INSTALLATION, OPERATION, AND MAINTENANCE

PREFACE:

This manual contains information concerning the installation, operation, and maintenance of Titan Flow Control (Titan FCI) WYE Type Strainers. To ensure efficient and safe operation of Titan FCI WYE Strainers, the instructions in this manual should be thoroughly read and understood. This manual is general in nature and is not meant to take the place of an on-site, process engineer or pipe fitter. As such, Titan FCI recommends that only experienced, skilled personnel be allowed to install and maintain Titan FCI WYE Strainers. Please retain this manual in a location where it is readily available for reference.

GENERAL INFORMATION:

A WYE Strainer is installed into a pipeline system to remove unwanted debris from the pipeline flow by utilizing a perforated or mesh lined straining element. This is illustrated in Figure 1. WYE Strainers remove only insoluble floating impurities with the most common range of particle retention ranging from 1 inch to 40 micron (.0015 inch).

Straining of the pipeline flow is accomplished via a perforated or mesh lined screen, internal to the strainer. In general, the size of the screen perforation should be slightly smaller than the smallest debris particle to be removed. If the screen perforation is undersized, the screen may require excessive cleaning. Consequently, if the screen perforation is oversized, unwanted debris may be permitted to flow through the pipeline; possibly damaging downstream equipment.

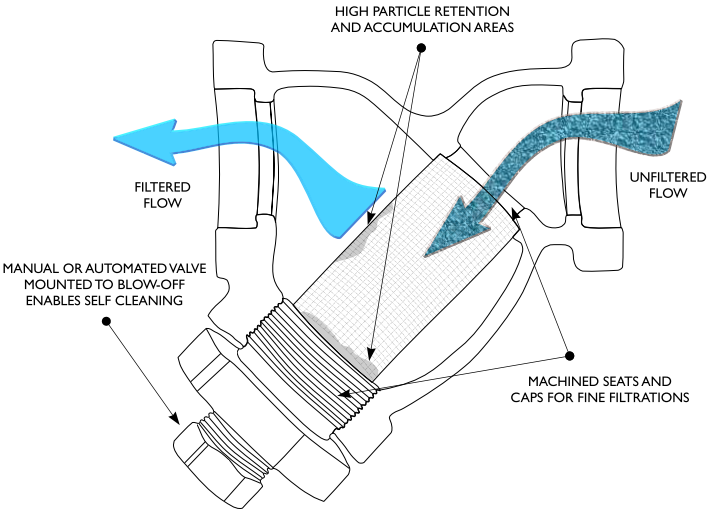

Figure 1: WYE Strainer Straining Illustration

GENERAL INFORMATION: continued...

Titan Flow Control offers a wide variety of WYE Strainer styles to meet all of your strainer requirements. Specific engineering design data, not contained in this manual, may be located within the Specification Sheets for each Strainer Model or within the certified engineering drawing.

Figure 2: WYE Strainer ~ Threaded Ends

Prior to selection of a Titan FCI WYE Strainer, the following factors must be determined:

- Material construction requirements of WYE Strainer.
- Design and working pressure/temperature requirements.
- Operating conditions (throttling, pressure drop, condensation, flow reversal, operation frequency, etc.).
- Pipeline service media type (liquid, gas, abrasive, corrosive, dirty, etc).
- The debris size to be removed.
- The debris loading of the pipeline.
- Pipeline media flow-rate and viscosity.
- Clean start-up pressure of the pipeline.
- Space availability for installation.

Please contact a Titan Design Engineer to assist in the determination of these requirements prior to selection and purchase.

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UNPACKING AND INSPECTION:

Upon receipt of product, it is important to follow these unpacking and inspection procedures.

All Titan FCI WYE Strainers are shipped in specialized shipping containers designed to prevent damage during transportation. If external damage to the shipping container is evident upon receipt of product, please request that a representative of the shipping carrier be present before unpacking the product.

- Carefully open the shipping container, following any instructions that may be marked on the container. Remove all packing material surrounding the Strainer and carefully lift it from the container. It is recommend to keep the shipping container and all packing material for reuse in storage or reshipment.

CAUTION:

For large or heavy Strainers, the appropriate material handling equipment must be used to prevent injury and possible damage to the WYE Strainer.

- Visually inspect the WYE Strainer for any signs of damage including scratches, loose parts, broken parts or any other physical damage that may have occurred during shipment. If damage is observed, immediately file a claim with the shipping carrier. WYE Strainers that are damaged during transportation are the responsibility of the customer. For information regarding Titan FCI's warranty policy, please refer to the last page of this document.

- Before installation, the WYE Strainer's cover should be removed and inspected internally for any loose or foreign materials that may have become trapped in the screen during transportation. After inspection, ensure sealing surfaces are clean and replace the gasket and cover. Make sure the gasket is seated correctly before tightening the cover bolts.

- If the WYE Strainer is not required to be installed immediately, it should be stored indoors in a clean, dry, consistent temperature environment. It is also recommended to utilize the original shipping container and packing materials to properly store the WYE Strainer. If long term storage is required, a desiccant may be necessary. This would be based upon the local, environmental storage conditions. Please consult a Titan FCI Design Engineer to assist in this determination.

Figure 3: WYE Strainer ~ Flanged Ends

UNPACKING AND INSPECTION: continued...

- When ready to install, remove any preservatives with solvent dampened cloths. Remove any loose material and protective packing material.

INSTALLATION:

Pre-Installation Checklist

- Ensure Working conditions (pressure/temperature) are within the specified capacity of the product being installed. Please refer to the certified drawings to assist in determining these values.

- Make sure that the construction material of the Strainer is chemically compatible with the media flowing in the pipeline.

- Inspect all sealing surfaces to ensure gasket surfaces are free of defects (no nicks or cuts). The pipeline should also be checked for proper alignment. Titan FCI WYE Strainers should never be utilized to realign an existing piping system.

- Ensure that the pipeline's mating flanges are the same type as the WYE Strainer being installed. Raised face flange ends cannot be mated to flat face flange ends.

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Pre-Installation Checklist continued...

- For flanged units, ensure Strainer end-to-end length and installation gap are with in ¼ in gap for gasket, and have sufficient clearance for easy opening of cover and screen removal. Refer to the certified drawing for screen removal clearance requirements.

- If the WYE Strainer is to be located on the discharge side of a pump, then a safety release valve must be installed between the WYE Strainer and the pump.

PRECAUTION:

A Titan FCI WYE Stainer should always be installed ahead of pumps and other expensive, downstream equipment to help ensure proper protection and trouble-free operation. This even holds true for "clean lines" to protect against pipe scale and accidentally introduced items such as: gaskets or tools.

Installation Procedure

Step 1:
Install blow down valve (if provided) at blow-off connection. Also, for maximum efficiency, install a differential pressure gauge at inlet and outlet connections or at the Strainer gauge tap (if provided).

Step 2:
Titan WYE Strainers must be positioned in the pipeline ahead of the equipment requiring protection. If the equipment requiring protection is a pump, the WYE Strainer must be placed on the suction side of the pump.

Step 3:
To provide for easier maintenance, the WYE Strainer should be located where the drain plug can be removed. Additionally, ensure the drain or blow-off is located at the lowest position when installed. If installed in the vertical position, the WYE side of the strainer must be pointing downward.

Step 4:
Ensure there is ample space at the WYE side of the Strainer for screen removal. Refer to the certified engineering drawing to determine the screen clearance requirements.

Step 5:
Before placing the WYE Strainer into place, support the existing pipeline with pipe supports near the inlet and outlet connections.

Figure 4: WYE Strainer ~ Solder Ends

Installation Procedure continued...

Step 5:
Place the WYE Strainer into the pipeline, ensuring that the flow arrow on the body of the WYE Strainer is pointing in the direction of the pipeline flow. For large or heavy Strainers, appropriate material handling equipment must be used.

Step 5:
Install a standard, ANSI (1/8" thick) flange gasket between the WYE Strainer and pipeline flanges, on both sides. Install lubricated flange bolts and hand tighten. Flange bolts should then be tightened, using a star or crisscross pattern to evenly load the bolts, in accordance with established piping standards. This is illustrated in Figure 5.

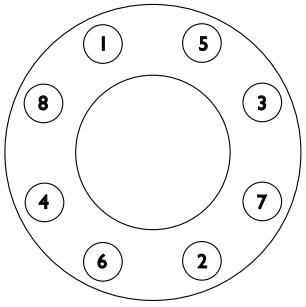

Figure 5: Bolting Sequence Pattern

CAUTION:

Excessive bolt torque may damage flanges. Please refer to established flange bolt torques for guidelines.

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OPERATION:

Once proper installation has been successfully completed, start the system gradually, at start up as well as after shut down. This eliminates sudden shock to the strainer and other equipment in the line. This is extremely important for steam service.

Start-up Procedure:

Step 1:
Open blow-down valve to remove air from the Strainer. To remove all fluid from the Strainer belly, a drip-leg can be installed or the piping can be placed at a 1/4" slope.

CAUTION:

With piping systems that contain fluids other than water or when the working temperature is above 120° F, fluid must be drained to safe area, away from the operator. Operators should always be fitted with appropriate protective equipment (goggles, gloves, vests, etc.) when venting or servicing is performed.

Step 2:
Start the piping system by opening the outlet valve nearest the WYE Strainer's outlet first. Then gradually open the inlet valve nearest the WYE Strainer's inlet, approximately 25% of normal operational flow. It is important to start the system gradually to avoid displacing or damaging the WYE Strainer.

Step 3:
Continue to open the inlet valve until the desired service flow has been reached.

Step 4:
Close the blow-down when air is removed and fluid begins to flow. The system is now ready to start.

MAINTENANCE:

Titan Flow Control WYE Strainers require little monitoring once they are properly installed. The pressure differential across the strainer should be check periodically to determine if the screen needs to be cleaned or replaced. If the pressure differential goes unchecked and the screen becomes completely clogged, the screen will break and require replacing.

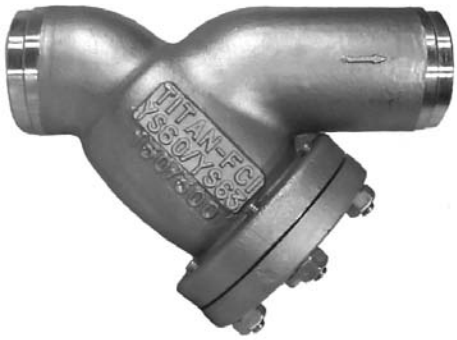

Figure 6: WYE Strainer ~ Butt-Weld Ends

CAUTION:

Strainer screens are not designed to withstand the same pressure ratings as the housings. If the screen becomes completely clogged, it will be exposed to the same pressure as the housing. In most cases, this will cause the screen to fail and potentially damage downstream equipment.

Titan FCI WYE Strainers are designed to require very little maintenance. Regular maintenance involves:

- Blow-down cleaning.
- Timely cleaning or replacement of screen.
- Periodically checking for leaks.

During normal use, the screen will become clogged with foreign matter, causing the differential pressure to increase. Once the differential pressure has increased to an unacceptable value, typically by 5 psi to 10 psi, it is time to clean or replace the screen. It is not advisable to let the differential pressure increase by 20 psi. This may cause the screen to fail and possibly damage downstream equipment.

A convenient and safe way to determine when the screen needs to be replaced is to install pressure gauges on the inlet and outlet sides of the Strainer. The maximum acceptable pressure drop across the Strainer will indicate when the screen needs to be replaced. Screen size and construction determine the maximum pressure drop a Strainer screen can withstand. Please consult factory for exact pressure ratings.

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Blow-Down Cleaning:

To avoid shutting down the system, when possible, clean the screen when pressure differential is 7 to 10 PSI. Clean the screen of debris by opening the blow-down valve. Keep valve open until all debris has been removed and pressure differential returns to normal range. Close the valve and resume normal operation. If pressure differential does not return to an acceptable level after blow-down cleaning then the screen needs to be removed and cleaned or replaced.

CAUTION:

Before removing the cover of the WYE Strainer, the pressure inside the vessel must be reduced to atmospheric via suction or venting. Failure to do so may result in serious bodily injury.

CAUTION:

Before removing the WYE Strainer's cover, ensure that the media that is flowing in the pipeline is known and any special handling precautions are understood. Please review the Material Safety Data Sheet (MSDS) for that specific fluid.

Screen Removal/Cleaning/Replacement:

Step 1:
Isolate the Strainer by closing the inlet and outlet valve connections on either side of the WYE Strainer. Make sure valves are bubble tight.

Step 2:
Open blow-down valve or other vent to relieve pressure inside and drain fluid from the Strainer.

Step 3:
Once pressure is relieved, remove the WYE side cap or cover.

Step 4:
Remove screen and clean. Do not permit screen to dry as it will be difficult to remove debris after it has hardened. Avoid banging or hitting the screen to remove stubborn debris. For perforated screens, it is recommended to use high pressure water or air stream to clean the screen. This is not recommended for mesh or mesh-lined screens as this may cause the mesh to tear. Solvent may be required if service is fuel, oil, or chemicals. Follow manufacturer's instructions when using solvent to clean the screen.

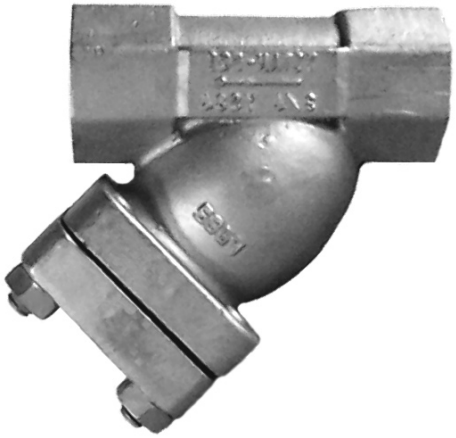

Figure 7: WYE Strainer ~ Socket-Weld Ends

Screen Removal/Cleaning/Replacement: continued...

Step 5:
Inspect screen and cover gasket for damage. If either is damaged, replace. Always ensure there is a spare gasket and screen on hand prior to maintenance.

Step 6:
Remove any debris or sludge from within the Strainer.

Step 7:
Replace cleaned or new screen into its original position, ensuring it is squarely positioned on the screen seat.

Step 8:
Replace cover gasket and cap or cover. Tighten cap or cover to specified torque rating.

Step 9:
Close blow-down valve.

Follow the Start-up procedure outlined within the OPERATION section of this manual.

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SPARE PARTS LIST:

For the bill of materials and spare parts listing of each WYE Strainer model, please refer to the corresponding Engineering Specification Sheet. For special or fabricated units, please refer to the certified engineering drawing for that unit.

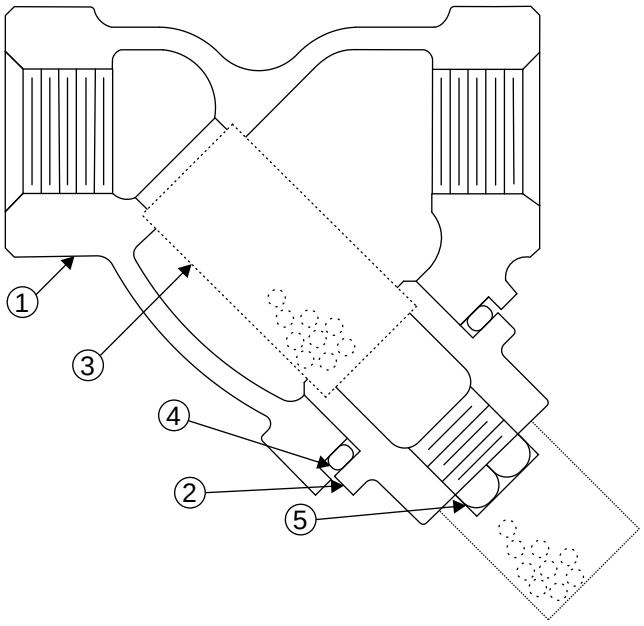

Figure 8: CAD Illustration

PARTS LIST	
No.	**WYE Strainer**
1	BODY
2	COVER/CAP
3*	SCREEN
4*	GASKET
5	PLUG

* Denotes recommended spare parts

WARRANTY:

Seller warrants each of the products and parts sold hereunder, under normal use of service, and subject to user's compliance with any operating instructions and other directions given by seller, to be free from defects in materials or workmanship for a period of one year from date of shipment from seller's plant. Seller's liability, under this warranty, shall be limited to, at the seller's option, to repairing or replacing any such defective product FOB seller's plant in Lumberton, NC, and reimbursing purchaser for shipping costs, subject to the following: (1) Timely receipt of purchaser's written notice that such products are defective. (2) Seller's written authorization to purchaser for the return of such products, (3) the return of such products to seller with shipping charges prepaid and (4) seller's inspection of and confirmation that such products are defective in materials or workmanship. If seller's inspection shows that the products returned are defective due to dirt, rust or any foreign material not attributable to seller: improper usage, over tightening on threads, abuse or incorrect assembly in the field, or other cause not due to seller's improper manufacture, seller will, subject to purchaser's written authorization, repair or replace such products at cost. Seller's factory inspection and testing reports will be made available to purchaser upon request.

THIS WARRANTY IS IN LIEU OF ANY OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING ANY IMPLIED WARRANTY OF FITNESS OR MERCHANTABILITY. SELLER SHALL NOT BE LIABLE FOR ANY SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES. NO REPRESENTATIVE OR SELLER HAS AUTHORITY TO MAKE ANY REPRESENTATIONS OR WARRANTIES, EXCEPT AS STATED HEREIN.