The Sheffield Kinetic Separator -- SS-1200 Series

Sheffield Separator Co.
GAS & LIQUID SEPARATORS
www.sheffieldseparators.com

The Sheffield Kinetic Separator uses kinetic energy to separate the desired analyzer sample from impurities often found in a process stream. This is accomplished by establishing fast loop flow from a high pressure sample tap to a low pressure sample return and kinetic flow reversal of a relatively small slipstream sample. Condensate and particulates in gas samples and any heavy immiscible liquid phase (such as free water) and solid contaminants in liquid samples will not negotiate this reversal of flow direction. They are totally separated from the analyzer feed stream. To further effect this separation, a second kinetic chamber with a hydrophobic filter polishes the sample. Although kinetic energy will physically separate impurities, it will not alter the chemical composition of the sample.

How It Works

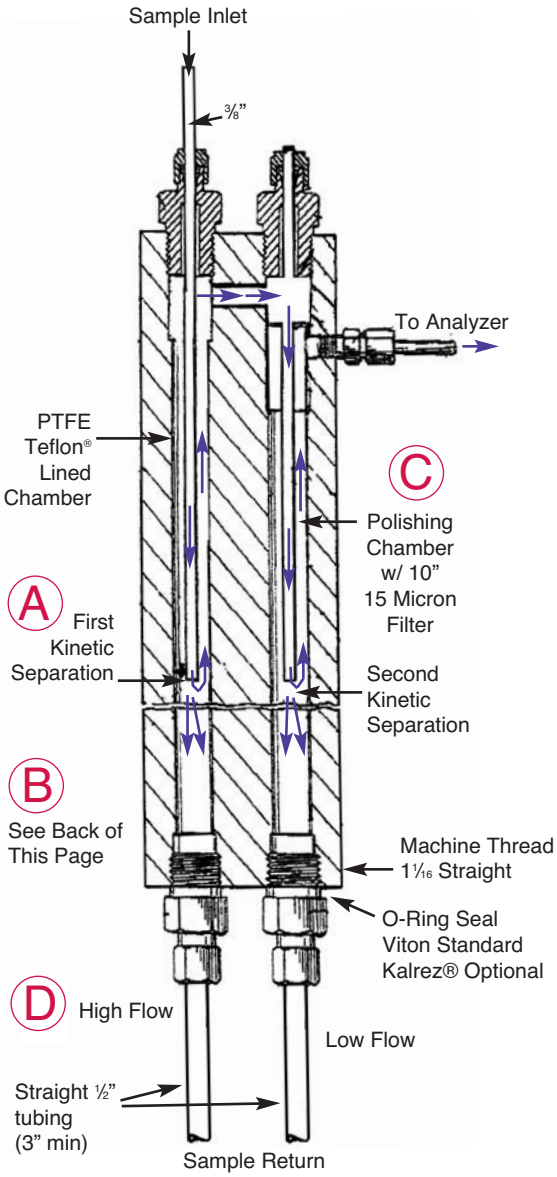
A Initially, the fast flow path enters the first chamber. Here system pressure forces the analyzer feed slipstream in the reverse direction; the main stream flow continues through the first chamber and exits the bottom of the filter housing. Gravity and inertia cause kinetic separation of the analytical process components. These are lighter than condensate and solids (particulates) in a gas sample and lighter than immiscible liquids and solids (particulates) in a liquid sample.

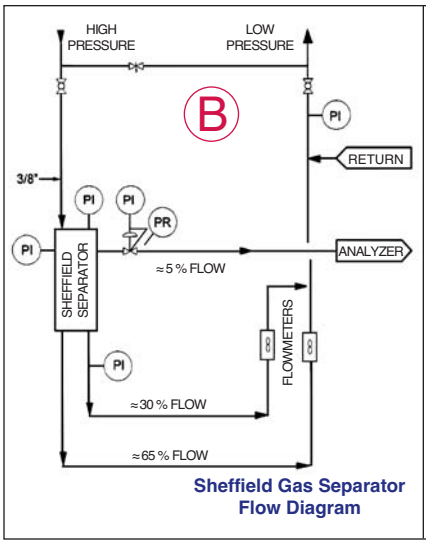
B The Sheffield Kinetic Separator is rated for high-pressure service, thus the first chamber of the separator is designed for installation directly in-line to the fast loop sample transport system. This results in a high flow rate and provides the inertia to effect the separation. This model embodies a special 10 inch, 15 micron Teflon®-lined (hydrophobic) self-cleaning low pressure drop filter. (See Flow Diagram on back page)

C The second chamber is a kinetic polishing chamber, aided by a special 10 inch, 2 micron Teflon®-lined (hydrophobic) self-cleaning low pressure drop filter. (See Flow Diagram on back page)

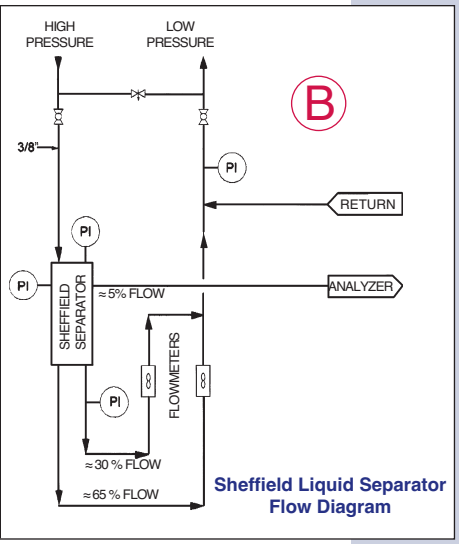
Most of the contaminates are separated in the first chamber. The second chamber filter only cleans the relatively small amount of sample going to the analyzer. Filter life is greatly enhanced. The filter element has a special Teflon®-lined interior, which repels water and particles as these impurities pass through the filter center with the sample. These impurities exit the bottom of the Sheffield Separator. These attributes combine to make the Sheffield Kinetic Separator virtually maintenance free.

D Finally, both chambers exit the bottom of the separator to a common juncture (See Flow Diagram on back page) with the fast loop return flow. This avoids product loss and disposal cost of the separated components.





Sheffield Gas Separator Flow Diagram



Sheffield Liquid Separator Flow Diagram

SPECIFICATIONS

Maximum Pressure: 2,000 PSIG
Minimum Pressure: 10 PSIG - Vacuum application with pump or eductor
Maximum Flow Rate: GAS: 40 SCFM w/ 100 PSIG
LIQ: 5 GPM w/ 100 PSIG
Minimum Flow Rate: GAS: 1.5 SCFH
LIQ: 2.5 GPH
Optimum Flow Rate:
GAS: First Chamber Exit: 5 SCFH - 10 SCFM
Second Chamber Exit: 2-5 SCFH
LIQUID: First Chamber Exit: 3 GPH - 2 GPM
Second Chamber Exit: 3-6 GPH
Maximum Temperature: 300° F
Pressure Drop: 2 PSIG
Material Components: 316L Stainless Steel
Other Material Upon Request
Dimensions: Model SS-1200: 1.5″ X 3″ X 11.5″
Internal Volume: Model SS-1200: 55 cu. cm
Inlet: ⅜″ Tubing (⅜″ NPT-F)
Outlet to Analyzer: ¼″ Tubing (¼″ NPT-F)
Outlet to Return: ½″ Tubing (1⁹⁄₁₆″ Straight)
(3″ Min. Straight Run)

Model Number Service Description

SS-1200GF: 12″ Sheffield Kinetic Separator for Gas Service with a Sheffield Hydrophobic Filter
SS-1200LF: 12″ Sheffield Kinetic Separator for Liquid Service with a Sheffield Hydrophobic Filter

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Frequently Asked Questions (FAQ)

Q. What information would you like to convey that does not lend itself to the facts and description of a brochure format?
A. 1) Of the applications that are within our specifications, 99% of gas and 95% of liquid sample streams have been successful. 2) Our specifications are extremely broad which enable the separators to be used in 95% of analyzer applications. 3) The impurities in a gas process are extremely heavy compared to the light representative gases in the sample. Free water and particulate are thousands of times heavier than a commonly used process gas such as hydrogen. This explains the kinetic separation which allows the light gases to reverse direction but the much heavier contaminates to continue in the same direction.

Q. What is the lag time for the separator?
A. In typical applications, lag times for gases or liquids are 11 seconds and 8 seconds respectively. Lag time is a function of the internal volume and the sample flow rate. The internal volume of the separator is extremely low because the chamber is 1" internal diameter. A typical fast loop in a gas process steam with a pressure of 100 psig and a flow of 1 SCFM in the fast loop, 20 SCFH flow from the separators second chamber and a 3 SCFH flow to the analyzer will result in 11 second total lag time for the separator. A typical fast loop in a liquid process stream with a pressure of 100 psig and a typical flow of 1 GPM in the fast loop, with a 20 GPH bypass exiting the second chamber, and 5 GPH flow to the analyzer (inclusive of analyzer bypass) will result in 8 second total lag time for the separator. Where the ratio of height to diameter (both internal) is greater than 10, mixing lag is not a factor.

Q. Is this a liquid or gas separator?
A. The separator has been successful in a number of applications. It was originally designed to improve response time in a gas phase single line sample transport system. It was so successful that the same design was applied to a fast loop gas application and to a liquid application with high particulate fouling and free water. The design was then upgraded and improved to accommodate an internal hydrophobic filter.

Q. What models are available?
A. The Model SS-1200 series is available in liquid and gas models.
The SS-1200GF is designed for difficult gas applications with heavy particulate and condensate. This model employs a 10-inch, 15-micron, fluorocarbon, hydrophobic filter in the second (polishing) chamber to filter particulate and coalesce free water.
The SS-1200LF is designed for liquid applications with heavy particulate and free water contaminates. The polishing chamber is equipped with a 10-inch fluorocarbon, hydrophobic filter with self-cleaning properties to filter particulate and separate free water.

Q. What are the materials of construction?
A. The body of the standard separator is 316L Stainless Steel. The first chamber has PTFE Teflon® lining to reduce surface friction. The standard filters are made of Fluorocarbon Resin with a Teflon® screen insert. All other parts are 316 Stainless Steel. The body may be fabricated of different material upon request.

Q. Why do the filters last longer?
A. The first chamber separates many of the contaminants using kinetic energy. These contaminants exit the separator prior to final filtration. The filter in the second polisher chamber only filters the small amount used by the analyzer. Both filters use open flow through the middle of the filters to flush particulates out of the separator.

Q. Why have a second chamber?
A. This is the only patented kinetic separator. It uses gravity and inertia in the first chamber to separate the sample from the contaminants. The second chamber uses the same kinetic principle for additional second pass separation, which is aided by a filter. This is particularly useful in times of Unit upsets and with extremely dirty Process Flows.

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