



## USER INSTRUCTIONS

*Installation*  
*Operation*  
*Maintenance*

# 682-53B System



## CONTENTS

<b>1</b>	<b>Introduction</b>	<b>3</b>
1.1	About this manual	3
1.2	How to use this manual	3
1.3	Other supplied documentation	3
1.4	Conformity with norms and directives	3
1.5	Use of alerts and icons	4
<b>2</b>	<b>Safety</b>	<b>5</b>
2.1	682-53B hazards	5
2.2	General safety	5
2.3	Trained and qualified personnel	5
2.4	Personal protective equipment (PPE)	6
<b>3</b>	<b>Environmental Considerations</b>	<b>7</b>
3.1	Disposing of waste products	7
3.2	End-of-life equipment	7
<b>4</b>	<b>Design Overview</b>	<b>8</b>
4.1	Purpose of 682-53B	8
4.2	Typical 682-53B installations	8
4.3	P & ID	9
4.4	Parts	10
4.5	Theory of operation (typical system)	12
4.6	Identifying the product (nameplate)	12
4.7	682-53B Product offerings	12
<b>5</b>	<b>Transport and Storage Requirements</b>	<b>13</b>
<b>6</b>	<b>Installation</b>	<b>14</b>
6.1	Introduction	14
6.2	Installation requirements	14
6.2.1	Safety considerations	14
6.2.2	System seal cooler mounting height	15
6.2.3	Interconnecting pipes	15
6.3	Installation procedure	15
<b>7</b>	<b>Operation</b>	<b>18</b>
7.1	Set up system	18
7.2	Start up system	19
7.3	Monitor system	19
7.4	Shut down system	20
<b>8</b>	<b>Maintenance</b>	<b>21</b>
8.1	Introduction	21
8.2	Periodic maintenance tables	21
8.3	Check barrier fluid pressure	21
8.4	Refill barrier fluid	22
8.5	Change barrier fluid	22
8.6	Check accumulator pressure	23
8.7	Charge accumulator	24
<b>9</b>	<b>Troubleshooting</b>	<b>26</b>
<b>10</b>	<b>Spare Parts</b>	<b>27</b>
<b>11</b>	<b>Appendix</b>	<b>28</b>
11.1	System logbook	28
11.2	GA drawings	29
11.3	Vendor documentation	30

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## 1 Introduction

### 1.1 About this manual

This manual (which is intended for operating, maintenance, and supervisory personnel) provides information on installing, operating, and maintaining the 682-53B system.

**NOTE:** As hazardous conditions can result from planned as well as unforeseen circumstances, pressurized equipment shall always be operated with caution.

Before installation, equipment should always be fully inspected including, but not limited to checking for:

- Any possible damage due to transport or storage
- Cleanliness, required before operation
- Existence of an affixed nameplate with correct inspection markings and design/test conditions clearly annotated

### 1.2 How to use this manual

Only trained and qualified personnel should use this manual. Refer to section 2.3. Inexperienced personnel should only work on this system under the supervision of a qualified person.

Before using this manual, make sure you have fully read and understood the safety section. If you are new to the system, pay particular attention to section 4, which describes the system in detail.

When maintaining the system, always make sure you follow the maintenance procedures. Pay particular attention to the alerts and icons.

### 1.3 Other supplied documentation

The appendix contains the General Arrangement drawings (called GA drawings) and documentation on the vendor parts. The instructions in this manual sometimes refer to the vendor documentation. If a reference is made to the vendor documentation, you must follow the instructions in that documentation as well.

### 1.4 Conformity with norms and directives


The 682-53B system conforms to the following norms and directives (if applicable):


- Machine directive/2006/42/EC
- NEN 5509:2016
- ATEX Directive 2014/34/EU
- PED 2014/68/EU
- ASME B31.3
- ASME BPVC Section VIII Div. 1
- API Standard 682


## 1.5 Use of alerts and icons


This manual uses “Notes”, “Cautions”, “Warnings”, and “Dangers” to alert you of important information and dangerous situations. These alerts (from the least severe to the most severe) are:

**NOTE:** “Notes” inform you of important additional information.


 **CAUTION:** *The equipment, product or surrounding area can be damaged if the “caution” is not obeyed.*

 **WARNING:** *Personnel can be (seriously) injured, or the equipment can be seriously damaged if the “warning” is not obeyed.*

 **DANGER:** *Personnel can be seriously injured (resulting in death) if the “danger” is not obeyed.*

 **DANGER/WARNING:** *Dangers or Warnings that refer to the use of the system in potentially explosive atmosphere – in accordance with the ATEX Directive 2014/34/EU.*

The above icons are the general icons that are used for “Cautions”, “Warnings”, and “Dangers”. More specific icons are also used, depending on the type of hazard. Refer to the following example:

 **WARNING – HIGH PRESSURE:** *The accumulator can burst if it is over pressurized. Fill the accumulator slowly; check the pressure gauge regularly.*

## 2 Safety

### 2.1 682-53B hazards

The following hazards can be present in the 682-53B system:

- High pressure
- Explosion
- Dangerous chemicals/media
- Temperature (hot surfaces)
- Nitrogen (N<sub>2</sub>) in the accumulator
- Dangerous moving parts (during installation)

If the 682-53B system has any external leaks, you must stop the system immediately and have the leak repaired by qualified personnel.

### 2.2 General safety

When installing, operating and maintaining the system, pay particular attention to safety:

- Obey all applicable safety laws and regulations.
- Obey all plant regulations.
- Make sure that only trained and qualified personnel work on the system. Refer to section 2.3.
- Read and understand each part of this manual.
- Follow the installation, maintenance and operating procedures exactly.
- Wear the relevant personal protective equipment (PPE). Refer to section 2.4.
- Never work alone.
- Make sure that adequate safety equipment is installed in and around the work area: first aid kits, safety showers (if applicable), fire extinguishers, escape routes, shut-off valves, etc.
- Make sure that personnel are fully trained on how to use the safety equipment. A qualified first aid specialist must always be available for each shift.
- Read the plant requirements for handling hazardous materials.
- Check MSDS for relevant information.

### 2.3 Trained and qualified personnel

Qualified personnel are people who have been authorized by those responsible for the safety of the Plant to perform the necessary work, and who can recognize and avoid possible dangers. The following aspects determine the qualification of personnel:

- Appropriate training
- Relevant experience
- Knowledge of relevant standards and specifications
- Knowledge of accident prevention regulations
- Knowledge of plant regulations and operating conditions

## 2.4 Personal protective equipment (PPE)

The 682-53B is often used for applications containing high-pressure, dangerous and/or toxic chemicals. When operating or maintaining this system, make sure you wear the appropriate PPE: protective clothing, gloves, safety glasses, etc.

Always follow local regulations regarding PPE.

If one (or more) of the below icons is shown in the work place, the equipment must be worn at all time.



When operating outside, PPE to be worn to prevent slip, trip and/or fall.

### 3 Environmental Considerations

**⚠ CAUTION:** *You are required by law to dispose of waste products and end of life equipment, according to local regulations.*

#### 3.1 Disposing of waste products

Any waste products resulting from the use or maintenance of the 682-53B must be disposed of according to local environment laws and regulations.

#### 3.2 End-of-life equipment

**STOP** **WARNING – DANGER CHEMICALS:** *Dangerous chemical might be released during removal of the system. Wear PPE. Follow all safety regulations and Plant regulations.*

**STOP** **WARNING – HIGH PRESSURE:** *High pressure might be stored in the system. Before removing or re-installing the system, make sure the entire system has been de-pressurized (and drained if required).*

**NOTE:** End-of-life equipment must be disposed of according to local environment laws and regulations.

## 4 Design Overview

### 4.1 Purpose of 682-53B

- Prevents a dual pressurized seal from leaking process media to atmosphere by circulating a pressurized barrier fluid over the mechanical seal.
- A bladder accumulator is applied to isolate the nitrogen from the barrier fluid and establish a higher pressure than in the seal chamber.
- Regulate the temperature of the barrier fluid by including a heat exchanger with water or air.
- Monitors the performance of the mechanical seal by measuring (optionally) pressure, temperature, flow and refill time.
- Lubricate the seal faces.

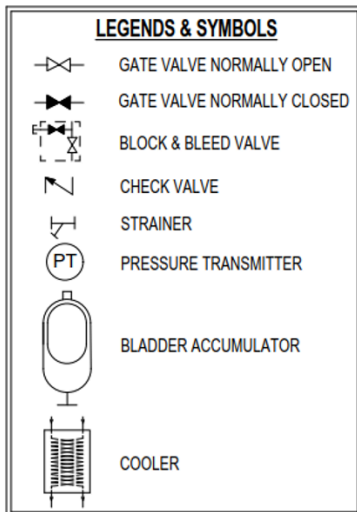
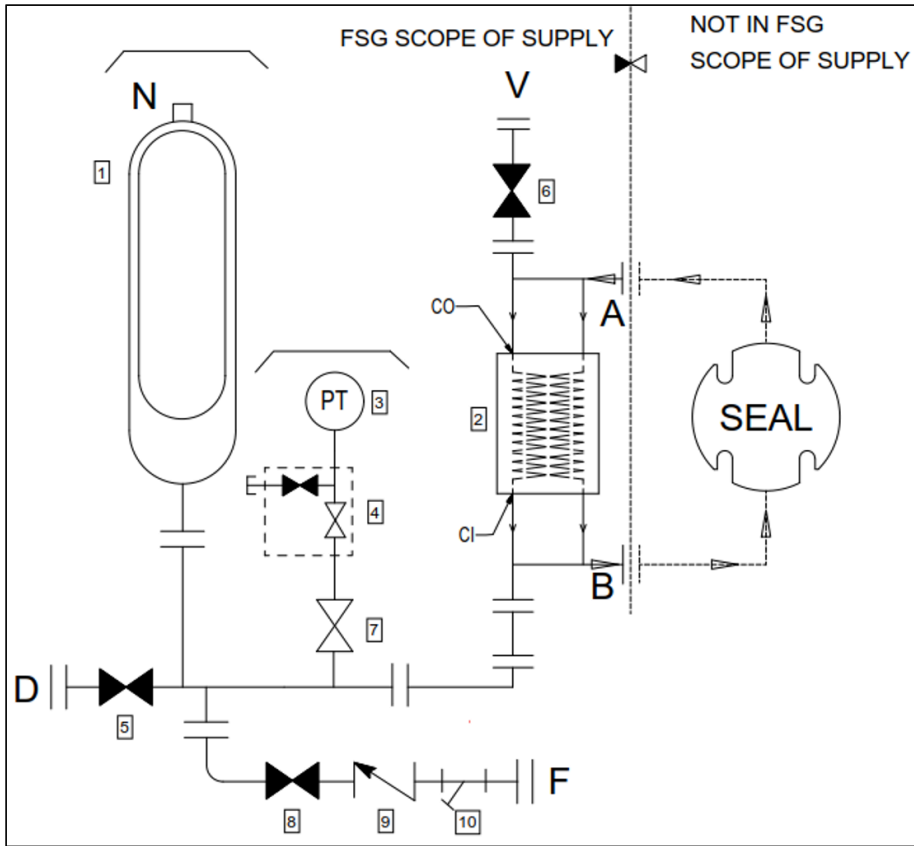
### 4.2 Typical 682-53B installations

This section describes typical 682-53B installations. The exact system design and (optional) components can vary depending on the options selected. For detailed information on the 682-53B installation, refer to the GA drawing(s) in the appendix.



4.3 P & ID

In each 682-53B drawing a P & ID is included, showing the components and piping flow. For the dedicated P & ID, refer to GA drawing in the appendix.



**TERMINATIONS:**

- A - FROM SEAL 3/4" #600 RFBW (BLINDED)
- B - TO SEAL 3/4" #600 RFBW (BLINDED)
- CI- COOLING WATER INLET 3/4" NPT (PLUGGED)
- CO- COOLING WATER OUTLET 3/4" NPT (PLUGGED)
- D - DRAIN 3/4" #600 RFBW (BLINDED)
- F - FILLING 3/4" #600 RFBW BLINDED
- V - VENT 3/4" #600 RFBW (BLINDED)
- N - 7/8"-14 UNF NITROGEN PRECHARGE

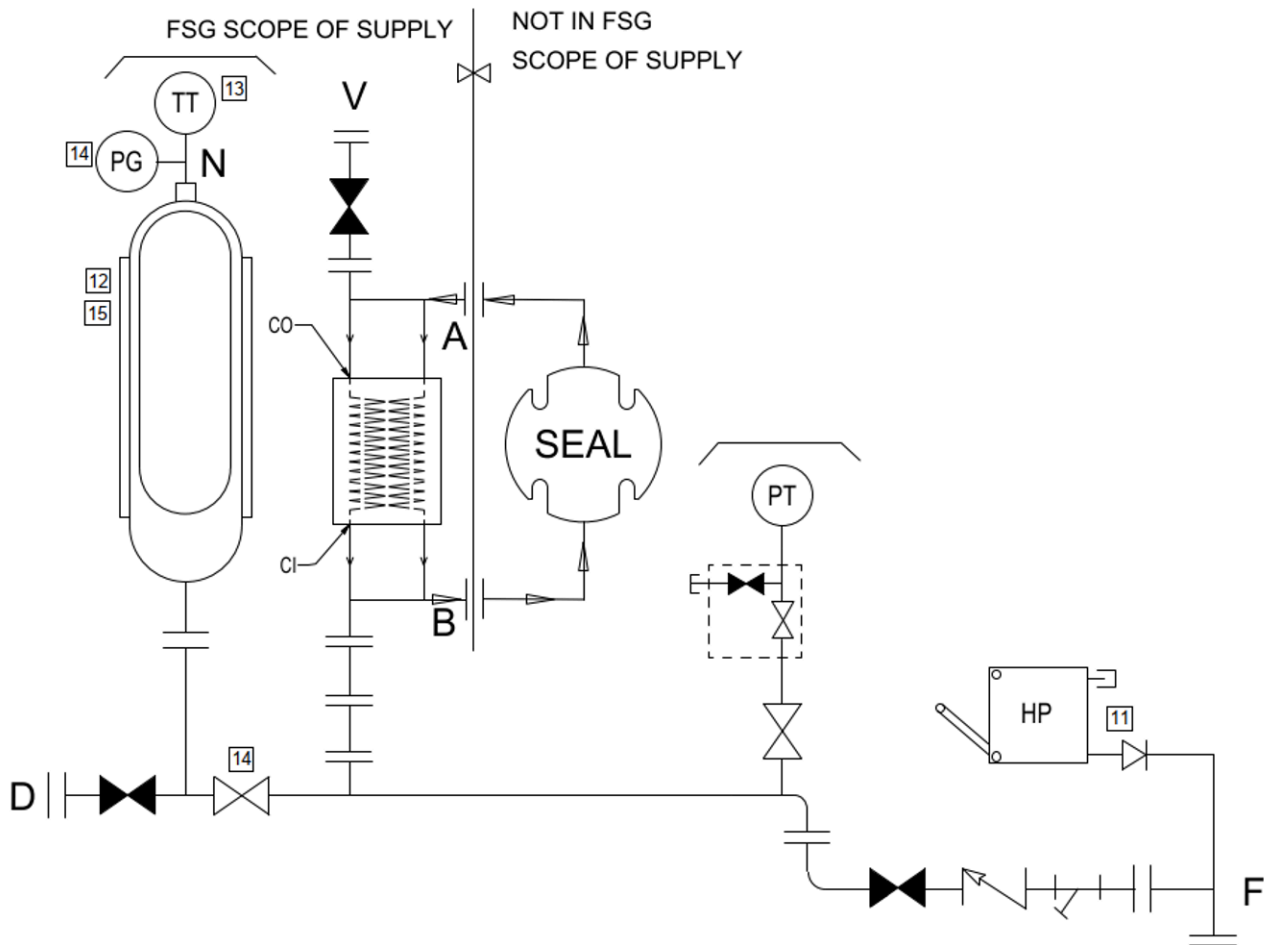
Figure 1: Typical schematic overview

## 4.4 Parts

### Standard parts

Number	Part	Function
1	Bladder accumulator	Stores energy, contains pressurized barrier fluid for lubricating and cooling a pressurized dual mechanical seal
2	Seal cooler	Used for cooling the fluid. Three types are available: water cooler, finned tube/pipe and forced draft air (size depends on the operating conditions). The cooler can be installed separately if there is insufficient space
3	Pressure transmitter (PT)	Used for pressure alarm and monitoring the pressure
4	Block and bleed valve	Used to isolate pressure transmitter and vent transmitter side
5	Drain valve	Used for draining the system
6	Vent valve	Used for venting the system
7	Instrument valve	Used for isolating the instrumentation from barrier pressure
8	Block valve	Used for closing off the fill inlet line
9	Non-return valve	To prevent a backflow when opening the block valve
10	Y-strainer	Remove solids from barrier fluid during filling

Optional parts (parts can be configured as option)



Number	Part	Function
11	Hand pump	Used to refill barrier fluid
12	CSA heated accumulator blanket	Used to insulate and heat bladder accumulator to reduce pressure fluctuations due to temperature changes
13	Floating alarm	Used to implement floating alarm strategy per API 682 4 <sup>th</sup> Edition
14	Accumulator isolation	Pressure gauge and isolation valve used to check bladder integrity when not in service
15	ATEX heated accumulator blanket	Used to insulate and heat bladder accumulator to reduce pressure fluctuations due to temperature changes

**STOP** **WARNING: Accumulator Isolation Valve, Item 14, should not be closed during operation, as it can lead to dangerous pressure fluctuations.**

Refer to the P & ID in appendix for applicable instruments.

### 4.5 Theory of operation (typical system)

**NOTE:** The numbers in the following description refer to the numbers used in the standard and optional parts tables shown in paragraph 4.4.

- A non-toxic barrier fluid is supplied to the cavity between the inner seal and outer seal of a dual pressurized seal. A bladder accumulator (1) ensures that the pressure of this barrier fluid is at least 1.4 barg (20 psi) [depending on the seal type] higher than the seal chamber pressure. This prevents pumping product leaking through the mechanical seal into the atmosphere.
- The accumulator is equipped with an elastomer bladder. This bladder is filled with N<sub>2</sub>. The N<sub>2</sub> stores energy, to keep the barrier fluid pressurized.
- The barrier fluid is captured in a closed loop. An integral pumping device circulates the barrier fluid through the closed loop. The barrier fluid lubricates the inner and outer seal. If the circulating flow is too low, an external circulation device (e.g., circulation pump) shall be used instead. The circulated barrier fluid passes through a cooler (2), to lower the temperature.

- As a part of system design, a calculated amount of barrier fluid is allowed to leak into the sealed fluid. This ensures that the sealed fluid can never enter the atmosphere. Due to the leakage over the seal, the pressure in the closed loop will drop slightly, but will automatically be compensated by the stored N<sub>2</sub> pressure in the accumulator. A pressure transmitter (3) indicates when the barrier fluid is below the minimum pressure. The barrier fluid must then be refilled to the maximum pressure as specified in the GA drawing(s) in the appendix. The N<sub>2</sub> pressure in the accumulator is checked once a year as a part of periodic maintenance.

**NOTE:** The system must be fitted with a pressure transmitter that will generate an alarm when the barrier fluid reaches the minimum pressure.

### 4.6 Identifying the product (nameplate)

The nameplate is, as per Flowserve standard, shown in the GA drawing.

This nameplate provides the necessary information regarding the system.

For information on the nameplate, see the attachments in “Chapter 12 Appendix”.

### 4.7 682-53B product offerings

Example:	Model	Accumulator	Certifications	Cooler Model	Construction	Trim Package	Options Package	Pump Height
53BC0AF06G0100L	53B	C	0	A	F06	G01	00	L
53BC0AF06G0100M	53B	C	0	A	F06	G01	00	M
53BC0AF06G0100H	53B	C	0	A	F06	G01	00	H
53BC0AT00G0100M	53B	C	0	A	T00	G01	00	M
53BC0BT00G0100M	53B	C	0	B	T00	G01	00	M
53BC0CT00G0100M	53B	C	0	C	T00	G01	00	M

Model: 53B

Accumulator: C (Carbon Steel/Buna), S (316/Buna)

Certifications: 0 (Standard, U-Stamp on accumulator), 1 (PED), 2 (U-Stamp on Seal Cooler and Accumulator), 3 (CRN)

Cooler Model: A (682H), B(682L), C(682M), D(ANC 6S), E(ANC 12S), F(ANC 12P), G(AFC), H(NX075)

Construction: F06 (CI 600 RFBW), T00(Tubing)

Trim Package: G00 (No Instruments), G01 (Global, E&H Hart), G02 (Global, E&H Foundation Fieldbus), G03 (Global, Rosemount Hart), G04 (Global, Rosemount Foundation Fieldbus), N01(CSA Low Temp Trim)

Options Package: 00 (No Options), 01(Handpump), 02(CSA CI 1 Div 2 Heated accumulator Blanket), 03(Floating Alarm), 04(Accumulator Isolation), 05(Options 1-4), 06 (ATEX Zone 2 heated blanket)

Pump Centerline: L (300-450 mm [11.8-17.7 in]), M (451-600 mm [17.7-23.6 in]), H(601-750 mm [23.6-29.5 in])

## 5 Transport and Storage Requirements

Full storage procedure (FTA106) can be obtained from Flowserve representative.

Below is an extract of the procedure.

Transport and storage criteria	Requirements
Transportation	The system must be transported and stored in the unopened, original shipping box. Instructions on the shipping box shall be followed.
Suspect damaged during transportation	Systems that have been dropped, or have been subjected to heavy impacts during transport, must not be installed. The Flowserve representative shall be contacted.
Warehouse requirements	The warehouse must be dry and dust free. The system should not be exposed to large temperature fluctuations, high humidity or radiation and shall be stored in the original box.
Long-term storage	After a storage period of 1 year, the system must be inspected for its “as new” properties. This applies particularly to the instrumentation and bladder of the accumulator.
Preserving installed systems	The preserving medium must not damage the installed system, for example by fouling or harming the components and mechanical seal. If you are not sure which preserving medium to use, contact Flowserve representative for preserving procedure.

## 6 Installation

### 6.1 Introduction


Before installing the system, make sure you have read and understood the Installation requirements in this section. If you have any questions regarding the installation of your system, contact your local Flowserve representative.

### 6.2 Installation requirements


#### 6.2.1 Safety considerations

Position the 682-53B as close to the seal as possible. Make sure there is sufficient room for:

- Evacuation of the Plant in case of an emergency (do not block walkways and emergency exits)
- Safe operation and maintenance of the system

 ***DANGER – RISK OF EXPLOSION: If the system is being installed in a hazardous area, there could be an explosion risk. Make sure all instrumentation has the adequate explosion protection.***

If the system is being installed in a confined area, make sure there is adequate ventilation.

 ***DANGER – SUFFOCATION HAZARD: Breathing N<sub>2</sub> in a confined space can result in sudden unconsciousness or death. Take extra care when working in confined areas.***

Adequate ventilation is required for:

- Safe filling of the accumulator with N<sub>2</sub>
- Correct cooling of the system

### 6.2.2 System seal cooler mounting height

The cooler must be positioned above the seal, unless a circulation pump is utilized. This will encourage thermosyphoning when the system is in standby mode and help with proper venting. The cooler will be mounted on the 53B stand based on pump centerline selection: L (300 to 450 mm [11.8 to 17.7 in.]), M (451 to 600 mm [17.7 to 23.6 in.]), H (601 to 750 mm [23.6 to 29.5 in.]).

### 6.2.3 Interconnecting pipes

The flow of barrier fluid through the system is either generated by:

- A pumping device, included in the seal design
- An external circulating pump
- Thermosyphoning (hot standby)

The interconnecting pipes between the system and the mechanical seal must be correctly fitted; otherwise the flow of the barrier fluid through the system might be restricted.

Pay particular attention to the following points:

- Minimize the number of restrictions (for example, limit the number of fittings).
- The total length of connection piping between the mechanical seal and 682- 53B shall not exceed 5 m (16.4 ft) in length per API 682 8.2.5.
- Unless otherwise specified, the pipe size shall be 0.75 in. and schedule shall be the same as the system piping (or as per specification).

- The pipes must be clean and free of burrs.
- The total pipe length and number of bends shall be kept to a minimum.
- Use smooth, large radius bends; do not use elbows, tees, etc.
- Pipe runs should be sloped continuously up or down to allow for adequate circulation, proper venting and draining shall be maintained.
- Make sure that the loop, including seal flange, does not include vapor traps.

Vapor traps will block circulation and overheating will appear. When vapor traps cannot be avoided, a proper venting solution shall be added.

- For threaded connections, do not use Teflon tape but Engineering Loctite 577.

**NOTE:** If isolation valves are part of the interconnecting piping, these valves shall be full bore and “locked open” during operation.

## 6.3 Installation procedure

Use this procedure to install or reinstall the system.

### Procedure

1. Before installing the system, inspect all components for damage. If any of the components are damaged, it shall be reported to the Flowserve representative.
2. Determine the installed position of the system. Refer to the Installation requirements.



**WARNING – CRUSH HAZARD: Possible injury and/or trapped limbs. Take care to avoid being trapped or crushed between heavy, moving objects.**

3. Use an appropriate lifting device together with the available lifting lugs on the 682-53B, to position the 682-53B system as close as possible to the mechanical seal. Make sure you leave sufficient room for operation and maintenance purposes.
4. Attach the stand firmly to the ground or base-plate of the equipment



**WARNING – HIGH PRESSURE: The cooling water circuit of the 682-53B system is not protected against overpressure. If the return line is closed, a water line could burst. Make sure a pressure relief valve is installed in the cooling water circuit.**

5. Install the water cooler, according to the Installation requirements. Refer to sections 6.2.2 and 6.2.3.
6. Manufacture the interconnecting piping according to the Installation requirements. Refer to section 6.2.4.

**NOTE:** Not all of the connections in the following step may apply to your system (some are optional). Also the names used in this procedure may vary slightly to the names in the GA drawings. Refer to the GA drawing(s) in the appendix for full details. In case of doubt, contact the Flowserve representative.


7. Make the following connections:
  - Barrier fluid supply line to mechanical seal: Connect the “to seal connection” to tap LBI (barrier fluid inlet) on the mechanical seal flange.
  - Barrier fluid return line from mechanical seal: Connect the “from seal connection” to tap LBO (barrier fluid outlet) on the mechanical seal flange.

- Drain: Connect the “drain connection” to a drain or a disposal point. Depends on the configuration of the 682-53B.
- Vent: Connect the “vent connection” to a vent or a disposal point. Depends on the configuration of the 682-53B.
- Fill: Connect the “fill connection” to a fixed makeup unit, or provide quick connect to fill with mobile refill unit. The fill line is provided in a vertical orientation, however if preferred the fill line can be rotated 90 degrees to a horizontal orientation with the gate valve handle pointing up. If the fill line is rotated additional piping support will be required near the fill connection.
- Cooling water connections Inlet and Outlet: If applicable, connect the “cooling water inlet line” to the cooling water IN connection; Connect the cooling water “outlet line” to the cooling water OUT connection.
- Electrical connections: Wire the electrical connections for instrumentation according to the applicable instrument and plant requirements; Wire the power supply for the electric motor of a forced draft cooler (FDC) or circulation pump according to the applicable electric motor and plant requirements. Refer to the vendor documentation in the appendix for more information.

**NOTE:** For locations of the connections, refer to the connections table on GA Drawing in appendix.

**NOTE:** Flange covers provided with system are for shipping only and are not pressure containing.



 ***DANGER – EXPLOSION RISK: Static electricity can build up and ignite flammable vapors. The system must be correctly earthed to minimize the risk of explosion caused by static electricity.***

8. Make sure the installation is correctly earthed to prevent the risk of explosion, caused by static electricity.
9. Sign the System Logbook in the appendix to verify that the installation has been completed according to this procedure.

## 7 Operation

### 7.1 Set up system

Use this procedure if:

- The system is being set up for the first time, or
- The barrier fluid has been completely drained from the system.

#### Procedure

**NOTE:** A 682-53B system is not self-venting. Any air trapped in the barrier fluid will have a negative effect on the performance of the seal. During system set-up venting is extremely important.

1. Make sure the block bleed valve to the instrumentation is open (if applicable).
2. Make sure the block valve in the drain line is closed.
3. Make sure the block valve in the vent connection is closed.
4. Check the pre-charge pressure of the accumulator. Refer to the GA drawing in Appendix for the required pressure. For API 682 4<sup>th</sup> Edition, the floating strategy is added, where charging pressure is related to ambient temperature. If floating strategy is applicable, the pressure, related to the current ambient temperature shall be considered.
5. If necessary, charge the accumulator with nitrogen. Refer to the chapter 8.7 "Charge accumulator".



**DANGER – EQUIPMENT OR PRODUCT DAMAGE:**  
*Dirty or incorrect barrier fluid can damage the equipment or product. Make sure the barrier fluid is correct for the product being processed. Do not over pressurize the system.*

6. Connect the filling unit to the fill connection of the 682-53B.
7. Open the block valve(s) in the filling line.
8. Fill the system until the maximum barrier pressure is reached. When floating strategy is applicable (according API 682 4<sup>th</sup> Edition), the maximum barrier pressure that is related to the current ambient temperature shall be considered.

Refer to the GA drawing(s) in the appendix for the correct setting.



**WARNING – HIGH PRESSURE:** *The 682- 53B can burst if it is over pressurized. Fill the system slowly; check the pressure gauge regularly and never exceed max. operating pressure.*

9. Close the block valve in the fill line (if applicable), depressurize the filling line and disconnect the filling unit when all steps below are finished (if applicable).
10. Check for leaks at fittings and pipe work, and rectify if necessary.
11. Vent the instrument lines.
12. Vent the closed loop(s) by carefully opening the vent valve(s). The pressure in the system will drop.
13. Close the vent valve as soon as the pressure is reduced to the minimum barrier pressure level Refer to the GA Drawing in the Appendix for the correct setting.

14. As the pressure reduces, during the venting process, the pressure transmitter (or switch) and its pressure alarm setting should be checked (if applicable).
15. Refill the system to the maximum barrier pressure.
16. Repeat steps 12 to 15 until all air has been removed from the system (normally 3 to 4 times).

### 7.2 Start up system

Use this procedure to start the system.

#### Procedure

1. Prior to the start-up, the Installation procedure (refer to section 6.3) and Set-up system procedure (refer to section 7.1) must be completed, and signed off by a qualified person.
2. If a water cooler is installed, apply the cooling water. Refer to the appendix for the correct piping diameter and flow rate (normally 25 liter/minute).
3. If a forced draft air cooler is installed, make sure the motor is electrically connected and the fan is rotating in correct direction (check rotation arrow). Flowserve recommends to use a soft starter for the electric motor of the FDC.
4. Make sure all block valves in the circulating loop are open (if applicable).
5. Start the external circulation pump (if applicable).



**DANGER – RISK OF EXPLOSION: Dangerous chemicals or vapors can leak into the environment if the sealing fluid is not correctly pressurized. Always pressurize the barrier fluid before pressurizing the equipment; also never de-pressurize the barrier fluid until the equipment has been fully de-pressurized, and vented.**

**NOTE:** For dual pressurized (double) seals, the barrier fluid pressure must be at least 1.4 bar (minimum requirement as per API 682) higher than pressure in the seal chamber, unless otherwise specified in the GA drawing(s).

6. Make sure the barrier fluid is at the correct pressure, according to the GA drawing(s) in the appendix.
7. Pressurize the equipment in which the seals are installed, according to the operating procedures of the equipment manufacturer.
8. Start-up the equipment, according to the operating procedures of the equipment manufacturer, unless otherwise specified by Flowserve.
9. Wait until the pump has been running for approximately 15 minutes.
10. Vent the closed loop(s) to remove any residual air. (refer to section 7.1 point 12 and further).

### 7.3 Monitor system

Use this procedure to monitor the system.

#### Procedure

1. Monitor the system for correct operation. Also, refer to the periodic maintenance tables in section 8.2.
2. Make sure:
  - There are no leaks.
  - The seals and/or bearings are not running hot.
  - There is no cavitation in the system.
  - There is no heavy vibration in the system.

3. If you notice any problems with the system, follow plant regulation for reporting and correcting faulty equipment.
4. The 682-53B system should be refilled once low barrier pressure has been reached. An alarm must be generated if a pressure transmitter or pressure switch is installed.

To prevent damage on the mechanical seal, the system should never have an operating pressure lower than the accumulator pre-charge pressure. Normal refill period is 25 to 30 days. Refer to chapter 8.5 for the refill procedure.

### 7.4 Shut down system

Check if the system can be shut down.

Check if system can be de-pressurized without negatively affecting the mechanical seal installed in main pump. System cannot be shut down if the following main pump conditions occur:

- Main equipment/pump is on hot stand-by
- Main equipment/pump is pressurized
- Main equipment/pump is in operation

**NOTE:** Always shut down the system according to plant regulations/end user safety procedures

When below points are checked, the system can be shut down:

- If a water cooler is installed, stop the cooling water.
- If a force draft air cooler is installed, stop the motor.
- If an external circulation pump is installed, stop the pump.
- De-pressurize the system.

**STOP** **WARNING – HIGH PRESSURE:** *The cooling water circuit of the 682- 53B system is not protected against overpressure. If the return line is closed, a water line could burst. Make sure a pressure relief valve is installed in the cooling water circuit.*

**STOP** **WARNING – HOT SURFACES:** *The system and surrounding surfaces might be hot. Take care when touching components. Wear the appropriate Personnel Protection Equipment (PPE), according to plant regulations.*

**STOP** **WARNING – DANGER CHEMICALS:** *Dangerous chemical might be released during removal of the system. Wear Personal Protective Equipment (PPE). Follow all safety regulations and Plant regulations.*

For removal and maintenance and before (re-)installation, the complete system must be de-pressurized (and drained if required).

## 8 Maintenance

### 8.1 Introduction

Periodic maintenance must be done at regular intervals (weekly, monthly, yearly). Refer to the following tables. In addition, check the vendor documentation for any periodic maintenance procedures required for the vendor components.

A “system logbook” is supplied in the appendix. Copy this sheet and use it as a record of the maintenance done on your system. The engineer(s) responsible for the maintenance must enter their name and the date of the maintenance (as well as any relevant comments).

For information on replacing major components, refer to the GA drawings and vendor documentation in the appendix.

### 8.2 Periodic maintenance tables

Use the following tables to plan the periodic maintenance for your system (refer to the table of contents and the appendix for the relevant information):

Weekly maintenance
Check the seals, system, and interconnecting pipe work for leaks. Rectify if necessary.
Check/refill the barrier fluid pressure.

Monthly maintenance
Do all weekly periodic maintenance procedures.
Check all painted surfaces, if applicable. Rectify if necessary.
Check all earthing and electrical connections. Rectify if necessary.


Yearly maintenance
Do all weekly and monthly periodic maintenance procedures.
Check the accumulator pressure and adjust if needed.
Replace the barrier fluid.

### 8.3 Check barrier fluid pressure

Use this procedure to check the barrier fluid pressure.

**NOTE:** The barrier fluid pressure can be checked while the seal pump is running.

#### Procedure

 **WARNING – HOT SURFACES:** *The system and surrounding surfaces might be hot. Take care when touching components. Wear the appropriate PPE, according to plant regulations.*

1. Use the installed pressure indicator/transmitter-with-display to check the barrier fluid pressure. The barrier pressure shall be between the minimum and maximum pressure settings. Refer to the GA drawing(s) in the appendix for the correct setting.
2. If the barrier fluid pressure is below the minimum pressure setting, you must refill the barrier fluid.

#### 8.4 Refill barrier fluid

Use this procedure to refill the barrier fluid.

**NOTE:** The barrier fluid can be filled while the seal pump is running, you will have to connect a refill unit.

**NOTE:** The barrier fluid type is specified on the GA Drawing(s). A Flowserve representative can supply information on barrier fluid, temperature and flow requirements based on product type, seal size and product temperature.

##### Procedure



**WARNING – HOT SURFACES:** *The system and surrounding surfaces might be hot. Take care when touching components. Wear the appropriate Personnel Protection Equipment (PPE), according to plant regulations*

1. Connect a refill unit.
2. Slowly open the shutoff valve(s) in the filling line.



**CAUTION – EQUIPMENT OR PRODUCT DAMAGE:** *Dirty or incorrect barrier fluid can damage the equipment or product. Make sure the barrier fluid is correct for the product being processed. Do not over pressurize the system.*

3. Use the refill unit to fill the system until the maximum barrier pressure is reached. Refer to the for the correct setting in the GA drawing(s) in the appendix.
4. Close the shutoff valve(s).
5. Unpressurize the line between refill unit and 682-53B and disconnect the refill unit.

#### 8.5 Change barrier fluid

Use this procedure to change the barrier fluid. The barrier fluid should be changed once a year or when it is contaminated.

##### Procedure

1. Check the process conditions to see if the equipment (in which the seals are installed) can be stopped.
2. Stop the equipment (including the pump), according to plant regulations, as described in chapter 7.4.
3. De-pressurize the equipment, according to plant regulations.
4. De-pressurize the 682-53B system, and open the drain valve.

**STOP** **WARNING – HIGH PRESSURE:** *The accumulator can burst if it is over pressurized. Fill the accumulator slowly; check the pressure gauge regularly.*

**STOP** **WARNING – HOT SURFACES:** *The system and surrounding surfaces might be hot. Take care when touching components. Wear the appropriate PPE, according to plant regulations.*

**STOP** **WARNING – DANGER CHEMICALS:** *Dangerous chemical might be released during removal of the system. Wear PPE. Follow all safety regulations and Plant regulations.*

5. Drain the 682-53B system.
6. Check all components for damage or leaks and replace or repair the component.
7. Check accumulator pressure (refer to section 8.6).
8. Make sure the drain valve is closed.
9. Refill the 682-53B system with clean barrier fluid.
10. Check set-up, and restart system (refer to sections 7.1 and 7.2).

## 8.6 Check accumulator pressure

Use this procedure to check the operating pressure of the accumulator. This procedure can only be followed, when system is not in operation.

### Procedure

1. Check the process conditions to see if the equipment (in which the seals are installed) can be stopped.
2. Stop the equipment (including the pump), according to plant regulations.
3. De-pressurize the equipment, according to plant regulations.
4. De-pressurize the 682-53B system, and open the drain valve.

**STOP** **WARNING – HIGH PRESSURE:** *The accumulator can burst if it is over pressurized. Fill the accumulator slowly; check the pressure gauge regularly.*

**STOP** **WARNING – HOT SURFACES:** *The system and surrounding surfaces might be hot. Take care when touching components. Wear the appropriate PPE, according to plant regulations*

**STOP** **WARNING – DANGER CHEMICALS:** *Dangerous chemical might be released during removal of the system. Wear PPE. Follow all safety regulations and Plant regulations.*

5. Attach the charge unit to the accumulator. Refer to vendor documentation in the appendix for information on the charge unit and accumulator.
6. Check the pressure gauge of the accumulator. Refer to the vendor documentation in the appendix for information on the accumulator.

**NOTE:** A charging kit of the same brand as accumulator shall be used. Other brands (although connection size might be the same) can cause damage to gas port of accumulator.

7. Adjust pre-charge of the accumulator, if applicable (refer to section 8.7).
8. Make sure the drain valve is closed.
9. Check set-up, and restart system (refer to sections 7.1 and 7.2).

### 8.7 Charge accumulator

Use this procedure to charge the accumulator with N<sub>2</sub>. The accumulator must be charged to the correct pressure; otherwise the fluid seal will not work correctly.

**NOTE:** Before starting this procedure, refer to the

vendor documentation in the appendix for any additional information.

#### Procedure

1. Check the process conditions to see if the equipment (in which the seals are installed) can be stopped.
2. Stop the equipment (including the pump), according to plant regulations.
3. De-pressurize the equipment, according to plant regulations.
2. De-pressurize the 682-53B system, and open the drain valve.

**⚠** **DANGER – SUFFOCATION HAZARD:** *Breathing N<sub>2</sub> in a confined space can result in sudden unconsciousness or death. Take extra care when working in confined areas.*

5. Attach the charge unit to the accumulator. When floating strategy is applicable (according API 682 4<sup>th</sup> Edition), the charging pressure, related to the current ambient temperature shall be considered.

Refer to the vendor documentation in the appendix for information on charge unit and the accumulator.

**NOTE:** A charging kit of the same brand as accumulator shall be used. Other brands (although connection size might be the same) can cause damage to gas port of accumulator. Recommended charging kit is Flowserve part number C0351034ZZ.





**WARNING – HIGH PRESSURE: The accumulator can burst if it is over pressurized. Fill the accumulator slowly; check the pressure gauge regularly.**

6. Fill the accumulator with N<sub>2</sub> until the required pressure that is related to the ambient temperature, is reached. Refer to the vendor documentation in the appendix for the correct setting.
7. Remove the charge unit from the accumulator.
8. Make sure the drain valve is closed.
9. Check set-up, and restart system (refer to sections 7.1 and 7.2).

## 9 Troubleshooting

Use the following table to troubleshoot the system. Once you have identified the problem, use the procedures in this manual to maintain the system. If you are not sure how to troubleshoot or maintain your 682-53B system, please contact your local Flowserve representative.

Parameter	Indication (1)	Possible cause	Solution
Pressure	Increases fast during refilling	N <sub>2</sub> pre-charge pressure too high	Check accumulator pre-charge pressure and adjust as stated in chapter 8.7
	Increases fast after pump start-up	N <sub>2</sub> pre-charge pressure too high	Check accumulator pre-charge pressure and adjust as stated in chapter 8.7
	Reduces fast (2)	Seal leakage too high	Check condition of seal (3)
Leakage in the system		Check the system for leakage	
Temperature	Too high	Insufficient circulation	Check system for blockages and contamination
		Insufficient circulation	add circulation device (pump)
		Air pockets in the circulating loop	Vent the circulating loop as stated in chapter 7.2
		Heat development in mechanical seal too high	Check seal condition
		Cooler not working	Check cooling water/air flow

The following notes apply to the above table:

1. An indicator or alarm is used for the Indication.
2. Pressure drops should be monitored over time. If the pressure drops too fast compared to previous readings, this could be caused by one of the listed causes. Slow reduction of pressure is normal over time.
3. In a combined 682-53B system, one system is used for two seals. Additional block valves are installed to help determine which inner seal (drive end or free end) is leaking. If you close one of these valves, the accumulator function is isolated from one of these loops. If the pressure in that loop drops rapidly, (which can be seen on the pressure gauge), the leaking inner seal is in that side of the pump.

## 10 Spare Parts

- The system is designed to provide reliable operation under a wide range of operating conditions. However, repairs will be necessary when system components reach the end of their normal life expectancy or when the system has been operated outside of its design capabilities.
- All liabilities and warranties to Flowserve FSD for damage incurred through the use of non-original replacement parts and accessories will be rendered null and void.
- Please note that special manufacturing and delivery specifications exist for all parts of our products manufactured or produced by ourselves and the replacement parts are always offered in accordance with the latest technology and with the most current regulations and laws.
- Flowserve uses SPIR lists with parts to be procured at Flowserve, that can be used for exchange when defect. Contact a Flowserve representative for a SPIR list of the system.

### 11 Appendix

#### 11.1 System logbook

Copy and use this logbook to record periodic or corrective maintenance done on your system. Use the following codes and enter remarks, the date, and your name:

Code	Remarks	Date	Name

Maintenance	W = weekly M = monthly Y = yearly A = adjust R = replace
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## 11.2 GA drawings

**NOTE:** Please see following inserted page(s):

### 11.3 Vendor documentation

**NOTE:** Please see following inserted page(s):

**Flowserve Corporation**

No. 35, Baiyu Road  
Suzhou Industrial Park  
Suzhou 215021, Jiangsu Province, PRC  
Phone: +86-512-6288-1688  
Fax: +86-512-6288-8737

**Flowserve Pte Ltd.**

No. 12 Tuas Avenue 20  
Singapore 638824  
Phone: +65 6879 8900  
Fax: +65 6862 4940

**Flowserve Corporation**

Flow Control Division  
1978 Foreman Drive  
Cookeville, Tennessee 38501 USA  
Phone: +1-931-432-4021  
Fax: +1-931-432-5518

**Flowserve Corporation**

Flow Control Division  
1350 North Mountain Springs Parkway  
Springville, Utah 84663-0913 USA  
Phone: +1-801-373-3028  
Fax: +1-801-489-2228

**Flowserve Flow Control (UK) Ltd.**

Burrell Road  
Haywards Heath  
West Sussex United Kingdom  
RH16 1TL  
Phone: +44-1444-314400  
Fax: +44-1444-314401

**Flowserve Ahaus GmbH**

von-Braun-Str. 19a  
48683 Ahaus  
Phone: +49-2561-686-119  
Fax: +49-2561-686-109

**Flowserve Flow Control GmbH**

Actuators and Automation Center  
Germany  
Rudolf Plank Str. 2  
D-76275 Ettlingen  
Germany  
Phone +49 (0)7243-103-0  
Fax +49 (0)7243-103-222

**Flowserve Flow Control Benelux BV**

Rechtzaad 17  
4703 RC Roosendaal NB Netherlands  
Phone: +31-165-598-800  
Fax: +31-165-555-670

**Flowserve India Controls Pvt Ltd.**

Plot No. 4, 1A, E.P.I.P, Road No. 8  
Whitefield, Bengaluru  
Karnataka 560066, India

**Flow Control Division Brazil**

Rua Tocantins, 128  
09580-130 - São Caetano do Sul - SP  
Brazil

**Headquarters**

Flowserve Corporation  
5215 North O'Connor Blvd.  
Suite 700  
Irving, Texas 75039-5421 USA  
Telephone: +1-937-890-5839

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