



AIX Treatment Engineering Checklist for Public Water Systems

This checklist outlines required documentation and important considerations in designing and implementing effective Anion Exchange (AIX) PFAS treatment that aligns with design standards and regulatory requirements outlined in the Vermont Water Supply Rule (Rule). The intent is to streamline and expedite the design and Permit to Construct review process for treatment installations at impacted public water systems. Any proposed variances to the Rule shall be accompanied by supporting documentation and a separate Variance Request (Section 3.7 of the Rule). If more space is needed for the responses, please attach additional pages or reference the section/page of the Engineering Report that covers this.

Water System Overview and Treatment Space

1. An overview of the water system and a brief description of the proposed construction is provided in the Engineer's Report and/or Basis of Design. Yes No

2. A description of the treatment system space is included in the Engineer's Report and/or Basis of Design. The description includes:
 - a. The operational and maintenance space, and any impacts the proposed treatment will have on the area. Yes No
 - b. Indication that the treatment space is heated and ventilated, not located in a confined space, and not located within a flood plain (determined as any area which is flooded with an average frequency of once or more in each 100 years as determined by the secretary). Yes No

3. A description of existing facilities that may impact the proposed treatment design is provided. (Consider existing wells, pump stations, treatment facilities, and storage facilities).
Yes No

4. Proposed treatment equipment will be housed in enclosures that provide adequate room for routine operation and maintenance and will protect equipment from weather elements.
Yes No



5. If new structures are needed to house treatment equipment, a description is provided.

Yes No Not Applicable

6. If standby power is currently available, is it adequate to run the proposed new infrastructure?

Yes No Not Applicable

7. Evaluate existing disinfection treatment infrastructure (if applicable). If improvements are necessary to ensure disinfection treatment meets requirements of Appendix A, Subpart 4.3 of the Rule and 40 CFR Part 141, a discussion is provided.

Yes No Not Applicable

8. A location map is provided. Yes No

9. The following have been provided in the Engineer's Report and/or Basis of Design:

a. Design flow/ADD (gpd)	Yes	No
b. Design rate/MDD (gpm)	Yes	No
c. The water system's long term / safe yield	Yes	No
d. Flow rate through treatment (gpm)	Yes	No
e. Instantaneous peak demand (gpm)	Yes	No

10. A description of any existing infrastructure that will be removed or modified as a part of the proposed project is provided. Yes No Not Applicable

11. A description of any other proposed improvements to the water system infrastructure (if applicable), such as new storage, new pumping facilities, etc. is provided.

Yes No Not Applicable

Water Quality Characteristics

1. A characterization of the contaminants and their concentrations that the proposed treatment is designed to remove is provided. Yes No



2. A characterization of the following **REQUIRED** water quality constituents and their concentrations that may interfere with AIX treatment is provided: *(Refer to PFAS Treatment Engineering Document (Section 4.2.1) for more details on interfering water quality constituents).*

a. Nitrate (mg/L)	Yes	No
b. Iron (mg/L)	Yes	No
c. Manganese (mg/L)	Yes	No
d. Turbidity (NTU)	Yes	No
e. pH	Yes	No
f. Alkalinity (mg/L)	Yes	No
g. Hardness (mg/L)	Yes	No
h. Total Organic Carbon (mg/L)	Yes	No

3. A characterization of the following **SUGGESTED** water quality constituents and their concentrations that may interfere with AIX treatment is provided: *(Refer to PFAS Treatment Engineering Document (Section 4.2.1) for more details on interfering water quality constituents).*

a. Nitrite (mg/L)	Yes	No
b. Phosphate (mg/L)	Yes	No
c. Sulfate (mg/L)	Yes	No
d. Bicarbonate (mg/L)	Yes	No
e. Chloride (mg/L)	Yes	No

4. A description on how the water quality constituents can impact AIX resin lifespan and whether pretreatment is needed is provided. *(Refer to the PFAS Treatment Engineering Document (Section 4.2.1) for specific water quality constituents.)*

Yes No

5. AIX treatment has the potential to increase treated water corrosivity. A description on mitigation measures is provided and includes any operational adjustments, post-treatment corrosion control, or alterations to existing corrosion control.

Yes No

6. Water quality samples were collected and analyzed in accordance with requirements of Subchapter 21-6 and Appendix A. Part 4.12.1(a) of the Rule.

Yes No

Unknown



7. A description of the water sampling locations, including when and where water samples were collected is provided. Yes No Not Applicable

AIX Design Considerations

1. For TNC and Domestic Bottled Water Systems: At least one train of two AIX units are plumbed in series? Yes No Not Applicable

2. For Public Community and NTNC Water Systems: At least two treatment trains are proposed, each train consisting of two AIX exchange units plumbed in series?

Yes No Not Applicable

a. Where only two trains are proposed, each train is capable of meeting the Permitted Water System Demand Design Rate (MDD) at the proposed filtration rate.

Yes No Not Applicable

b. Where more than two treatment trains are proposed, the AIX units are capable of meeting the Permitted Water System Demand Design Rate (MDD) at the approved filtration rate with one treatment train removed from service.

Yes No Not Applicable

3. All wetted components are NSF 61 certified. Yes No

4. All treatment chemicals are NSF 60 certified.

Yes No Not Applicable

5. All chemicals proposed in the design are described in the Engineer's Report and/or the Basis of Design? Yes No Not Applicable

6. A justification for the choice of the selected AIX resin is provided and considers the water quality of the source water, including the resin's preferential list. Yes No

7. The AIX resin manufacturer and type is provided. Yes No



9. Equipment manufacturer's specifications for units, including minimum and maximum flow rates, pressures, operating temperatures and other applicable design parameters are provided.

Yes No

11. The AIX vessel (internal and external) diameter and height are included in inches.

13. A description of the underdrains, supporting gravel, and screens that will prevent resin loss is provided.

15. The volume of resin in each unit (cubic ft.) is provided. Yes No

16. Calculations for the Empty Bed Contact Time (EBCT) for each AIX treatment train are provided.
(Calculations should meet or exceed the specifications in Appendix A. Subpart 4.12 of the Rule and be based on the actual volume of resin in the vessels, not the size of the vessels.)

Yes No



17. EBCT meets the 2-minute minimum per train as outlined in Appendix A. Subpart 4.12.2 of the Rule, assuming maximum flow rate through the primary (lead) vessel(s).

Yes

No

18. Calculations for the hydraulic loading rate in gallons per minute per square foot (gpm/ft²) of bed area of each unit are provided. *(The hydraulic loading rate must be between 6-16 gpm/ft², or as specified by the resin manufacturer per specifications in Appendix A, Subpart 4.12 of the Rule.)*

Yes

No

19. AIX units have necessary piping and valves to facilitate ease of operational adjustments to modify the configuration of primary (lead) and secondary (lag) units, and to remove a unit from service while maintaining functionality of treatment process.

Yes

No

If no, a justification is provided.

Yes

No

Not Applicable

20. Pressure gauges are added so that pressure loss across treatment units can be monitored.

Yes

No

21. A description of the range and precision of the pressure gauge including maximum operating pressure is provided.

Yes

No

22. Pressure gauges are appropriately sized to monitor the pressure loss across the units per manufacturer specification, which is provided.

Yes

No

23. The expected pressure loss across each AIX unit is provided.

Yes

No



31. Sample ports are provided for the inlet and outlet of each unit. Yes No
32. Design drawings demonstrate that all sampling ports and gauges are accessible and that the lead/lag changeout can be accomplished. Yes No
33. A description of what engineering controls are included in the design to prevent the AIX units from dewatering is provided. Yes No
34. A description of filter to waste provisions for the AIX units during startup and resin changeout is provided. Yes No
35. A discussion of how the water system will maintain acceptable finished water pH following AIX treatment is provided. Yes No
36. Waste discharge pipes will be installed with an air gap between the discharge and the disposal point to prevent back-siphonage. The air gap will be a minimum of 6 inches, or twice the discharge pipe diameter, whichever is greater. Yes No

Pretreatment Considerations

1. Water quality constituents that will prevent successful performance of the proposed AIX treatment are present and pre-treatment is necessary. Yes No
2. Pretreatment rationale and how it can impact water quality and PFAS treatment performance is provided and includes the treatment processes and sequence of treatment. Yes No Not Applicable
3. Treated water below the Vermont PFAS MCL will be used for the backwashing of any pretreatment processes. Yes No Not Applicable



4. If backwashing/regenerating pretreatment is proposed, a description of how the backwash/regenerated water will be supplied, and where the wastewater will go is provided.

Yes

No

Not Applicable

5. Backflow prevention on the pretreatment backwash line is provided.

Yes

No

Not Applicable

6. If backwashing/regeneration is proposed, the additional demand on booster pumps and well pumps is provided in gpm.

Yes

No

Not Applicable

7. The total volume of backwash water and the anticipated frequency of backwashing is described.

Yes

No

Operations and Maintenance

1. The Water System has the appropriate Operator Classification for the proposed treatment system.

Yes

No

2. A description of where treatment chemicals will be stored for all chemicals identified in proposed treatment design is provided.

Yes

No

Not Applicable

3. A description of how initial rinse to waste of the AIX resin will be completed upon installation and media change out is provided.

Yes

No

4. Applicable to CWS and NTNCs only: verify how the water system intends to operate PFAS treatment system:

- a. One train on stand-by at all times until breakthrough of the PFAS compounds listed in Section 6.12 at the entry point to the distribution system, followed by the valving-off of the expired train(s) and valving-on of the stand-by train and initiation of the changeout procedure. ☐



10. The location where Entry Point samples will be collected is provided. Yes No



State of Vermont, Agency of Natural Resources

PFAS AIX Treatment Design Checklist (Revised December 26, 2025)
