

# Chesterton Seal Support System Type WSS

## Installation, Operation and Maintenance Instructions

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## 1.0 EXPLANATION OF SYMBOLS

You will find the following symbols with all occupational safety warnings in these operating instructions, in which there is a risk to life and limb. Please adhere to these warnings and act with special care. Inform other users of these occupational safety warnings. In addition to the warnings in these operating instructions, the generally valid safety and accident prevention regulations must be taken into account.



### ATTENTION:

A note on appropriate assembly and operation of the sealing support systems, non-adherence may result in malfunctions or damage to the sealing fluid system.



### WARNING:

Warnings when not adhered to, may result in damage, injury or the loss of the type approval permit.



### DANGER:

Electrical warnings which, when not adhered to, may result in damage or injury or the loss of the type approval permit.

These warnings are provided in parts of these operating instructions where special note should be taken to ensure that the directives, regulations, warnings and the correct work procedures are adhered to, so that damage or destruction of the machine and other system components can be prevented. These warnings are to be fully adhered to.

## 2.0 SAFETY INSTRUCTIONS



These operating instructions contain basic information to be taken into account during set-up, operation and maintenance.

They must therefore be carefully read by the technician and other technical staff/operator before assembly and commissioning and should be made permanently available at the place of installation of the system.

Not only the general safety instructions listed in this chapter, but also the special safety warnings inserted under the main points must be taken into account. In addition, all safety warnings in the attached operating instructions for individual sub-systems must be adhered to as well as those of the manufacturer of any optional components installed.

- Read all instructions.
- Keep these operating instructions as a reference document.
- The sealing system and tank may only be removed or fitted when the equipment is in a fully shut down and safe condition, with careful adherence to the safety, accident and environmental regulations of the operator and local laws, as they apply to the relevant system component.
- The use of this system under conditions other than those specified on the tank label and the technical data sheet is not permitted. The risk is accepted by the operator.
- Any operation under different conditions is to be clarified with the manufacturer in advance.
- The tank is provided without the required safety equipment. Suitable equipment complying with operator regulations and local law is to be fitted before commissioning the system.
- Before commissioning the system, the required tests are to be carried out on the equipped tank, in accordance with the operator regulations and local law.
- The customer or operator must ensure that the persons entrusted with the handling, assembly and operation of the sealing system are also familiar with the design and function of the sealing system and the associated mechanical seal.
- It must be ensured that the seal and seal tank has been completely filled and bled. The mechanical seal must never be started up dry!

### 3.0 RISK



Work in tanks may pose a risk of poisoning or asphyxiation.

Work may only be carried out with the aid of suitable personal protective measures (e.g. breathing equipment, protective clothing, etc.).

There may be a risk of an explosive atmosphere being created in the tank. The corresponding steps to prevent the generation of sparks are to be taken. Work in this area may only be carried out by technical staff in accordance with the relevant safety directives.

Care must be taken that the power supply to the drive sub-systems is interrupted and secured to prevent unintentional switching on by third parties.

When handling sealing fluids, it is imperative to take note of the corresponding safety instructions. The required personal protective equipment should be assessed and made available to those working with the tanks.

### 4.0 EQUIPMENT IDENTIFICATION

Tanks are fitted with a tank certification nameplate and a system certification/product identification nameplate.

Tanks are U Stamped and designed in accordance with ASME BPVC Section VIII Division 1.

Tanks are PED certified to 2014/68/EU.

The certification nameplates will have the following information:

#### EQUIPMENT IDENTIFICATION NAMEPLATES

Tank Certification Nameplate	System Certification/Product Identification Nameplate
Certification markings	System model (reorder number)
Maximum allowable working pressure (MAWP) of tank	System serial number
Maximum design metal temperature (MDMT) of tank	Year built
Serial number	Working capacity
Year built	System pressure (PS)
Capacity	Maximum system temperature (TS MAX)
Test pressure of tank	Test pressure for system
Product category	

## 5.0 USE AND APPLICATION

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The sealing support tank may only be used for tasks as specified in the technical data sheet. Any other use or use exceeding this limitation is not deemed appropriate. The manufacturer cannot be held responsible for any resulting damage. Appropriate use also includes adherence to all operating instructions and the inspection and maintenance intervals.

The operating and design data, corrosion allowance, and support loads may be taken from the data sheet or are listed in the technical data sheet.

General damage includes damage to the sealing support system resulting from pressure peaks, frost, freezing of the media, corrosion or erosion due to short-term operating states or wrong operation of the system, which can no longer be verified; such damage is excluded from the warranty.

See technical data sheet for any deviations from this rule.

## 6.0 COMPONENTS, TRANSPORT AND STORAGE

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- The sealing support system is to be transported and stored in its unopened original packaging.
- Only use suitable equipment or lifting devices to transport the components.
- The storage location must be dry and dust-free. Temperature and radiation influences are to be avoided.
- Weight specifications are according to the technical data sheet.
- There are no provisions for long-term preservation of the sealing tank.

### ***Description of the sealing support tank***

The sealing support tank has been constructed in accordance with the technical data sheet. The tank has connections that can be used for inspection and cleaning. Auxiliary connections are provided on the seal tank as detailed on the technical data sheet.

### ***Disassembly state***

Sealing support systems are delivered as complete units.

No sealing liquid has been added, nor does it form part of the consignment. Where possible, accessories have been pre-fitted.

### ***Possible add-on systems***

Depending on the customer's requirement, the sealing support tank may be fitted with connections for add-on systems. Other add-on systems can be fitted to some degree, following consultation with the manufacturer. Details of optional accessories can be found in the product documentation.



### ***Functional test***

Inspection for damage. Seal tanks are to be visually checked after prolonged storage.

Functional check of the additionally fitted monitoring units.

### Design

All pressurized weld connections are MAG/TIG welded, either welded through or counter-welded. Design, construction and manufacturing of the tank is according to ASME BPVC Section VIII Division 1 2015 Edition and is PED certified to 2014/68/EU.



### Function

Sealing support tanks are used to supply liquid to mechanical seals. They are to be filled with a suitable sealing liquid. The liquid exchange at the mechanical seal takes place through natural circulation in accordance with the thermosiphon principle or through a forced circulation pump or a seal internal pumping ring.



### Conditions for use

- Viscosity of the barrier liquid at an operating temperature of less than <math><10\text{cSt}</math> with natural circulation, <math><20\text{cSt}</math>, with forced circulation during operation (even during start-up).
- Only product-compatible, neutral, clean, well lubricating and harmless media may be used as barrier liquids. When using a forced circulation pump, the viscosity information provided by the pump manufacturer should be taken into account, but it should not be greater than the values provided above.
- The arrangement of the tanks in relation to the mechanical seal should be in accordance with the mode of operation described in the **Pipe assembly** information under **Section 8** and should be agreed upon with the mechanical seal manufacturer.
- Where the sealing circuit contains stop valves (ball valves), they must be open, full bore type providing little or no additional resistance. The use of gate or needle valves is not recommended.
- The liquid level in the tank must always remain above "MIN".
- The temperature of the sealing liquid should remain at least <math>40^{\circ}\text{C}</math> (<math>72^{\circ}\text{F}</math>) below boiling temperature.
- Where necessary, the sealing medium must be cooled or heated.
- Any overflow connections / ventilation connections are to be piped and channelled into a suitable slop system under atmospheric pressure, without barriers or reduction in the cross-section of the pipe. The pipes should be checked regularly for blockages.



This is based on the tank drawing. Assembly must take place in such a way that no major additional forces act on the tank, such as vibration or bolting stressed caused by mounting.

### Assembly of the sealing support system

The tank may only be mounted using the attached bracket. Assembly must be such that no vibration acts on the sealing support system. Where necessary, rubber isolating bushings are to be used for assembly. No welding or other physical modification may be carried out on the tank. It is recommended to use a stand, anchored to the floor.



### Electrical assembly

The assembly must be inspected by an expert before commissioning to ensure that the required electrical safety measures are in place. Grounding, nulling, isolating transformer, earth leakage or error voltage safety switches must meet the requirements of the relevant power supplier and local regulations.

The voltage stipulated in the technical data must be the same as the grid voltage available.

Please ensure that the electrical plug connections are above the potential flood lines and are protected from moisture. Power grid connection cables and sockets are to be checked for damage before use.

The connection ends must not be immersed in water, as this may result in water penetrating into the motor connection zone.

Motor safety switches and switch boxes may never be installed in areas in which there is a risk of explosions.

The electrical connection must be in accordance with the local regulations. The supply voltage and frequency are to be taken from the pump label and the label of the electrical device. Care must be taken that the data provided on the labels are in accordance with the existing power supply.

- The switch device should be set up in the immediate vicinity of the pumping station. The maximum lengths of the power supply cables and level-measuring system cables are to be taken into account.

## 8.0 ASSEMBLY (cont.)

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- The installation site may not be within the "EX" risk zone (even for "EX"-protected pumps).
- Assess the provision of cable conduits.
- Assess the provision of voltage supply.
- Pull the power supply cable and control lines through the cable pipe and connect the controls in accordance with the operating instructions and the terminal plan for the switch box.
- Carry out the required grounding work.
- In addition, the operating instructions for the pump and sensors apply.

### ***Pipe assembly***

The information below must be taken into account when assembling the pipe system.

- The pipe cross-section should be as large as possible. Connections should be of the screw type, or clamped for sterile applications.
- Pipes should be ascending, without narrowing or kinks, from the mechanical seal to the tank. Where shut-off devices are required, ball valves should be used.
- Pipes should be fitted in arcs of at most 90° (45° to be preferred) and with a radius >80 mm (>3 inches); >100 mm (>4 inches) to be preferred.
- The layout must take into account any changes in the length of the pipes caused by thermal expansion or vibrations.
- Pipes should be attached with clamps at regular intervals. Screw connections and fittings should not be subjected to mechanical load.
- The tank should be at least 0.3 m (1 foot) and at most 2 m (6 feet) above the mechanical seal to ensure that the thermosiphon effect can be initiated. Where a circulation pump is used, a shorter distance is possible.
- The return pipe from the mechanical seal must lead to the lateral connection of the tank.
- Overflow and bleeding connections must be connected according to **Section 7**.

### ***Insulation***

The sealing support system is usually delivered from the manufacturer without any insulation. The operator should check whether insulation or other protection is necessary according to the statutory regulations. Insulation should be provided by the customer. When insulating the heat exchanger (when equipped), care should be taken that the cleaning openings are provided with easily removable insulation caps.



### ***Cleaning the supply systems***

Pipes and screw connections should be cleaned before final assembly (e.g. with compressed air or suitable cleaning solution). The cleaning solution must be disposed of in accordance with the specifications.

## 9.0 INITIAL OPERATION



A flushing process is required before installation and commissioning, so that any existing debris is removed from the tank.

Pumps should never be left to run dry (risk of overheating).

Any valves should be opened before commissioning the system.

Where three-phase current equipment is used, care must be taken that the correct flow direction has been set.

The cleaning medium must be compatible with the sealing liquid.

To ensure ongoing operation, the operator should carry out regular inspections with the aid of the monitoring devices. The intervals are to be defined by the operator. Where the system is being recommissioned after disassembly for maintenance or cleaning purposes, new seals must always be used

1. Install the system in a suitable location, free from vibrations and not more than 2 m (6 feet) higher and 1 m (3 feet) away from the mechanical seal.
2. Connect the tank using the supplied hose to the seal supply connection (50) and back from the seal return connection (51). It is extremely important that the return line from the seal to the seal-return connection (11) does not sag. More information on attaching the finned tube (22) can be found in the **Finned tube option** within this section (**Section 9**).

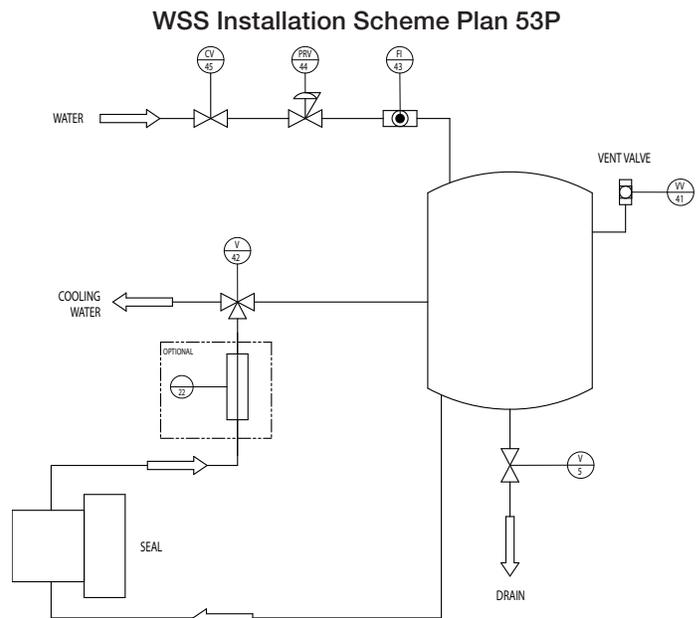
If debris/particulates are potential in water supply line, installation of a filter (23) is recommended on the inlet side of the check valve (45).

3. Before filling, open the 3-way valve (42) to the seal water release (12). This allows the seal to be fully vented.
4. Connect a valve to the water supply in case of interrupted water supply at the check valve (45) before the pressure regulator (44) [the pressure regulator has a maximum inlet pressure of 20.6 bar (300 psi) and a maximum discharge pressure of 8.6 bar (125 psi)].
5. Close the pressure regulator by turning the cap clockwise.
6. Open the water supply and turn the cap counterclockwise until water flows into the tank. When water flows from seal water release (12), redirect 3-way valve (42) into tank. Wait until the maximum level is reached. The tank is vented via the vent valve (41). Thereafter, set the desired pressure using the pressure regulator (44). Turn the cap clockwise to increase pressure; turn the cap counterclockwise, to reduce pressure. Upon reaching the desired pressure, lock the regulator at the set pressure.

7. The water supply must remain connected to allow the system to self-manage the system level and pressure.
8. At the first start up please check the flow direction of the buffer fluid. The pipe which becomes warm must be connected to the return port of the tank. If not, the thermosiphon effect will stop. If there are problems with the circulation, change the pipes at the seal tank.

### Finned tube option

1. Install the finned tube (when equipped) at the seal return (51).
2. The end user provides the pipe and excludes it from the seal to the finned tube (22).



## 10.0 SWITCHING OFF



Before switching off the circulation pump (when equipped), care should be taken that supply of the tank is discontinued by switching off. Care should be taken that the stopping time of the pump is sufficiently long, as due to the hot wall materials used there may be some delayed heating, posing a risk of steam bubble formation and destruction of the equipment.

To prevent pressure peaks, valves should always be gradually opened and closed.

**Open the tank after it has cooled down and is depressurized. This applies to all sealing elements to which the tank has been fitted.**



### Note:

Depending on the medium used, there is a risk of freezing when temperatures drop below 5°C (41°F). In such cases the sealing liquid tank must be completely drained via the draining connections provided (N5) before being decommissioned. This is to prevent frost damage.

Drainage valves may only be removed in a depressurized state and when the medium has reached room temperature. An adequate cooling time must be ensured.

Open the drain valve and allow medium to drain via the drainage connection (5).

Collect the medium in accordance with current regulations and risk warnings and dispose of it in an appropriate way.

Completely empty the heat exchanger.



### Attention:

When opening pressurized components there is a risk that the lock screw may be ejected with force, as well as a risk of sustaining burns where temperatures are high.

## 11.0 MAINTENANCE AND DISPOSAL

Standards, norms and local regulations should be adhered to.

Correctly installed and operated sealing liquid systems require practically no maintenance. Sealing or barrier liquid should always be available in adequate amounts.

### Maintenance intervals

#### Daily

- Check and note the system pressure.
- Look for signs of leaks from the seal, system and pipes.
- Check the sealing liquid filling level / temperature and adjust when required.
- Check the temperature and the flow rate of the cooling medium.
- Check all alarm signals. Take action if necessary

#### Monthly

- All filters (where present), should be inspected and replaced when they are dirty or blocked.
- Any discoloration of the sealing liquid or filter contamination can be sign of a leak of the inner mechanical seal and should be investigated without delay.

#### After 5 years

- It is recommended that a complete internal and external inspection of the tank and all system components should be carried out at 5-year intervals.

#### Cleaning

The cleaning intervals of the sealing liquid system depend on the system location and the medium used.

Cleaning may be carried out

- Mechanically by brushing with a nylon brush.
- High-pressure cleaning of each individual pipe using special nozzles and water.
- Chemical cleaning of the entire space on the pipe side. The liquid used must be chloride-free. It is recommended that chemical cleaning be carried out by a specialized company.

When rinsing the tank, the rinsing liquid must be properly disposed of. The rinsing medium must be compatible with the sealing medium. External cleaning is not absolutely necessary but is good maintenance practice.

When using sealing liquid systems in sterile areas, the necessary sterilization temperatures and times are to be adhered to. These are determined by the operator.

## 11.0 MAINTENANCE AND DISPOSAL (cont.)

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### **Note:**

**A nylon or stainless steel brush is to be used for cleaning stainless steel tanks and pipes.** The use of a normal steel brush will result in corrosion.

### **Breakdown**

After any breakdown, the tank and the monitoring equipment should be checked. Faulty components and those that are no longer functional are to be repaired or replaced.



### **Repairs**

Repairs may only be carried out by specialized staff. Original spares should be used to ensure correct operation.

Welding on the tank or heating of the tank for other reasons, as well as all work that could result in a decrease in wall thickness, is not permitted.

### **Disposal**

The following procedure is to be used for proper disposal:

The sealing liquid system should be taken out of operation.

Liquids are to be drained from the tank, pipes and components are properly disposed of. The same applies to contaminated cleaning cloths and binders.

All cables and switch equipment are to be removed and disposed of as electronic waste.

All plastic parts are to be separately disposed of.

Steel and aluminium materials are usually handed over to a disposal company.

## 12.0 SYSTEM LEAKAGE

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The following procedure is to be followed:

1. Mark the leak.
2. Remove the system from operation as detailed in **Section 10**.
3. Tighten the fittings once the system has been depressurized. If the leak cannot be removed with the steps as detailed above, the sealant should be replaced. Once the old sealant has been removed, the sealing threads must be thoroughly cleaned. Inspect the threads for damage and repair or replace in accordance with these instructions.
4. New sealant should be applied to the threads and the threaded connections tightened. Care should be taken that, where a connection has several screws, they are positioned crosswise and are evenly tightened.



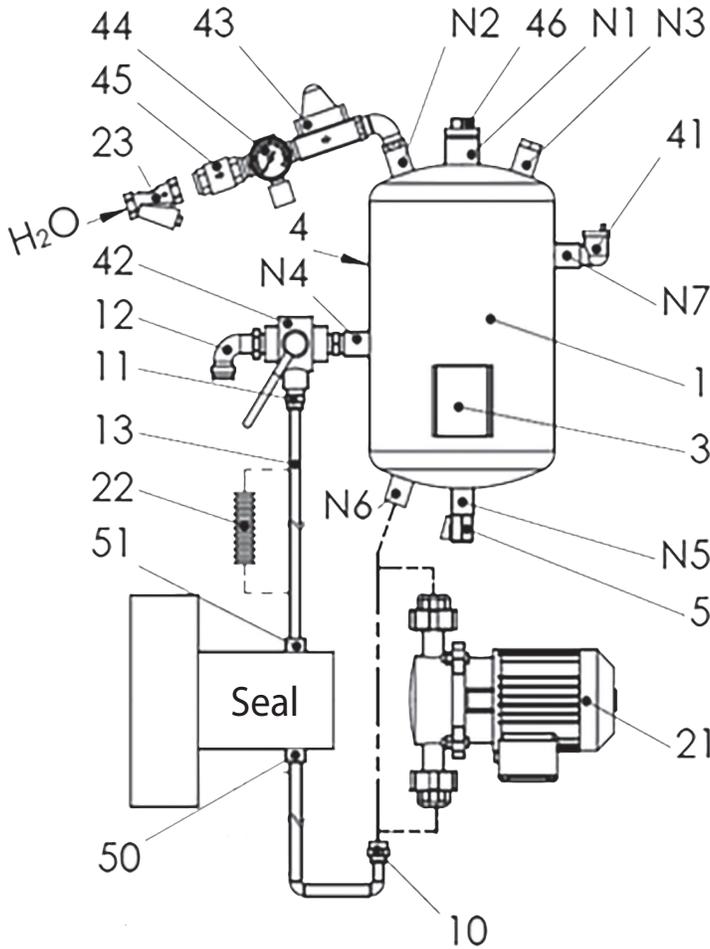
Before commissioning, the operator must check the components used for suitability regarding EX zone, ignition protection type and EPL.

Ensure that the ignition temperature of the sealing liquid or the transfer medium is at least 50°C (90°F) above the maximum permitted surface temperature of the pump.

All conductive parts of a device must be connected in such a way that no dangerous differences in potential can occur between them. If there is a possibility that insulated metal components could become charged and thus act as a source of ignition, grounding connections must be provided. The grounding resistance may not exceed  $10^6$  Ohm

## 14.0 ITEM OVERVIEW AND COMPONENT LIST

### Water Savings System



Position	Water Savings WSS	Description
1	X	Seal Tank
3	X	Name Plate
4	X	Mounting Bracket
5	X	Drain Valve 1/2" NPT
10	X	1/2" Straight Fitting 1/2" Push In Tube
11	X	1/2" NPT Straight Fitting 1/2" Push In Tube
12	X	1/2" NPT Elbow 1/2" Push In Tube
13	X	Polyamide Tube Diameter 1/2"
21	O	Circulation Pump
22	O	Finned Tube Kit
23	O	Inline Water Filter
41	X	Vent Valve
42	X	3 Way Ball Valve – L Type
43	X	Flow Indicator
44	X	Water Supply Regulator With Gauge
45	X	Check Valve
46	X	Plug 1" NPT
50	X	1/2" NPT Straight 1/2" Push In Tube
51	X	1/2" NPT Straight 1/2" Push In Tube
N1	X	Nozzle 1" NPT with Plug
N2	X	Fill Water 1/2" NPT
N3	X	Connection 1/2" NPT with Plug
N4	X	Seal Return Connection 1/2" NPT
N5	X	Drain 1/2" NPT
N6	X	Seal Supply Connection 1/2" NPT
N7	X	Vent 1/2" NPT

X = Standard / O = Optional



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