



“T” Style Vacuum Filters ST Series 1” – 4” BSPP

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Note: Please read the maintenance instructions given by the OEM for the machinery first. The OEM's manual should be adhered to in order to protect the equipment. Solberg Manufacturing, Inc has made every effort to make sure that these instructions are accurate but is not responsible for any typos, slight variations or for human errors that may occur.

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Maintenance Manual

“T” Style Vacuum Filters

ST Series 1” – 4” BSPP

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****For Further Information Please Call: +1-630-616-4900***



Section A

INTRODUCTION

The purpose of this manual is instruction on the proper assembly and care of Solberg inlet vacuum filters.

WARNING

This manual must be read and thoroughly understood before using and caring for this vacuum filter. Failure to comply could result in explosion, product/system contamination or personal injury.

This manual should be used as a supplement to the user's understanding of the proper care needed to maintain a safe and dependable vacuum filter. It is the responsibility of the user to interpret and explain all instructions to persons who do not read or understand English BEFORE they are allowed to maintain and use this filter.

This manual should be readily available to all operators responsible for operation and maintenance of the inlet vacuum filters.

We thank you for selecting products from Solberg Manufacturing, Inc. We are confident that our superior filter designs will meet your application requirements.

Section B

GENERAL INFORMATION

1. Identification of Solberg Inlet Vacuum Filters.

All Solberg inlet vacuum filters should have an identification label/nameplate that gives the following information:

**Assembly Model #
Replacement Element #**

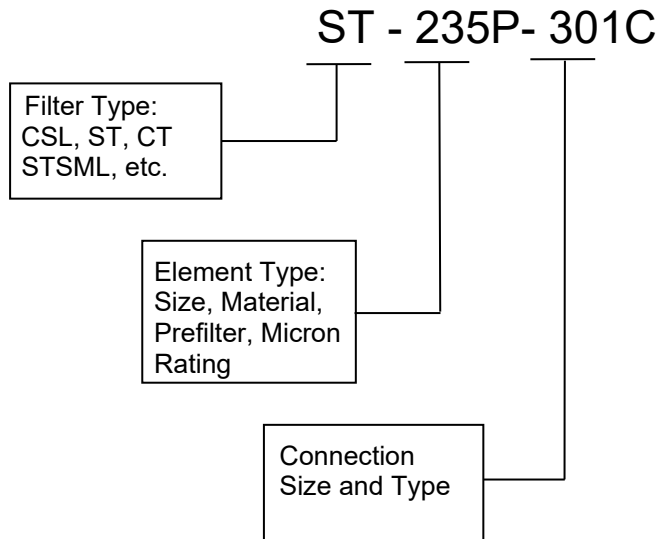
(The exception is OEM supplied units. In this case, please enter the OEM part numbers in Table 1.)

Fill in the actual nameplate data from your new Solberg inlet vacuum filter(s):

No.	Filter Model Number	Replacement Element	Initial Delta P Readings
1			
2			
3			
4			
5			

Table 1

The model number designates the filter type, the original element configuration and housing connection size. For example, the following part number identifies the filter as being a 'ST' design filter with a 235 element with prefilter and 3" BSPF coupling connection:



2. Filtration Rules of Thumb

General: For peak output performance from a compressor, blower, vacuum pump, engine, or any other machine that consumes air, one must have clean, unrestricted air. Proper filtration can help stabilize the working environment within rotating equipment even when the external conditions may be quite severe. A critical component in creating the right working conditions is filter sizing. With the properly sized filter, equipment will run smoothly over its entire expected operating life.

A major factor in filtration and filter sizing is air velocity through the filter media. Generally, the slower the velocity of air through a media the higher the filter efficiency and, conversely, the lower the pressure drop. Therefore, the primary goal in filter sizing is to optimize the velocity of air through the media (sometimes called face velocity).

Rule of Thumb #1: Always begin with the filter cartridge requirements when sizing a filter. Once the appropriate element has been selected then move on to the housing requirements.

Rule of Thumb #2: Always ask or specify a filter based on a micron rating *with filtration efficiencies*. As an example, stating a requirement for a 1-micron filter is misleading because no efficiency rating has been specified. A 1-micron filter at 95% efficiency may be less efficient than a 5-micron filter at 99% efficiency. For proper air system performance in light and industrial duty environments, a filter with a minimum of 99% filtration efficiency at 5 microns is required.

Rule of Thumb #3: Size your filter correctly by understanding the impact air velocity through a media has on efficiency and pressure drop. Maintain the suggested Air-to-Media ratios listed below based on the external environment listings and Filtration efficiency needs.

Filtration Efficiency Requirements (99%+ efficiency)	Environmental Conditions	Air to Media Ratio	
<i>Industrial Grade 2-micron Paper</i>	Industrial Duty (clean, office/warehouse-like)	30 CFM/ft ²	(549m ³ /h)/m ²
	Severe Duty (workshop, factory-like)	15 CFM/ft ²	(274.5m ³ /h)/m ²
	Extreme Duty (Foundry, Construction-like)	10 CFM/ft ²	(183m ³ /h)/m ²
<i>Industrial Grade 5-micron Polyester</i>	Industrial Duty (clean, office/warehouse-like)	65 CFM/ft ²	(1189.5m ³ /h)/m ²
	Severe Duty (workshop, factory-like)	40 CFM/ft ²	(732m ³ /h)/m ²
	Extreme Duty (Foundry, Construction-like)	25 CFM/ft ²	(457.5m ³ /h)/m ²
<i>Industrial Grade 1-micron Polyester</i>	Severe Duty (Foundry, Construction-like)	25 CFM/ft ²	(457.5m ³ /h)/m ²
<i>Industrial Grade 0.3-micron HEPA Glass @ 99.97% Efficiency</i>	Industrial Duty (Pre-filtered Applications)	9 CFM/ft ²	(164.7m ³ /h)/m ²
	Severe Duty (workshop, factory-like)	7 CFM/ft ²	(128m ³ /h)/m ²
	Extreme Duty (Foundry, Construction-like)	5 CFM/ft ²	(91.5m ³ /h)/m ²

Table 2

Rule of Thumb #4: Pressure drop is also caused by the dirt holding capacity of the element. As the element fills up with dirt, the pressure drop increases. It is important to document the pressure drop across a given filter when it is new and then clean or replace it when the pressure drop increases by 10" to 15" / 250-280mm H₂O over the original reading.

Rule of Thumb #5: The inlet connection greatly influences the overall pressure drop of the filter system. To minimize the restriction contributed by an inlet filter, a velocity of 6,000 ft/min (10200m³/h) or less is suggested through the outlet pipe.



The table below lists the suggested flows based on pipe size:

Pipe Size (inches)	Max Airflow		Pipe Size (inches)	Max Airflow	
1/2"	10 CFM	17m ³ /h	2 1/2"	195 CFM	332m ³ /h
3/4"	20 CFM	34m ³ /h	3"	300 CFM	510m ³ /h
1"	35 CFM	60m ³ /h	4"	520 CFM	884m ³ /h
1 1/4"	60 CFM	102m ³ /h	5"	800 CFM	1360m ³ /h
1 1/2"	80 CFM	136m ³ /h	6"	1,100 CFM	1870m ³ /h
2"	135 CFM	230m ³ /h			

Table 3 *Note: This information is for general use only. A qualified engineer must properly design each system.

3. Element Specifications

Temperature Range: -15° to 220°F / -26° to 105°C

Filter Change-Out Differential: 10" to 15" / 250-380mm H₂O Over Initial Delta P

Media	Micron Rating
Standard Paper	99+% @ 2 micron
Standard Polyester	99+% @ 5 micron
"S" Series Wire Mesh	Epoxy Coated Wire Mesh
"Z" Series Polyester	99+% @ 1 micron
"HE" Series HEPA	99.97% @ 0.3 microns
"U" Series Polyester	99+% @ 25 micron
"W" Series Polyester	99+% @ 100 micron
"S2" Series	Stainless Steel Wire Mesh
"AC" & "ACP" Series	N/A
"Y" Series Polypropylene	99+% @ 10 micron

Table 4

Temperature Range: -15° to 385°F / -26° to 196°C

Filter Change-Out Differential: 10" to 15" / 250-380mm H₂O Over Initial Delta P

Media	Micron Rating
"MX" & "MXD" Series – Nomex Cloth	99+% @ 5 micron

Table 5

4. Element Cleaning - Inlet Filtration

Solberg elements should be cleaned or replaced, once the pressure drop reaches 10 to 15-inches water column (250 - 380mm WC) above the initial pressure drop of the installation.

The decision to clean the element rather than replace it is left to the discretion of the operator. Any damage which results from by-pass or additional pressure drop created by element cleaning is the sole responsibility of the operator.



WARNING

The overall performance of a filter element is altered once cleaned.

The initial pressure drop after cleaning will be greater than the original, clean pressure drop of the element.

After each subsequent cleaning, the initial pressure drop will continue to increase.

Under all circumstances, the initial pressure drop of the element needs to be maintained at less than 15-inches water column (380mm WC).

Cleaned elements that exceed 15-inches water column (380mm WC) at start-up should be replaced with new elements.

With many types of equipment, the maximum pressure drop allowed will be dictated by the ability of the equipment to perform to its rated capacity. Under all circumstances, the operator should avoid exceeding the manufacturer's recommended maximum pressure drop for their specific equipment.

- A. **Polyester Element:** The polyester element may be washed in warm soapy water, vacuumed, gently blown out or replaced. The element should be dry before reinstallation. The element should be replaced after a maximum of three cleanings.
- B. **Paper Element:** The paper element may be lightly blown with low pressure air. It is disposable and in most cases should be replaced with a new element.
- C. **Polyurethane Prefilter:** The prefilter may be washed as a sponge or replaced to give the element a longer service life.
- D. **Epoxy Coated Wire Mesh and Stainless Steel Wire Mesh Elements:** Cleaning instructions similar to polyester, except mild solvents may be used.
- E. **Activated Carbon Element:** Not cleanable
- F. **Polypropylene Element:** Cleaning instructions similar to polyester
- G. **Nomex Cloth Element:** Cleaning instructions similar to polyester

If you are not confident that the integrity of the element was maintained during cleaning, it is recommended that a new element be installed. Also, spare parts such as gaskets, wing nuts and washers can be supplied upon request.



Section C

PROCEDURES

1. Installation.

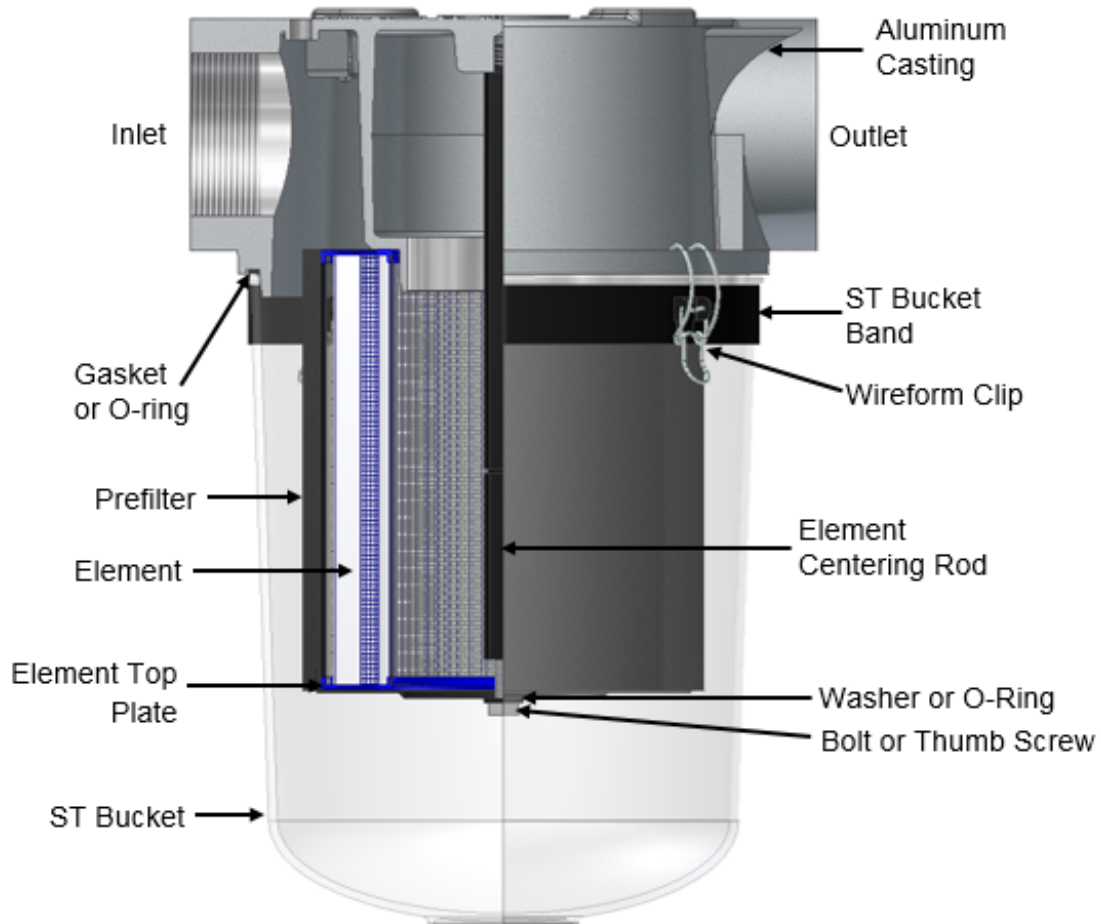


Figure C.1.1: Housing Terms

- A. Maximum operating temperature for most Solberg inlet vacuum filter products is 220°F / 105°C. Temperatures in excess of this could cause damage to elements, media and elastomers. High temperature products are available.
- B. Direction of flow is typically from the outside of the element to the inside of the element. Most products have arrows indicating direction of flow on the inlet and outlet ports.
- C. Ensure that pipe/flange connections are adequately sealed so the potential for leaks is reduced to a minimum.

2. Disconnecting Bucket from Casting.

A. Remove bucket by releasing wireform clips and lifting off.

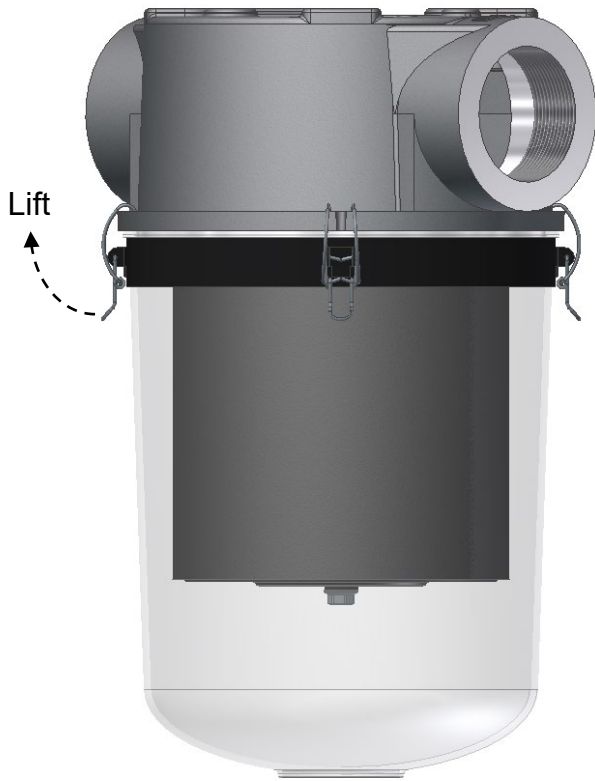


Figure C.2.1: Clip release direction.



Figure C.2.2: Released clip position.



Figure C.2.3: ST bucket removal.

3. Removing Element for Service/Maintenance.

A. Units with 896, 897, 850/1, and 851/1 elements (Figures C.3.1 & C.3.3):

- Remove O-ring/washer and bolt/thumb screw securing the element to the centering rod.
- Carefully lift the element off of the centering rod.

B. Units with 234 and 235 elements (Figures C.3.2 & C.3.4):

- Remove washer and bolt securing element and element top plate.
- Carefully lift the element and element top plate off of the centering rod.

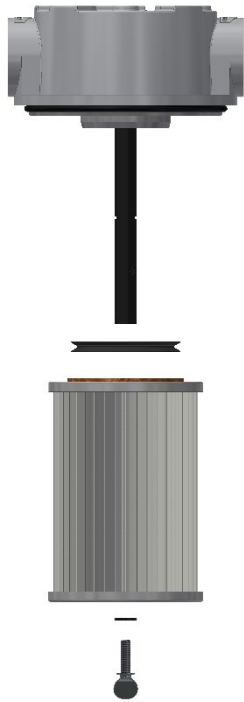


Figure C.3.1: Element removal.



Figure C.3.2: Element and top plate removal.

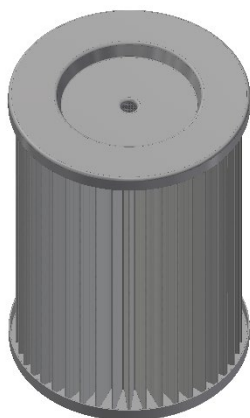


Figure C.3.3: Element with gaskets.

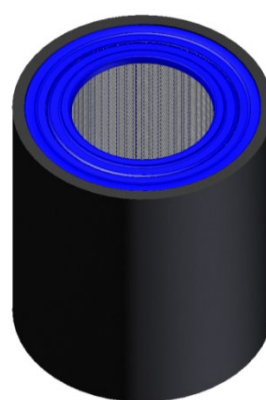


Figure C.3.4: Element with pre-filter.

WARNING

Failure to comply with these instructions may result in system or equipment contamination.

4. Securing Element.

A. ST units with 896, 897, 850/1, and 851/1 elements:

- Place new or cleaned element evenly in casting on top of butterfly gasket. Be sure element seats properly in the casting and there is no dirt or particulate present on sealing surfaces.
- Align the bolt hole on the end cap with the bolt hole in the centering rod.
- Secure the element with the bolt/thumb screw and O-ring to the centering rod.

B. ST units with 234 and 235 elements:

- Place new or cleaned element evenly in casting. Be sure element seats properly in the casting and there is no dirt or particulate present on sealing surfaces.
- Place the element top plate on the element and align the bolt hole on the end cap with the bolt hole in the centering rod.
- Secure the element with the bolt and washer to the centering rod.



Figure C.4.1: Top plate and centering rod bolt hole alignment.



Figure C.4.2: Element and top plate properly secured to casting.

WARNING

Defective installation may cause system or pump contamination. Use only genuine Solberg replacement parts.

5. Securing Bucket to Casting.

- A. Make sure all surfaces are free from dust and other particulate.
- B. If the unit has a gasket:
 - Casting gasket must rest evenly along casting gasket groove.

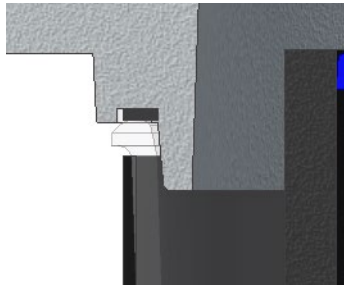


Figure C.5.1: Detail of gasket seated along casting gasket groove.

- C. If the unit has an O-ring:
 - O-ring must rest evenly on the sealing surface of the casting.



Figure C.5.2: O-ring seated evenly on casting sealing surface.

- D. Place the ST bucket on the casting, on top of the gasket/O-ring. Place the ST bucket band over the bucket. Align the casting slots and wireform clips. Re-fasten wireform clips.

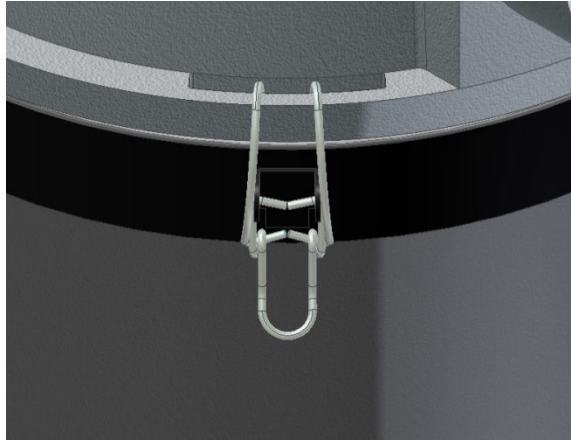


Figure C.5.3: Wireform clip and casting slot alignment.

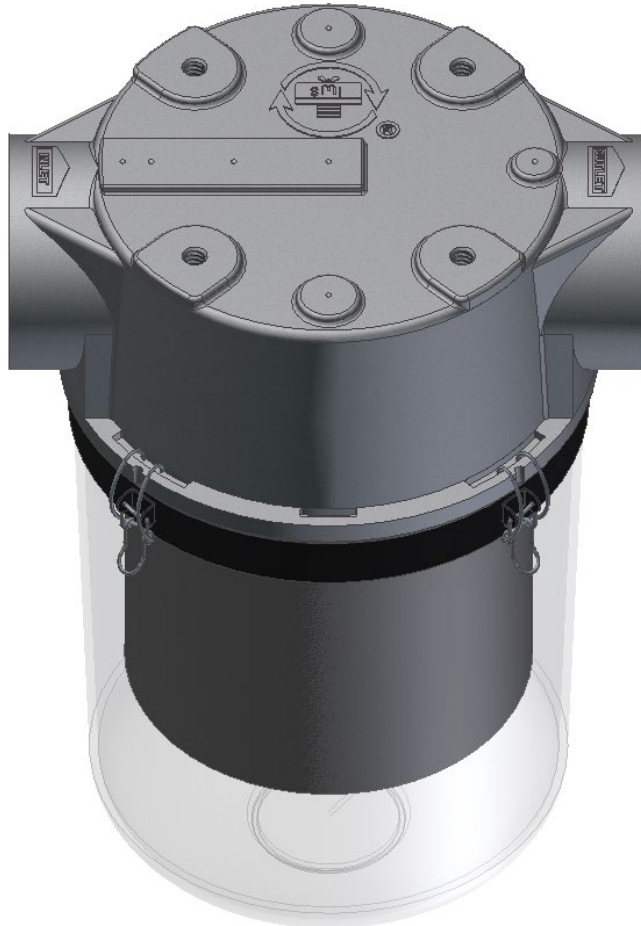


Figure C.5.4: ST bucket properly secured to the casting.

6. Equipment Startup.

- A. Be sure to read the instructions on installation or element replacement as listed above before starting equipment.

WARNING

If at any time the operator is unable to verify the integrity of the element or any housing feature, the factory or a regional representative should be contacted prior to start-up.

- B. Please check the listed steps prior to startup.

1. Check element to make sure it is seated properly on casting sealing surface.

WARNING

Failure to seat the element properly may result in contaminant by-pass resulting in damage to equipment.

2. Check that the element top is properly secured to the element and centering rod.
3. Check that the casting O-ring/gasket is seated properly on the casting.
4. Check that the bucket is secure with the bucket band and wireform clips.

WARNING

If the air flow is reversed through a Solberg filter unit, be sure to check the element and housing internals for damage. Failure to do so may result in damage to equipment.

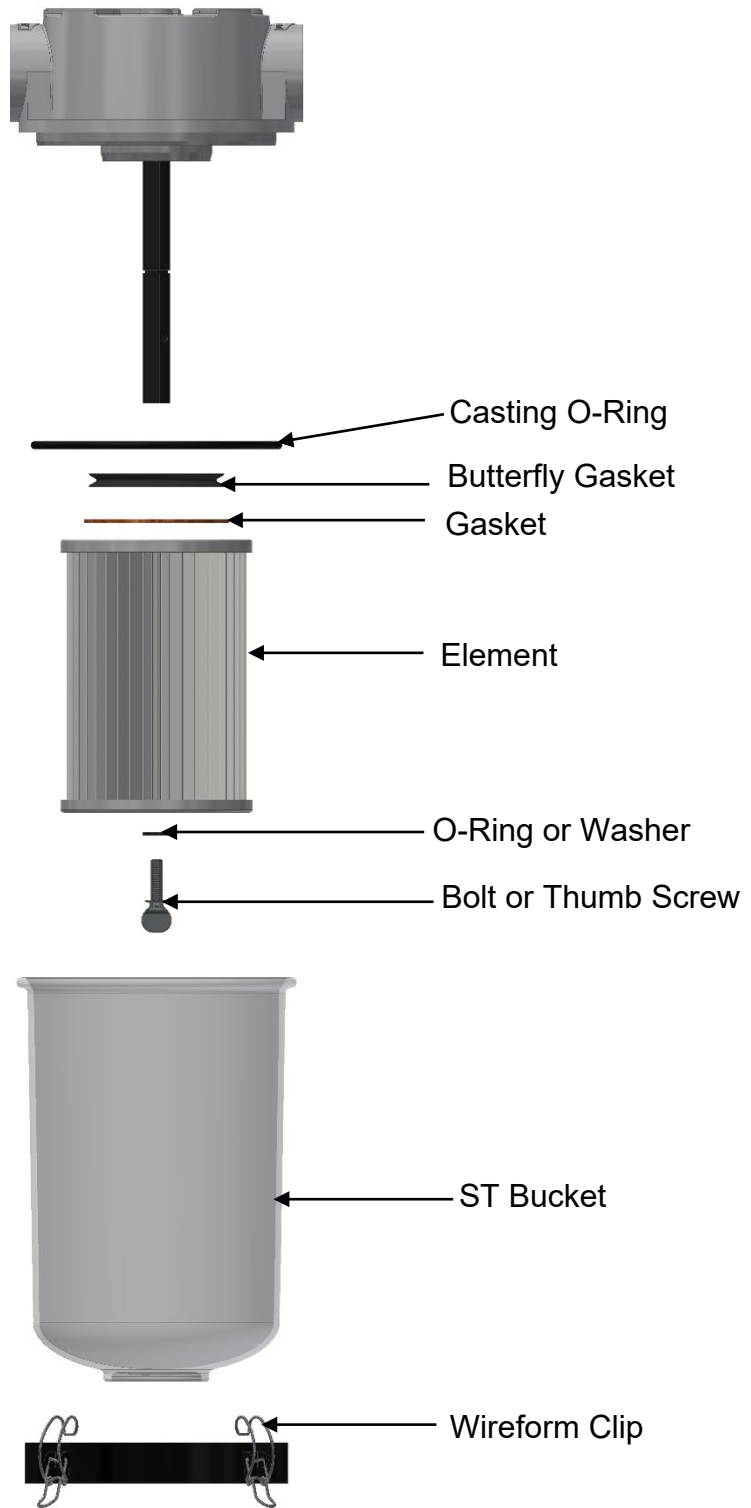
5. Be sure all fasteners and hardware have been tightened.

Section D

MAINTENANCE RECOMMENDATIONS

1. Pressure drop readings are recommended to have an effective vacuum filter. Always document initial pressure drop during start-up when element is clean. Replacement cartridge is needed when system experiences 10" to 15" / 250-380mm H₂O higher pressure drop above the initial reading.
2. Always check replacement cartridge gaskets to ensure they are adhered uniformly along the end caps during handling. If not, contact Solberg Manufacturing, Inc. immediately. Do not modify or change from Solberg specified parts!
3. Always check inlets/outlets, element base and its components when replacing element to ensure cleanliness. Wipe clean if necessary.
4. Operate only when a proper seal exists.





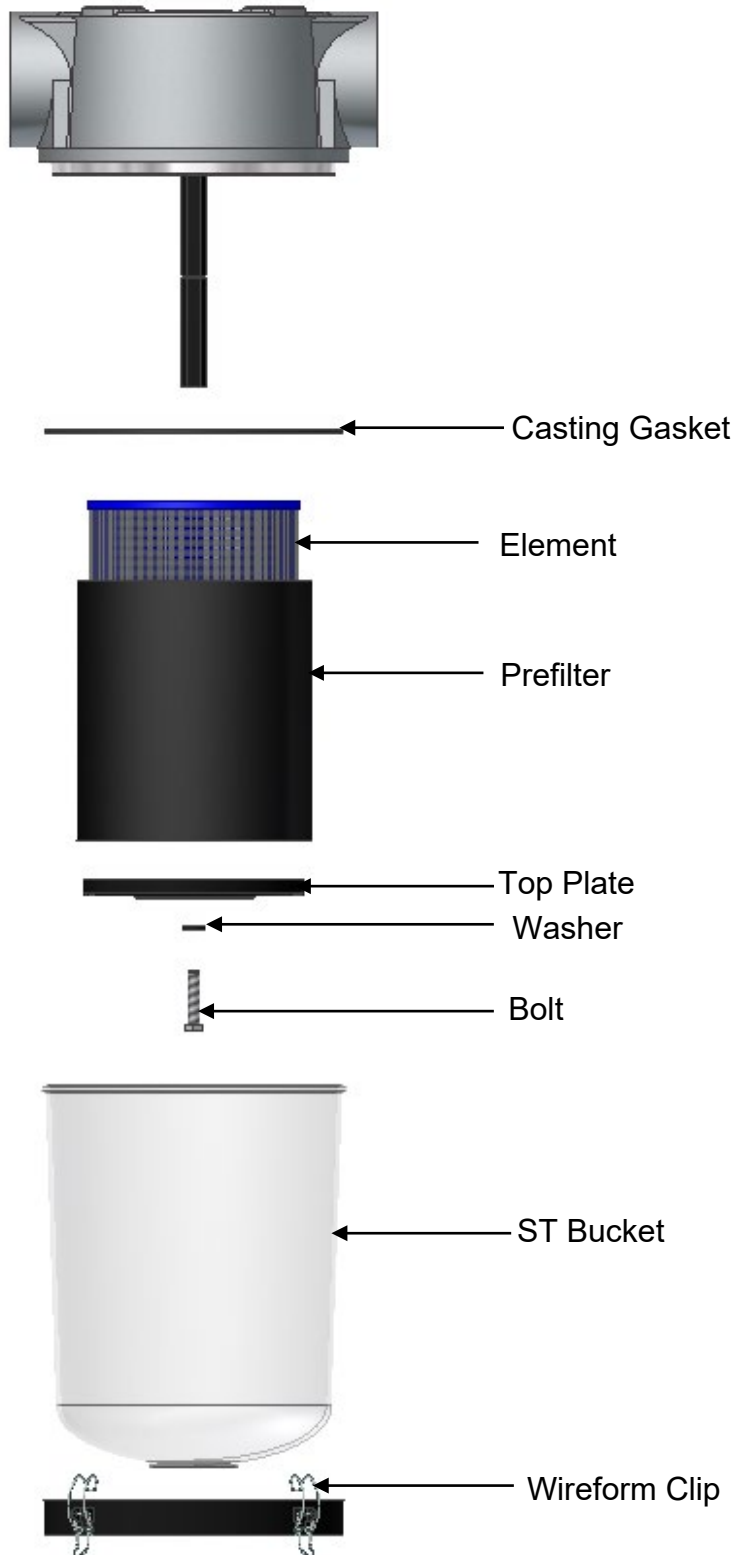
ST "T" Style Vacuum Filter Available Replacement Parts
896, 897, 850/1, and 851/1

Available Replacement Part by Product Number					
Product #	Element**	Prefilter	Butterfly Gasket	O-Ring or Washer	Bolt or Thumb Screw
ST-896-XXX	896	PF896	9110900	9240030	5060250
ST-897-XXX	897	PF896	9110900	9240030	5060250
ST-850/1-XXX	850/1	PF850	9111100	5010445	5060300
ST-851/1-XXX	851/1	PF850	9111100	5010445	5060300

**Note: Even element numbers are Paper elements and odd element numbers are Polyester elements.

Available Replacement Part by Product Number				
Product #	Gasket	Casting O-Ring	ST Bucket	Wireform Clip
ST-896-XXX	N/A	9262K375	1050250	5080110+36
ST-897-XXX	N/A	9262K375	1050250	5080110+36
ST-850/1-XXX	9111200	9241260	1050810	5080110+36
ST-851/1-XXX	9111200	9241260	1050810	5080110+36





ST "T" Style Vacuum Filter Available Replacement Parts
234 & 235

Available Replacement Part by Product Number				
Product #	Element**	Prefilter	Top Plate	Washer
ST-234-XXX	234	PF234	1030700+10	5020150
ST-235-XXX	235	PF234	1030700+10	5020150

****Note:** Even element numbers are Paper elements and odd element numbers are Polyester elements.

Available Replacement Part by Product Number				
Product #	Bolt	Casting Gasket	ST Bucket	Wireform Clip
ST-234-XXX	5011330	9112900	1051850	5080110+36
ST-235-XXX	5011330	9112900	1051850	5080110+36

