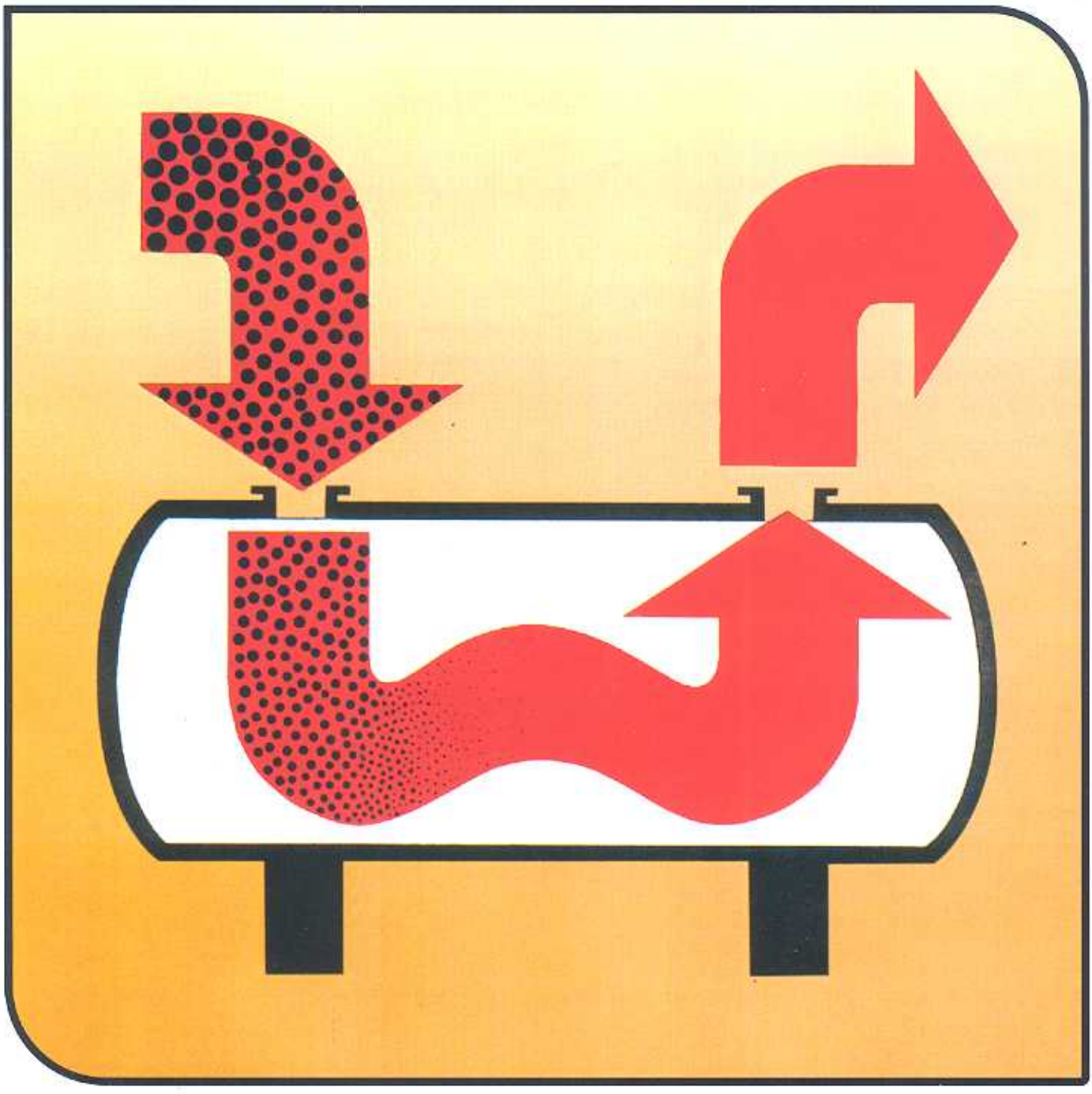
Micro and Dust Scrubbers



recover valuable hydrocarbons
from your gas stream and
protect downstream equipment

BS&B®
PROCESS
SYSTEMS

Remove costly, unwanted particles from your gas stream and recover valuable hydrocarbons with BS&B Micro and Dust Scrubbers.

Here's why it will pay you to clean your gas:

Even after separation, solid and liquid particles less than 10 microns in diameter may still exist in the gas stream.

If the solid particles are allowed to remain in the gas stream after separation, deposits may be built up on the walls of downstream operations. Result: You will lose money. Why? Because operations may be decreased in efficiency. Production capacity may be decreased. And it may be necessary to increase fuel and maintenance costs.

If the valuable liquid hydrocarbons are not recovered at the separation stage and are allowed to go down the line with the dry gas, you will again be losing money. These hydrocarbons are often more valuable than the gas itself.

In simple terms, if you are not taking steps to extract solid particles from the gas stream after separation and if you are not taking steps to recover the very small valuable liquid particles that may still exist after separation ... you are losing money.

The one way to solve this problem is to install either a BS&B Micro Scrubber or a BS&B Dust Scrubber. **How do you know which one you need? Keep reading.**

When is it practical to use only a Dust Scrubber?

Dust Scrubbers do just what the name implies. They clean solid particles, down to one micron in size, out of your dry gas stream. If there is enough liquid content (water and oil) in the gas stream to form a mud cake on the filter elements, but not enough liquid to coalesce in the filters, it is still practical to use a Dust Scrubber.

The Micro Scrubber: Newest idea in cleaning gas.

Why is a Micro Scrubber necessary? To extract solid particles and recover liquid hydrocarbons. The ordinary field separator is designed to remove liquid particles, 10 microns or larger. This is done by gravity settling and centrifugal force in the moving gas stream. In some cases, this is adequate separation.

But it only removes liquid particles 10 microns or larger.

What about dust particles, scale and grit? And what about the valuable hydrocarbons that may still be entrained as a fog in the gas stream?

This is where the Micro Scrubber comes in. A Micro Scrubber will more than pay for itself by recovering valuable hydrocarbons, by removing harmful contaminants from the gas stream to protect your equipment, by keeping your product at a high grade and by keeping your downstream operation running at a greater profit, under the following conditions:

1. The mist or fog material found in the pipeline is often composed of valuable hydrocarbons of high market value. Loss of this

material is costly. **Micro Scrubbers minimize this loss...** remove mist particles down to one micron in diameter.

2. Or, the mist material may be corrosive by nature or may become corrosive in processing atmospheres, creating costly maintenance problems in downstream equipment. **Micro Scrubbers remove virtually all corrosive materials from the pipeline.**

3. Most separation processes are designed only to remove water or solvent droplets of 10 microns and larger in diameter. When liquid in mist size droplets (1 to 10 micron diameter) are allowed to pass into processing systems, chemical and fuel requirements are greatly increased. **Micro Scrubbers reduce the need to increase these chemical and fuel requirements.**

4. Even when present in small quantities, mists can cause foaming, emulsions, etc., thus causing interference with downstream processes. **Micro Scrubbers -minimize this downstream interference.**

5. Oily and salty mists can cause the scaling, fouling and attrition of heat exchanger surfaces, . inner valve parts, inner pump parts, etc. This causes needless shutdown and prevents' equipment from operating at maximum efficiency. **Micro Scrubbers eliminate frequent unnecessary shutdowns, keep equipment operating at high efficiency.**

6. Mists and unwanted solid particles will contaminate expensive chemicals downstream of the separator. **Micro Scrubbers remove virtually all of these contaminants.**

These are only a few of the situations in which Micro Scrubbers make you money by recovering valuable hydrocarbon mists, help save you money by increasing the efficiency of downstream operations and increase your profits.

More ways are being found every day.
It is wise to look into Micro Scrubbers and Dust Scrubbers, now. It is even wiser to look into BS&B Micro and Dust Scrubbers.

Here's why you should choose a BS&B Micro Scrubber or Dust Scrubber

BS&B is one of the foremost names in the oil and gas processing equipment field. For more than 100 years, BS&B has been accumulating the engineering skills needed to serve you with advanced engineering concepts and design as well as efficient fabrication of oil and gas production and processing equipment.

BS&B was a pioneer in the development of the Dust Scrubber and now, the Micro Scrubber. Years of patient research, experimentation, development and perfection have gone into BS&B Dust and Micro Scrubbers. Each is made to best suit your operation. Each is designed for fastest payout, lowest maintenance and most efficient service. And each has been made to keep your downstream equipment operating at its best.

When it comes to Dust Scrubbers and Micro Scrubbers, or any fine production and processing equipment, you can count on BS&B for the very best in the industry.

The following pages explain the operation and features of BS&B Micro and Dust Scrubbers. Discover for yourself why the many features built into BS&Bequipment will provide more efficient operation and faster payout...

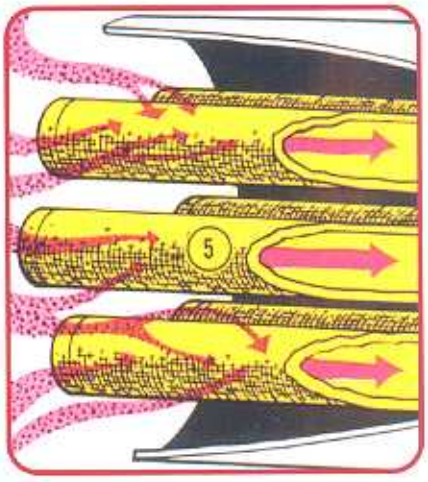
How the BS&B Micro Scrubber works

PRIMARY SEPARATION SECTION

The gas stream enters the Micro Scrubber through a top mounted inlet nozzle. (1). The stream then strikes an extension of the filter element section housing (2) and changes direction abruptly. Liquid slugs are thrown out of the stream and detained in this section, preventing flooding of the filter elements. Accumulated liquid drains into the primary (or forward) sump (3), for removal.

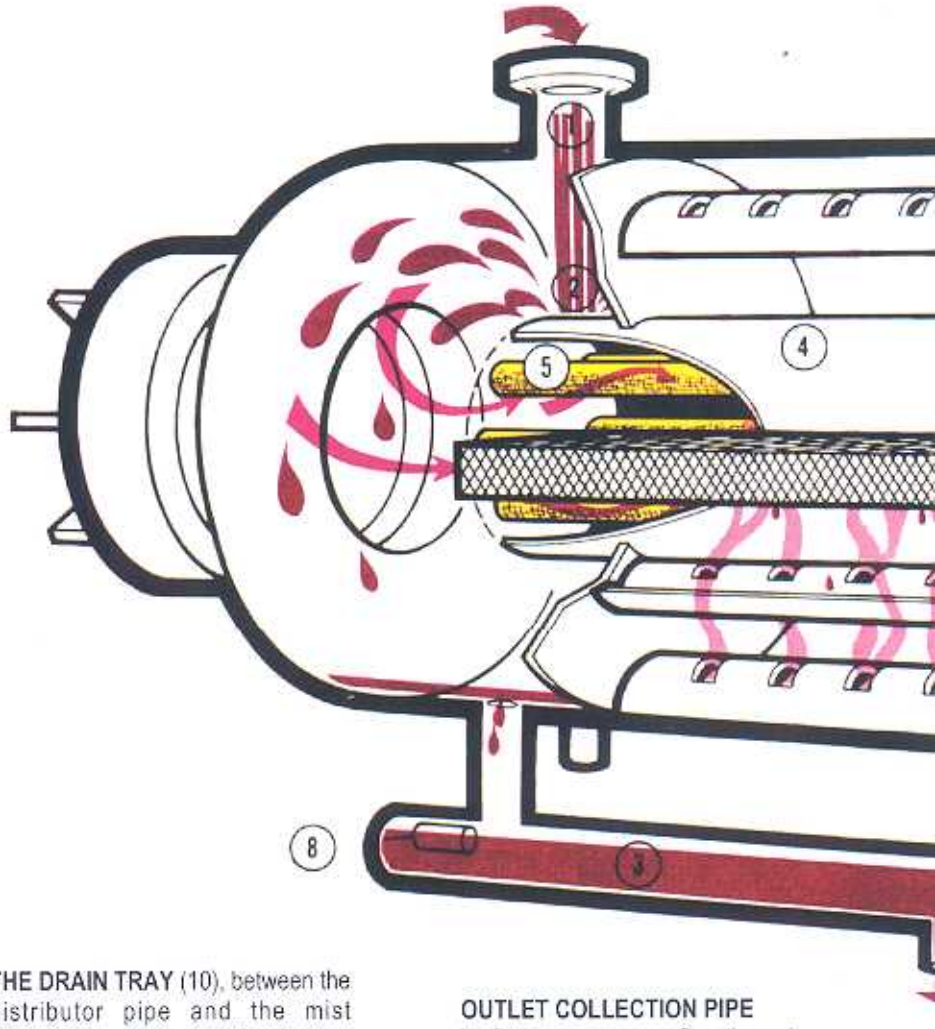
FILTERING SECTION

With the slugs and the large liquid droplets removed, the gas makes a 180° turn from the primary separation section, and passes into the filtering section housing (4). Gases pass through the walls of the fiberglass filter tubes along their entire lengths (5). Solid and liquid particles, 10 microns and larger, are stopped at the surface of the filter tubes; the solids form a cake and the liquids drain off and pass back into the primary separation section for removal.



SUMP

The liquids that have been removed from the primary separation section are now accumulated in the forward sump (3). The liquids that have been removed from the secondary gas space are now accumulated in the rear sump (7). Each sump must be drained separately since differential pressure between the two sections prevents the use of a common dump valve. Liquid is removed from each section by BS&B Liquid Level Controls (8).



MIST EXTRACTION SECTION

The gas makes a 180' turn from the secondary gas space into the distributor pipe (9) running the length of the mist extraction section. The distributor pipe is slotted for uniform gas distribution along the full length of the mist extractor elements. The gas flows from the distributor pipe, around and through a slotted drain tray (10), and into the stainless steel, knitted wire mesh mist extractors (11) on both sides of the filter section housing (4). Here the remaining liquid drops impinge upon the myriad surfaces in the mist extractors, coalesce and drop out, leaving liquid free gas.

THE DRAIN TRAY (10), between the distributor pipe and the mist extractors, collects liquids draining from the mist extractors, thereby preventing liquid re-entrainment in the rising gas. The collected liquids drain into the secondary gas space (6) for accumulation.

OUTLET COLLECTION PIPE

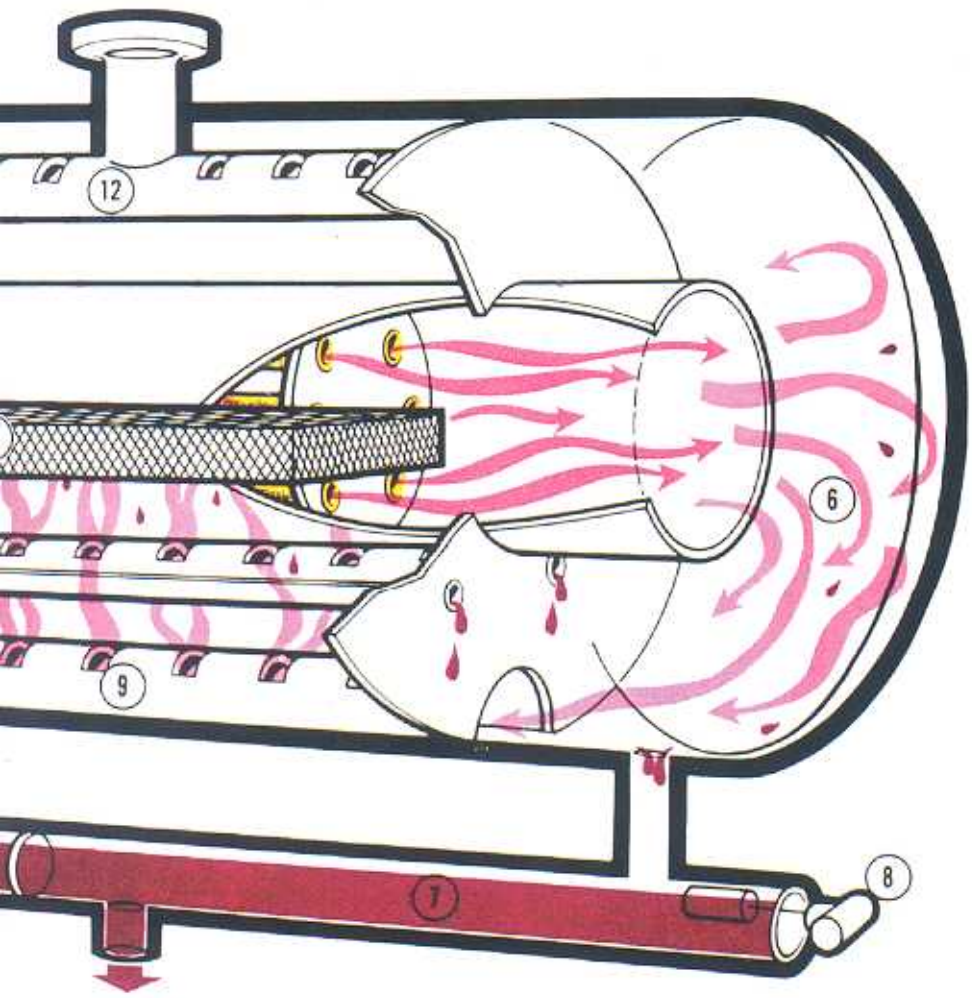
To further assure gas flow through the full length of the mist extraction section, a slotted outlet collection pipe (12), as long as the mist extractors, is connected to the gas outlet nozzle.

FILTER TUBES

The filter tube walls retain any solid particles, one micron or larger. Liquid particles, one micron or larger, collect inside the walls of the filter media and coalesce until their mass is large enough for the gas stream to force them through. These larger liquid droplets are then carried in the gas stream through the center of the filter tube and pass into the secondary separation section (6). (Usually the liquid particles have coalesced to a 10 micron or larger size by the time they are forced lik through the walls of the filter tube.)

SECONDARY SEPARATION SECTION

The gas, now free of dust and solid particles and carrying coalesced liquid droplets, leaves the filtering section and enters the secondary gas space (6). Because the secondary gas space is a much larger area, the velocity of the gas is greatly reduced. The calming effect of this section allows the larger liquid drops to fall to the bottom, accumulate and drain off into the secondary section of the sump (7).



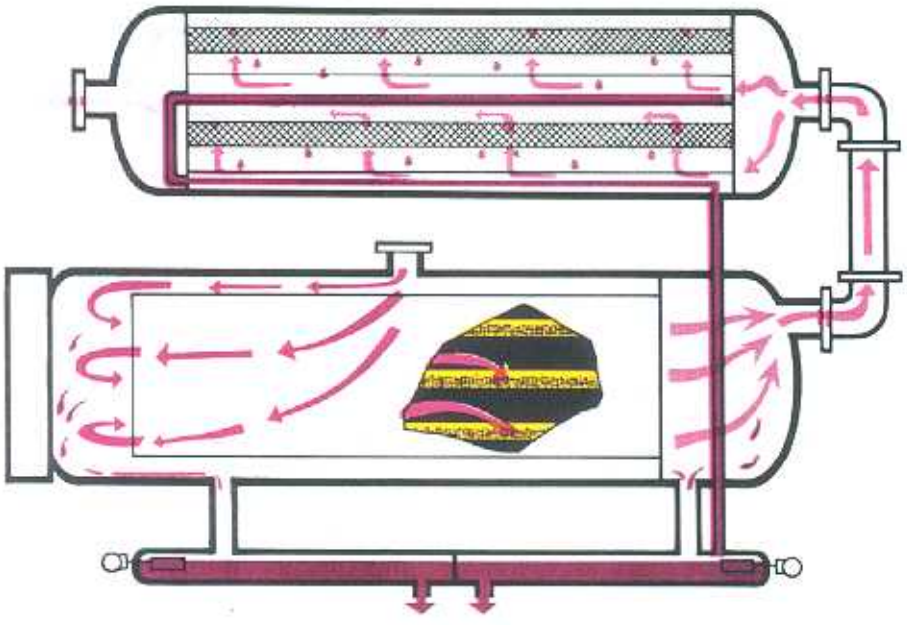
Features of the BS&B Micro Scrubber

- Guards against filter flooding when upstream equipment malfunctions or accumulation points in gas line unload.
- Blow down connections are available to flush filter elements of solid material, thus helping to extend the life of the filter.
- Filter elements trap liquids and solid materials that would not normally separate from the stream.
- Filters trap liquid particles that would normally pass through a mist extractor and coalesces them into a size the mist extractor will remove.
- Quick-connect end closure provides for minimum downtime to service. (ASA flanged closures available if desired.)
- Special lock and bleed valve prevents premature opening of quick connect closures.
- Filter elements are readily replaceable.
- Filters are installed for maximum gas contact surface area.
- Gas distributor and collection pipes provide uniform flow through mist extractors.
- Drain back baffle prevents liquid draining from the mist extractors from re-entrainment with the rising gas.
- Stainless steel knitted wire mesh mist extractors make for high efficiency gas scrubbing.
- Level controllers and diaphragm motor valves automatically remove collected liquids from the sumps.
- Fiberglass elements used for long life, lower pressure drop and high filtering properties.
- Gas inlet and outlet conveniently and universally located to provide the simplest hookup.
- Available for compliance with ASME Code Construction.
- A differential pressure gauge allows quick evaluation of filter condition.

BS&B Micro Scrubber with External Element Section

The operation of the Micro Scrubber with External Element Section is very similar to the basic Micro Scrubber described on the preceding pages.

The major difference is the placement of the mist extraction section in a separate vessel, allowing more filter and mist extraction area for greater capacity.



Extra Features of the BS&B Micro Scrubber with External Element Section

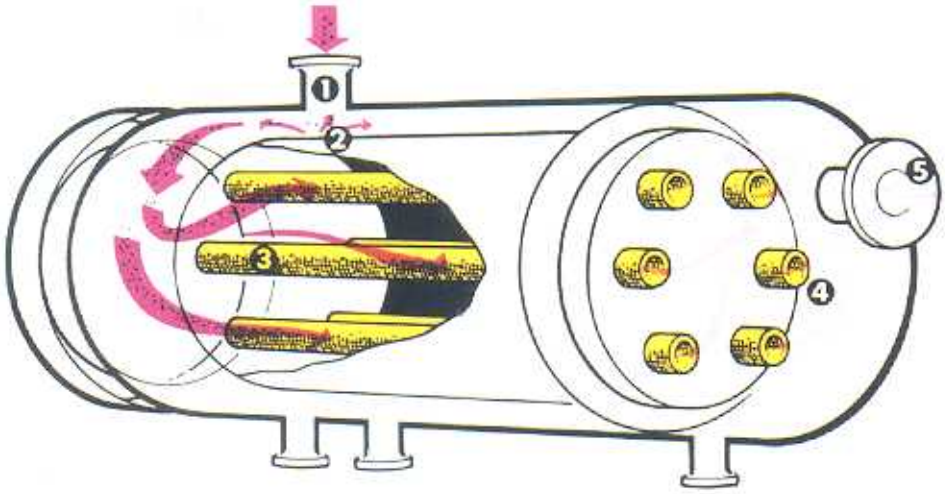
- The Micro Scrubber with External Element can handle a larger volume of gas.
- Dual mist extractors provide more surface area for removal of entrained liquids without increasing the pressure drop through the mist extraction section.
- Since the External Element is mounted above the filtering ser.,tion, it takes less floor space. Allows greater capacity where floor space is limited.
- Utilizes full vessel diameter for filter area.
- Reduces size of quick opening closure or nozzle for filter service.

BS&B Dust Scrubber

In many gas processing systems, dust and scale deposits on the walls of processing equipment can cause fouling. This fouling often causes an increase in fuel requirements and maintenance costs and a decrease in operation efficiency and capacity.

When gas stream contaminants consist solely of solid particles or both solids and liquids with just enough liquid to form a mud cake on the filter elements, but not enough to coalesce in the filter elements, a BS&B Dust Scrubber is recommended.

The Dust Scrubber contains only filter elements, requiring no mist extraction section. Blow down connections are provided to extend the operating life of the filter elements.



Features of the BS&B Dust Scrubber

- Removes dust particles down to 1.0 microns in size.
- Full vessel volume for installing filter elements; a compact vessel.
- Blow down connections make cleaning filter surfaces easy, extend life of filters.
- Quick-connect end closure provides for minimum downtime to service. (ASA Flanged closures available if desired.)
- Special lock and bleed valve prevents premature opening of quick' connect closures.
- Differential pressure gauge and assembly mounted externally. Filter loading may be checked without equipment shutdown.
- Fiberglass elements for long life. Lower pressure drop and high filtering properties.

How it works:

The gas stream enters the vessel through a top mounted inlet nozzle (1). The gas strikes the filter section housing (2) and changes direction abruptly, throwing out the larger solid particles. At this point, the gas makes a 180° turn and passes into the center of the filter section housing where it can contact all terior surfaces of the filter tubes (3). As gas passes through the walls of the filter tubes, solid particles are trapped and clean gas passes into the center of each tube and out the far end into a collection area (4). An outlet nozzle (5) in the vessel discharges the stream.

Information needed with inquiries about BS&B Micro and Dust Scrubbers

Gas Flow Rate
Gas Gravity
Liquid Flow Rate
Liquid Gravity
Operating Pressure
Maximum Working Pressure
Inlet Temperature
Corrosion Allowance

BS&B PROCESS SYSTEMS

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