



Application Guide

Sampling Train — Multiple Sorbent Tubes



Multiple-tube sampling provides many benefits when collecting hazardous gases and vapors from air. This method reduces time in the field and uses fewer sample pumps because multiple contaminants requiring different sample tubes can be sampled with one pump. Multiple-tube sampling also allows collection of Time-Weighted Averages (TWAs) and Short-Term Exposure Limits (STELs) and side-by-side simultaneous sampling at different flow rates. This Application Guide demonstrates how to set up a **Sampling Train Using Multiple Sorbent Tubes**.

Required Equipment

1. An **air sampling pump** capable of sampling at the recommended flow rate with the sampling medium in line, such as:
 - SKC 210 Pocket Pump® with Constant Pressure Controller Cat. No. 224-26CPC-10 (for use in constant flow mode only) and Adjustable Multiple Tube Holder Cat. No. 224-26 Series
 - SKC AirChek® 2000 Sampler with Constant Pressure Controller Cat. No. 224-26-CPC and Adjustable Multiple Tube Holder Cat. No. 224-26 Series
 - SKC Universal Series Sampler and Adjustable Multiple Tube Holder Cat. No. 224-26 Series
 - SKC AirChek 52 Sampler with Constant Pressure Controller Cat. No. 224-26-CPC and Adjustable Multiple Tube Holder Cat. No. 224-26 Series
 - SKC AirChek XR5000 Sampler with Constant Pressure Controller Cat. No. 224-26-CPC and Adjustable Multiple Tube Holder Cat. No. 224-26 Series
2. An **airflow calibrator**, such as:
 - Defender Primary Standard Calibrator 717 Series
3. An **Adjustable Low Flow Holder**:
 - Dual (for 2 tubes) Cat. No. 224-26-02
 - Tri (for 3 tubes) Cat. No. 224-26-03
 - Quad (for 4 tubes) Cat. No. 224-26-04
4. The **sorbent sample tubes** specified in the method
5. The **appropriate size protective covers** for the Adjustable Low Flow Holder:
 - for 6 x 70-mm tubes 224-29A
 - for 8 x 110-mm tubes 224-29B
 - for 10 x 150-mm tubes 224-29C
 - for 10 x 220-mm tubes 224-29D

Optional Equipment

1. SKC **Tube Breaker**:
 - Cat. No. 222-3-50 for 6 and 7-mm (OD) tubes
 - Cat. No. 222-3-51 for 8 and 10-mm (OD) tubes

Introduction

To determine the correct flow rate for the chemical of interest, refer to the appropriate analytical method. *See the operating instructions for the pump to ensure that it is capable of sampling at the correct flow rate.*

1. Preparing the Sorbent Tubes

Using a tube breaker, break off both ends of each sorbent tube to provide an opening of at least one-half the internal diameter. These tubes will be used for calibrating the flow and not for collecting the sample.

2. Setting Up the Calibration Train with Adjustable Low Flow Holder — See Figure 1

If using a Universal Series Sampler, ensure that it is in the low flow mode. If using a 210 Pocket Pump in constant flow mode or any of the AirChek Samplers, connect the appropriate CPC to the pump inlet. Using flexible tubing, connect the adjustable low flow holder to the pump intake or CPC. Place the sorbent tubes into the black rubber sleeves of the adjustable low flow holder. The printed arrow on the sorbent tube shows the direction of the airflow and should point toward the tube holder. If there is no arrow printed on the tube, insert the end of the tube with the smallest sorbent section (backup section) into the tube holder.

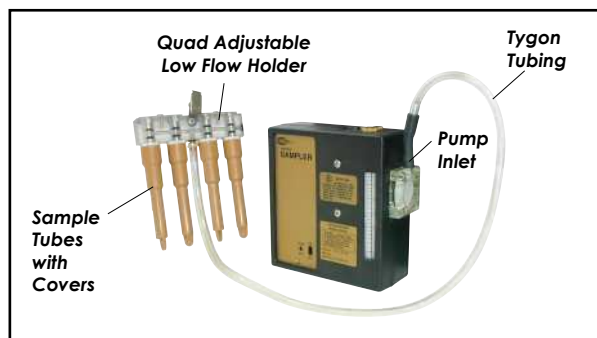


Figure 1. Multiple-tube sampling train using a quad adjustable low flow holder and Universal Series sampler

Sampling Train — Multiple Sorbent Tubes

3. Calibrating the Flow Rate — See Figure 2

Ensure the pump has run for 5 minutes before calibrating. Note the flow rates specified by each sampling method and add them together. Set the pump to a flow rate at greater than or equal to 15% higher than that sum. Calibrate the flow rate through each tube. The flow rate through any one tube cannot exceed 500 ml/min. Ensure the pump has run for 5 minutes before calibrating. To calibrate the flow rate, connect the open end of one sorbent tube to an external calibrator.

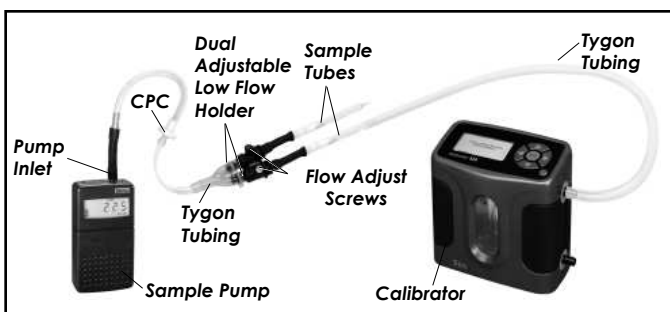


Figure 2. Calibration train with a dual adjustable low flow holder and 210 Pocket Pump

Adjust the flow adjust screw on the corresponding port on the tube holder until the desired flow rate is achieved. Turn the screw clockwise to decrease the flow. Disconnect the tube from the calibrator and calibrate the next tube. Changing the flow on one tube will not affect the flow through tubes already set. For tri and quad models, first rotate each anti-tamper cover to expose the flow adjust screw (see Figure 3). When using a multi-port tube holder, ensure that all ports contain sorbent tubes. If sampling for fewer chemicals than the number of ports, insert unopened sorbent tubes in the empty ports to seal them. Calibrate the flow rate for each tube as specified in the analytical method for the chemical of interest. When the flow rate has been calibrated, remove the calibrator and set aside the sorbent tubes used to calibrate the flow. These tubes will be used after sampling to verify the flow rate. Record the pre-sample flow rate.

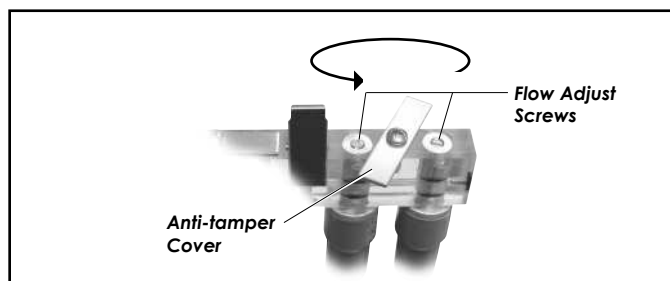


Figure 3. Top view of a quad adjustable low flow holder

4. Sampling — See Figure 4

When ready to start sampling, break off both ends of new sorbent tubes in the same manner used for calibrating the flow. Insert the sorbent tubes into the rubber sleeves of the adjustable low flow holder. Ensure unused ports contain unopened tubes to "seal" the port. Place a protective cover over each sorbent tube. Attach the clips to a worker's collar and the pump to the worker's belt. The sorbent tubes should be placed in a vertical position during sampling. Turn on the pump and note the start time and any other sampling information. If one tube is removed from a multiple port tube holder during sampling, immediately replace it with an unopened tube for the remainder of the sampling period.

5. After Sampling

At the end of the sampling period, turn off the pump and note the ending time. Remove the sorbent tubes, seal the ends of each tube with the caps provided, and record pertinent sample information.

Using a calibrator, calibrate the flow rate with representative sorbent tubes in line (the sorbent tubes originally used to calibrate the flow) to verify that the flow has not changed by more than 5%.

Submit field blanks from the same lot number as the sample tubes. Field blanks should be subjected to exactly the same handling as the samples (open, seal, and transport) except that no air is drawn through them.

Pack the sample sorbent tubes, field blanks, and all pertinent information securely for shipment to a laboratory for analysis.

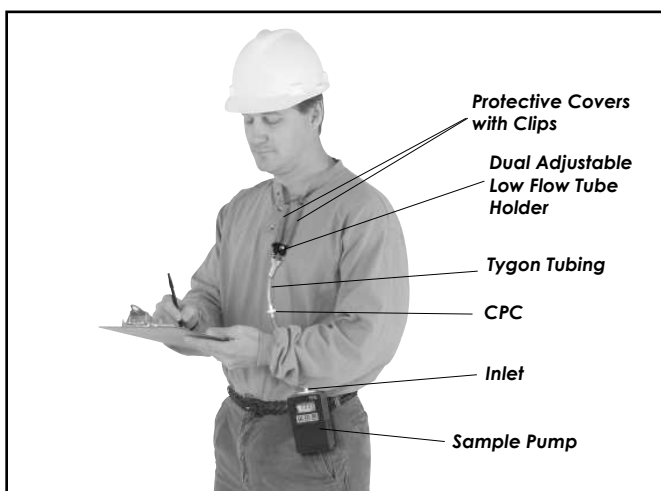


Figure 4. Dual-tube sampling train on worker

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