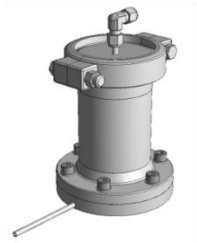
MMS AG Membrane Systems

Clean-in-place
-General guidelines-

MMS Bench and Pilot systems

Tools enabling Innovation



MMS MEMTESTER

MMS Triple System

MMS SW 18

Applications: Membrane screening | Process evaluation | Process Optimisation

MMS AG Membrane Systems

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1 Cleaning Recipes and Membrane Storage

Caution:

- Exceeding pH, temperature, pressure or pressure drop limitations may damage the membrane.
- Chlorine cleaners may damage the membrane if the concentration is too high or the membrane material does not tolerate chlorine.
- Please refer to the specification sheet of the membrane supplier for detailed information on process limitations and storage conditions.

Caution

1.1 Exemplary CIP Recipes

Membrane cleaning is vital for long-term process stability. The following CIP recipes are exemplary guidelines and should be modified according to the specifications of the membrane and the potential fouling components.

Alkaline (Pre-Cleaning):

An alkaline pre-cleaning ensures a high level of microbiological product safety and is recommended in the following cases:

1. Use of a new membrane (removal of preservative solution).
2. After storage of a used membrane in water for > 1 day.
3. After storage of a used membrane in a preservative solution.

Step		Temp. (°C)	pH	Duration (min)
1	Flushing	20		until water is clean
2	Alkaline CIP	50	10 – 12	10
3	Empty system	n/a		
4	Flushing	20		until water is clean
5	CWF	20		1 - 2

Alkaline/Acid/Alkaline:

A combination of alkaline and acid cleaning steps can be used as standard CIP procedure for removal of organic and inorganic deposits. Some membranes may need an additional alkaline step in the end to recover the best performance.

Step		Temp. (°C)	pH	Duration (min)
1	Flushing	20		until water is clean
2	Alkaline CIP	50	10 – 12	20-30
3	Empty system	n/a		
4	Flushing	20		until water is clean
5	CWF	20		1 - 2
6	Acid CIP	50	1.5 – 2.5	20-30
7	Empty system	n/a		
8	Flushing	20		until water is clean
9	CWF	20		1 - 2
10	Alkaline CIP (may be skipped)	50	10 – 12	20-30
11	Empty system	n/a		
12	Flushing	20		until water is clean
13	CWF	20		1 - 2

Alkaline/Alkaline & Enzyme/Acid/Alkaline:

Enzymatic cleaners can be used for pH sensitive membranes or to remove stubborn organic deposits. Enzymatic cleaners are usually used in combination with a mild alkaline cleaner and an additional acid cleaning step is required for enzyme inactivation afterwards. The first alkaline step may be skipped depending on the intensity of fouling. Some membranes may need an additional alkaline step in the end to recover the best performance.

Step		Temp. (°C)	pH	Duration (min)
1	Flushing	20		until water is clean
2	Alkaline CIP (may be skipped)	50	10 – 12	20-30
3	Empty system	n/a		
4	Flushing	20		until water is clean
5	CWF	20		1 - 2
6	Alkaline & Enzyme CIP	50	~10	30-40
7	Empty system	n/a		
8	Flushing	20		until water is clean
9	CWF	20		1 - 2
10	Acid CIP	50	1.5 – 2.5	20-30
11	Empty system	n/a		
12	Flushing	20		until water is clean
13	CWF	20		1 - 2
14	Alkaline CIP (may be skipped)	50	10 – 12	20-30
15	Empty system	n/a		
16	Flushing	20		until water is clean
17	CWF	20		1 - 2

Alkaline/Alkaline & Chlorine/Acid/Alkaline:

Chlorine cleaners can be used to remove stubborn organic deposits and should only be used for chlorine stable membranes (typical limitation: 150 – 200 ppm free chlorine). Check concentration of free chlorine after 5 min. Additional hypochlorite may be added if the concentration drops too much. Some membranes may need an additional alkaline step in the end to recover the best performance.

Step		Temp. (°C)	pH	Duration (min)
1	Flushing	20		until water is clean
2	Alkaline CIP	50	10 – 12	20-30
3	Empty system	n/a		
4	Flushing	20		until water is clean
5	CWF	20		1 - 2
6	Alkaline & Chlorine CIP	50	~10	30-40
7	Empty system	n/a		
8	Flushing	20		until water is clean
9	CWF	20		1 - 2
10	Acid CIP	50	1.5 – 2.5	20-30
11	Empty system	n/a		
12	Flushing	20		until retentate and permeate are clean
13	CWF	20		1 - 2
14	Alkaline CIP (may be skipped)	50	10 – 12	20-30
15	Empty system	n/a		
16	Flushing	20		until water is clean
17	CWF	20		1 - 2

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