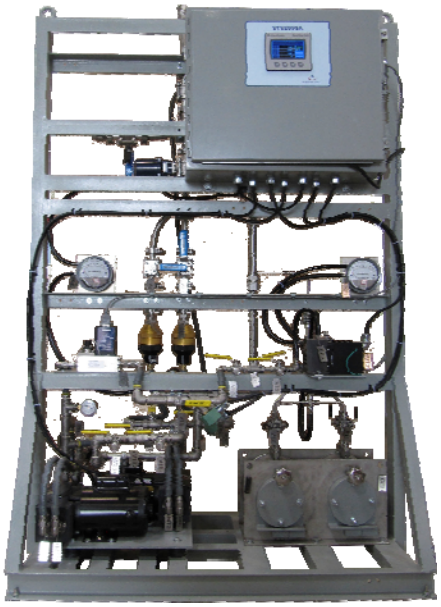
Normal and Accident Particulate and Iodine Sampling System STS200GA

FIXED FILTER | **REPRESENTATIVE SAMPLING**



SYSTEM OVERVIEW

The APANTEC, LLC. STS200GA Stack Sampling System is designed to sample particulate, iodine and noble gas contained in the ventilation exhaust or stack effluent. Sample is pulled from the stack by the STS200GA sample pump and then transported to high efficiency air filters. Parallel flow paths are provided for normal range P/I filters with redundant vacuum pumps for motive force. A splitter block designed per ANSI N13.1-1969 diverts the normal sample flow to the parallel filter elements. Upon notification of an accident condition, the system automatically switches to accident range sampling. The system can also be operated continuously via selection of front panel controls for manual sampling. The skid mounted PLC Controller monitors the stack flow rate and temperature, and sample flow rate and temperature, and controls system and component Fail relays and other communications to notify plant personnel of system status. The PLC Controller communicates Stack Mass Flow Rate and Sample Mass Flow Rate via 0-5VDC analog outputs and system status via relay contacts to the Control Room.

System Features

- **System skid, fully wired, plumbed and assembled**
- **Skid Mounted PLC Controller**
- **Two Normal and Accident Range Particulate/Iodine Filters**
- **Normal and Accident Range Sample Pumps**
- **Parallel Fixed Filters**
- **Compliant with ANSI N13.1-1999**

The STS200GA Sample Transport System consists of all tubing, valves and fittings between the inlet to the STS200GA and the stack sample return fitting downstream of the sample skid. The transport system utilizes seamless stainless steel tubing where metal tubing is used. Where required, rubber hose is used to allow flexible connections and to permit sound isolation. The system is designed to flow at an equivalent of 2 standard cubic feet per minute (SCFM) or 56.6 standard liters per minute (SLPM) during normal sampling conditions. This flow rate is required to optimize particulate capture in the customer provided stack sample nozzle by matching the actual sample flow rate with the design nozzle flow rate. Sample tubing from the sample nozzle to the skid inlet will be 3/4”OD x 0.065” wall thickness, seamless, stainless steel tubing to maximize transport of particles to the sample skid assembly. This tubing size allows for minimum particle impaction losses on interior tubing walls by maintaining laminar flow conditions. The sample air then passes through a 3/4” ball valve and into the splitter block.

The specially designed splitter block takes its internal configuration from numerous particulate transport studies. The design reduces particulate losses on internal walls due to turbulent impaction, and also from impaction due to drastic changes of direction of flow or from sudden changes in inside diameters.

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After the splitter block is the particulate and iodine filter assembly. Two parallel and redundant filter holders are provided. Each holder accepts 47 mm diameter filter paper and TEDA cartridges. The holders disassemble by screw threads to allow replacement of the filter papers. The outlet end of the filter holders are equipped with a quick disconnect fitting to allow easy opening without system disassembly and without tools. Each filter holder assembly is isolated by an inlet and an outlet ball valve. This allows for uninterrupted sampling by bringing the fresh filter on line and then isolating the expired filter without stopping the pump.

The filter paper selected for this application is industry standard FP5211. This type of filter is a hydrophilic, laminated glass fiber with acrylic resin binder and a scrim backing. It is water proof, with good heat resistance and a DOP collection efficiency of 99.99%. Iodine cartridges are industry standard 47 mm TEDA cartridges. Any filter media that is 47 mm in diameter can be used.

The two filter holder outlet valves discharge to a header that then flows to the Normal Sample Mass Flow Controller. The mass flow controller consists of a thermal mass flow sensor followed by a flow control valve and a control electronic board assembly. The flow sensor detects sample mass flow by comparing heat transfer from one thermocouple to another, and then the control electronic board compares this flow rate with a command signal sent by the PLC. If the sample flow rate does not match the input command signal, the control board then adjusts the flow control valve to bring flow rate in line with the commanded flow rate. The control board also continuously outputs the actual sample flow rate to the PLC for display, and out-of-range alarming. Flow totalization is performed using a Foxboro or Yokagawa flow totalizer placed in series with the vacuum pump.

The normal range mass flow controller discharges to the gas sample volume fittings/valves and then to the redundant normal range sample pumps. The gas sample port provides isolation valves to allow collection and removal of the customer provided gas volume when desired. The normal range pumps are rocker piston vacuum pumps with integral motor. The pump is capable of suction vacuum levels up to approximately 26 inches of Mercury (26”Hg) and discharge pressure levels up to approximately 10 psig. A noble gas grab sample port and isolation valves are provided at the exhaust of the vacuum pump.

The normal sample pumps discharge to the sample return line, which exits the skid assembly and dumps to the ventilation stack.

The accident range sampling system is designed in the same fashion as the normal range sampling system, but is designed to sample at a lower flow rate of 1 SLPM to reduce contamination and extend filter replacement intervals. The accident range filters are lead shielded to reduce ALARA concerns. A separate accident range sample pump and flow element are provided for the accident range sampling. As with the normal range sampler, splitter blocks designed per ANSI N13.1-1969 are used to divert the sample flow through the accident range filters and flow path.

SPECIFICATIONS

GENERAL

Temperature:	32°F to +122°F.
Humidity:	<95% Relative Humidity, Non-condensing
Pressure Range:	
Internal Pressure:	+10 psig maximum
External Pressure:	Ambient
Mounting:	Skid: Floor Mounted
Skid Size:	48.0" Wide x 24.0” Deep x 74" High (±0.50”)
Skid Weight:	1000 LB, approximately
Skid Power:	115 VAC +/- 10%, 60 +/- 5Hz, Single Phase, 10 Amps maximum

SAMPLE TRANSPORT SYSTEM

Sample Temperature:	32°F to 122°F
Sample Flow Rate:	56.6 SLPM/2 SCFM nominal
Sample Flow Indication:	Thermal Mass Flow Controller Analog Output to RM1W for display
Filter Elements:	47mm OD Industry Standard FP5211
Filter Material:	Hydrophilic, Laminated Glass Fiber with Acrylic Resin Binder and a Scrim Backing. TEDA Activated Charcoal Cartridge
Filter Collection Efficiency:	99.99%, DOP
Wetted Materials:	
Tubing:	Type 316L Stainless Steel (SS)
Valves and Fittings:	Type 316 SS
Filter Holders:	Anodized Machined Aluminum
Hose:	Neoprene
Flow Totalizer:	Foxboro or Yokagawa

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