



Application Guide

Sampling Train — Pre-filter and Tube



Sorbent tube sampling is the NIOSH/OSHA-approved method for collecting most hazardous gases and vapors from the air. Filters are used to sample airborne particulate chemical hazards. Occasionally, it is necessary to sample simultaneously for gases or vapors and particulates or to eliminate particulates from the sample. In such cases, a sorbent tube is used with a pre-filter in line. This Application Guide demonstrates how to set up a **Sampling Train for Pre-filter and Tube Sampling**.

In most cases, such sampling is performed in low flow mode. The equipment list and other details of this guide assume low flow. Check the method in each case to verify recommended flow. If high flow (> 1000 ml/min) is stipulated, eliminate low flow items from the equipment list and select high flow equipment as specified in the Application Guide for Filter Sampling (Publication #1166).

Required Equipment

1. An **air sampling pump** capable of sampling at the recommended flow rate with the sampling medium in line, such as:
 - SKC Universal Series Sampler with a 224-26 Series Adjustable Low Flow Holder
 - SKC AirChek® 2000 Sampler with Constant Pressure Controller Cat. No. 224-26-CPC and a 224-26 Series Adjustable Low Flow Holder
 - SKC AirChek 52 Sampler with Constant Pressure Controller Cat. No. 224-26-CPC and a 224-26 Series Adjustable Low Flow Holder
 - SKC AirChek XR5000 Sampler with Constant Pressure Controller Cat. No. 224-26-CPC and a 224-26 Series Adjustable Low Flow Holder
2. An **airflow calibrator**, such as:
 - Defender Primary Standard Calibrator 717 Series
3. The **sorbent sample tube** specified in the method
4. The SKC **filter and cassette blanks** specified in the method
5. SKC **Collar Clip and Cable Ties** Cat. No. 225-13-6
6. **PTFE tubing**
7. **Spacer or stainless steel screen**
8. The **appropriate protective tube cover**

Optional Equipment

1. **Cassette Shrink Bands** Cat. No. 225-25
2. SKC **Tube Breaker** Cat. No. 222-3-50 (for 6 and 7-mm OD tubes) or 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 Filter Cassettes — See Figure 1

The filter cassette blank holds the filter securely in place during sampling. The cassette consists of an inlet section, an outlet section, and possibly a middle ring or extension cowl. The cassette with all three sections can be used with the inlet in place (closed face) or with the inlet removed (open face) depending on the sampling method. The filter is assembled as described below and as shown in Figure 1.

To load the cassette, place the appropriate stainless steel screen, support pad, or spacer in the outlet of the cassette and add the appropriate filter. Insert the extension cowl or middle ring if required, then close the cassette firmly with the inlet section. Assemble a second "representative" cassette for calibrating the flow rate (not for collecting the sample). Insert plugs into the inlets and outlets of each cassette until ready to use. Seal both cassettes with shrink bands (optional).

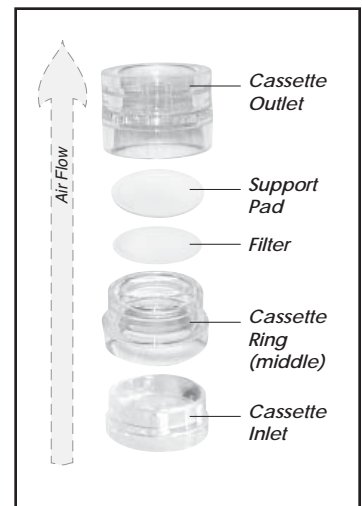


Figure 1. Filter assembly

Sampling Train — Pre-filter and Tube

2. Preparing the Sorbent Tubes

Using a tube breaker, break both ends of a sorbent tube to provide an opening of at least one-half the internal diameter of the tube. Cap the ends of the tube until ready to use. Prepare a second "representative" sorbent tube for calibrating the flow rate (not for collecting the sample).

3. Setting Up the Calibration Train

If required, use flexible tubing to connect the CPC to the pump inlet. Use additional flexible tubing to connect the CPC to the adjustable low flow holder (a CPC is not required for Universal Series pumps). Remove the caps from the representative sorbent tube and insert it into the black rubber sleeve of the adjustable low flow holder. The printed arrow on the sorbent tube shows the direction of airflow and should be pointed toward the 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 holder.

Remove the plugs from the representative filter cassette. Using PTFE tubing, connect the cassette outlet to the tube inlet. With additional tubing, connect the cassette inlet to the external calibrator. Luer adapters can be used to connect the filter cassette to the tubing.

4. Calibrating the Flow Rate

Ensure pump has run for 5 minutes before calibrating. With the representative sampling media (loaded filter cassette and sorbent tube) in line, calibrate the flow rate specified in the analytical method for the chemical of interest. If using a 224-26 Series Adjustable Low Flow Holder, use the flow adjust screw on the holder to adjust flow rate. Refer to the pump and calibrator instructions for correct calibration of flow rate. When the flow rate has been calibrated and verified, remove the filter cassette and sorbent tube used for calibrating the flow rate and set these aside. They will be used again for verifying the flow rate after sampling has been completed. Record the pre-sample flow rate. Remove the external calibrator.

5. Sampling — See Figure 2

When ready to start sampling, prepare a sampling train identical to the one used for calibrating the flow rate, but **without** the external calibrator. Insert a new filter cassette loaded with the appropriate spacer or stainless steel screen and filter and a new sorbent tube. See Figure 2. Attach the cassette to a worker's clothing near the breathing zone and the pump to the worker's belt. **The inlet of the cassette should be facing down.** Remove the plug from the cassette inlet (if applicable). Turn on the pump and note the start time and any other sampling information.

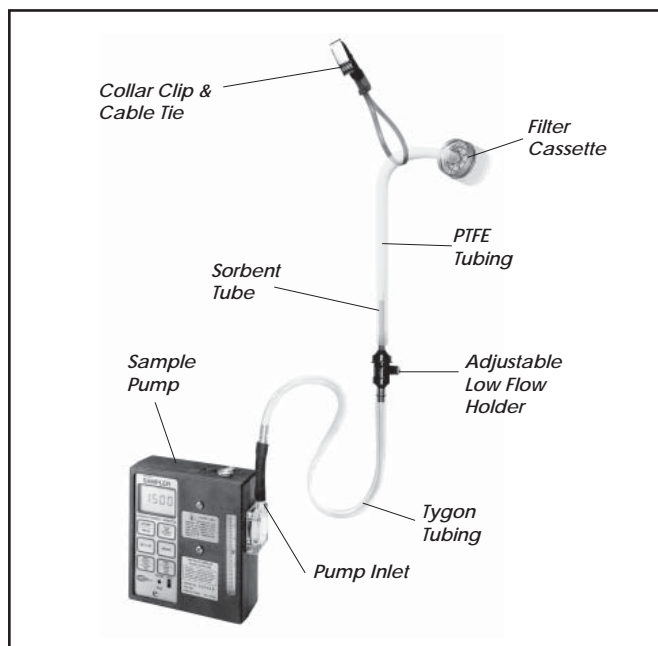


Figure 2. Sampling train using a pre-filter cassette and a sorbent tube

6. After Sampling

At the end of the sampling period, turn off the pump and note the ending time. Remove the filter cassette from the worker and cap the inlet and outlet of the cassette with the plugs provided. Remove the sorbent tube, seal the ends of the tube with the caps provided, and record pertinent sampling information.

Use representative sampling media (filter cassette and tube) to verify that the flow rate has not changed by more than 5%.

Submit field blanks from the same lot numbers as the sampling tubes and filters. Field blanks should be subjected to exactly the same handling as the samples (tubes are opened; cassettes are loaded with a filter and supports) except that no air is drawn through them.

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

Copyright 1996 - 2010

Notice: This publication is intended for general information only and should not be used as a substitute for reviewing applicable government regulations, equipment operating instructions, or legal standards. The information contained in this document should not be construed as legal advice or opinion nor as a final authority on legal or regulatory procedures.