

Industry Challenge

In petrochemical plants and oil refineries, gas analysis plays an important role. In fact, some processes are only possible because of the instant feedback that online gas analyzers provide. In the natural gas industry, gas analyzers are used to determine the BTU value and monitor the moisture and sulfur content of the gas. The BTU value is then used to determine the monetary value by which the gas is traded.

Erroneous analytical results could have extreme financial or health consequences – particularly if the error is unknown and happens consistently. Regardless of how precisely analytical techniques are performed, the accuracy of the analysis is limited to how well the sample gas represents the process gas. For that reason, obtaining a representative sample is imperative to gas analysis.

Procuring a quality sample from a gas source that is free of liquids is a relatively simple task; however, when the source contains entrained liquids, significant distortion of the gas phase composition can occur during sampling. Also, most analyzers cannot handle the raw conditions of line contamination: if even the slightest amount of entrained liquid reaches the analyzer, it may cause serious damage to the analyzer.

Ideally, liquid should be removed from the sample gas at the prevailing pressure and temperature conditions of the

flowing source gas before a change in pressure or temperature takes place. Yet, it is more than a trivial task to extract a representative gas sample from a flowing process line and properly transport it to an online analyzer while maintaining the sample integrity. In the past, most techniques for removing the entrained liquids from gas samples included some sort of coalescing action. While coalescing filters are useful in removing a portion of entrained liquid, they are not 100% effective. Also, as the liquid collects and drains on the downstream side of the coalescing media, some of the liquid is usually re-entrained.

The A+ Corporation Solution

Our **Genie® Probes™** containing **Genie® Membrane Technology™** are designed to extract a gas sample from a pipeline, at pipeline conditions, leaving behind liquid and particulate from the source. They are typically used in conjunction with a **Genie® Membrane Separator™**, which provides analyzer protection against liquid in the event of an upset condition.

If it is not practical or economically feasible to sample within the line using a probe, then a good alternative is to use the **Genie® Membrane Separator™** for analyzer protection. **Genie®** products have offered reliable, cutting edge solutions to sample conditioning problems since the development of the **Genie® Membrane Separator™ Model 101** in 1988. Our **Genie® Series 100**

Membrane Separators™, containing **Genie® Membrane Technology™**, remove 100% of entrained liquid from gas samples. This process provides maximum analyzer protection in the event of an upset condition. **Genie® Membrane Technology™** contains microscopic passages that are non-species selective, allowing gas and vapor molecules to flow through with ease. Liquid molecules cling tightly together as a “cohesive group;” therefore, they are unable to flow through the membrane’s small passages. Unlike a coalescing filter, **Genie®** membranes allow only gas particles to reach downstream, so there is no chance that liquid may re-entrain once the separation is complete.

As an added feature, the **Genie® Model 101** can be retrofitted with the **Liquid Block™** assembly. Liquid can be forced through any phase separation membrane when circumstances create excessive membrane differential pressure. The **Liquid Block™** option provides the ultimate safeguard against liquid breakthrough that can occur during inadvertent circumstances. It has an internal valve that actuates and limits flow through the **Genie®** membrane in the event that the membrane differential pressure setting is exceeded. As a result, the maximum membrane differential pressure for total separation is maintained, even when the potential for increased differential pressure is present. Also, the **Liquid Block™** feature completely closes in the presence of excess liquid and particulate, which provides the highest level of

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analyzer protection possible. **The Liquid Block™** will automatically reset itself once the excess liquid exits the Bypass.

A+ Corporation also features the **Genie® Supreme Series™ 100** models, which incorporate **Genie® Membrane Technology™** with an improved housing design and the revolutionary **Liquid Block™** cover (optional in some models). With the new housing design, Genie® membranes last even longer. **Genie® Supreme Separators™** can be back mounted for easy front access and have threaded housing covers so that tools are not needed to inspect the membrane. With **Genie® Supreme Separators™**, inspections can be performed in a matter of seconds. All of the connection ports are located on the body so that tubing and fittings do not have to be removed for internal access. A built in membrane retention feature, previously an option, prevents the membrane from “ballooning” into the inlet cavity and rupturing should internal reverse flow occur. Furthermore, the straight-through bypass provides bulk separation of liquid and particulate from gas, thereby reducing the amount of liquid and particulate contaminants that come in contact with the membrane.

Membrane Technology

Genie® membranes are extremely inert and recommended for applications with most process fluids. Their extremely low absorption characteristics make them

suitable for use in systems designed for PPB, PPM, and “percent level” component concentrations. Although an individual membrane is soft and pliable, it is extremely strong and durable.

There are four basic types of membrane for the **Genie® Series 100 Membrane Separators™**. The Type 5 and BTU membranes are suitable for separation of most liquids from gases. The Hi-Flow and Hi-Flow Backed membranes are best suited for the separation of liquid water and other high surface-tension liquids from gases.

In order to select the correct membrane type for a particular application, it is necessary to determine the type of liquid that needs to be removed from the gas sample. If the liquid is water or a solution consisting primarily of water, sulfuric acid, caustic solution, glycols, oily liquids, or any other high surface-tension liquids, then the Hi-Flow or Hi-Flow Backed membrane types are recommended. The Type 5 and BTU membrane will also separate the liquids referenced above, as well as any hydrocarbon liquids that may be present in the gas stream. The Type 5 & BTU membrane types will require a greater membrane differential pressure than required for the Hi-Flow or Hi-Flow Backed membrane.

All four membrane types are excellent for filtration of sub-micron sized particles. Please note that since the membrane is a surface filter, instead of a depth

filter, it will load very quickly in high particulate applications. A depth filter may be required to adequately pre-filter a dirty sample, upstream of a **Genie® Membrane Separator™**.

For expert product application assistance, please call (225) 644-5255, or send a request by e-mail to sales@geniefilters.com.

