



OPTIMIZING DEMINERALIZATION:

Why Mixed-Bed Units Should Not Follow RO + Degasser Directly A TECHNICAL JUSTIFICATION

Why Mixed-Bed Units Should Not Be Placed Directly After RO and Degasser Systems?

Short Answer: Certainly Not. Let's Understand Why.

What is a Mixed-Bed Unit?

A Mixed-Bed unit is a polishing unit, not a treatment unit. It is typically used after the Cation and Anion exchangers. This unit contains a mix of Cation and Anion resins thoroughly blended together. Each bead pair essentially forms a miniature DM (Demineralization) system, and collectively, they provide high-purity water by further polishing the already demineralized water from upstream systems.

In Cation and Anion exchangers, water is treated by respective resins to remove the majority of dissolved mineral salts. The ideal treated water at this stage contains only residual amounts of sodium (a positive ion) and hydroxide (a negative ion), typically no more than 5 ppm in total.

Role of Mixed-Bed in Water Treatment

As a polishing unit, the Mixed-Bed is not designed to handle high levels of mineral content. In fact, it operates at a higher flow rate—typically more than 2.2 times that of the Cation or Anion units. The presence of minerals other than sodium and hydroxide, even in trace amounts, severely affects its performance and efficiency.

When this happens:

- The Mixed-Bed begins functioning like a primary ion exchange unit rather than a polishing unit.
- It gets oversized to handle the unnecessary load.
- Regenerant chemicals like HCl (hydrochloric acid) and NaOH (caustic soda) are wasted.
- Its operation becomes inefficient, typically performing only at 25–30% of its actual potential.
- The Output Between Regeneration (OBR) is greatly reduced. For reference, the OBR of a Mixed-Bed is designed to be approximately three times that of the Anion exchanger.

Why Mixed-Bed Should Not Follow RO + Degasser Directly

Reverse Osmosis (RO) followed by a Degasser does not fully remove all dissolved ions. The treated water still contains traces of:

- Cations: Calcium, Magnesium, Sodium
- Anions: Chloride, Sulphate, Nitrate, and Alkalinity

Passing this RO + Degassed water directly into a Mixed-Bed unit:

- Forces it to operate as a primary exchanger (like Cation/Anion), not a polisher.
- Leads to oversized equipment and underutilized performance.
- Results in higher operational costs and inefficient regenerant usage.

Best Practice Recommendation

The correct sequence should be:

- i. RO System
- ii. Degasser
- iii. Cation Exchanger
- iv. Anion Exchanger
- v. Mixed-Bed Polisher

This ensures that:

- The Cation and Anion exchangers remove most of the remaining salts.
- The Mixed-Bed operates at its optimal polishing efficiency.
- Chemical consumption is minimized.
- The system achieves maximum OBR with minimal regenerant loss.

Conclusion:

The Mixed-Bed unit should never be installed directly after the RO + Degasser system. It is a polishing unit, not a treatment unit, and should always follow Cation and Anion exchangers to ensure efficiency, cost-effectiveness and extended resin life. This sequence avoids indirect operational losses and ensures consistent high-purity water output.