

PROTON EXCHANGE MEMBRANES:

HANDLING, STORAGE AND PRE-TREATMENT INSTRUCTIONS

GENERAL

Ionomr's Pemion® membranes are the only hydrocarbon-based cation exchange membranes with the required chemical stability for operation in fuel cells. They have low ionic resistance, ultra-low hydrogen crossover, high electrical resistance, and excellent chemical and mechanical durability.

This document serves as a general guide for the handling, use, and storage of Pemion® membranes.

BEFORE YOU START

- Refer to the Pemion® Safety Data Sheet (SDS), and follow appropriate safety practices. Although Pemion® membranes are supplied in a dry state, the packaged product may contain residual water or trace solvents.
- Store, handle and process the membrane in a clean, dust-free, and well-ventilated environment, preferably in a relative humidity (RH) and temperature-controlled environment between 50-60% RH and 20-25 °C.
- All surfaces that come in contact with the membrane during handling, inspection, treatment, storage, and installation should be smooth and clean.
- Pemion® membranes are sensitive to moisture content, and may expand or contract in response to changes in relative humidity. Hence, proper control of ambient environmental conditions is strongly recommended.
- Pemion® membranes are incompatible with soaking in polar solvents such as alcohols for extended durations; Pemion® is readily soluble in polar solvents (see List of Suitable Solvents for Pemion®), but is insoluble in water.

• While on the clear backing sheet, Pemion® membranes are not compatible with temperatures exceeding 60 °C.

In addition, dry conditions (e.g., < 40% RH) are not recommended, because they may cause difficulty with removal of the membrane from the backing sheet.

- Free-standing Pemion® membranes (i.e., once the backer has been removed) are not compatible with temperatures exceeding 160 °C.
- Pemion® membranes are best used as-received. No pre-treatment is necessary, and soaking in aqueous solutions is not recommended. Pemion® will readily ion-exchange with aqueous electrolytes (cations) in solutions containing them.
- For applications requiring radical scavengers or antioxidants, it is recommended that their integration is achieved by incorporation into cell electrodes during cell assembly, rather than by soaking/exchange of the membrane.

HANDLING

Gloves should be worn at all times when handling Pemion® membranes.

- The membrane should be handled with care: do not puncture, crease, abrade, or tear the membrane. Any punctures, creases, lacerations, or abrasions of any kind may reduce membrane performance, or increase the likelihood of leaks (e.g., gas crossover).
- When cutting membranes to desired dimensions, best results are achieved by cutting membranes dry (prior to wetting/soaking, if applicable) using a new, sharp blade, or high-quality sharpened die. Care should be taken when cutting membranes and related membrane electrode assembly components via laser, because incorrect laser settings or operation may result in burred edges & negatively impact materials integrity.

STORAGE

- Storage of Pemion® membranes is best done in the native, dry form, with minimum exposure to heat, light, and changes to relative humidity.
- Storage in original humidity barrier packaging or analogous humidity barrier packaging between 21-25 °C and 50-60% RH is required; original packaging materials are resealable using a heat sealer.
- Membranes must be repackaged between uses, as per the instructions above.
- Membranes must not be left out in ambient lab environments for long periods of time (e.g., overnight or more). The acceptable period of time will depend on ambient temperature and RH.
- Wet storage is not recommended due to swelling of the material in aqueous environments.

REMOVAL OF PEMION® MEMBRANES FROM THE BACKING LAYER:

Primary method

1. With clean gloved hands, hold the membrane on its backing layer.
2. Using a thumb or a finger, rub against the corner edge of the membrane to produce separation from the backing layer.
3. Once corner separation from the backing layer is achieved, carefully and gently, begin to pull the membrane from the backing layer whilst holding the backer down on a clean dry surface.
4. As the backing layer is released, support the membrane as it is removed from the backing layer, until all of the membrane has been removed.

Secondary method

1. With clean gloves, wet a small corner or edge of the membrane/backing layer with de-ionized water; this should aid in separation of the membrane from the backing layer. Use of precision tweezers may additionally help with this separation. Repeat the steps 1 to 4 in the primary method.
2. If the membrane does not separate upon initial wetting, apply a small amount of water across an area close to the edge of the membrane and repeat the primary method. Do not subsequently use the wetted portion of the membrane in the device active area.

FOR COATING PEMION® MEMBRANES AFTER REMOVING FROM THE BACKING LAYER

Ensure that the membrane remains flat.

A powder coating masking tape (e.g. 3M™ Polyester Tape 8992, https://www.3mcanada.ca/3M/en_CA/p/d/b40070623/), or generally low bonding strength tape is recommended to overlap the edges of the membrane prior to coating procedures, to stabilize the membrane in place. This will help maintain the membrane positioning, and eliminate stress lines that may develop.

Use caution when removing tape from the membrane after the coating process, as tape may strongly bind to Pemion®.

ROLL UNWIND ORIENTATION (Base Film Facing Out)

