QUALITY SWEETENS.

Start-up Conditions for Food-grade Lewatit® Ion Exchange Resins

QUALITY WORKS.
In the food industry, high demands are placed on products that come into contact with food. Ion exchange resins that meet food contact requirements with regard to their composition must be pretreated by the user in accordance with the manufacturer’s instructions, to comply with the extraction limits described in the associated regulations. In this brochure, the start-up conditions are described according to the resin type and area of application in order to meet the manufacturer’s declarations drawn up by LANXESS on the use of Lewatit® ion exchange resins in the food sector.

Recommended specifications for regeneration chemicals of Lewatit® ion exchange resins

<table>
<thead>
<tr>
<th>Appearance</th>
<th>Sodium chloride</th>
<th>Hydrochloric acid</th>
<th>Sulfuric acid</th>
<th>Sodium hydroxide</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conc. NaCl</td>
<td>&gt;97%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conc. HCl</td>
<td>&gt;30%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conc. H2SO4</td>
<td></td>
<td></td>
<td>&gt;93%</td>
<td></td>
</tr>
<tr>
<td>CO₃²⁻ content</td>
<td>&lt;0.2% (2,000 ppm)</td>
<td>&lt;0.2% (2,000 ppm)</td>
<td>&lt;0.1% (1,000 ppm)</td>
<td></td>
</tr>
<tr>
<td>Cl⁻ content</td>
<td></td>
<td></td>
<td>&lt;1% (10,000 ppm)</td>
<td>&lt;0.5% (5,000 ppm)</td>
</tr>
<tr>
<td>SO₄²⁻ content</td>
<td>&lt;1% (10,000 ppm)</td>
<td>&lt;0.5% (5,000 ppm)</td>
<td>&lt;0.1% (1,000 ppm)</td>
<td></td>
</tr>
<tr>
<td>SiO₂ content</td>
<td>&lt;0.004% (40 ppm)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alkaline earth content (Ca²⁺)</td>
<td>&lt;0.4% (4,000 ppm)</td>
<td>WS &lt;100 ppm*</td>
<td>&lt;0.01% (100 ppm)</td>
<td></td>
</tr>
<tr>
<td>Iron content (Fe³⁺)</td>
<td>0.001% (10 ppm)</td>
<td>&lt;0.002% (20 ppm)</td>
<td>&lt;0.002% (20 ppm)</td>
<td>&lt;0.001% (10 ppm)</td>
</tr>
<tr>
<td>Aluminum content (Al³⁺)</td>
<td></td>
<td></td>
<td></td>
<td>&lt;0.001% (10 ppm)</td>
</tr>
<tr>
<td>Mercury content (Hg²⁺)</td>
<td></td>
<td></td>
<td></td>
<td>&lt;0.001% (2 ppm)</td>
</tr>
<tr>
<td>Acid consumption (pH 8.2)</td>
<td>None</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Organochlorines</td>
<td>&lt;0.02 g/l (approx. 17 ppm)</td>
<td>Nil</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oxidants</td>
<td>&lt;4 ppm Cl₂</td>
<td>&lt;12 ppm Cl₂</td>
<td>&lt;10 ppm O₂</td>
<td></td>
</tr>
</tbody>
</table>

* For counter current regeneration process, when the lowest hardness leakage is required.

These specifications are based on DIN 19604, DIN 19610, and DIN 19615. The concentrations are expressed in % or in ppm, based on the weight of reagent of 100%.
## RECOMMENDED
### START-UP PROCEDURE

### Demineralization with strong acid cation resin types

#### Standard regeneration
Hydrochloric acid/sulfuric acid

#### Form supplied
Sodium

#### Resin types
- Lewatit® S 1568
- Lewatit® S 1668
- Lewatit® S 2568

### Procedure
1. The resin should be transferred to the column and soaked in demineralized, soft, or drinking water for approximately one hour.
2. Backwash the resin for at least 30 minutes.
3. Let the resin bed settle and then drain to within 10 cm of the top of the bed.
4. Let 4 bed volumes of hydrochloric or sulfuric acid solution (6% HCl or H₂SO₄) pass through the column at a rate of 2 bed volumes per hour.
5. Rinse the resin with at least 4 bed volumes of demineralized water at a flow rate of 2 bed volumes per hour.
6. Let 4 bed volumes of caustic soda solution (4% NaOH) pass through the column at a rate of 2 bed volumes per hour.
7. Rinse the resin with at least 4 bed volumes of demineralized water at a flow rate of 2 bed volumes per hour.
8. Let 4 bed volumes of hydrochloric or sulfuric acid solution (6% HCl or H₂SO₄) pass through the column at a rate of 2 bed volumes per hour.
9. Rinse the resin with at least 5 bed volumes of demineralized water at a flow rate of 2 bed volumes per hour.
10. Take the resin into service.

### Inversion/demineralization with strong acid cation resin types

#### Softening and dealkalization with weak acid cation resin types

#### Standard regeneration
Hydrochloric acid/sulfuric acid

#### Form supplied
Hydrogen

#### Resin types
- Lewatit® S 2328
- Lewatit® S 2568 H
- Lewatit® S 8528

### Procedure
1. The resin should be transferred to the column and soaked in demineralized, soft, or drinking water for approximately one hour.
2. Backwash the resin for at least 30 minutes.
3. Let the resin bed settle and then drain to within 10 cm of the top of the bed.
4. Let 4 bed volumes of hydrochloric or sulfuric acid solution (6% HCl or H₂SO₄) pass through the column at a rate of 2 bed volumes per hour.
5. Rinse the resin with at least 4 bed volumes of demineralized water at a flow rate of 2 bed volumes per hour.
6. Let 4 bed volumes of hydrochloric or sulfuric acid solution (6% HCl or H₂SO₄) pass through the column at a rate of 2 bed volumes per hour.
7. Rinse the resin with at least 5 bed volumes of demineralized water at a flow rate of 2 bed volumes per hour.
8. Take the resin into service.
**RECOMMENDED START-UP PROCEDURE**

### Softening with strong acid cation resin types

**Standard regeneration**
- Brine solution

**Form supplied**
- Sodium

**Resin types**
- Lewatit® S 1568
- Lewatit® S 1668
- Lewatit® S 2568

**Procedure**

1. The resin should be transferred to the column and soaked in demineralized, soft, or drinking water for approximately one hour.
2. Backwash the resin for at least 30 minutes.
3. Let the resin bed settle and then drain to within 10 cm of the top of the bed.
4. Exhaust the resin with 4 bed volumes CaCl2 solution (5%) at a rate of 2 bed volumes per hour or exhaust the resin with normal drinking water at a flow rate of 5–20 bed volumes per hour.
5. Rinse the resin with at least 4 bed volumes of demineralized or soft water at a flow rate of 2 bed volumes per hour.
6. Regenerate the resin with 2–3 bed volumes of NaCl solution (10%) at a rate of 2 bed volumes per hour.
7. Rinse the resin with at least 4 bed volumes of demineralized or soft water at a flow rate of 2 bed volumes per hour.
8. Take the resin into service.

### Thin juice softening/NRS process with strong acid cation resin types

**Standard regeneration**
- Caustic soda

**Form supplied**
- Sodium

**Resin types**
- Lewatit® S 1568
- Lewatit® S 1668

**Procedure**

1. The resin should be transferred to the column and soaked in demineralized water for approximately one hour.
2. Backwash the resin for at least 30 minutes.
3. Let the resin bed settle and then drain to within 10 cm of the top of the bed.
4. Regenerate the resin with 2 bed volumes of NaOH solution (4%) at a rate of 2 bed volumes per hour.
5. Rinse the resin with at least 4–8 bed volumes of demineralized or soft water at a flow rate of 2 bed volumes per hour.
6. Take the resin into service.
Demineralization
with strong basic anion resin types

Standard regeneration
Caustic soda

Form supplied
Chloride

Resin types
Lewatit® S 6268
Lewatit® S 6368
Lewatit® S 6368 A
Lewatit® S 6368 A SO4
Lewatit® S 7468

Procedure
1. The resin should be transferred to the column and soaked in demineralized, soft, or drinking water for approximately one hour.
2. Backwash the resin for at least 30 minutes.
3. Let the resin bed settle and then drain to within 10 cm of the top of the bed.
4. Let 4 bed volumes of caustic soda solution (4% NaOH) pass through the column at a rate of 2 bed volumes per hour.
5. Rinse the resin with at least 4 bed volumes of demineralized water at a flow rate of 2 bed volumes per hour.
6. Let 4 bed volumes of hydrochloric or sulfuric acid solution (6% HCl or H₂SO₄) pass through the column at a rate of 2 bed volumes per hour.
7. Rinse the resin with at least 4 bed volumes of demineralized water at a flow rate of 2 bed volumes per hour.
8. Let 4 bed volumes of caustic soda solution (4% NaOH) pass through the column at a rate of 2 bed volumes per hour.
9. Rinse the resin with at least 5 bed volumes of demineralized water at a flow rate of 2 bed volumes per hour.
10. Take the resin into service.

Decolorization
with strong basic anion resin types

Standard regeneration
Brine/alkalized brine solution

Form supplied
Chloride

Resin types
Lewatit® S 6268
Lewatit® S 6368
Lewatit® S 6368 A
Lewatit® S 6368 A SO4
Lewatit® S 5528

Procedure
1. The resin should be transferred to the column and soaked in demineralized, soft, or drinking water for approximately one hour.
2. Backwash the resin for at least 30 minutes.
3. Let the resin bed settle and then drain to within 10 cm of the top of the bed.
4. Let 3–4 bed volumes of alkalized brine solution (10% NaCl/1% NaOH) pass through the column at a rate of 2 bed volumes per hour at room temperature.
5. Displace the regenerant solution with 1.5 bed volumes of demineralized or soft water at a rate of 2 bed volumes per hour.
6. Rinse the resin with at least 5 bed volumes of demineralized or soft water at a flow rate of 2–5 bed volumes per hour.
7. Take the resin into service.
**RECOMMENDED START-UP PROCEDURE**

### Demineralization with weak basic anion resin types

**Standard regeneration**
Caustic soda

**Form supplied**
Free base/chloride

**Resin types**
- Lewatit® S 4268
- Lewatit® S 4228
- Lewatit® S 4328
- Lewatit® S 4468
- Lewatit® S 4528
- Lewatit® S 5228
- Lewatit® S 5221
- Lewatit® S 5328

**Procedure**

1. The resin should be transferred to the column and soaked in demineralized, soft, or drinking water for approximately one hour.
2. Backwash the resin for at least 30 minutes.
3. Let the resin bed settle and then drain to within 10 cm of the top of the bed.
4. Let 4 bed volumes of caustic soda solution (4% NaOH) pass through the column at a rate of 2 bed volumes per hour.
5. Rinse the resin with at least 4 bed volumes of demineralized water at a flow rate of 2 bed volumes per hour.
6. Let 4 bed volumes of hydrochloric or sulfuric acid solution (6% HCl or H₂SO₄) pass through the column at a rate of 2 bed volumes per hour.
7. Rinse the resin with at least 4 bed volumes of demineralized water at a flow rate of 2 bed volumes per hour.
8. Let 4 bed volumes of caustic soda solution (4% NaOH) pass through the column at a rate of 2 bed volumes per hour.
9. Rinse the resin with at least 5 bed volumes of demineralized water at a flow rate of 2 bed volumes per hour.
10. Take the resin into service.

### Chromatography with strong acid cation resin types

**Standard regeneration**

**Form supplied**
Sodium, calcium, potassium, hydrogen

**Resin types**
- Lewatit® MDS 1368 Ca/MDS 1268 Ca
- Lewatit® MDS 1368 Na/MDS 1268 Na
- Lewatit® MDS 1368 K/MDS 1268 K
- Lewatit® MDS 1369 Ca/MDS 1269 Ca
- Lewatit® MDS 1369 Na/MDS 1269 Na
- Lewatit® MDS 1369 K/MDS 1269 K
- Lewatit® MDS 2368

**Procedure**

1. The resin should be transferred to the column and soaked in demineralized water for approximately one hour.
2. Backwash the resin for at least 30 minutes.
3. Let the resin bed settle and then drain to within 10 cm of the top of the bed.
4. Rinse the resin with at least 2–4 bed volumes of demineralized water at a flow rate of 1 bed volume per hour (preferably at operating temperature).
5. Take the resin into service.
Polish with adsorbent resin types

Standard regeneration
Caustic soda
Ethanol

Form supplied
Nonfunctional

Resin types
Lewatit® S 7968
Lewatit® AF 5

Procedure

1. The resin should be transferred to the column and soaked in demineralized, soft, or drinking water for approximately one hour.
2. Backwash the resin for at least 30 minutes.
3. Let the resin bed settle and then drain to within 10 cm of the top of the bed.
4. Let 2 bed volumes of caustic soda solution (4% NaOH) pass through the column at a rate of 2 bed volumes per hour.
5. Rinse the resin with at least 4 bed volumes of demineralized water at a flow rate of 2 bed volumes per hour.
6. Let 0.5 bed volumes of hydrochloric or sulfuric acid solution (0.5% HCl or H₂SO₄) pass through the column at a rate of 2 bed volumes per hour.
7. Rinse the resin with at least 4 bed volumes of demineralized water at a flow rate of 2 bed volumes per hour.
8. Take the resin into service.

Alternative regeneration with ethanol 1–3 as above

4. Let 2 bed volumes of ethanol (50–96%) pass through the column at a rate of 2 bed volumes per hour.
5. Rinse the resin with at least 4 bed volumes of demineralized water at a flow rate of 2 bed volumes per hour.
6. Take the resin into service.
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