

Aquaporin Inside® Flat Sheet Reverse Osmosis Membrane

Shipping, Handling, and Storage Guide

Introduction

This document outlines the guidelines for the shipping, handling, and storage of Aquaporin Inside® Reverse Osmosis Flat Sheet Membranes (RO FS).

Proper handling and storage of RO FS is important to:

1. Prevent damage from handling, such as physical scratches. The polyamide rejective layer of RO FS is fragile and prone to damage, which would cause loss in functionality.
2. Prevent biogrowth on RO FS by following the storage guide written on the cardboard box.
3. Prevent performance deterioration due to harsh or inappropriate handling and/or environment. Contamination or chemical reactions may occur, which would irreversibly damage the functionality of RO FS.

Shipping and Transportation

During shipping and transportation, RO FS deterioration may occur due to several common causes: physical damage and harsh or inappropriate shipping or transportation environments. To ensure minimum or no damage to the RO FS from shipment and transportation, users shall:

1. Keep the RO FS packages away from protruding surfaces or sharp items to prevent physical damage to the RO FS.

2. Secure the RO FS packages on pallets, and move the pallet instead of directly gripping the RO FS package body.
3. Ensure that the placement of the RO FS packages on the pallet is stable and secure, to avoid external force and vibration to the membrane rolls.
4. During shipping and transportation, maintain the temperature below 40 °C. If the shipping period is longer than two months, temperature must be maintained below 30 °C. Prolonged exposure of RO FS to temperatures > 40 °C will accelerate the deterioration of membrane functionality.
5. The recommended shipping method is air shipment or temperature-controlled ocean freight.
6. Arrange land transportation with enclosed vehicles, such as box trucks, to protect RO FS from direct exposure to sunlight.

Storage

Prior to use, the user shall:

1. Store the RO FS in their original packaging. Keep dry and store away from direct sunlight.
2. Store RO FS in:
 - a. Temperatures within 5 to 35 °C, and
 - b. Relative humidities (RH) within 40 to 80%.

3. Avoid freezing the RO FS and keep away from any moisture.
4. Avoid storing RO FS with harsh and incompatible chemicals such as:
 - a. Corrosive, flammable, explosive or hazardous substances
 - b. Non-ionic or cationic surfactants, coagulants, organic solvents, oils, polymer, solid with scratches,
 - c. Chlorine gas, ozone, potassium permanganate, hypochlorite ions, and other oxidized substances.

After opening, the user should fully consume the RO FS as soon as possible.

If the storage of an opened RO FS roll is unavoidable, the user shall:

1. Store the opened RO FS roll in:
 - a. Temperatures within 20 to 30 °C, and
 - b. RH within 50 to 70%.
2. If the opened RO FS roll will not be consumed soon, it is recommended to pack it back to the original packaging, following the repacking procedures described in the RO FS Operation Guide. This is to minimise the oxidation and over-drying of RO FS.
3. Keep opened RO FS dry and store away from direct sunlight.
4. Store opened RO FS away from harsh or incompatible chemicals listed in the previous paragraph, point 4.

Handling

When using the RO FS after opening, the user shall:

1. Handle the RO FS roll with care. Avoid contacting the rolls with sharp items or protruding surfaces.
2. Avoid touching the active layer of RO FS with any sharp or rough items to prevent performance deterioration.
3. Handle the RO FS with clean hands or gloves to minimise contamination.
4. Avoid contacting the RO FS with harsh chemicals, as listed in the “Storage” section, which would affect RO FS performance.

Recommended Personal Protective Equipment (PPE) when handling RO FS:

1. Protective apparel
2. Safety gloves (nitrile rubber)
3. Eye protection (safety goggles)