

Technical Service Bulletin 903

Loading of Resin

There are variety of ways for the loading/unloading resins depending on the equipment design and procedures developed at the site for its own suitable ways. Before loading the resins, it is recommended to make a detailed inspection of the empty column.

1. Equipment and Materials

- Ion exchange column(s)
- Ion exchange resin
- Feed water
- Personal Protective Equipment (PPE)

2. Pre-loading Procedures

2.1 Safety Precautions

- Wear appropriate PPE, including safety goggles and gloves
- Check PPE before use.
- Ensure fall distance before selecting PPE.
- Lockout–tagout (LOTO) all the drives to ensure water will not enter column while working.
- Ensure people are not working near column when hardware/tools are used to open the Manholes.
- Ensure proper ventilation in work area.
- Familiarize yourself with the Material Safety Data sheet (MSDS) for each resin

2.2 Column Preparation

- 1) Ensure that all debris from used resins or foreign materials is removed from the column(s).
- 2) Clean the distributors and inspect all laterals, splash-plates, and nozzles for any damage or blockages.
- 3) Check the integrity of the rubber lining, if present, and perform a spark test if possible.
- 4) Whenever possible, check the pressure loss of the empty column at nominal flow rate and observe the flow patterns for uniformity.

3. Loading Procedure for Single Bed

A single bed is a resin column in which only one type of ion exchange resin is charged.

- 1) Fill column with sufficient feed water to allow settling to avoid resin damage.
- 2) Load the ion exchange resin about one-third of the total resin capacity to be charged by pouring it from the

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top or by the use of a vacuum eductor.

- 3) Drain excess water as necessary.
- 4) Let the bed settle for 10 minutes.
- 5) Wait for 10 minutes for the resin bed to settle.
- 6) Drain the water until further resin quantity can be added.
- 7) Repeat the procedure from step 2 to step 7 till complete quantity is loaded.
- 8) Backwash the resins for 30 mins.
- 9) Drain the water until the water level is 0.1 meter higher than resin bed height.
- 10) Take ion exchange resin sample if needed.
- 11) Close Column and carry out double regeneration.
- 12) For Small Columns resin can be filled in a single step.

4. Loading Procedure for Mixed Bed Resins

A mixed bed produces high-purity water by mixing cation and anion exchange resins. It separates two types of ion exchange resins around a middle collector, and it is important to separate each part of ion exchange resins including its level. Therefore, caution should be taken during the charging process.

4.1 Cation Resin

- 1) Fill the column with sufficient feed water to allow settling to avoid resin damage.
- 2) Load the cation exchange resin by pouring it from the top or by the use of a vacuum eductor. Drain excess water from bottom as necessary.

Note

Top level of cation exchange resin (H form) layer should approximately align with center of the middle collector. The Middle Collector position shall be carefully designed to match the volume of resin. This condition will not apply when Inert resin is used. In such case the Middle Collector position shall be as per the Inert resin volume.

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4.2 Anion Resin

- 1) Check if the top layer of the charged cation exchange resin is flat, and if not, apply a reverse flow that moves the top layer of the resin slightly to make it flat.
- 2) Load the anion exchange resin from the top manhole of the resin column, and if drainage is necessary, drain it through the middle collector.
- 3) After loading the resin, add water from the top of the resin column and flush with twice the resin Bed Volume using feed water, for about 10 minutes, by draining through the middle coll

Note

If water should be added after completing the loading of the anion exchange resin, it should be added up to the top or the top of collector of the resin column, and drainage should be done through the middle collector. It is not recommended to apply a reverse flow or add water through the middle collector, as this can cause disturbance in the resin bed.

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5. Precautions

- Avoid dropping resin beads from a height to prevent breakage.
- Do not overfill the column; leave adequate space for resin.
- Prevent the resin from drying out during the loading process.
- Avoid contamination of the resin with oils, metals, or other impurities.
- Handle the resin gently to prevent physical damage to the beads.

6. Quality Control

- Verify the final bed height meets specifications.
- Check for uniform distribution and absence of channels or cracks in the resin bed.
- Confirm proper sealing of all column fittings.

7. Documentation

- Record the type and quantity of resin used.
- Document any observations or deviations from standard procedures.
- Update relevant logs and maintenance records.

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