FLOWSERVE

# Installation Instructions

## CPM Seal Support Reservoir Assembly


*Experience In Motion*

## Introduction

This manual covers the installation and operation of the CPM Seal Support Reservoir for dual non-pressurized (plan 52) and dual pressurized seals (plan 53). The following instructions describe the appropriate system, buffer/barrier fluids, installation, start-up, and maintenance.

## Reservoir

The standard CPM Seal Support Reservoir is designed in accordance with ASME Code Section VIII, Division 1. All tanks are welded in accordance with ASME Code Section IX. Tanks include inlet, outlet, vent and fill along with two mounting lugs as minimum connections.

## Sealing System Description

CPM Seal Support Reservoir can be used as reservoirs for dual pressurized Inside, dual pressurized inside/outside or dual non-pressurized Flowserve Seal designs. The sealing system produced is defined as being either a thermal convection system or a forced circulation system.

## Support System Descriptions

Plan 53 is a pressurized dual seal system which is used in services where no process leakage to atmosphere is tolerated. The system consists of dual mechanical seals with a barrier fluid between them. The barrier fluid in the supply tank is pressurized to a higher pressure (normally 1.7 bar [25 psig]) than the seal chamber maximum 11 bar [160 psig]). Primary (inboard) seal leakage will be barrier fluid into the product. Minimal leakage is customary.

Plan 53 is usually chosen over a plan 52 for dirty, abrasive, or polymerizing products which would either damage the seal faces or cause problems with the barrier fluid system if a plan 52 is used. Two conditions to consider when incorporating plan 52; first, there will always be some leakage of barrier fluid into the product. Normally, this leakage will be minute, and the leakage rate can be monitored via the visual water flow indicator. However, when using plan 53 the product must be able to accommodate a small amount of contamination from the barrier fluid.

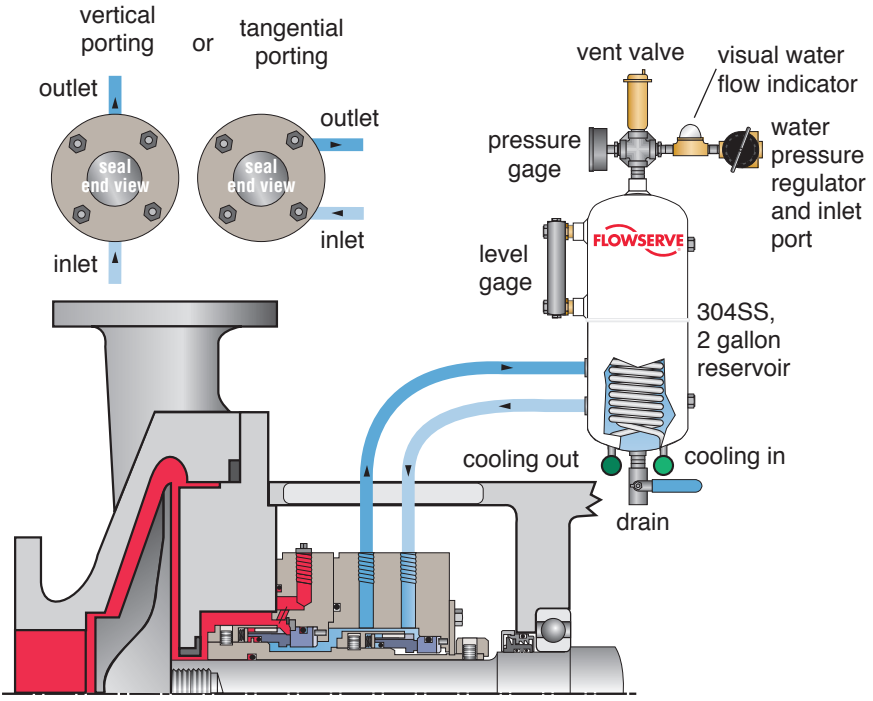
Secondly, a plan 53 system is dependent on having the supply tank pressure maintained at the proper level. If the supply tank pressure drops below seal chamber pressure, seal leakage direction will be reversed and the barrier fluid will be contaminated with the process fluid. The flush plan will then become a plan 52.

**An Induced Circulation System** is essentially the same as the thermal convection system except for the addition of a circulating device in the seal cavity which provides for positive flow in the system. The addition of a circulating device provides for positive flow of buffer fluid shown in Figure 1. To maximize dual seal cooling add cooling coils inside the reservoir as a means of removing heat.

## Dual Pressuzied Inside Seal with Induced Circulation through CPM Seal Support Reservoir with Cooling Coil

Figure 1

Plan 53



## Buffer/Barrier Fluid Selection

For a plan 53 pressurized barrier fluid system where the method of pressurization is a gas blanket, special attention is given to the application conditions. Gas solubility in the barrier fluid increases with the rising temperature and pressure. However, the CPM Seal Support Reservoir is designed for pressurization from a water header system. The water header system provides pressure to the seal when pressurized above operating conditions in a dual pressurized operating mode. Should consumption of barrier water increase the header system will automatically refill the tank. The water regulator on the inlet of the tank determines the point of re-supply. The pressure level at which re-supply is accomplished is adjustable to suit the application need.

The condition of the water within the tank should be checked over the entire operating curve of the application. Particular attention should be paid during start up conditions. Water on the seal at the time of start up is a critical condition for longevity of seal life. Also close care should be taken to ensure water conditions are maintained to avoid pressure reversals contaminating barrier water with process fluids.

1. The water should not freeze at the minimum site ambient temperature.

2. The water should have an initial boiling point at least 10°C (50°F) above the temperature to which it will be exposed.

3. The water should not have a flash point higher than the service temperature.

## Installation

1. The reservoir is mounted vertical not more than .9 meter (3 feet) from the seal gland to the vertical centerline of the reservoir. The bottom of the reservoir is mounted .3 to .6 meter (12 to 24 inches) above the horizontal centerline of the pump.

2. All lines from the seal cavity to the reservoir must slope upward at all points. The upward slope should be a minimum of 24 cm/m (1/4" per foot) with all bends being large radius. The minimum size for pipe or tubing should be 13 mm (1/2") diameter.

3. Connect the supply connection (lower seal connection on the reservoir) to the bottom (inlet) gland connection.

4. Connect the return connection (upper seal connection on the reservoir) to the upper (outlet) gland connection.

5. If valves are used to isolate the seal chamber and the reservoir make sure these are fully open while filling and during operation.

6. If the reservoir is equipped with cooling coils, connect cooling water lines to the reservoir at the cooling coil points.

7. Remove all plastic plugs and properly seal or attach tubing with metal fittings.

8. It is highly recommended that the reservoir be flushed with clean fluid prior to equipment start up to remove any foreign matter from the system.

***Caution:*** The CPM Seal Support Reservoir System is not for use with hazardous materials.

9. **Fill reservoir with water barrier fluid to the middle of the sight glass.** Gas volume of the system should be at least 25 percent of the reservoir volume to allow for thermal expansion during operation.

10. Before starting the system, bleed all air from highest point in the system, the vent valve.

11. Connect external water supply to reservoir on plan 53 (dual seal). A pressure regulator and check valve are required to maintain a constant pressure on the system. The pressure in the reservoir should be maintained at least 25 psi above the seal cavity pressure. **Make sure reservoir is filled before pressurizing.**

**No Vent Valve (No.156) installed.**

In the application where the air vent valve (No.156) is not supplied and pressure is applied using a gas blanket the following instruction is to be followed:

A. Fill the reservoir with water barrier fluid to the middle of the sight glass level gauge. Gas volume is about 25 percent of the reservoir volume and will allow for thermal expansion during operation.
B. Connect the external pressurizing gas supply to the top connection of the reservoir assembly.
C. Turn on the gas supply and regulate to the required pressure.

**Vent Valve (No.156) installed.**

In the application where the air vent valve (No.156) is supplied and installed the level gauge will not indicate level as the system will be completely filled with water barrier fluid. Pressure is applied using the water supply pressure controlled by the pressure regulator (No. 237).

a. Fill the reservoir assembly with water barrier fluid and all the gas will be vented from the vent valve (No.156). The system is now completely filled with water barrier fluid.
b. Set the water pressure using the pressure regulator and pressure gauge (No.237 and 246).
c. Once the system is turned on and the seal and system are in operation an increase in temperature of the system will result in an increase in pressure. However, due to the normal leakage of barrier fluid from the mechanical seal the pressure will regulate to the set pressure of the pressure regulator. If the temperature drops and the pressure drops, again the regulator will maintain the water pressure in the system.

## Start-Up

1. Plan 52 - open valve to the vent or process recovery system slowly.

2. Plan 53 - slowly open valve between reservoir and external pressurization source. Slowly increase the pressure to avoid gas ingestion. Check for leaks as unit is being pressurized. Operating pressure is normally 1.72 bar (25 psi) above seal cavity pressure. The pressure gauge on system can be used to monitor system pressure.

3. If system is equipped with cooling coils open valve to allow water to flow through coils.

4. The main pump can now be started.

## Maintenance

During planned plant shutdowns it is recommended that the buffer/barrier fluid be drained, reservoir flushed and new fluid put in the reservoir. This will ensure the quality of the buffer/barrier fluid used to lubricate the seals and to remove any particles that may have accumulated in the reservoir.

When changing or cleaning the glass on armored sight gages (weld pad level gage) always install new gaskets and retorque bolts to proper amount. It is also recommended that the bolts be checked and retorqued prior to first operation. They can come loose during shipping and transport.

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FIS168eng REV 09/2018 Printed in USA

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