

# Handling, Preservation & Storage

## Storage and Shipping of SecondLife RO Elements

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### General

SecondLife RO Membrane Elements should be handled in such a way that biogrowth and change in membrane performance during long-term storage, shipping or system shut-downs are prevented. The elements should preferably be stored and shipped outside the pressure vessels and loaded into the pressure vessels just prior to startup. Follow accepted safety practices when using biocide solutions as membrane preservations. Always wear eye protection. Consult the relevant Material Safety Data Sheets as supplied by the manufacturer of the chemicals

### Storage and Shipping

SecondLife RO Membrane Elements are tested and shipped either in dry condition or as wet and preserved elements. Wet elements are preserved in a standard storage solution containing a buffered 1 wt% food-grade sodium metabisulfite (SMBS). The storage solution prevents biological growth during storage and shipping of elements

Wet elements are bagged in a durable, oxygen-barrier composite plastic bag and preservative solution is delivered prior to vacuum sealing. Precise preservative volume and high bag integrity help ensure a stable preservative environment during transportation and storage

Please follow these guidelines for storage of SecondLife RO Elements:

- Store inside a cool building or warehouse and not in direct sunlight.
- Temperature limits: 25°F to 95°F (–4°C to +35°C).
- New dry elements will not be affected by temperatures below 25°F (–4°C).
- Elements stored in 1% SMBS will freeze below –4°C, but the membrane will not be damaged, provided the elements are thawed before loading and use.
- Keep new elements in their original packaging
- Preserved elements should be visually inspected for biological growth 12 months after shipment and thereafter every three months. If the preservation solution appears to be not clear the element should be removed from the bag, soaked in a fresh preservation solution and repacked. In case no equipment for re-preservation (fresh solution, clean environment, bag sealing device) is available, the elements can be left in their original packaging for up to 18 months. When the elements are then loaded into the pressure vessels, they should be cleaned with an alkaline cleaner before the plant is started up.

## Storage and Shipping

Any SecondLife RO Element that has been used and removed from the pressure vessel for storage or shipping must be preserved in a preservation solution as follows:

- Use the standard storage solution of 1% food-grade SMBS (not cobaltactivated) in good-quality water (preferably reverse osmosis (RO) or nanofiltration (NF) permeate).
- Soak the element for 1 h in the solution; keep it in a vertical position so that the entrapped air can escape. Allow it to drip out, and seal it into an oxygen barrier plastic bag. We recommend reusing the original bag or original spare bags available from SecondLife RO. Do not fill the plastic bag with the preservation solution—the moisture in the element is sufficient, and leaking bags might create a problem during transport.
- Identify the element and the preservation solution on the outside of the bag.
- Re-preserved elements should be visually inspected for biological growth every three months. If the preservation solution appears to be not clear the element should be re-preserved and repacked as above.
- The pH of the preservation solution must never drop below pH 3. In the absence of a buffer such as is used in the original preservative, a pH decrease can occur when bisulfite is oxidized to sulfuric acid. Therefore, the pH of the bisulfite preservation solution should be spot checked at least every 3 months. Re-preservation is mandatory when the pH is 3 or lower.
- Wear protective gloves and sleeves to avoid prolonged contact with skin and sleeves when working with preservative.

## Re-wetting of Dried Out Elements

Elements that have dried out after use may irreversibly lose water permeability. Rewetting might be successful with one of the following methods:

- Soak in 50/50% ethanol/water or propanol/water for 15 minutes.
- Pressurize the element at 150 psi (10 bar) and close the permeate port for 30 minutes. Take care that the permeate port is reopened before the feed pressure is released. This procedure can be carried out while the elements are installed in a system. In this case, the pressure drop from the feed side to the concentrate side must not exceed 10 psi (0.7 bar) during high pressure operation with closed permeate port – otherwise the permeate backpressure near the concentrate end will become too high. Preferably, the permeate port is not completely closed but throttled to a value equal the concentrate pressure. Then there is no need for a special pressure drop limit.
- Soak the element in 1% HCl or 4% HNO<sub>3</sub> for 1 – 100 h. Immerse the element in a vertical position to allow the entrapped air to escape.

## Shipping

Unless otherwise specified, when SecondLife RO Elements have to be shipped, they must be preserved with a preservation solution according to Preservation and Storage. Make sure that:

- The plastic bag does not leak.
- The element is properly identified.
- The preservation solution is correctly labelled.

We recommend using the original packaging with the original polystyrene foam cushions to protect the element from mechanical damage. Elements with non flushcut product water tubes should be protected against damage to the product water tube ends.

The membrane elements will not be damaged by freezing temperatures during shipping provided the elements are thawed before loading and use.

## Disposal

SecondLife RO Elements can be disposed of as municipal waste, provided:

- No preservation solution or other hazardous liquid is contained in the element.
- No depositions of hazardous substances are on the membranes (e.g., elements used in wastewater treatment).

## Preservation of RO and NF Systems

The procedure of shutting down an RO/NF system has been described in Section 5.4. SecondLife RO Elements must be preserved any time the plant is shut down for more than a maximum of 48 h to prevent biological growth. Depending on the previous operational history of the plant, it will be necessary in almost all cases to clean the membranes prior to shut-down and preservation. This applies to cases when the membranes are known or assumed to be fouled. After cleaning, the preservation should follow within the next 10 h as follows:

1. Totally immerse the elements in the pressure vessels in a solution of 1 – 1.5% SMBS, venting the air outside of the pressure vessels. Use the overflow technique: circulate the SMBS solution in such a way that the remaining air in the system is minimized after the recirculation is completed. After the pressure vessel is filled, the SMBS solution should be allowed to overflow through an opening located higher than the upper end of the highest pressure vessel being filled.
2. Separate the preservation solution from the air outside by closing all valves. Any contact with oxygen will oxidize the SMBS.
3. Check the pH once a week. When the pH becomes 3 or lower, change the preservation solution.
4. Change the preservation solution at least once a month. During the shut-down period, the plant must be kept frost-free, and the temperature must not exceed 113°F (45°C). A low temperature is desirable.

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Form No . 10-D0007-en, Rev. 1  
January 2023

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