

Regeneration of Softener Units

The end of a softener service cycle is determined by either a timed service run, total gallon throughput, or a high measure of hardness in the softener effluent. A four-step regeneration sequence is then performed.

1. BACKWASH CYCLE

The backwash cycle expands the resin bed from its settled and packed condition and cleans the resin by flushing out any suspended solids that may have been filtered out during the service run. Resin particles can act as effective filter media because they have ionic charges which can coagulate fine particles. During the backwash, the resin beads rub against each other and this scrubbing action helps clean the surface of the beads from accumulated dirt. The backwash flow also removes any broken resin particles or resin fines. Also, the backwash cycle classifies the bed with the larger resin beads on the bottom and the finer resins on top. This provides the best conditions for a good uniform flow of brine, rinse, and service.

It is desirable to expand the softener resin bed about 50% and to have the duration of the backwash cycle long enough to effectively remove all of the resin fines and other suspended solids. At ambient temperatures (about 60oF), using standard softening cation resin, a flow rate of six gallons per minute per square foot of surface area for a duration of 10 to 15 minutes is sufficient. It is very important to consult manufacturer's literature for the specific resin being regenerated to find the correct backwash flow rate. The backwash flow rate is very dependent on temperature, cooler water expands the bed more than warmer water.

2. BRINE INTRODUCTION

Sodium chloride is used as the regenerant chemical for converting exhausted softener resin back to the sodium form. It is applied to the bed at a concentration of 8 to 12%, usually 10% is the norm. A contact time of 30 minutes is desirable. The total contact time is calculated from the time the brine is introduced to the bed until it is displaced from the bed during the slow rinse. Salt dosage range is from 6 to 15 pounds per cubic foot.

3. SLOW RINSE

The slow rinse or displacement step removes from the bed the volume of brine regenerant that is still in the vessel. This is the most pure brine that the resin will see so it is important not to flush it out too quickly. During the slow rinse cycle, the valve from the concentrated brine is shut and only the dilution water is introduced to the bed at the dilution water flow rate. It helps if the dilution water and the slow rinse water are from a softened water supply.

4. FAST RINSE

The final step is a fast rinse and it is performed at the service flow rate. The fast rinse step removes any residual brine from the resin beads and helps to flush out any brine that may be present in dead areas in the tank. The recommended flow rate is 1 to 1.5 gallons per minute per cubic foot minimum.

Refer to the ResinTech literature for a specific regeneration recommendations and capacity predictions.

