ Frequency:

- | | | |
|-----|----------------------------|-------------|
| 24. | Check Pressure Drop | every visit |
| 25. | Log and replace cartridges | as needed |

EDI/Portable Exchange Deionizers

Maintenance: _____ Frequency:

- | | | |
|-----|------------------------|-------------|
| 26. | Log water quality | every visit |
| 27. | Call and Log Exchanges | as needed |
| 28. | Check for leaks | every visit |

General: Check area, update logs, provide customer report

Notes:



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Turn-Key Water Purification

When you buy an A.B.E. product, you automatically get A.B.E. Service People, as scheduled, on-site for the first year.

When you buy a A.B.E. product you get:

- Quick and professional installation and startup of all equipment.
- Extended warranties in the form of free one year on-site support, as scheduled, across North America.
- Concise illustrated Maintenance and Operating manuals on all water treatment equipment from A.B.E. Where more than one type of equipment is being used, as an option, A.B.E. can provide an Operating and Maintenance Manual on what each piece of equipment does and how it does it, and how it all works together as a system. With this option, the manual includes an “As Built” 3-D illustration of the whole system
- Free Telephone and e-mail support on A.B.E. equipment installed anywhere in the world for the life of the equipment.