



# TECHNICAL SERVICE MANUAL

## VIKING BOLTED-LID SIMPLEX IN-LINE BASKET-TYPE STRAINERS

|         |         |
|---------|---------|
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### INTRODUCTION

This bulletin deals exclusively with Viking Bolted-Lid Basket-Type Strainers. When ordering parts be sure to give complete part name, serial number and model number. The basket mesh size is stamped on the basket handle and the O-ring construction can be identified with a Viking color code (listed under O-ring Information).

Use of basket strainers can avoid costly failures and increase the life of the equipment. Proper use of strainer can minimize down time. A definition for strainers is "a coarse filter". Strainers are typically intended to trap larger foreign objects such as rags, weld beads or bolts. Filters are intended to capture very small particles.

Lid sealing is accomplished with one O-ring, therefore proper application of O-ring is essential. The O-ring must be acceptable for the temperature limits of the system as well as compatible with the fluid being strained. Misapplication may result in O-ring swell, (making lid removal difficult) or premature O-ring failure, causing strainer leakage.

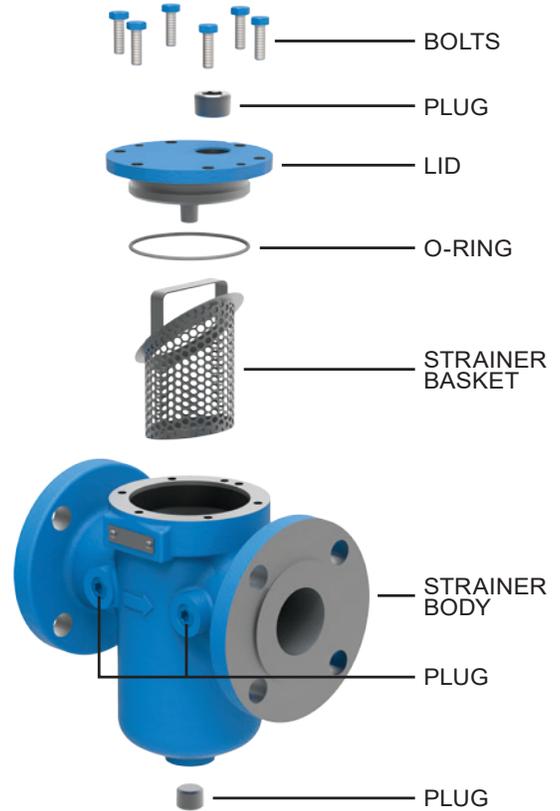


FIGURE 1

### DANGER !

**Before opening any Viking pump liquid chamber (pumping chamber, reservoir, relief valve adjusting cap fitting, etc.) be sure:**

1. That any pressure in the chamber has been completely vented through the suction or discharge lines or other appropriate openings or connections.
2. That the driving means (motor, turbine, engine, etc.) has been "locked out" or made non-operational so that it cannot be started while work is being done on pump.
3. That you know what liquid the pump has been handling and the precautions necessary to safely handle the liquid. Obtain a material safety data sheet (MSDS) for the liquid to be sure these precautions are understood.

**Failure to follow above listed precautionary measures may result in serious injury or death.**

Viking does not recommend using Bolted-Lid Strainers for the following applications:

1. Fluids having vapor pressure higher than one atmosphere, either at room temperature or operating temperature.
2. Straining of particles finer than 70 microns (50X250 Mesh available through 4").
3. Temperatures below 0°F or above +350°F.
4. High system pressure applications (**See Table A**).
5. High basket differential pressure (**See Table A**).

| Strainer Size                                       | 2"  | 3"  | 4"    |
|---|-----|-----|-------|
| Basket Clearance<br>(Required from port centerline) | 7.5 | 9.5 | 11.75 |
| Maximum Basket Differential Pressure (PSID)         | 150 | 125 | 125   |
| ① Class 150 Maximum System Pressure (PSIG)          | 250 | 250 | 250   |
| ① Class 300 Maximum System Pressure (PSIG)          | 640 | 640 | 640   |

① System pressure ratings are for temperature range of 0°F to 150°F per ANSI B16.42 Ductile Iron pipe flanges and flanged fittings.

TABLE A



Determine and exercise necessary precautions before removing the lid, involving fluids which are:

- **POISONOUS OR TOXIC**
- **FLAMMABLE**
- **HARMFUL TO FACE OR HANDS**
- **HOT** (Liquids containing boiling water (+212° F at sea level) can produce steam; extra care to properly vent strainer must be exercised).
- **ENTRAINED WITH AIR** (Be sure the system is completely vented)

**DO NOT ATTEMPT TO VENT THE SYSTEM BY UNBOLTING THE LID.**

## INSTALLATION

Strainers should be placed ahead of any equipment needing protection. The mesh size used in the strainer body should be only as small as required to protect the equipment. This will minimize the pressure drop through the strainer. For pump protection, locate the strainer on suction side of the pump. Proper sizing of the strainer and basket mesh can prevent the pump from cavitating due to excessive pressure drop across the strainer. There are several factors which influence pressure drop such as viscosity of fluid, percentage and size of particles or contaminants, and frequency of cleaning.

If the liquid contains undesirable ferrous particles, magnetic inserts can be added to the baskets to help remove these particles.

A second strainer (or filter) located on discharge side of pump may be desirable to protect other equipment in the system which requires a smaller mesh basket for finer straining of the liquid. A basket with a smaller mesh opening (the higher the mesh number, the smaller the opening in the mesh) can be permitted on the discharge side because pressure drop is less critical. Maximum differential pressures allowable across strainers are listed in **Table A, page 1**.

Locate the strainer in a position where the drain plug can be easily removed (Replace the plug with a drain valve for frequent maintenance). Provide adequate space above the strainer for basket removal as listed in **Table A, page 1**. The Bolted-Lid strainer has cast arrows on the body to indicate the direction fluid must flow. These strainers are not designed for any type of backwash operation.

**NOTE:** Mounting the strainer with ports in a vertical position is **NOT** recommended because of increased difficulty during servicing.

For the larger strainers, additional external support of the strainer may be required to reduce pipe strain in the system. This can be accomplished either by supporting the flanges or providing a base for the bottom of the strainer. Lid removal for maintenance will be much easier if the top of the strainer is not over 3 feet off the ground. In the event that the strainer is not at highest point in the system, valves are recommended on both sides of strainer to prevent the strainer from filling up while cleaning the basket.

As the basket becomes clogged with foreign matter, differential pressure will rise. **Table A, page 1** shows maximum pressure differential allowable across the basket. If this pressure is exceeded, damage to the basket may occur. A good way to indicate when basket must be cleaned is to: 1) Install a

pressure differential gauge or 2) install a pressure gauge on each side of the strainer.

**NOTE:** Strainers located on the discharge side of the pump must have a safety relief valve between the pump and the strainer set no higher than the strainer's maximum system pressure (see **Table A, page 1**).

## DISASSEMBLY

**NOTE:** Before removing the lid to clean the basket make sure that you have a spare O-ring in the event that the fluid being strained has caused the O-ring to swell.

### DANGER !

Before opening any Viking pump liquid chamber (pumping chamber, reservoir, relief valve adjusting cap fitting, etc.) be sure:

1. That any pressure in the chamber has been completely vented through the suction or discharge lines or other appropriate openings or connections.
2. That the driving means (motor, turbine, engine, etc.) has been "locked out" or made non-operational so that it cannot be started while work is being done on pump.
3. That you know what liquid the pump has been handling and the precautions necessary to safely handle the liquid. Obtain a material safety data sheet (MSDS) for the liquid to be sure these precautions are understood.

Failure to follow above listed precautionary measures may result in serious injury or death.

1. Remove the bolts from top of lid.
2. Raise up the lid.
3. Remove the basket and clean. Do not strike the basket to clean it out; this could deform the basket side or lip and decrease the strainers effectiveness. Avoid using a sharp object such as a screwdriver, which could puncture the mesh. To clean the basket, use a small brush or compressed air.

## ASSEMBLY

1. Place basket into strainer body.
2. Reinstall the lid by lining up the lid holes with the holes on the strainer body.

**NOTE:** Do not attempt to install the lid if the strainer has filled up; drain before installing the lid. Press down on the lid firmly and evenly until it is seated.

3. Reinsert the bolts.

| STRAINER SIZE | RECOMMENDED BOLT TORQUE |
|---------------|-------------------------|
| 2"            | 13-16 Ft-Lbs            |
| 3"            | 27-30 Ft-Lbs            |
| 4"            | 45-48 Ft-Lbs            |

4. Reinstall the drain plug (if removed) or close the drain valve (if installed).

5. Before starting up the system, make sure to open all valves that were closed for servicing. After starting up the system, check for any possible leaks. If there is any leakage around the lid, return to Disassembly. Remove the lid and refer to Trouble-Shooting, page 4, for possible causes of leakage.

**NOTE:** When installing a new O-ring, it is recommended that the O-ring be lubricated with grease before installing onto the lid.

**DANGER !**

**Before starting the system, be sure the lid is in the proper position and the bolts are installed to prevent the lid from coming loose.**

of the elastomer with the fluid(s) at operating temperature extremes, is essential and **Table B** lists suitability for several O-ring elastomers, along with Viking's means of identification. If an O-ring is incompatible with a fluid, excessive O-ring swell or contraction might result and/or properties of the elastomer may change, reducing the satisfactory performance life of the O-ring. Included in Table B is a general list of fluids that Parker's O-ring Manual does and does not recommend for specific elastomers. Obviously if an O-ring should swell, sealing will be enhanced between lid and body, but would make the lid difficult to remove. Conversely, O-ring shrinkage will reduce sealing and possibly cause a leak. Several good sources are available covering O-ring compatibility. These include O-ring manufacturers literature, Viking Pump's Liquid List, Viking's Application Department, manufacturers of other components in the system and previous experience.

Generally it is best to have an extra O-ring on hand when removing the lid. Once the lid has been removed, if any swelling has occurred, reinstalling the lid with the existing O-ring will be difficult (if not impossible) and may require another O-ring.

## O-RING INFORMATION

Proper application and use of the O-ring elastomer will affect the ease of lid removal and the life of the O-ring. Compatibility

| TYPE OF ELASTOMER   | VIKING IDENTIFICATION | TEMPERATURE LIMIT <sup>①</sup><br>LIMIT °F | LIQUIDS <sup>②</sup>   |  |
|---|-----------------------|--|--|--|
|   |                       |  | RECOMMENDED  | NOT RECOMMENDED  |
| FKM   | GREEN DOT             | 0 TO +350                                  | Petroleum oils<br>Di-Ester base lubricant<br>Silicone fluids & grease<br>Halogenated hydrocarbon<br>Selected phosphate ester acids | Ketones<br>Skydrol<br>Amines<br>Low molecular weight esters & ethers<br>Hot hydrofluoric or chlorosulfonic acids |
| <sup>①</sup> Temperatures listed are for static seal applications only for the Bolted-Lid Simplex strainer line.<br><sup>②</sup> Source: Parker O-ring Handbook |                       |  |  |  |

**TABLE B - O-RING SELECTION**

## TROUBLESHOOTING

| PROBLEM                                    | POSSIBLE CAUSE                                | SOLUTIONS   |
|--|---|---|
| The lid is difficult to open               | 1) The system is under pressure               | 1) Relieve the pressure   |
|  | 2) The O-ring is swollen                      | 2) Check compatibility of the O-ring with the fluid and temperature.  |
|  | 3) The fluid inside is sticky or solid        | 3) a) Remove the lid before liquid solidifies<br>b) May require heat tape and insulation around body            |
| The lid is difficult to install            | 4) The O-ring is swollen                      | 4) Confirm FKM O-ring compatibility   |
|  | 5) The O-ring is not lubricated               | 5) Lubricate the O-ring with grease or a suitable lubricant   |
|  | 6) There is too much fluid in the body        | 6) Drain out the fluid, leaving more air in the body before installing the lid                                  |
| Fluid leaks around the top of the strainer | 7) The O-ring is cut                          | 7) Replace the O-ring (never try to install a cut O-ring)   |
|  | 8) There is foreign material under the O-ring | 8) Remove & clean the O-ring, groove in lid, & body O-ring seat. Reinstall, making sure to lubricate the O-ring |
|  | 9) The O-ring has shrunk                      | 9) Select a compatible O-ring material  |
| There is excessive pressure drop           | 10) The basket is filled with contaminants    | 10) Clean the basket more frequently  |
|  | 11) The basket mesh is too fine               | 11) Check the pressure drop curves. A larger strainer or a larger mesh basket may be required                   |
|  | 12) The viscosity is too high                 | 12) Increase the strainer unit size or use a larger mesh basket.  |

**VIKING PUMP****WARRANTY**

Viking pumps, strainers and reducers are warranted to be free of defects in material and workmanship under normal conditions of use and service. The warranty period varies by type of product. A Viking product that fails during its warranty period under normal conditions of use and service due to a defect in material or workmanship will be repaired or replaced by Viking. At Viking's sole option, Viking may refund (in cash or by credit) the purchase price paid to it for a Viking product (less a reasonable allowance for the period of use) in lieu of repair or replacement of such Viking product. Viking's warranty is subject to certain restrictions, limitations, exclusions and exceptions. A complete copy of Viking's warranty, including warranty periods and applicable restrictions, limitations, exclusions and exceptions, is posted on Viking's website ([www.vikingpump.com/warranty/warranty-info](http://www.vikingpump.com/warranty/warranty-info)). A complete copy of the warranty may also be obtained by contacting Viking through regular mail at Viking Pump, Inc., 406 State Street, Cedar Falls, Iowa 50613, USA.

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