JOHNSON PUMP GROUP
AN SPX BRAND

Cleaning Appendix to Instruction Manual

TopWing

Ultra-Hygienic Rotary Lobe Pumps

CERTIFIED HYGIENIC EQUIPMENT DESIGN EUROPEAN GROUP EHEDG
TYPE EL
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3-A®
02 - 10

SPX®

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1.0 Typical CIP (Cleaning In Place) cycle

CIP relies on the circulation of fluid through the system at velocity and temperature. Velocity is required to generate turbulence in order to dislodge debris whilst temperature is required for the fluids to clean effectively.

Velocity is normally about 2 metres/second (6 feet/second). The need of velocity can depend on the pumped liquid, the process and the system to be cleaned. A centrifugal pump is often used to circulate the cleaning fluids as the required velocity is often beyond the scope of a PD pump. It is advised to have minimum 2 bar pressure over the PD pump during the CIP cycle.

The typical CIP cycle:

Step 1 Pre-rinse. Cold water – 5 minutes – removes product debris.

Step 2 Detergent wash. Normally sodium hydroxide (Caustic) alkaline based – 30 to 45 minutes at 75°C to 95°C – removes carbohydrates, proteins, fats.

Step 3 Rinse. Cold water – 5 minutes – removes detergent residues.

Step 4 Acid wash. Nitric or phosphoric acid – 15 to 30 minutes at 60°C – removes mineral salt residues and neutralizes.

Step 5 Final rinse. Cold water – 5 minutes – removes acid residues.

Cycle times, temperatures, fluids and concentrations of fluids used will vary depending on the product, process and system. Further, additional washes may be introduced.

2.0 Typical SIP (Sterilizing In Place) cycle

Sometimes referred to as “Steaming Through” or “Steaming In Place”.

Equipment components may need sterilizing, i.e. heating to high temperature (up to 140°C) to kill organisms still remaining on the surface of the equipment.

A typical SIP cycle:

Step 1 Pre-rinse. Cold water – 5 minutes – removes any debris.

Step 2 Sterilization. Steam condensate – 30 minutes at 121°C to 140°C kills off any remaining micro-organisms and spores.

Step 3 Nitrogen Purge. Nitrogen – 5 minutes – ambient – gives inert atmosphere.

Step 4 Solvent flush. Acetone, toluene, isopropyl alcohol – 5 minutes – ambient – dries system out.

These steps may be done more than once before use.

3.0 Typical COP (Cleaning Out of Place) cycle

A typical COP cycle:

a. Clean the exterior of the pump with a soft brush and warm water (60°C) with a detergent.

b. Remove front cover, retainers and rotors, stationary and rotating seals including O-rings.

c. Clean all removed parts with a soft brush and **cold water** until the parts are visual clean.

d. Clean the internals of the rotor case with a soft brush and **cold water** until the internals are visual clean

e. If needed make an additional cleaning cycle using warm water and a soft detergent at 60°C.

f. Flush all parts thereafter during a few minutes with clean water

g. If additional cleaning method is needed please contact SPX for further details.

4.0 Cleaning the TopWing pump

In this section we give general advice but cleaning schedule should be determined on site for materials being processed.

- The design of TopWing supports efficient cleaning, manual and CIP (Cleaning In Place).
- The pump design supports full drainage after cleaning.
- The pump has been tested by a certified body and is approved to be clean after a CIP cycle (EHEDG certified).

SPX has additionally tested that the splines area of the shaft/rotors is tight so no leakage occurs in to this area provided that the routines for maintenance and cleaning are followed.

4.1 CIP cleaning

The pump is especially easy to Clean In Place due to:

- Strategically positioned seals inside the rotor case
- Flat body profile and flat front cover
- Retainer solution developed for CIP
- Pump easy to drain

4.2 Drainage

To meet 3-A and EHEDG regulations the pump must support full drainage.

a) **3-A and EHEDG –**
Pump assembled with the ports in vertical position

Pump is fully drained if the system is designed for full drainage.
Pump needs to be assembled on lowest level in the system.

b) **3-A –**
Pump assembled with the ports in horizontal position

Pump is fully drained by removing the front cover.

4.3 Manual cleaning (COP)

The pump can be disassembled for manual cleaning (COP). Please follow a validated procedure for COP cleaning. If needed please contact your supplier for further information.

4.4 SIP cleaning

The pump can be sterilized with saturated steam. It is important that the elastomers in the pump are of material resistant to the steam. EPDM and Perfluor are commonly used for this purpose. If needed please contact your supplier for further information.

4.5 External cleaning

TopWing is made of stainless steel and supports external drainage. It is recommended always to clean the exterior before opening the pump to protect the pump interior from contamination. Clean the pump exterior with a soft brush and cold water and, if needed, use warm water thereafter. Do not flush over the pump exterior with pressurized liquid.

4.6 Inspection

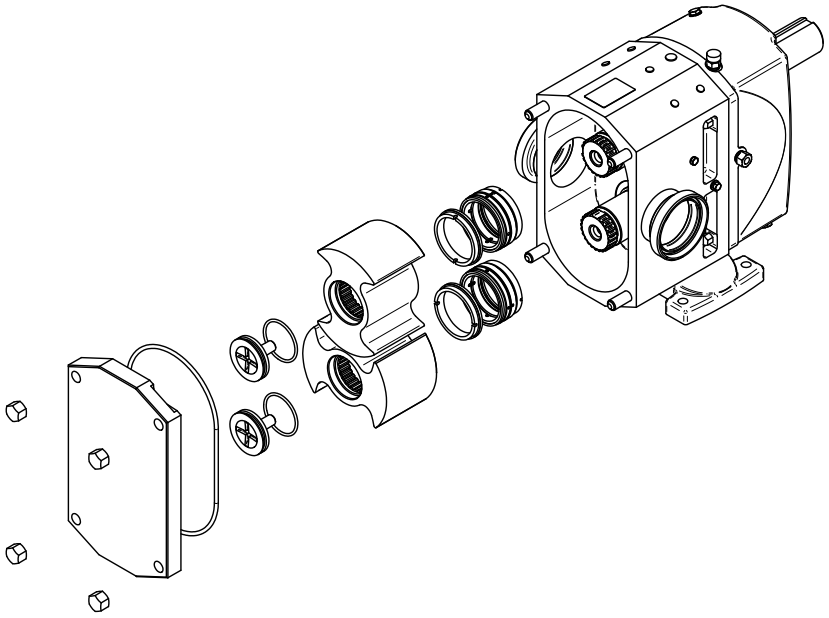
It is advised to inspect the pump externals and internals frequently. Recommendation is to do an inspection every second week by opening the front cover and every fourth week by removing the retainers and rotors to inspect seal and spline area.

Inspection every second week

- Inspect the pump external, if needed clean the pump external before next step
- Open the front cover
- Check if there are visible pollution or mechanical damages in the pump

Additional inspection every fourth week or whenever a possible leakage is detected or whenever visible pollutions or damages are detected

- Remove retainers and rotors
- Remove shaft seals
- Remove all O-rings in front cover, retainers and shaft seals
- If damages are detected correct maintenance action is needed to be defined and executed. Please follow the instruction in chapter 4.0.
- If pollution is visible detected behind retainers in rotor and shaft splines please contact your supplier for a validated cleaning procedure



Note

- O-rings always need to be replaced if there are signs of mechanical, chemical or thermal damages. Examples of damages: hardened, dissolved, swelling, cracks, cuts, peel or wrong shape.
- If a leakage is detected, please stop the pump, identify the maintenance action and correct the leakage.

4.7 Replacement of parts

If there are any damages in the pump internal stainless steel, those parts need to be replaced. For 3-A and EHEDG demands the surface roughness should not exceed RA 0.8 and in several pharmaceutical or bioprocess applications the surface roughness should not exceed RA 0.5.

O-rings and shaft seals are considered as wear parts. The O-rings and shaft seals should be replaced if leakage is detected or if any damages of those parts are detected when inspecting the pump internals.

It is advised to replace all O-rings after each disassembly.

O-ring kit with certificate

5.0 Configuration and assembly of pump unit to meet 3A and or EHEDG

Please see the section 1.6 Pump designation for sizes and options that meets 3-A standard and/or EHEDG.

For full information regarding 3A regulations we refer to 3A® Sanitary Standard for Centrifugal and Positive Rotary pumps. Please visit "www.3-a.org".

For full information regarding EHEDG certification we refer to EHEDG institute. Please visit "www.ehedg.org".

6.0 Cleaning test of TW2 retainer, shaft and rotor splines

6.1 Background to the Bacteriologic test

Very small amount of pollution is needed to start a bacteria growth. If pollution is detected behind the retainers a validated cleaning method is needed.

The used test method is common within milk production, ATP-bioluminescent measurement. This method shows remaining pollution on a visual clean area after manual cleaning.

6.2 Bacteriologic test

- Shaft splines, rotor splines and retainer thread have been polluted by Yoghurt
- The polluted parts have been dried in an oven during 2 hours at 60° C.
- Cleanability has been measured in RLU
- Following equipment have been used:
  - ATP monitoring system from Hygienias type SystemSURE II
  - Surface Swabs Hygienia Ultra-Snap
  - Brushes type WypAll L30
  - L30 cloths from Kimberly-Clark
  - Alkaline detergent with chlorine P3-topax M55, 3.5%, from Henkel-Ecolabs

1. Measure RLU, on the polluted shaft with the ATP monitoring system
2. Clean with cold water and a brush during 5 minutes per part (shaft splines, rotor splines, retainer threads etc)
3. Wipe dry with WypAll L30 cloth. Use a forceps to remove eventual remains of paper
4. Measure RLU with the ATP monitoring system
5. Apply P3-topax M55 on the parts during 5 minutes but observe that the chemical must not dry on to the parts

Important cleaning area – The splines

Important cleaning area – The internal thread

6. Richly flush the parts with warm water during 2 minutes

7. **Air dry** the parts (do not use a cloth)

8. Measure RLU with the ATP monitoring system in the splines area as well as in the internal thread.

   Always use **separate** swab/test sticks for splines and threads.

6.3 Result of the ATP-measurements

- Before cleaning: 54 RLU
- After cold water cleaning: 15 RLU
- After using P3-topax M55: 2 RLU

Measured on a 50 cm^2 surface

6.4 Equipment

- Hygienias type SystemSURE II
- Surface Swabs Hygienia Ultra-Snap
- Henkel-Ecolab P3-topax M55 – alkaline detergent
- Brushes
- Kimberly-Clark WypAll L30 - cloths
- Forceps
- Stainless 0.5 l measuring cup

6.5 Protection equipment

- Acid/chlorine/alkaline resistant overall
- Protection boot of PU
- Acid/chlorine/alkaline resistant gloves
- Protective glasses
- Face protection

7.0 Hydrostatic pressure test of TW2

7.1 To assure that retainer O-ring is leakage free

A TW2 rotary lobe pump has been tested to assure that the retainer O-ring and the rotating seal O-ring is leakage free into shaft splines.

- The pump was hydrostatic tested with red coloured water
- The pump was filled from bottom to top to prevent air pockets.
- The pump was pressurized (see picture) with 25 bars during 30 minutes.
- This procedure was repeated 3 times.

No red coloured water was detected behind the retainer O-ring or behind the stationary seal O-ring

7.2 Equipment used

- TW2 pump
- Pressure pump system 0-50 bar

WHERE IDEAS MEET INDUSTRY

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