Storage and preservation of spiral wound membrane elements

1. General provisions

1.1. Technical service bulletin (TSB-108) applies for reverse osmosis, nanofiltration and ultrafiltration spiral wound membrane elements nanoRO, nanoNF, nanoUF series produced in accordance with TOR 2292-010-67318131-2012, TOR 2292-005-67318131-2012, TOR 2292-006-67318131-2012.

1.2. Technical service Bulletin sets up the rules of storage and preservation of spiral wound membrane elements which compliance allows to keep membrane elements operational.

1.3. JSC "RM Nanotech" supplies spiral wound elements in dry condition and wet. Wet membrane elements are preserved in a solution containing 1% of sodium metabisulphite in order to keep operational characteristics and to prevent microbiological exposure on it.

1.4. Preserved elements are packed in an oxygen barrier film. Bags are vacuum sealed from both sides in a nitrogen atmosphere.

1.5. Non-tested dried-out membrane elements are preliminary processed with glycerin which provides presence of residual moisture after drying out.

1.6. Non-tested dry membrane elements are made of membrane processed with glycerin which provides presence of residual moisture after drying out.

1.7. Dry membrane elements are kept in barrier bags.

1.8. Storage warranty period of wet membrane elements is 6 months from the date of delivery subject to follow membrane elements storage procedures described in Cl. 3.

Storage warranty period of wet membrane elements depending on temperature is provided in chart 1.

Storage temperature, ^{0}C	5-15	16-35	More than 35
Storage warranty period of wet membrane elements	6 months	3 months	1 month

Storage period of wet membrane elements shouldn't exceed 12 months if procedures described in Cl. 3 of this bulletin were followed.

1.9. Storage warranty period of dry membrane elements is 12 months from the date of delivery subject to follow membrane elements storage procedures described in Cl. 4 of this bulletin.

Storage period of dry membrane elements shouldn't exceed 18 months if procedures described in Cl. 4 of this bulletin were applied.

Storage warranty period of dry membrane elements depending on temperature is provided in chart 2.

Storage temperature, ^{0}C	5-15	16-35	36-45	More than 45
Storage warranty period of dry membrane elements	12 months	6 months	3 month	1 month

1.10. Membrane elements can be returned not later than 90 days after delivery if they remained unused and are in original manufacture's packaging otherwise it can be refused or additional fees will be required to restore ready-for-sale condition. Customer should receive consent to return elements before sending elements for warranty inspection. . Transportation fees to the manufacturer's location for the returned membrane elements are covered by sender, JSC "RM Nanotech" will cover expenses for the transportation to the buyer of the elements replaced under the warranty. Elements should be kept moist and clean at all the time; elements should be placed in a moisture proof packaging before return.

2. Storage requirements

2.1. New elements should be stored in original manufacture's packaging.

2.2. New elements packed in accordance with TOR should be stored inside dry facilities at a temperature from + 5 ^{0}C up to + 35 ^{0}C, humidity up to 60%, and not in direct sunlight.

2.3. Elements are stored at the shelves located not less than 1 meter from the heating elements and can be stacked 5 elements high.

2.4. Elements shouldn't have any impacts of aggressive media, thermal radiation or mechanical stress while storing.

2.5. It is recommended to keep membrane elements frost-free and to avoid temperature higher than 35 ^{0}C.

3. Wet membrane elements storage procedures

3.1 Membrane elements should be inspected **not less than once every 3 months** when stored.

3.2. The following procedures should be performed in case of long-term storage (more than 3 months) of the membrane elements.

Once every 3 months you are required to:

- Open cardboard box;
- Check the integrity of the barrier film;
- Check vacuum inside barrier film;
- Check membrane elements end caps for any discoloring;
- Membrane elements should be re-preserved if bags without vacuum or suspicious elements or elements with biological growth were detected (Cl. 3.3);
- After inspection, if no declension was detected, put membrane element back in a cardboard box. The date of inspection should be written outside the box.

Re-preservation and re-packing of the membrane elements are required after 6 months of storage (Cl. 3.3).

3.3. Re-preservation of the membrane elements.

You will require to prepare 1-1,5% solution of sodium metabisulfite. When dissolved in water, sodium bisulfite is formed from sodium metabisulfite.

To prepare preservation solution you need to use food grade sodium metabisulfite containing 95% of assay and desalinated or softened water, chlorine-free, preferably reverse osmosis or nanofiltration permeate. Soak elements in preservation solution during 1 hour, keep it in vertical position for 15 minutes to dispose solution and then seal it into an oxygen barrier plastic bag. Put repacked elements in cardboard box and write down the date of next inspection. You can buy oxygen barrier plastic bags at JSC "RM Nanotech".

Re-preservation should be conducted once every 3 months after original manufacture packaging was opened.

3.4. Dry membrane elements storage procedures.
Dry membrane elements should be visually inspected once every 3 months.

The following procedures should be followed in case of long-term storage (more than 3 months) of the membrane elements.

Once every 3 months you are required to:

- Open cardboard box;
- Check for moisture inside barrier film;
- Check membrane elements end caps for any discoloring;
- After inspection, if no declension was detected, put membrane element back in a cardboard box. The date of next inspection should be written outside the box.
- Membrane elements where moisture inside barrier film or discoloring at the end caps were detected should be re-preserved and re-packed in accordance with Cl. 3.3.

  Storage period for dry membrane elements reversed into wet is set for not more than 3 months since the date of re-preservation subject to follow Cl. 3.2.

4. Preservation of the membrane system

Membrane elements should be kept in wet condition after use.

4.1. The following procedures should be applied if membrane system is shut down for more than a maximum of 48 hours. For shorter shut-downs we recommend regular cleaning.

4.2. A chemical cleaning of the membrane elements should be done before preservation of the system. Preservation should follow right after cleaning and disinfection, within maximum 12 hours between cleaning/disinfection and preservation.

4.3. Preservation is carried out by recycling of 1 - 1,5% of sodium metabisulfite solution using chemical cleaning block. Solution should be recycled through the system around 1 hour. It's required to make sure during preservation that system is deaerated and airproof from outside.

4.4. Close all valves at the system. Any contact of sodium metabisulfite solution with oxygen will oxidize SMBS and pH will reduce.

4.5. Periodic pH control of the preserved membrane system should be conducted. pH level must never drop below 3. Re-preservation is mandatory when pH level is lower than 3. Preservation solution should be changed not less than once every 3 months.

4.6. Maximum temperature must not exceed 35°C during shutdown, but should not be less than 0°C. The storage optimum temperature is 5-15°C.

4.7. To restart system it should be washed from preservatives for at least 1 hour.

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