



USER INSTRUCTIONS

*Installation
Operation
Maintenance*

Flowserve Standard Refill Cart

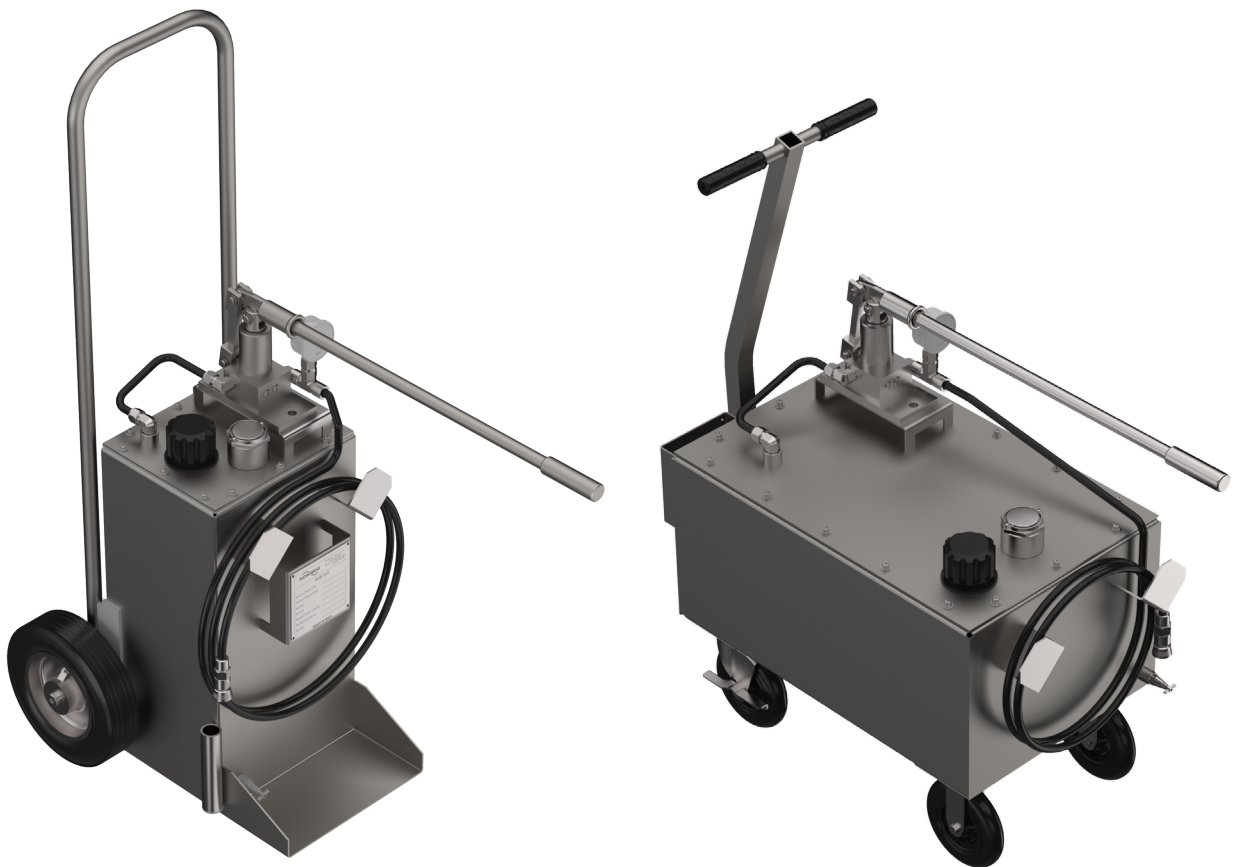


Figure 1. 10 Gallon & 20 Gallon Refill Cart

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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 Standard Refill Carts

Installation in accordance with the following instructions will contribute to long and trouble-free operation of the assembly.

1.2 How to use this manual

Before using this manual, make sure you have fully read and understood the safety section, which can be found in chapter 2. When new to the Refill Cart, pay attention to section 4, which describes the system in detail.

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 qualified personnel.

When maintaining the Refill Cart, always make sure maintenance procedures are followed. Pay particular attention to the alerts and icons.

The Refill Cart may only be used for its main purposes as described in this manual. No adjustments can be made without the approval of Flowserve.

Changes, modifications, repairs or use under conditions deviating from the design specifications without prior permission of Flowserve will make the declaration of conformity and the nameplate invalid.

1.3 Other supplied Documents

Annex II contains the assembly drawing and sub-component manuals.

1.4 Use of alerts and icons

This manual uses “Notes”, “Cautions” “Warnings” and “Dangers” to alert you of important information and/or hazardous situations.

Note: “Notes” inform you of important additional information.

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. All Icon used in this manual are listed below:

WARNING	
	HIGH PRESSURE: Take caution when de-pressurizing the Refill Cart. The Refill Cart might have energy stored inside. Make sure that de-pressurizing happens slowly.

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

WARNING	
	HAZARDOUS CHEMICALS: Dangerous chemicals might be released during removal of the Refill Cart. Wear Personal Protective Equipment (PPE). Follow all safety regulations and Plant regulations.

2. Safety

2.1 Types of hazardous exposures

The following hazards can be present in the Refill Cart:

- High hydraulic pressure buildup in the hose
- Exposure to hazardous chemicals
- Temperature (hot surfaces)
- Pinch Hazards
- Static Buildup

If the Refill Cart develops an external leak in the tank, it should be moved immediately to a containment area and should have the process fluid drained into an appropriate container. If the leak is from a component, it should be replaced and confirmed that it is fluid-tight before returning to service. If the tank is leaking due to a fracture or failure of the tank walls, The tank will need to be repaired by qualified personnel. When extreme conditions occur, and the possibility of a failure is imminent, plant-/end-user safety regulations shall be followed.

2.2 General Safety

When installing, operating and maintaining the Refill Cart, pay attention to the following:

- Obey all applicable safety laws and regulations.
- Obey all plant regulations.
- Make sure that only trained and qualified personnel work on it. Refer to section 2.3.
- Read and understand each part of this manual.
- Follow the installation, operation, and maintenance procedures exactly.

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 if the “danger” sign is not obeyed.

- Wear the relevant Personal Protective Equipment (PPE). Refer to section 2.4.
- Never work alone (if there is a possibility of an accident).
- Read the plant requirements for handling hazardous materials

2.3. Trained and qualified personnel

Qualified personnel are people 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 Refill Cart is often used for applications containing high-pressure, high-temperature and/or hazardous chemicals. When performing operating or maintenance tasks, make sure you wear the appropriate Personal Protective Equipment (PPE): protective clothing, gloves, safety glasses, etc as defined in the SDS for the process fluid stored in the Refill Cart.

2.5. Actions in extreme conditions

The tank is not designed to be a pressure retaining device. The tank contains a breather to allow for expansion or contraction of the atmosphere inside the tank. Depending on the volatility of the process fluid in the Refill Cart and the environmental conditions, it is possible to have hazardous vapors escape the tank. A review of the process fluid and its vapor properties should be done to ensure it meets the plant safety and containment expectations.

In the event of emergency issue with the Fill Cart, always follow emergency plant regulations. Immediate evacuation of service personnel to be according to plant regulations.

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

Make sure waste products are disposed as defined by their respective SDS. Always follow local and plant regulations.

Any waste products resulting from the use or maintenance of the Refill Cart must be disposed of according to local environmental laws and regulations.

3.2. End of life equipment

WARNING	
	HAZARDOUS CHEMICALS: Hazardous chemicals might be released during removal of the Refill Cart. Wear Personal Protective Equipment (PPE). Follow all safety regulations and Plant regulations.

WARNING	
	HIGH PRESSURE: Take caution when de-pressurizing the Refill Cart. The Refill Cart might have energy stored inside. Make sure that de-pressurizing happens slowly.

When the equipment reaches the end of life, the shutdown procedure (section 7.4) shall be followed. The equipment must then be deinstalled and transported to a safe location. Always pay extra attention to safety!

Note: End-of-life equipment must be disposed of according to local environmental laws and regulations.

4. Description

The RCT Refill Cart is a mobile container designed to hold barrier fluid or product to be transported and transferred to a seal support system and transferred to a higher pressure system through a manually operated hydraulic pump. The Refill Cart contains all the support equipment to store and protect the intended medium as well as the ability to pressurize and transfer the fluid to a pressurized system.

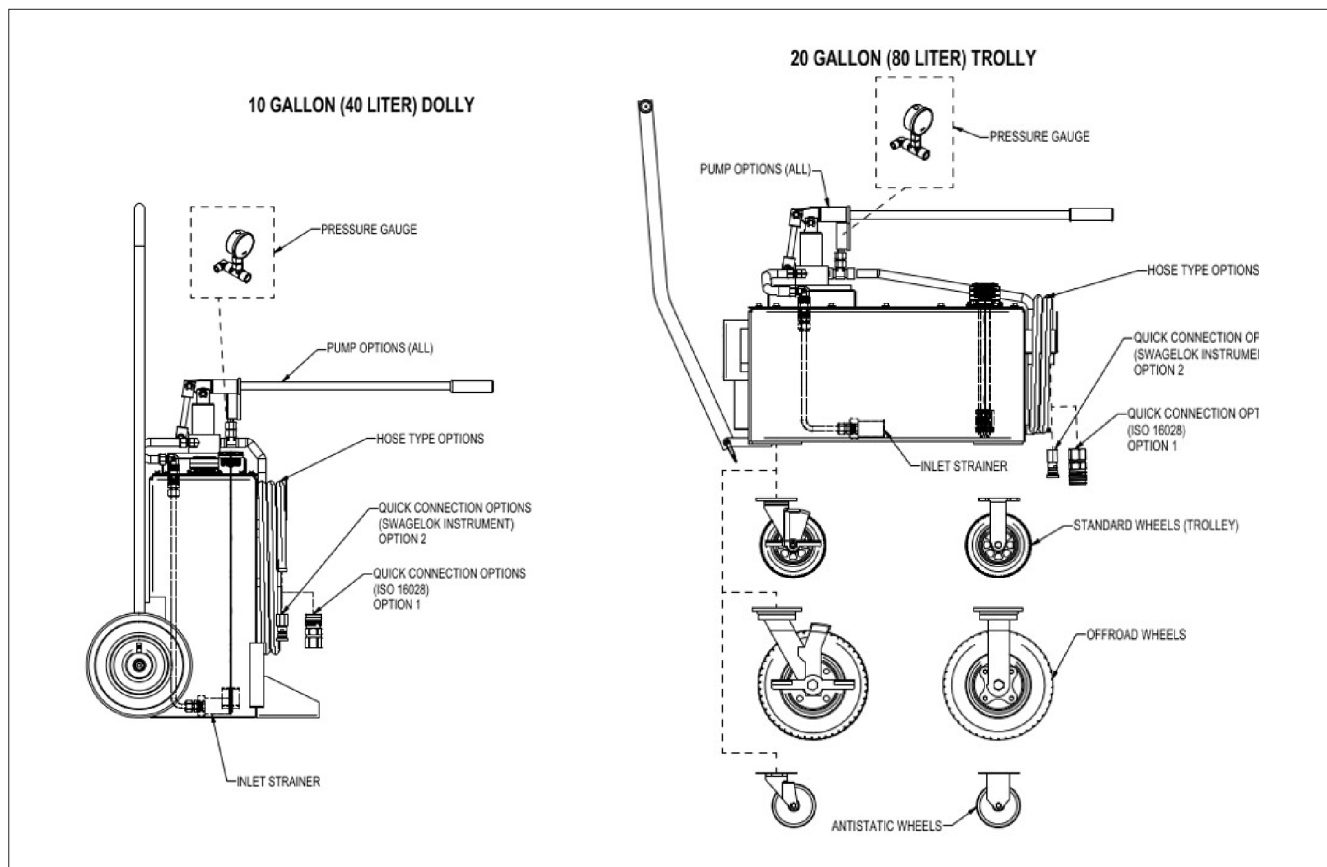


Figure 2. 10 Gallon & 20 Gallon Refill Cart with options

4.1. Design Features

Operating conditions may vary but shall never exceed the design conditions. Refer to the customer drawing of the Refill Cart for boundary dimensions, design conditions and operating constraints.

The key design features of the Refill Cart are listed below:

- Meets API Standard 682 where applicable
- Tank constructed of 304 Stainless Steel with a removable lid for corrosion resistance and ease of cleaning.
- Castor wheel options for different applications offered on the 20-gallon trolley.
- Multiple pump choices up to 2,500 PSI.
- Two styles of Refill Cart with a 10-gallon dolly and a 20-gallon trolley.
- Standardized process connections and clear options for customer defined.
- Designed for low viscosity fluids, such as water when used with the stainless steel pumps and bronze piston.
- Integrated level gauge and drain valve.
- Optional pressure indicator and strainer can be selected.

4.2. The operating principle

The Refill Cart is a container that can store process fluid, typically barrier fluid. This cart can be physically moved to the system intended to be charged and connected via the rubber hose and a quick connect. The mobile charging unit is designed for charging the systems while under pressure. See the customer drawing for maximum connection pressure. The pump is single acting in the downstroke allowing the system to be operated without it being secured to the ground. The pump includes an internal pressure relief device designed to assist with overpressure protection. The pump also includes a non-return valve to keep a constant pressure to the system being filled.

The pump is cycled to create flow of the process fluid from the Refill Cart to the rubber hose. The force required on the pump handle is directly related to pressure the pump must exceed to create flow. Once the filling of the system is complete, the system is to be isolated and the quick connect can be removed. The outlet pressure of the system can be released with the needle valve on the pump. It is expected to do this when it is safe to do so.

The tank has a level indicator (LG) that can be used to monitor the fluid level of the tank. The tank can be filled through the filler cap (F) which also serves as a breather and pressure relief for the tank. The drain plug is designed to allow the tank to be drained and allow for sample to be taken or checked for contaminants

The pressure instrument (P) shows the pressure in the rubber hose during operation. It is important to check this before connection the quick connect to ensure the connection pressure is low. If any process fluid is retained in the rubber hose under pressure, it can fluctuate with change in temperature. The seal supply (B) can have a suction filter installed to assist in avoiding clogs as it is a will provide filter the mesh strainer. It is not intended to clean dirty process fluid. Any process fluid added to the Refill Cart should be clean before storing in the tank.

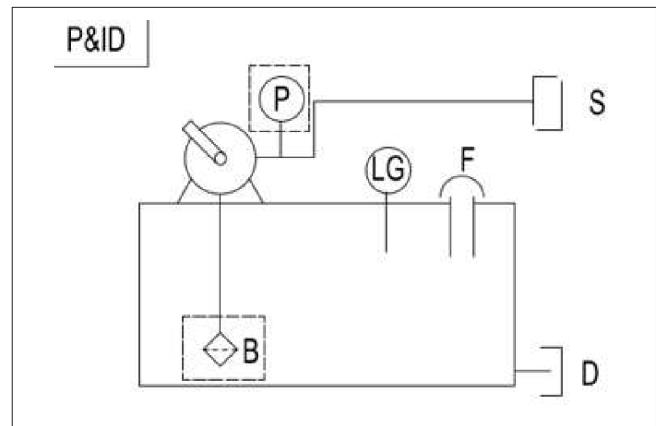


Figure 3. Refill Cart operating principle with P&ID and connection table.

Replacement KIT (Table 6)		
B	Seal Supply	½in Tube
D	Drain	½in FNPT
F	Fill	2.31in Hole
LG	Level Gauge	1-½in FNPT
P	Pressure Instrument	¼in FNPT
S	Hose Connection	¾in FNPT

4.3. Identifying the Product (Type Plate)

The nameplate is, as per Flowserve standard, shown on the general assembly drawing.



Figure 4. Example of the Nameplate for Refill Cart

Flowserve Standard Refill Cart

The part code is defined from the smart part code.
It is defined below.

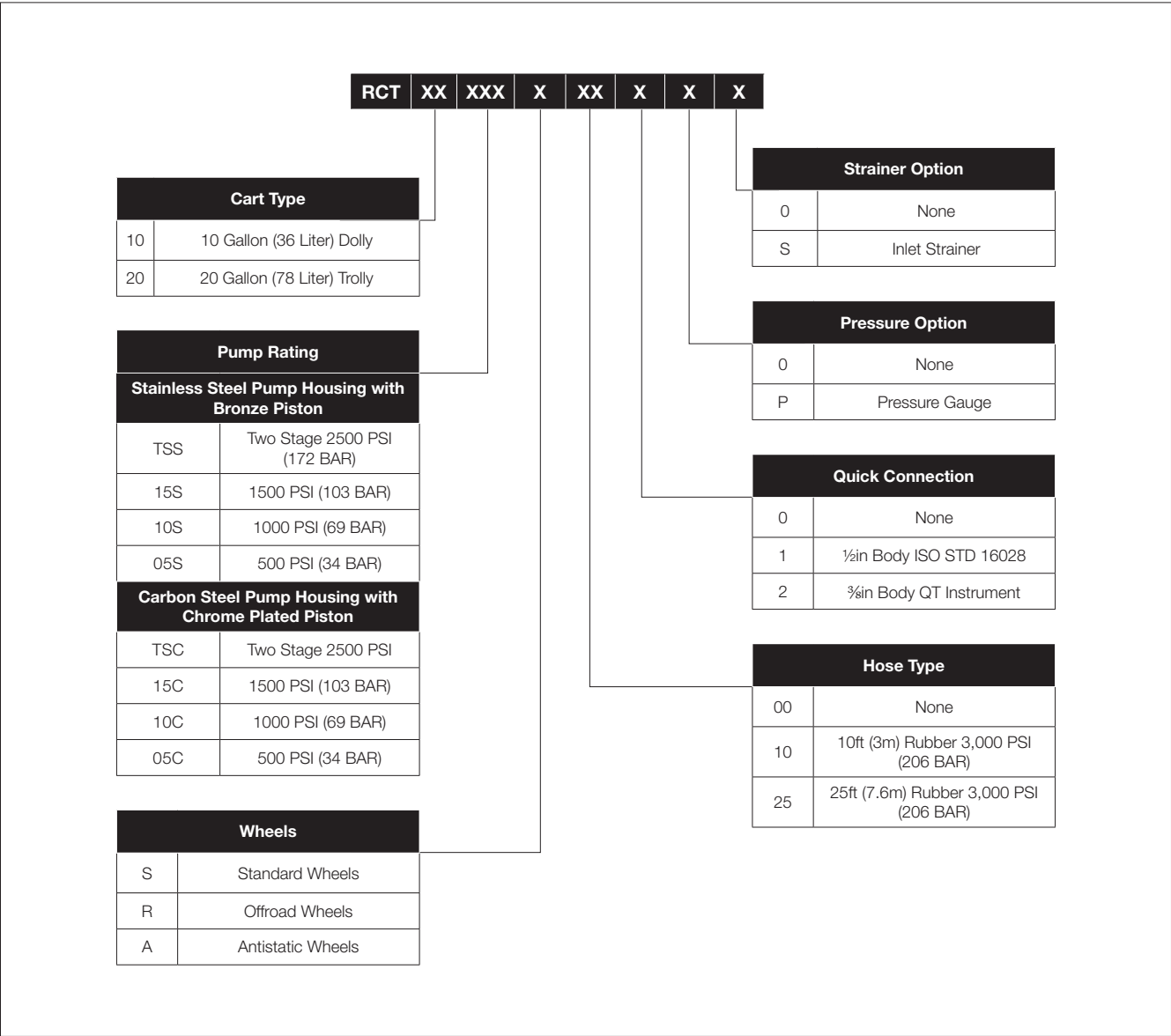


Figure 5. Refill Cart Smart Part Decoder

5. Preservation, Packing, Transport and Storage Requirements

5.1. Mechanical preservation instructions

5.1.1. Preservation

Equipment should not be sealed in a way that will obstruct inspection. Access for normal inspection and preservation maintenance shall be provided. Internal and external surfaces shall be dried and cleaned of surface corrosion and foreign material.

The Refill Cart shall be thoroughly cleaned and dried after manufacturing and testing, before applying preservatives. It is important that the internal tank is to be sealed from dust and other debris for shipping and short term storage. When stored for long term storage, additional preservations should be applied appropriate for the time and location of storage.

For equipment where water is used for cleaning or pressure testing, the water shall have antifreeze medium added unless the water is completely drained off. This also applies if the ambient temperature is below 4°C during any of these operations.

Internal surfaces consisting of corrosion resistant materials shall not be preserved unless stated otherwise.

5.1.2. De-Preservation

For de-preservation the applicable dust caps/plugs need to be removed prior to commissioning. During hook up it is mandatory to keep these caps/plugs in place for as long as possible to prevent contamination.

5.2. Packing

WARNING	
	CRUSH HAZARD: Possible injury and/or trapped limbs. Take care to avoid being trapped or crushed between heavy, moving objects when (un)boxing the panel.

The Refill Cart is to be carefully lifted inside a timber box. Always make sure that proper lifting devices are used.

- Unit Weight 10 Gallon (Empty) : 40 lbs (18.1 kg)
- Unit Weight 20 Gallon (Empty) : 65 lbs (29.5 kg)

To prevent damage during transport all equipment needs to be properly secured inside their timber package with suitable bolting, straps, or wooden supports.

For unboxing, the equipment must be lifted carefully out of its shipping box.

5.3. Transportation and storage requirements

Note: The following requirements apply to the Refill Cart and all related equipment:

Transport and storage criteria	Requirements
Transportation	The system must be transported and stored in the unopened, original shipping box.
Suspect damaged during transportation	Inspect Refill Cart s that have been dropped or have been subjected to impacts during transport to confirm that they are operational before installation.
Warehouse requirements	The warehouse must be dry and dust free.
Long-term storage	After a storage period of 2 years, inspect the Refill Cart before installation.
Preserving Refill Carts previously in service	The tank should be cleaned with an appropriate solvent for the previous process fluid used. Special care should be taken to ensure the pump and the hose are clean before storing.

Table 1 - Transport and Storage Criteria

6. Operation

6.1. Setup Procedure

Before using the Refill Cart, the following should be performed prior to use.

- Inspect the internals of the tank by removing the lid and checking for dust and debris.
- Confirm that the strainer, if supplied, is clean and free of debris
- Check that the float for the level gauge is free.
- Inspect the gasket for damage and replace as needed
- Reinstall the lid and tighten hardware to 8ft-lbs
- Confirm that the wheels are installed properly
- Verify that the drain valve is closed.
- Add product fluid to the tank though the fill connection.

Bleeding the pump and hose.

- Remove the quick connect from the hose and place the end of the hose into the fill port.
- Open the release valve on the pump and slowly operate the pump 20 times and close the release valve.
- Slowly operate the pump using the supplied handle to prime and fill the pump and hose.

Setting the overload valve

The overload valve is set to the pump's max design pressure. If a lower set pressure is required to comply with API 682, then the following procedure should be followed to set the pump internal overload valve. This valve is not an approved ASME Safety Valve.

See "Overload Valve" notes in the troubleshooting chapter on setting the overload valve.

6.2. Operating Procedure

- With the Refill Cart primed and full, the following process is required to operate.
- Park the cart on a firm, level surface near the system to be filled.
- If no pressure gauge is supplied, the system gauge should be visible when operating the hand pump.
- For the 20-gallon trolley, engage the wheel brakes. No brakes are supplied on the 10-gallon dolly
- Verify that the process fluid in the Refill Cart is the same as the buffer or barrier fluid in the system intended to be filled. The method and process should be per the plants processes for identification.
- Make sure the release valve is closed prior to connecting the Refill Cart to the system.
- Connect the quick connect to the system. Make sure that the quick connect is secure by pulling gently on the connect and visually inspecting it.
- Open all isolation valves between the Refill Cart and the system.
- Operate the hand pump at a comfortable pace. Monitor the pressure of the system during pumping to make sure that you don't overpressure the system. Note: for 53C systems, the pressure of the system should not increase during operation. Monitor the level of the accumulator. If pressure increases, stop immediately.
- When complete, close all isolation valves between the Refill Cart and the system.
- Open the release valve and remove the quick connect from the system.
- Store the hose and the pump handle and release the brakes, if applied.

The system should be thoroughly cleaned if the type of liquid is ever changed.

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

WARNING	
	HAZARDOUS CHEMICALS: Hazardous chemicals might be released during removal of the Refill Cart. Wear Personal Protective Equipment (PPE). Follow all safety regulations and Plant regulations.

7. Maintenance

7.1. General Guidelines

Periodic maintenance must be done at regular intervals (on use, monthly, yearly) refer to the following tables.

All liabilities and warranties to Flowserve for damage incurred using non-original replacement parts and accessories will be rendered null and void.

To avoid potential explosion hazards during maintenance, the tools, cleaning and painting materials used must not give rise to sparking or adversely affect the ambient conditions. Where there is a risk from such tools or materials the Refill Cart must be moved to a safe area for dismantling.

7.2. Periodic Maintenance Tables

Use the following tables to plan the periodic maintenance for your Refill Cart (refer to the table of contents and the Appendix for the relevant information)

On use maintenance
Inspect the quick connect for damage. Replace as needed.
Check the hose for cuts or heavy damage. Remove and replace if damage is suspected.
Confirm the wheels are free of damage and spin freely. Grease (if applicable) or replace.
Verify the process fluid is sufficient for the filling application.

Monthly maintenance
Do all on use maintenance procedures.
Verify the hand pump is functioning correctly and is holding pressure.
Ensure that the release screw is free and seals tightly.
Remove the lid and inspect the suction filter (if supplied) for debris. Clean and reinstall.
Visually inspect for corrosion on all surfaces. Remove corrosion and repair as typical.

Yearly maintenance
Do all on use and monthly periodic maintenance procedures.
Drain and clean the tank and the pump.

Table 2 – Maintenance and Inspections

8. Troubleshooting

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

Note: the recommended response actions always include notify the supervisory authority and respond according plant regulation.

Parameter	Possible Cause	Solution
Pump won't build pressure	- Lack of oil in the tank - Air in the pump - Release valve not seated - Circuit valve not seating - Overload not seating - Clogged intake	- Refer to "Oil" notes - Refer to "Air Bleeding" notes - Refer to "Release Valve" notes - Refer to "Pump Valve" notes - Refer to "Overload Valve" notes - Clean and inspect the suction filter and hose for debris and clogs
Pump won't hold pressure	- Release valve not seated - Ball valve not seated - Overload valve not seated - Leaking hose or quick connect - Plan type failed	- Refer to "Release Valve" notes - Refer to "Pump Valve" notes - Refer to "Overload Valve" notes - Inspect hose and quick connect for sources of failure - Confirm that the plan type being filled is functioning correctly and not bleeding pressure.
Pump feels soft or does not flow fully	- Air in the fluid or pump - Lack of oil in tank	- Refer to "Air Bleeding" notes - Refer to "Oil" notes
Pump piston or handle raises by itself	Large ball in ball valve circuit not seating properly	Refer to "Pump Valve" notes
Pump functions but does not build pressure to its service rating	Overload valve not properly set	Refer to "Overload Valve" notes

Table 3 - Localization and Elimination of Vaults, Damages and their Consequences

Air Bleeding

Air accumulation in a hydraulic system will cause erratic action. This may appear as pump failure to the inexperienced user. For this reason, it is advisable to bleed the air from each pump before attempting to operate. To remove air from the pump, open the release valve with the pump in an upright position. Operate the pump slowly through the full piston stroke about a dozen times. Close the release valve. The pump should be ready for use.

Oil

If the pump fails to operate, check the process fluid level. A low level can result in the pump losing suction. If the level is high but the problem persists, confirm that the level gauge visually as the level gauge may be damaged or stuck. Use the same process fluid as currently in the tank to avoid contamination.

Pump Piston

Leakage of oil around the pump piston may indicate worn or damaged piston packings.

To replace packings:

- Remove the piston actuating linkage.
- Remove the piston. Refer to the vendor drawing for the pump
- Remove all packings.
- Clean all parts and dry with compressed air.
- Install new packings, wipers, and static seals making sure that the packing seal lips face down toward the pressure. (Lubricate each part with clean compatible oil before assembly)
- Open the release valve to allow air to bleed from the piston barrel and insert the piston.
- Replace the piston linkage.

NOTE: With the release valve open, stroke the pump about a dozen times to bleed air completely from the pump.

Pump Valves

If the pump fails to supply pressure or if the pump piston is under pressure at all times, the pump valves may need cleaning. Remove the pump from the Refill Cart. Remove the valve plug and seal. Tilt the pump to remove the valve springs and balls. Allow oil to drain from the pump through these valve holes to wash foreign matter from the valve cavity. Lay the pump on its side to clean and inspect the valve chamber. Be careful not to mar or nick the ball valve seats. Clean the valve balls and springs in solvent. Replace rusted or corroded balls. Do not stretch the ball springs. To reassemble, insert in sequence, the small ball, small spring, large ball, and large spring into the cleaned chamber. Finally, screw in the valve seal plug. Contact Flowserve for replacement parts.

This procedure should be carried out in all ball valve circuits. If the valves fail to operate properly after they have been cleaned, it may be necessary to re-seat the valve balls. Remove the springs and tap each ball lightly in its respective seat using the 1/4" ball seating tool (CP13-42) for the small ball and the 3/8" ball seating tool (CP13-43) for the large ball. Remove the balls to make sure they are not stuck to the seats. Reassemble the pump valves as before. See "Air Bleeding" instructions before attempting to operate the pump.

Release Valve – Screw Type

If the pump fails to lift or hold a load, the release valve may be dirty. Remove the release screw, release valve seal and the 9/32" release ball. Clean and inspect the valve seat and screw. A slight depression in the end of the screw is not harmful. Screws with excessive deformation should be replaced. Re-seat the release ball using the 1/4" ball seating tool (CP13-42). To reassemble, insert the release valve packing using inserting tool (P1A-40). Reinstall the release screw. See "Air Bleeding" instructions before attempting to operate the pump.

Overload Valve

If the pump fails to lift or hold a load after the release valve and pump valves have been checked, the overload valve may be dirty. To clean the valve, remove the valve plug and the plug seal. Using a screwdriver, remove the overload valve screw, valve spring, plunger, and steel ball. Clean and inspect the valve cavity. If the ball seat is marred, re-seat the overload ball by lightly tapping the ball on seat using tool (CP13-45). Remove the ball to prevent sticking. Reassemble the ball, plunger, spring and valve screw. Connect a pressure gage to the pressure outlet. Stroke the pump to obtain maximum desired pressure. Turn the valve screw clockwise to increase the pressure reading and counter-clockwise to reduce the maximum reading. After the valve is set properly, replace the valve seal and valve plug. Note that the seal kit contains the new style plug and seal. See "Air Bleeding" instructions before attempting to operate the pump.

ANNEX I

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:

Weekly maint = W	Monthly maint = M	Yearly maint = Y	Adjust = A	Replace = R
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ANNEX II



Headquarters

Flowserve Corporation
5215 North O'Connor Blvd.
Suite 700
Irving, Texas 75039-5421 USA

Flowserve Corporation has established industry leadership in the design and manufacture of its products. When properly selected, this Flowserve product is designed to perform its intended function safely during its useful life. However, the purchaser or user of Flowserve products should be aware that Flowserve products might be used in numerous applications under a wide variety of industrial service conditions. Although Flowserve can provide general guidelines, it cannot provide specific data and warnings for all possible applications. The purchaser/user must therefore assume the ultimate responsibility for the proper sizing and selection, installation, operation, and maintenance of Flowserve products. The purchaser/user should read and understand the Installation Instructions included with the product, and train its employees and contractors in the safe use of Flowserve products in connection with the specific application.

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