Application Guide

Sampling Train — Filters and Cyclones

Filters are used to sample airborne chemical hazards in particulate form. Filter samples are collected using a small, porous filter typically 25 or 37 mm in diameter. Filters are placed into blank cassettes that can be used alone to sample or are placed into a cyclone and cassette adapter. A cyclone is used to measure respirable dust (particles small enough to reach the alveoli of the lung). When using a cyclone, the respirable particles will collect on the filter while the larger particles fall into the bottom of the cyclone (grit pot). This Application Guide demonstrates how to set up a **Sampling Train Using Filters and Cyclones**.

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
   - SKC AirChek® 2000 Sampler
   - SKC AirChek 52 Sampler
   - SKC AirChek XR5000 Sampler
2. An **airflow calibrator,** such as:
   - Defender Primary Standard Calibrator Cat. No. 717 Series
3. **Filters, support pads or screens, and blank cassettes** as specified in the method
4. **Cyclone**, size as specified in the method, such as:
   - SKC 37-mm Aluminum Cyclone Cat. No. 225-01-02
   - SKC 25-mm Aluminum Cyclone Cat. No. 225-01-01
5. **Cyclone Calibration Chamber** Cat. No. 225-01-03
6. **Filter Cassette Holder** Cat. No. 225-1

Optional Equipment

1. **Cassette shrink bands** Cat. No. 225-25
2. **Luer adapter,** PVC Cat. No. 225-13-2

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 Cassette

The filter cassette 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.

Without Cyclone — See Figure 1

To load the cassette, place a cellulose support pad or stainless steel screen in the outlet section of the cassette and then the appropriate filter (conditioned and weighed according to the method used). Add the extension cowl or middle ring if required, close the cassette firmly with the inlet section, and insert the plugs into the inlet and outlet.

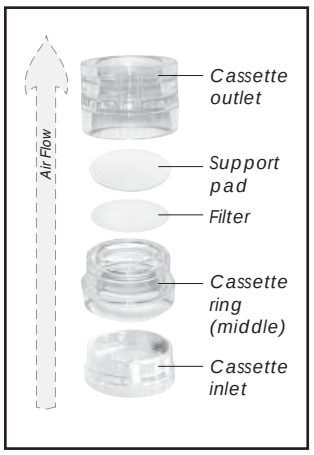

Figure 1. Filter Assembly

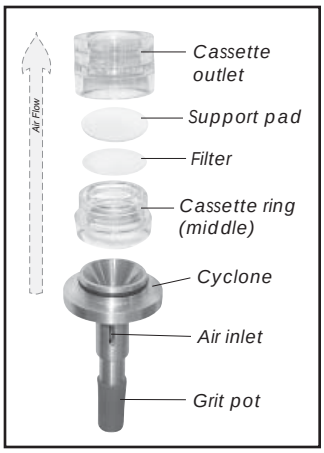

Figure 2. Filter Assembly with a Cyclone

With Cyclone — See Figure 2

To load the cassette, place a cellulose support pad in the outlet section of the cassette, add the appropriate filter, insert the middle ring, and place the cyclone securely into this ring. Insert a plug into the cassette outlet.

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2. Setting Up the Calibration Train

Without Cyclone

If using a Universal Sampler, ensure that it is in the high flow mode. For calibrating the flow, use a filter cassette that has been loaded with a filter representative of the type to be used in the field. Remove the plug from the cassette outlet and use flexible tubing to connect the cassette outlet to the pump inlet and the cassette inlet to an external calibrator. Luer adapters can be used to connect the filter cassette to the tubing.

With Cyclone

If using a Universal Sampler, ensure that it is in the high flow mode. For calibrating the flow, use a filter cassette that has been loaded with a filter representative of the type to be used in the field. Insert the SKC cyclone calibration chamber over the cyclone stem and ensure that it fits securely to avoid leaks. Remove the plug from the cassette outlet and use flexible tubing to connect the cassette outlet to the sampler inlet and the calibration chamber to the external calibrator. Luer adapters can be used to connect the filter cassette to the tubing. **The cap on the stem of the cyclone (grit pot) should remain in place during calibration and sampling.**

3. Calibrating the Flow Rate

Ensure pump has run for 5 minutes before calibrating. With the representative sampling medium in line, calibrate the flow rate specified in the analytical method for the chemical being sampled. The flow rate for optimum separation when using the SKC Aluminum Cyclone is 2.5 L/min for a 4-µm cut-point, meeting the ACGIH/ISO/CEN curve (Solderholm Convention). See the sampler and calibrator operating instructions for calibrating flow rate. When the flow rate has been calibrated and verified, remove the filter cassette used to calibrate the flow and set it aside. It will be used to verify the flow rate after sampling. Record the pre-sample flow rate. Remove the external calibrator. If using a cyclone, remove the calibration chamber.

4. Sampling — See Figure 3

When ready to start sampling, prepare a new filter cassette identical to the one used for calibrating the flow. Seal the cassette with a cassette shrink band (optional). The band will shrink around the cassette upon drying. Insert the loaded filter cassette or cassette/cyclone assembly into a filter cassette holder with the inlet or cyclone stem facing down. Secure the cassette with the spring-loaded hold-down plate and insert the adapter on the end of the short piece of rubber tubing to the outlet of the cassette. Connect the long piece of flexible tubing to the inlet of the pump. Attach the filter holder to a worker's collar and the pump to the worker's belt. The inlet of the cassette should be facing down. If a cyclone is used, it should be placed in a vertical position. Remove the plug from the cassette inlet, if applicable, and turn on the pump. Note the start time and any other pertinent sampling information.

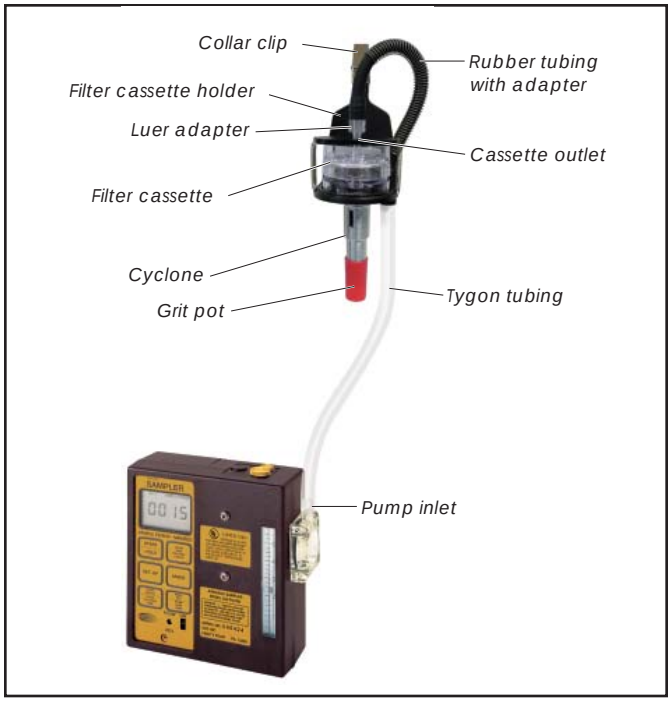

Figure 3. Sampling Train for Filter Assembly with a Cyclone

5. After Sampling

At the end of the sampling period, turn off the pump and note the ending time. Remove the filter cassette from the holder and cap the inlet and outlet of the cassette with the plugs provided. If a cyclone was used, remove the cyclone and discard the dust in the cap (grit pot). Close the cassette firmly with the inlet section, and use the caps provided to plug the inlet and outlet. When removing cassettes from the sampling train, handle carefully to avoid losing sample.

Using a calibrator, calibrate the flow rate with the representative filter in line to verify that the flow has not changed by more than 5%.

Along with the sample filter cassette, submit field blanks from the same lot number as the sample filters. Field blanks should be subjected to exactly the same handling as the sample (load, seal, and transport) except that no air is drawn through them.

Pack the sample filter cassette, field blanks, and all pertinent sampling information securely for shipment to a laboratory for analysis.