

Industry Challenge

Maintaining sample integrity during spot sampling is extremely challenging when the source gas contains entrained liquid. There are many industries that deal with this challenge, but it is particularly a concern in the natural gas industry since gas is frequently transported through pipelines near its dew point.

The American Petroleum Institute (API) 14.1 and Gas Processors Association (GPA) 2166 standards both agree that if liquid is present in the source gas, it should be separated at the pipeline temperature and pressure; otherwise, a phase change will alter the sample composition. The only way to ensure that liquid is removed at pipeline conditions is to remove it inside the pipeline. Our **Genie® Probes™** containing **Genie® Membrane Technology™** are designed for just that purpose. Yet, it is sometimes not practical or economically feasible to use a probe. This is frequently the case when spot sampling low-flow rate streams. With that in mind, **A+ Corporation, LLC** has designed hardware for technicians to utilize outside of the pipeline, which will produce acceptable results in an economical manner.

There are eight spot sampling procedures recommended in the **GPA Standard 2166**, which are accepted by **API**; however, hardware designed

specifically for wet gas sampling outside of the pipeline is extremely limited. As a result, several separate, bulky pipe and valve pieces are usually connected together in an attempt to achieve the desired results. For example, a very common apparatus used to remove liquid from gas in sample systems is a GPA separator. A GPA separator may remove liquid slugs, but liquid aerosols remain in the sample. A GPA separator also has a very large internal volume that requires extensive purging and increases the probability of sample distortion due to condensation.

To assist in preventing condensation, a sample system should be designed with the lowest internal volume possible. That can be achieved by limiting the distance between the sample point and the sample cylinder, selecting hardware with low internal volume, and designing the system with the fewest fittings and valves as possible.

Since GPA procedures are based on the use of sampling systems containing ancillary valves, the procedures consist of lengthy steps that leave room for variation in interpretation. Inconsistent sampling techniques add error to results, particularly if too little or too much purging occurs. Simplifying spot sampling apparatus would help implement GPA methods by allowing

them to be performed accurately and consistently for each sample collected; however, care must be taken when attempting to simplify the system to meet all of the GPA guidelines for sampling apparatus. A sample system should effectively remove liquid from the source, minimize the possibility of condensation, and be as simple as possible to use so that representative sampling occurs even when spot sampling a gas at its hydrocarbon dew point.

A+ Corporation, LLC Solution

The **Genie® Spot Sampling Manifold™** is a leading-edge gas sampling apparatus that removes liquid from a gas, minimizes condensation, and drastically simplifies spot sampling. It consists of a **Genie® Supreme Series™ Model 123HP with Liquid Block™** plus a manifold, pressure gauge, two flow restrictors, and two valves all in one compact product designed with very low internal volume. Liquid from the source is removed utilizing **Genie® Membrane Technology™**. This technology has been in use globally for over fifteen years and has been proven to be the best method for removing liquid entrainment.

An inertial pre-separation path in the **123HP** provides bulk separation of liquid and particulate from gas. **Genie® Membrane Technology™** ensures

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that thorough separation occurs next. Only the gas phase flows through the membrane to the manifold fitting, while two-phase fluid exits the **123HP** through the primary bypass if liquid is present. Both the primary and secondary bypasses are designed with flow restrictors to minimize typical Joule Thomson cooling effects on the cylinder. A built in membrane retention feature protects the membrane in the event of inadvertent back pressure or back flow. The membrane retention in tandem with inertial pre-separation increases membrane life. When servicing is eventually necessary, the housing construction of the **123HP** allows quick and easy membrane inspection without tools or disassembly of the sample system.

Liquid can be forced through any phase separation membrane when circumstances create excessive membrane differential pressure. The **Liquid Block™** feature of the **Spot Sampling Manifold™** provides the ultimate safeguard against liquid break-through during such inadvertent circumstances. An internal valve actuates and limits flow through the **Genie®** membrane in the event that the membrane differential pressure setting is exceeded (see FAQs for more information or definitions of terms). As a result, the maximum membrane differential pressure for good 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 analyzer protection possible. The **Liquid Block™** will automatically reset itself once the excess liquid exits the bypass.

The opportunity for condensation is minimized with the **Spot Sampling Manifold™** because it is designed with extremely low internal volume, which minimizes gas contact with internal surfaces. Internal volume is further reduced since tubing and fittings typically required in sample systems are not necessary.

The **Spot Sampling Manifold™** can be used in all GPA methods. Begin by simply connecting to the source valve and sample cylinder. Regardless of which sampling method is being used, the procedure will always be easier than it would otherwise be with standard apparatus since less valve turning is required. Each model is shipped with procedures that allow sample collecting to occur quickly and consistently. Additional information such as Price Sheets, FAQs, and Application Notes are conveniently available from **A+ Corporation, LLC**. Please call **(225)-644-5255**, or send a request by e-mail to sales@geniefilters.com.

