Hawaii Analytical Laboratory

MEDIA GUIDE

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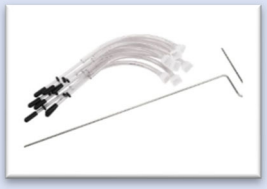
	Analysis	Matrix	Media Needed	Method	Flow rate	Minimum Quantity
Asbestos	**PCM**	Air	PCM	NIOSH 7400 - Rule A	1 - 4 L/min	400 L @ 48 L
	TEM	Air	PCM / TEM	NIOSH 7402 (PCM) / AHERA (TEM)	0.5 - 16 L/min	400 L min / 1250 L
	Asbestos	Surface	Tape lift kit/Transparent Tape		N/A	N/A
Gravimetric	**Respirable Dust**	Air	PVC (Pre-weighted) & cylcone	NIOSH 0600m	Nylon cyclone: 1.7 L/min Aluminum cyclone: 2.5 L/min	20 L @ 5 mg/m^3
	Total Dust	Air	PVC (Pre-weighted)	NIOSH 0500m	1-2 L/min	7 L @ 15 mg/m^3
Lead	**Pb**	Air	MCE	NIOSH 7082m	1 - 4 L/min	200 L @ 0.05mg/m^3
	Pb	Wipe	Ghost Wipe	NIOSH 7082m	N/A	100 cm^2 / 1 ft^2
Metals	**Hexavalent Chromium**	Air	PVC (Pre-loaded)	OSHA ID-215	2 L/min	960 L
	Hexavalent Chromium	Wipe	Ghost Wipe	OSHA W4001	N/A	0.050 µg/100 cm2
	Ag	Air	MCE			
	Cr	Air	MCE	NIOSH 7024m	1-3 L/min	10 L @ 0.5 mg/m^3
	Cd	Air	MCE	NIOSH 7048m	1-3 L/min	25 L @ 0.1 mg/m^3
	Zn	Air	MCE	NIOSH 7030m	1-3 L/min	2 L @ 5 mg/m^3
	As	Air	MCE	NIOSH 7900m Gaseous hydride	1-3 L/min	30 L @ 0.002mg/m^3
	Cu / Ni / Mn	Air	MCE	OSHA 121m	2 L/min	480 L
	Mercury (particulates only)	Air	MCE	EPA 7470Am	2 L/min	60 L
Silica	**Silica**	Air	PVC (Pre-loaded) + cyclone	NIOSH 7500	Nylon cyclone: 1.7 L/min Aluminum cyclone: 2.5 L/min	400 L to 1000 L
Microbiology & Mycology	**Mold / Fungi**	Air	Air-o-cell/Allergenco-D	Bright Field Light at 400X - 1000X	15 L/min	75L – 150 L
	Mold / Fungi	Surface	Tape lift kit/Transparent tape	Bright Field Light at 400X - 1000X	N/A	N/A
OCP	**18 analytes + Chlordane**	Dust	Ghost Wipe	EPA 8081Bm	N/A	10 g
	18 analytes + Chlordane	Air	MCE + OVS (for particulates) MCE + Chromosorb (for vapor)	NIOSH 5510m	0.5-1 L/min	10 L @ 0.5 mg/m^3
	Toxaphene	Dust	Ghost Wipe	EPA 8081Bm	N/A	N/A
	Toxaphene	Air	MCE and Sorbent Tube	NIOSH 5510m	0.5-1 L/min	10 L @ 0.5 mg/m^3
PCBs	**PCBs 7 Aroclors**	Air	Swinnex (for particulates) Florisil 100 mg/50 mg (for vapors)	NIOSH 5503m /EPA 8082Am	0.05 to 0.2 L/min or less	1 L@ 0.5 mg^3
	PCBs 7 Aroclors	Wipe	Ghost Wipe	EPA 8082Am	N/A	

Pump Attachments		
Media	**Description & Use**	**Required Equipment**
OVS Sorbent Tube Calibration Adapter Kit **SKC Item # 224-31** 	Assists calibration of a sample pump with an OVS sorbent tube by securely connecting the OVS to the calibrator while mimicking actual sampling conditions. Sampling: Secure the OVS tube into tube holder with the inlet end facing away from the pump.	• Personal sampling pump • OVS Sorbent tubes • Calibrator • Additional tubing/adapters (optional)
OVS Tube Holder **SKC Item # 224-29V** 	Protective cover to assists sampling by preventing accidental breakage of the sorbent tube during use. Sampling: Insert OVS tube into rubber sleeve of tube holder and replace protective cover.	• Personal sampling pump • OVS Sorbent tubes • Calibrator • Additional tubing/adapters (optional)
Low Flow (Constant Flow) Module **Sensidyne Item # 800518** 	An attachment for GilAir 3 & 5 sampling pumps to maintain consistent low flow rates by compensating for back pressure from filters or sorbent tubes. Sampling: Before sampling, connect the low flow module to the pump at the top. Remove the small plastic piece and replace.	• GilAir 3 or 5 (or another compatible pump) • Sorbent tube / sampling media • Calibration device • Flexible tubing, tube holder, clips • Screwdriver
Multi Flow Module **Sensidyne Item # 800519** 	Accessory for GilAir 3 & 5 to enable low-flow and high-flow sampling on a single pump. Sampling: Attach high-flow media directly to main pump inlet, connect low-flow media to the module using tubing. Calibrate each flow path separately using a primary standard.	• GilAir 3 or 5 (or another compatible pump) • Sampling media • Calibrator • Adapters and tubing
Dual Port High/Low Flow Manifold **Sensidyne Item # 911-0902-01-R**  	Used for sampling two different medias with the same flow rate simultaneously with a singular pump. Sampling: Set the GilAir Plus pump to constant-pressure high-flow (CPH) mode and connect the manifold with tubing to up to two filter samples.	• GilAir Plus pump • Sorbent tube adapter nipple • Flexible tubing • Luer fittings • Sorbent/Charcoal tube holder • Filter cassettes or sorbent tubes • Gilibrator-2 or equivalent air flow calibrator

Low Flow Constant Pressure Controller **SKC Item # 224-26-CPC** 	Maintains constant back pressure across tubes with low-flow sampling pumps. Used with an Adjustable Low Flow Holder to enable accurate multi-tube or single-tube sampling in the low-flow range. Sampling: Connect pump inlet to the CPC outlet (unlabeled side), and connect the CPC inlet to the Adjustable Low Flow Holder with sorbent tube. Adjust flow rates using the holder's needle valves.	• Low Flow Constant Pressure Controller • Adjustable Low Flow Holder • Personal sampling pump • Sorbent tubes • Flexible tubing • Calibration equipment
Filter Cassette Holder **Zefon Item # ZA0061** 	Universal filter cassette and cyclone holder designed to securely attach air sampling devices to a worker's collar for personal air monitoring. Sampling: Secure the filter cassette or cyclone in the holder using the friction-fit or snap-in mechanism, ensuring the inlet faces outward. Clip the holder to the worker in their breathing zone.	• Filter cassette holder (Zefon ZA0061) • 25mm or 37mm filter cassette or aluminum/nylon cyclone • Personal sampling pump • Flexible tubing for pump connection • Filter media appropriate for target analyte
Inner Wall Tubing Adapter **Zefon Item # AOC-WS10** 	Tubing attachment designed to connect directly to the inlet of an Air-O-Cell cassette, allowing air sampling from inside wall cavities. Sampling: Insert the tubing end of the inner wall adapter into the hole with the cap in place, then use a plunger rod to push off the cap and expose the tubing inside the wall cavity. Remove the inlet and outlet plugs from the cassette and connect the adapter to the cassette inlet.	• Inner Wall Tubing Adapter • Air-O-Cell cassette • Calibrated personal air sampling pump • Drill (or equivalent tool) • Tape seals or plugs for cassette after use
All in One, Low Flow Adapter Tube Holder 	Combined Constant Pressure Controller (CPC) and Single Adjustable Low Flow Holder into one tube holder to maintain a constant pressure for flow stability. Sampling: Attach tubing to the pump inlet and connect it to the CPC and low-flow adaptor. Break the tips off a sorbent tube and insert it into the rubber sleeve on the holder. Adjust the flow screw until the target low flow is reached.	• Personal sampling pump • Flathead screwdriver

Low Flow Adapter, Universal Adjustable 	A sampling addition for low flow sampling without an adapter that used with standard sampling pumps in constant pressure mode. <u>Sampling:</u> Attach to the inlet of the pump. Insert the sorbent tube into the adapter, aligning the arrow on the tube to indicate airflow direction. Adjust the flow to the method-specified rate.	• 6mm x 70mm tube • Personal sampling pump • Sorbent Tube

Media:
PVC pre-weighted (Zefon Item # 7P53P)

Description: 37mm 3-piece air sampling filter cassette preloaded with 5.0µm PVC filters that are pre-weighed to within 0.00001g (10µg)

Analyses: Total Dust, Respirable Dust (NIOSH 0500m / NIOSH 0600m)

Specifications: (see below)

BAND	Red Band
MATERIAL	PVC filter, Cellulose pad, Polyethylene housing
FILTER DIAMETER	37 mm
FILTER PORE SIZE	5.0 micron
GRAVIMETRIC	Pre-weighted
TOLERANCE	20 µg
HOUSING STYLE	3-Piece
CONNECTION	Luer Taper

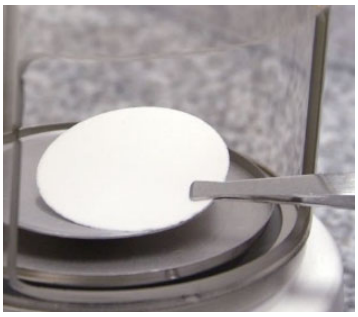
Required Equipment:

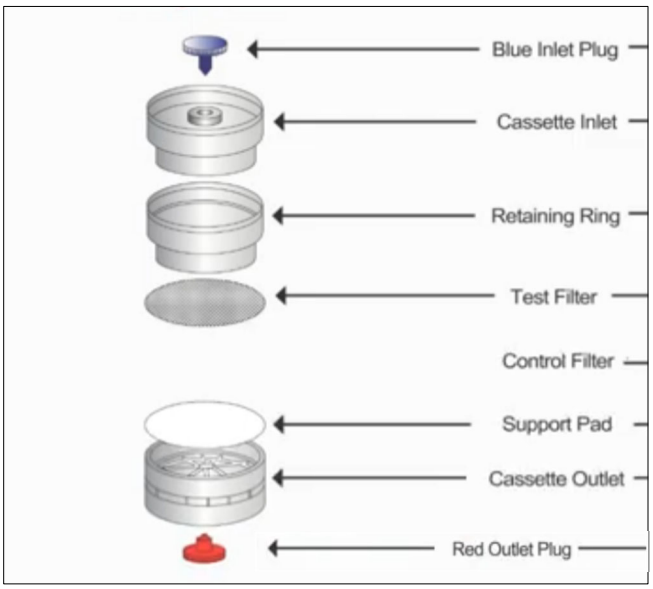
- 37mm 3-Piece Styrene Filter Cassette preloaded with pre-weighed PVC filter
- Sampling pump (capable of 1-4 L/min for total dust or ~2.5 L/min for respirable dust with cyclone)
- Flexible tubing for connection between the cassette and pump
- Calibration device (e.g. rotameter)
  Aluminum Cyclones / Nylon Cyclones (for respirable dust sampling)
  Filter Cassette Holder (for the cyclones or personal)

Sampling procedure:

Inspect the cassette for damage, then connect the outlet side to a calibrated personal sampling pump using flexible tubing. Set the flow rate according to the sampling method (typically 1–4 L/min for total dust or approximately 2.5 L/min with a cyclone for respirable dust). Secure the cassette in the worker's breathing zone or sampling location with the inlet side facing the air source. Start the pump and record the sample ID, start time, and flow rate. Allow the pump to run for the required duration, then cap both ends of the cassette to prevent contamination, and label with sample details.

Photographs of media / sampling: (see below)





References:

MANUFACTURER: Zefon 7P53P

METHOD: NIOSH 0500 / NIOSH 0600

MEDIA VIDEO: Zefon "Air Sampling Media"

SAMPLING VIDEO: SGS Galson "Respirable Dust Sampling NIOSH 0600"

Media:
PVC pre-loaded (Zefon Item # 735PVC)

Description: 37mm 3pc Styrene Cassette with 5.0um PVC (polyvinyl chloride) Filters

Analyses: SUB: Silica (NIOSH 7500m), Cr6+ (NIOSH 7600)

Specifications: (see below)

BAND	Unbanded
MATERIAL	PVC filter, Cellulose pad, Clear Styrene housing
FILTER DIAMETER	37 mm
FILTER PORE SIZE	5.0 micron
GRAVIMETRIC	Not Weighted
TOLERANCE	20 µg
HOUSING STYLE	3-Piece

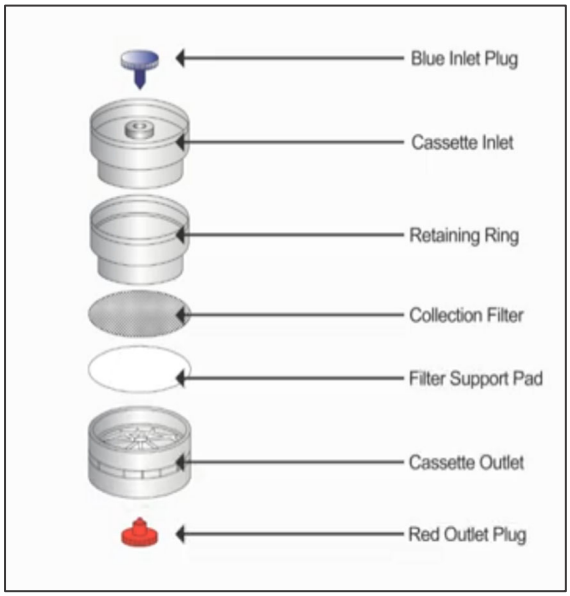
Required Equipment:

- 37mm 3-piece styrene filter cassette preloaded with 5.0µm PVC filter
- Sampling pump (capable of 1-4 L/min)
- Flexible tubing for connection between the cassette and pump
- Calibration device (e.g. rotameter)
- Aluminum Cyclone / Nylon Cyclone sampler (if sampling respirable silica)
- Filter Cassette Holder (if sampling respirable silica or personal)

Sampling procedure:

Inspect the preloaded PVC cassette for any damage or separation between sections. Connect the outlet side of the cassette to a calibrated personal sampling pump using flexible tubing. If sampling for respirable silica, attach a cyclone upstream of the cassette. Secure the sampler in the worker's breathing zone or designated location with the inlet facing the air source. Set the flow rate depending on the method requirements (typically between 1 and 4 L/min), and verify using a calibration device. Start the pump and record the sample ID, start time, and flow rate. Allow the pump to run for the required duration to collect the desired air volume. After sampling, stop the pump, cap both the inlet and outlet to prevent contamination, and label the cassette with sample information.

Photographs of media / sampling:



References:

MANUFACTURER: CASSETTE, 37MM 3PC, 5.0µm PVC, 50/BX | Zefon International

METHOD: NIOSH 7500 / NIOSH 7600

Media:
MCE pre-loaded (Zefon Item # 738MCE)

Description: 37mm 3-Piece Styrene Filter Cassette preloaded with a 0.8µm Mixed Cellulose Ester (MCE) Filter Membrane used to collect airborne particulates

Analyses: Metals in air: Pb, As, Cd, Cr, Zn, Cu, Ni, Mn, Ag, Hg (NIOSH 7082m / 7900m / 7048m / 7024m / 7030m / OSHA 121m / EPA 7470Am), and OCP particulates in air (EPA 8081Bm)

Specifications: (see below)

BAND	Unbanded
MATERIAL	MCE filter, Cellulose pad, Clear Styrene housing
FILTER DIAMETER	37 mm
FILTER PORE SIZE	0.8 micron
GRAVIMETRIC	Not Weighted
HOUSING STYLE	3-Piece

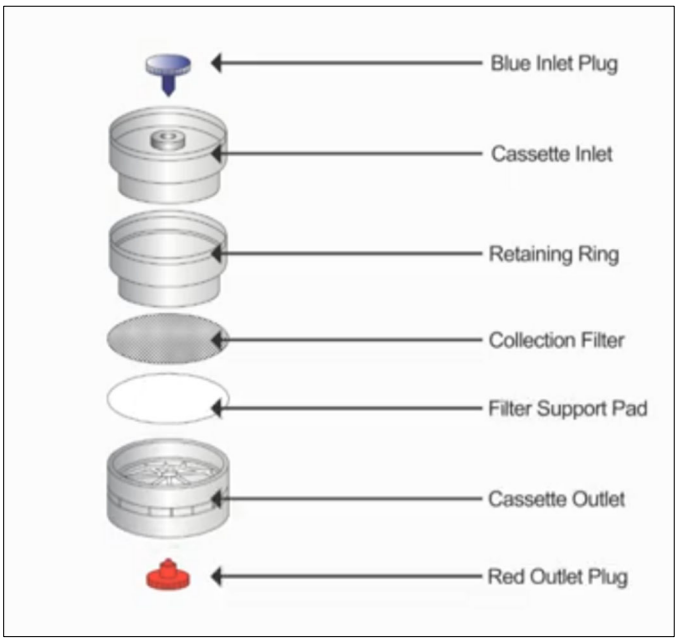
Required Equipment:

- MCE cassette (preloaded)
- Sampling pump (capable of 1-4 L/min)
- Flexible tubing for connection between the cassette and pump
- Calibration device (e.g. rotameter)
- Optional: Sampling stand/clip

Sampling procedure:

Inspect the pre-loaded MCE cassette preloaded for cracks or separation, ensuring all parts are properly sealed. Connect the outlet side to a calibrated personal sampling pump using flexible tubing. Set the flow rate according to the method (typically around 2.0 L/min for metals in air), and secure the cassette in the worker's breathing zone or sampling location with the inlet facing the air source. Start the pump and record the sample ID, start time, and flow rate. After the desired sampling period, stop the pump, cap both the inlet and outlet to prevent contamination, and label the cassette with all relevant sample information.

Photographs of media / sampling: (see below)



References:

MANUFACTURER: Zefon 738MCE

METHOD: NIOSH 7082 / NIOSH 7900 / NIOSH 7048 / NIOSH 7024 / NIOSH 7030 / OSHA 121 / EPA 7470 / EPA 8081b

MEDIA VIDEO: Zefon "Air Sampling Media"

SAMPLING VIDEO: SGS Galson "Metal Sampling NIOSH 7300/OSHA 125G"

Media:
Ghost Wipe (Zefon Item # EE-SC4250)

Description: Individually sealed, 15 x 15 cm, sturdy wipes moistened with DI water that dissolve easily during digestion process, used for surface/dust sampling.

Analyses: Metals: Pb, As, Cd, Cr, Zn, Cu, Ni, Mn, Ag, Hg, Ba (NIOSH 9100 / NIOSH 9102)

Specifications: (see below)

MATERIAL	Disposable towelette moistened with DI water
DIMENSIONS	15cm x 15cm
PACKAGING	Individually packaged
CASING	Hard-walled 50mL centrifuge tubes (after sampling)

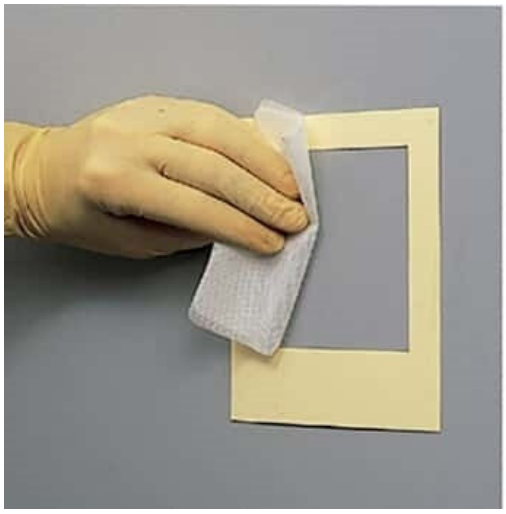
Required Equipment:

- Pre-moistened disposable wipe (e.g. Ghost Wipe)
- 50-mL centrifuge tubes for sample storage
- Powderless plastic gloves (disposable)
- Steel template (e.g. 2 sq ft) or measuring tape
- Masking tape to secure template (if needed)

Sampling procedure:

Wearing clean gloves, place a template over the sampling area (e.g. 2 sq ft) and secure it with masking tape if necessary. Remove a pre-moistened wipe from its package and unfold it completely. Using firm pressure, wipe the surface in an overlapping “S” pattern with horizontal strokes. Fold the exposed side inward and wipe the same area again using vertical “S” strokes, then fold again to expose a clean surface and wipe the area a third time. Fold the wipe with the exposed side inward and place it into a clean, hard-walled 50-mL centrifuge tube or equivalent container. Seal the tube and label with sample information.

Photographs of media / sampling:



References:

MANUFACTURER: Zefon EE-SC4250

METHOD: NIOSH 9100 / NIOSH 9102

SAMPLING VIDEO: EnvExpres "GhostWipes for Lead and Beryllium Dust Sampling"

PICTURE: Enviropore "Ghost Wipe / Tube Kit 20ea"

Media:
MCE for PCM (Zefon Item # Z008BA)

Description: 37mm 3-Piece Styrene Filter Cassette preloaded with a Mixed Cellulose Ester (MCE) Filter Membrane for the collection and analysis of airborne asbestos fibers.

Analyses: Asbestos in air (NIOSH 7400)

Specifications: (see below)

BAND	White Band
MATERIAL	MCE filter, Cellulose pad, Conductive housing
FILTER DIAMETER	25 mm
FILTER PORE SIZE	0.8 micron
GRAVIMETRIC	Not Weighted
HOUSING STYLE	3-Piece

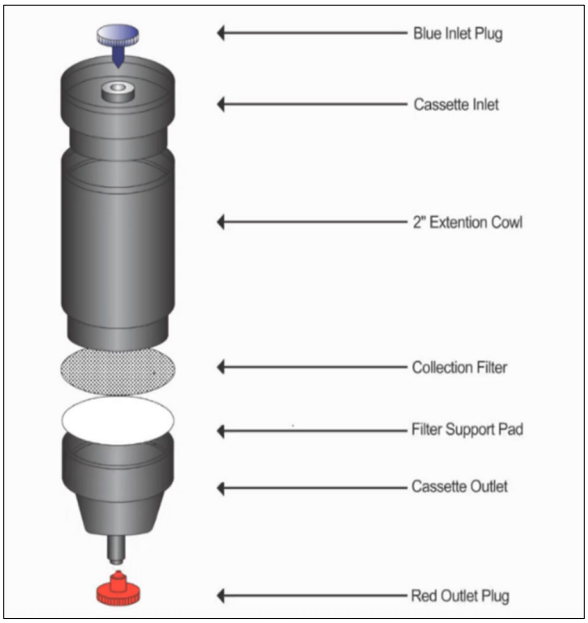
Required Equipment:

- 37mm MCE filter cassette (preloaded)
- Sampling pump (capable of 1-4 L/min)
- Flexible tubing for connection between the cassette and pump
- Calibration device (e.g. rotameter)
- Optional: Sampling stand/clip

Sampling procedure:

Inspect the PCM cassette for any cracks or damage, then connect the outlet side to a personal sampling pump using flexible tubing. Calibrate the pump to the recommended flow rate (typically 1–2 L/min for PCM sampling), with the entire cassette in-line. Secure the cassette in the worker's breathing zone or at the designated sampling location, making sure the inlet section is facing toward the air source. Start the pump, and record the sample ID, start time, and flow rate. After the desired sampling duration, stop the pump, then cap both the inlet and outlet ports of the cassette to prevent contamination and label the cassette with the sample information.

Photographs of media / sampling: (see below)



References:

MANUFACTURER: Zefon Z008BA

METHOD: NIOSH 7400

MEDIA VIDEO: Zefon "Air Sampling Media"

SAMPLING VIDEO: SGS Galson "Asbestos Personal Sampling NIOSH 7400"

Media:
TEM (Zefon Item # Z045BA)

Description: Description: 25mm 3-Piece Cassette with 0.45µm and 5.0µm MCE filters for airborne asbestos fiber collection and TEM analysis.

Analyses: SUB: TEM in air (NIOSH 7402)

Specifications: (see below)

BAND	White Band
MATERIAL	MCE filter, Cellulose pad, Conductive housing
FILTER DIAMETER	25 mm
FILTER PORE SIZE	0.45 micron
GRAVIMETRIC	Not Weighted
HOUSING STYLE	3-Piece

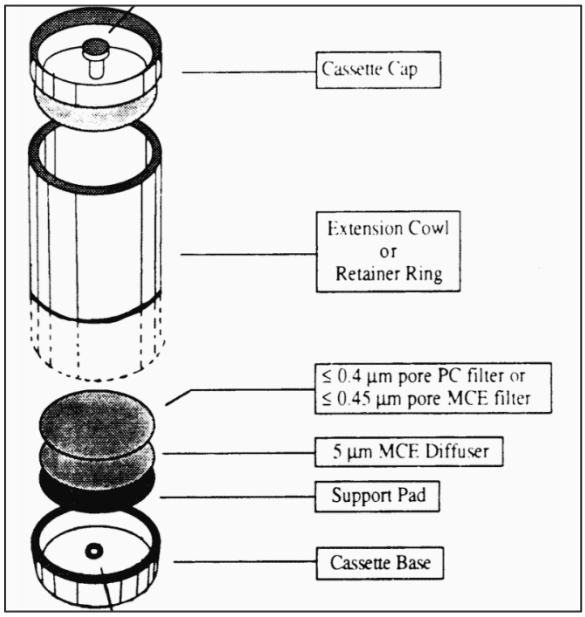
Required Equipment:

- 25mm TEM cassette preloaded with MCE filter
- Sampling pump (capable of 1-10 L/min)
- Flexible tubing for connection between the cassette and pump
- Calibration device (e.g. rotameter)

Sampling procedure:

Confirm TEM cassette isn’t damaged, then connect the outlet side to a calibrated personal sampling pump using flexible tubing. Calibrate the pump to the recommended flow rate depending on the method requirements (typically between 1 and 10 L/min). Position the cassette in the worker's breathing zone or sampling location, making sure the inlet faces the air source. Begin sampling, and document the start time, flow rate, and sample ID. After the required volume of air has been collected, stop the pump, cap both the inlet and outlet of the cassette to prevent contamination, and label the cassette with relevant sample information.

Photographs of media / sampling:



References:

MANUFACTURER: Zefon Z045BA

METHOD: NIOSH 7402

SAMPLING GUIDE: EMSL " Field Sampling Guide (Asbestos by TEM)"

MEDIA VIDEO: Zefon "Air Sampling Media"

Media:
Air-O-Cell (Zefon Item # AOC050)

Description: Sampling cassette for rapid collection and quantitative analysis of a wide range of airborne aerosols.

Analyses: Mold in air (Bright Field Light at 400X - 1000X)

Specifications: (see below)

BAND	Unbanded
MATERIAL	Adhesive-coated gel slide, Clear Styrene housing
GRAVIMETRIC	Not Weighted

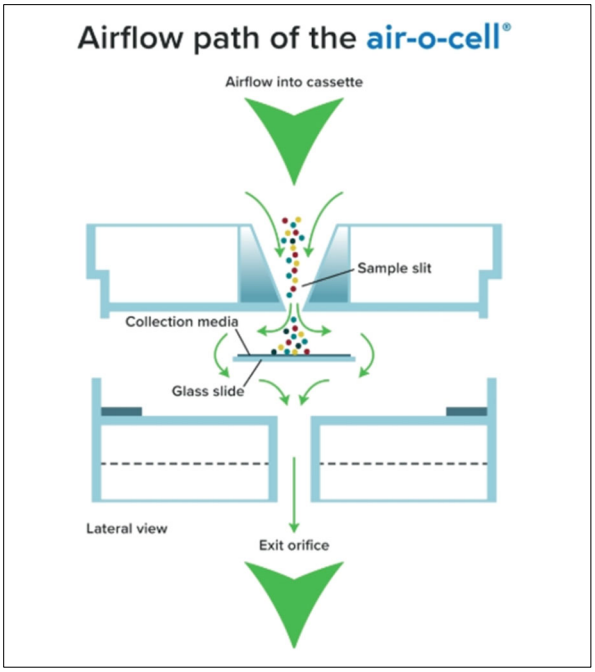
Required Equipment:

- Air-O-Cell cassette
- Sampling pump (capable of 15 L/min)
- Flexible tubing for connection between the cassette and pump
- Calibration device (e.g. air flow indicator)
- Optional: Sampling stand/clip (e.g. tri-pod)

Sampling procedure:

Inspect the Air-O-Cell cassette for any damage, and ensure both the inlet and outlet ports are clean and unobstructed. Attach the cassette either directly to a Bio-Pump mounted on a tripod, or use flexible tubing to connect the cassette's outlet to a calibrated personal sampling pump for area sampling. Ensure the inlet port faces the air source, and set the pump to the required flow rate (typically 15 L/min), and verify calibration before sampling. Start the pump and record the sample ID, start time, and flow rate. Air entering the cassette will pass through a precision slit, depositing airborne particles onto the adhesive-coated glass slide inside. After the designated sampling period (typically 5–10 minutes), stop the pump, cap both ports of the cassette to prevent contamination, and label it with the sample details.

Photographs of media / sampling: (see below)



References:

MANUFACTURER: Zefon AOC050

SAMPLING GUIDE: Zefon "Air-O-Cell Sampling Cassette Operating & Instruction Manual"

SAMPLING VIDEO: Zefon "Air-O-Cell Air Sampling Cassette"

PICTURE: SERVPRO "Mold Removal Remediation Blog"

Media:
Tape-Lift (HAL)

Description: Adhesive strip used on surfaces that have visible mold growth for direct examination. It allows determination of fungal spores. Kits are made in house by HAL staff.

Analyses: Mold surface (Bright Field Light at 400X - 1000X)

Specifications: (see below)

DIMENSIONS	~ 25mm x 75mm
MATERIAL	Transparent adhesive, Clear flexible substrate, Glass slide
HOUSING STYLE	Protective plastic case

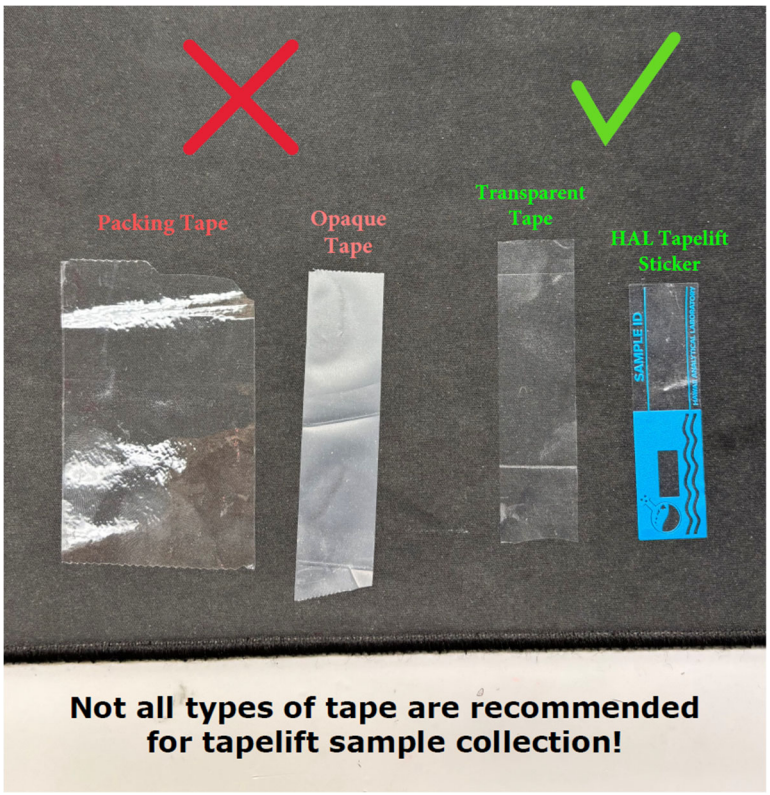
Required Equipment:

- Tape lift (transparent adhesive strip)
- Glass slide for mounting sample
- Permanent marker for labeling sample ID
- Clean gloves to prevent contamination
- Protective case for sample transport

Sampling procedure:

Write the sample ID on the sticker before peeling it from right to left. Avoid touching the exposed adhesive window on the left side, as this is the sample collection area. Press the window gently onto the targeted surface to collect the sample, then peel it off and place it onto the provided glass slide. Return the slide to its protective casing for storage and transport. Avoid folding the tape in on itself, using adhesive with an opaque substrate, or packing tape as media for sample collection.

Photographs of media / sampling:



References:

SAMPLING GUIDE:

- EMSL "Direct Exam Sampling Guide"
- InterNACHI "Tape Sampling for Mold Inspections"

SAMPLING VIDEO: EMSL TV "Tapelift Sampling"

Media:
XAD-2 OVS Sorbent Tube (SKC Item # 226-58)

Description: OVS glass sorbent tube with internal quartz filter and XAD-2 resin (270/140 mg, 20/60 mesh) for airborne pesticide and organophosphorus compound sampling.

Analyses: OCP in air (NIOSH 5510)

Specifications: (see below)

MATERIAL	Glass tube, XAD resin, Quartz filter
USE	OCP in air sampling
COMPATIBILITY	GilAir-3 & GilAir-5 pumps

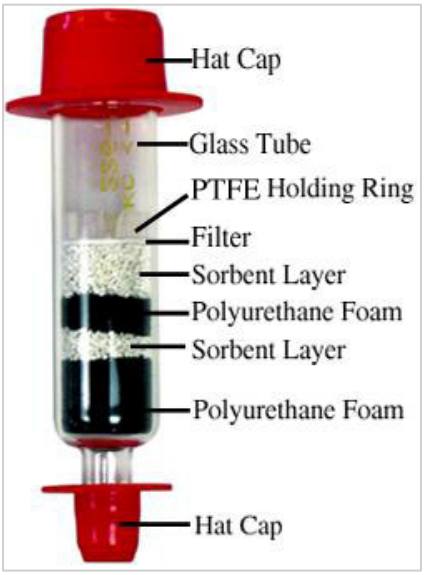
Required Equipment:

- OVS (OVerSorbed) sorbent tube
- Sampling pump (capable of 1.0 L/min)
- Flexible tubing for connecting the sorbent tube to the pump
- Tube holder (Type V) for securing the OVS tube during sampling
- Calibration device (e.g. rotameter) for verifying flow rate
- Protective storage container for the sorbent tube after sampling
- Optional: MCE Cassette for sampling train

Sampling procedure:

Inspect the OVS sorbent tube to ensure it is intact and properly assembled. Break both ends of the tube just before sampling using a tube breaker, then connect it to a calibrated personal sampling pump using flexible tubing with the backup section positioned closest to the pump. Keep the tube upright during sampling to maintain proper flow. set the pump to the required flow rate (typically between 0.5 and 1.0 L/min) and verify it using a calibration device with the full sampling train in place. Position the sampler in the worker's breathing zone or designated sampling location, then start the pump and record the sample ID, flow rate, and start time. After the designated sampling period (between 10 and 200 liters) as specified by the method. After sampling, disconnect the tube, cap both ends securely to prevent contamination, and label with sample information.

Photographs of media / sampling:



References:

MANUFACTURER: SKC 226-58

METHOD: NIOSH 5510

SAMPLING GUIDE:

SAMPLING VIDEO: SKC "Sampling with Single Sorbent Tube"

Media:
Chromsorb 102 Sorbent Tube (SKC Item # 226-107)

Description: 8 x 110 mm glass sorbent tube, 2 sections, 100/50 mg sorbent, 20/40 mesh, fits Type B tube cover

Analyses: OCP vapor in air (EPA 8081Bm), Chlordane (NIOSH 5510)

Specifications: (see below)

MATERIAL	Glass tube, Wool filter, Solvent extraction
USE	OCP vapor in air sampling
COMPATIBILITY	GilAir-3 & GilAir-5 pumps
HOUSING	2 sections

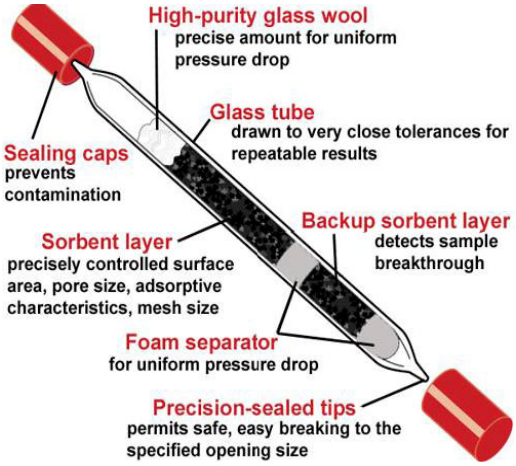
Required Equipment:

- Chromosorb 102 sorbent tube, 8 x 110 mm, 2 sections (100/50 mg, 20/40 mesh)
- Sampling pump (capable of 0.01 to 0.2 L/min)
- Low Flow Module (Optional)
- Flexible tubing for connecting the sorbent tube to the pump
- Tube breaker for opening the ends of the sorbent tube
- Calibration device (e.g. rotameter)
- Tweezers for handling tubes
- Glass vials with PTFE-lined caps for secure sample storage
- Optional: MCE Cassette for sampling train

Sampling procedure:

Before sampling, break both ends of the Chromosorb 102 sorbent tube using a tube breaker, ensuring the larger front section is oriented toward the airflow. Connect the tube to a calibrated personal sampling pump using flexible tubing, and confirm all connections are airtight. Set the flow rate between 0.01 and 0.2 L/min and verify it using a calibration device with the sampling train in-line. Position the sampler in the worker's breathing zone or designated location, then start the pump and record the sample ID, start time, and flow rate. Allow the pump to run for the required duration to collect the target air volume. After sampling, stop the pump, remove the tube, and cap both ends with plastic caps to prevent contamination. Label the tube with sample information and place it in a clean glass vial for transport to the laboratory.

Photographs of media / sampling:



References:

MANUFACTURER: SKC 226-107

METHOD: EPA 8081Bm / NIOSH 5510

SAMPLING GUIDE: Zefon "Operating Instructions"

SAMPLING VIDEO: SKC "Sampling with Single Sorbent Tube"

Media:
PCB Wipe Kit (HAL)

Description: Sterile gauze wipe used for PCB analysis, packaged with a 40 mL VOA vial for sample storage and a separate VOA vial containing hexane for moistening the wipe. Kits are made in house by HAL staff.

Analyses: PCB surface (EPA 8082Am)

Specifications: (see below)

WIPE	Sterile gauze
SOLVENT	Hexane (Ultra-resi grade)
MATERIAL	40mL VOA glass vial, PTFE-lined cap
PACKAGING	Individually packaged

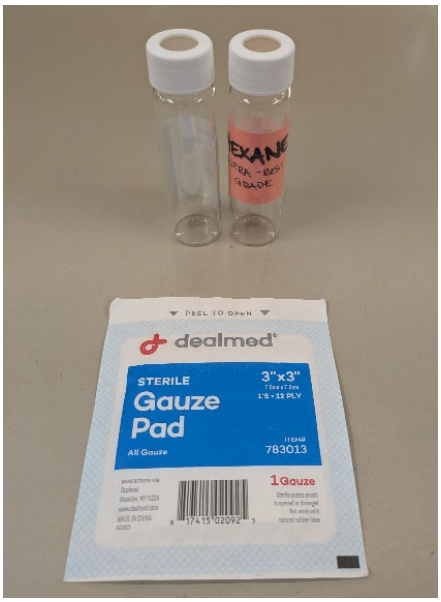
Required Equipment:

- Sterile gauze pad (3” x 3”)
- 40 mL VOA glass vial (for sample storage)
- VOA vial pre-filled with ~40 mL hexane (for wetting the wipe)
- Disposable gloves
- 10 cm x 10 cm template (or ruler to measure area)
- Forceps (optional, for handling gauze)

Sampling procedure:

Wearing a clean pair of disposable gloves, mark out a 10 cm x 10 cm area on the target surface using a template or ruler. Open a sterile gauze pad and wet it with approximately 5 mL of hexane from the labeled solvent vial. Using firm, uniform pressure, wipe the defined area with the moistened gauze in horizontal strokes (left to right), then repeat the wipe in vertical strokes (top to bottom) to cover the area twice. Allow the gauze to air dry briefly if needed, then fold it with the sampled side inward and place it into a clean, unused 40 mL VOA vial. Cap the vial securely, and label it with the sample ID.

Photographs of media / sampling:



References:

METHOD: EPA 8082A

SAMPLING GUIDE:

- Merit Lab "Wiping out PCBs"
- EPA "Wipe Sampling and Double Wash/Rinse Cleanup..."

SAMPLING VIDEO:

- SGS Galson "PCB Wipe Sampling"
- HRP Associates Inc "How To: PCB Wipe Sample"

Media:
Swinnex Filter Holder (SKC Item # 225-32)

Description: Reusable 13 mm polypropylene filter holder for in-line or syringe-based filtration; used with membrane filters for collecting PCB particulates

Analyses: PCB in air (NIOSH 5503m – particulates)

Specifications: (see below)

MATERIAL	Polypropylene filter holder, Silicone seal
FILTER DIAMETER	13 mm (not included)
FILTERATION AREA	0.7 cm^2
MAX PRESSURE	3.5 bar (50 psi)
AUTOCLAVABLE	Yes
CONNECTIONS	Male slip and Female lock Luers

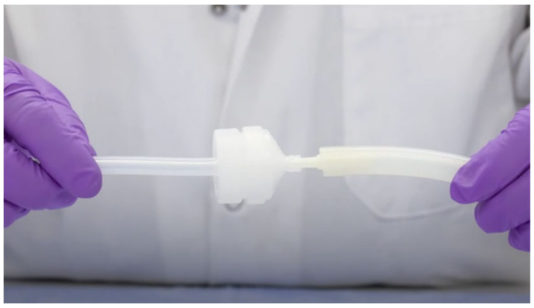
Required Equipment:

- Swinnex Filter Holder, 13 mm (225-32)
- 13 mm glass fiber filter (binder-free, e.g., Type A/E, 1.0 µm nominal pore size)
- Sampling pump (capable of 0.05 to 1.0 L/min)
- Low Flow Module (optional)
- Glass Florisil tube with two sections for PCB collection (front: 100 mg, backup: 50 mg)
- PVC tubing to connect the filter holder to the Florisil tube and sampling pump
- Calibration device (e.g. rotameter)
- Tweezers for filter handling
- 7-mL glass vials with plastic caps for filter storage

Sampling procedure:

Load a 13 mm glass fiber filter into the Swinnex polypropylene filter holder, ensuring it is properly seated and secured with the silicone gasket. Connect the outlet of the holder to a glass Florisil tube using PVC tubing, oriented with the glass wool and front sorbent section facing the filter. Attach the Florisil tube to a calibrated personal sampling pump set between 0.05 and 0.2 L/min (or up to 1.0 L/min for low PCB concentrations). Position the sampler in the worker's breathing zone or designated location with the inlet facing the air source. Start the pump and record the sample ID, flow rate, and start time. After collecting the desired air volume (typically 1 to 50 L), stop the pump, disassemble the setup, and transfer the glass fiber filter to a 7-mL glass vial. Cap the Florisil tube with plastic caps, and label all components with sample details.

Photographs of media / sampling:



References:

MANUFACTURER: SKC 225-32

METHOD: NIOSH 5503

SAMPLING VIDEO: Merck "How to use Swinnex Filter Holders" not a sampling video

Media:
Glass Fiber Filters 13mm (SKC Item # 225-16)

Description: 13mm Glass Fiber Filter, Type A/E, binder-free, with a 1.0µm nominal pore size; designed for gravimetric analysis of air pollutants and dissolved or suspended solids in wastewater.

Analyses: PCB in air (NIOSH 5503m – particulates)

Specifications: (see below)

MATERIAL	Glass Fiber filter
FILTER DIAMETER	13 mm
FILTER PORE SIZE	1.0 µm
GRAVIMETRIC	Not Weighted
AUTOCLAVABLE	Yes
BINDER	No

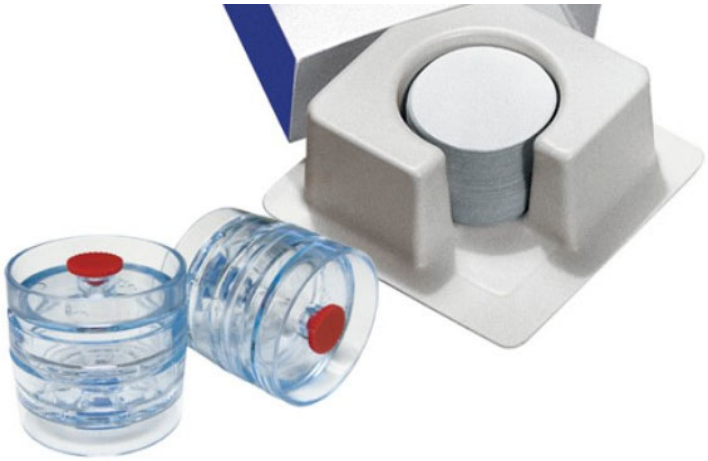
Required Equipment:

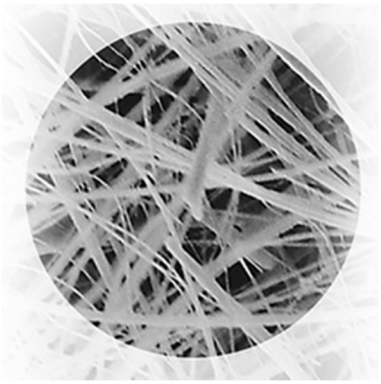
- 13mm Glass Fiber Filters (Item # 225-16)
- Swinnex cassette compatible with 13mm filters
- Tweezers for handling filters
- Florisil glass tube
- PVC tubing to connect the Swinnex cassette and Florisil tube
- Sampling pump (capable of 0.05 to 0.2 L/min)
- Flexible tubing for connection between the cassette and pump
- Calibration device (e.g. rotameter)
- 7-mL glass vials with plastic caps for filter storage

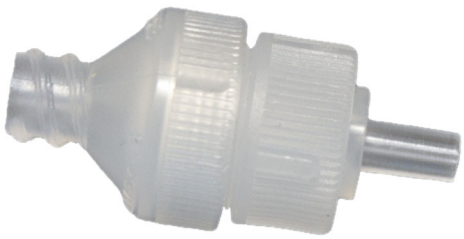
Sampling procedure:

Assemble by loading a 13 mm glass fiber filter into a Swinnex filter holder and connecting it to a Florisil sorbent tube using PVC tubing. Attach the full assembly to a calibrated personal sampling pump using flexible tubing. Set the flow rate between 0.05 and 0.2 L/min (or up to 1.0 L/min for low PCB concentrations), and verify accuracy with a calibration device. Secure the sampler in the worker's breathing zone or designated location with the inlet facing the air source, and record the sample ID, flow rate, and start time. Collect a total air volume between 1 and 50 liters. After sampling, stop the pump, transfer the glass fiber filter to a 7-mL glass vial using clean forceps, seal the Florisil tube with plastic caps (not rubber) to prevent contamination, and label all components with sample information.

Photographs of media / sampling:







References:

MANUFACTURER: SKC 225-16

METHOD: NIOSH 5503

SAMPLING VIDEO: Merck "How to use Swinnex Filter Holders"

Media:
Florisil Sorbent Tube (SKC Item # 226-39)
Florisil Sorbent Tube (SKC Item # 226-39-2)

Description:
- 6 x 70-mm glass sorbent tube, 2 sections, 100/50 mg sorbent, 30/60 mesh, fits Type A tube cover
- 8 x 110-mm glass sorbent tube, 2 sections, 400/200 mg sorbent, 30/60 mesh, fits Type B tube cover

Analyses: PCB in air (EPA 8082Am - vapor)

Specifications: (see below)

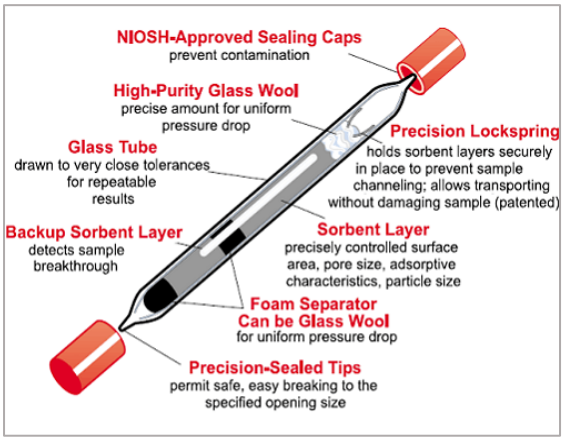
MATERIAL	Glass tube, Glass wool
USE	Solvent extraction
HOUSING	2 sections
SORBENT COATING	No

Required Equipment:
- Sorbent tube, Florisil (Type A or Type B tube cover)
- Sampling pump (capable of 0.05 - 0.2 L/min)
- Flexible tubing to connect the sorbent tube to the pump
- Tube breaker for opening the sorbent tube ends
- Calibration device (e.g. rotameter)
- Tweezers for handling tubes
- Glass vials with PTFE-lined caps for sample storage

Sampling procedure:

Break both ends of the Florisil sorbent tube immediately before sampling, ensuring the larger front section faces the airflow. Connect the tube to a calibrated personal sampling pump using flexible tubing, and verify all connections are secure. Set the flow rate between 0.05 and 0.2 L/min, and position the sampler in the worker's breathing zone or designated sampling area. Draw air through the tube for the required sampling duration to achieve the target volume. After sampling, cap both ends of the tube with plastic caps to prevent contamination, label it with sample information, and place it in a clean glass vial for transport.

Photographs of media / sampling:



References:

MANUFACTURER: SKC 226-39 & SKC 226-39-02

METHOD: EPA 8082A

SAMPLING VIDEO: SKC "Sampling with Single Sorbent Tube"

PICTURE: Uline "Sorbents and Spill Kits"

Media:
GilAir-3 Pump (Zefon item # GIL-800485-171-1205)

Description: A compact, battery-powered personal air sampling pump designed for consistent low-to-medium flow rates (0.75–3 LPM) with automatic flow compensation, ensuring accurate air sample collection onto media.

Uses: Compatible with 37mm filter cassettes, 25mm cassettes (with adapter), or sorbent tubes (respirable dust, metals, solvents, and vapors).

Specifications: (see below)

FLOW RANGE	0.75-3 LPM
CHARGER	120 V
BACKPRESSURE COMPENSATION	Up to 15” H2O at 2.5 LPM
PROGRAMMABLE	No
DATALOGGING	No
ACCESSORIES INCLUDED	Tubing, Air Boss, Cassette Holder, Screwdriver

Required Equipment:

- GilAir-3 pump (with belt clip)
- Fully charged battery or charger (120 V)
- Flexible tubing (to connect pump outlet to cassette or sorbent tube)
- Cassette holder or tube holder
- Filter cassette (37 mm or 25 mm) or sorbent tube, depending on analysis
- Calibration device (e.g., Gilibrator or bubble meter)
- Screwdriver (for flow adjustments)
- Calibration adapter (if included)
- Low Flow Module (Optional)

Sampling procedure:

Before sampling, fully charge the battery pack and verify the flow rate. Connect flexible tubing from the pump outlet to the sampling cassette inlet. Use a calibrator to adjust the flow to the desired rate (typically 0.75–3 LPM) by turning the flow adjustment screw. Once calibrated, clip the pump securely onto the worker's belt or place it in the sampling location, ensuring the tubing and cassette are correctly positioned for representative air sampling. Switch the pump on using the On/Off switch, record the start time and sample details, and allow it to run for the specified sampling period. After sampling, turn the pump off, disconnect the tubing, seal the cassette, and document the final flow rate and sampling time. If needed, retrieve stored run data from the display before sending the sample to the laboratory.

Photographs of media / sampling:

References:

MANUFACTURER: Zefon GIL-800485-171-1205

SAMPLING GUIDE: Zefon "GILAIR-3 & GILAIR-5 Air Sampling Systems Operation Manual"

SAMPLING VIDEO: Sensidyne "Introduction to Using the GilAir Plus..."

Media:
GilAir-5 Pump (Zefon item # GIL-800883-171-1205)

Description: A compact, battery-powered personal air sampling pump designed for consistent low-to-medium flow rates (0.75–5 LPM) with automatic flow compensation, ensuring accurate air sample collection onto media such as sorbent tubes or filter cassettes in personal or area monitoring.

Uses: Compatible with 37mm filter cassettes, 25mm cassettes (with adapter), or sorbent tubes (respirable dust, metals, solvents, and vapors).

Specifications: (see below)

FLOW RANGE	0.75-3 LPM
CHARGER	120 V
BACKPRESSURE COMPENSATION	Up to 15” H2O at 2.5 LPM
PROGRAMMABLE	No
DATALOGGING	No
ACCESSORIES INCLUDED	Tubing, Air Boss, Cassette Holder, Screwdriver

Required Equipment:

- GilAir-5 pump (with belt clip)
- Fully charged battery or charger (120 V)
- Flexible tubing (to connect pump outlet to cassette or sorbent tube)
- Cassette holder or tube holder
- Filter cassette (37 mm or 25 mm) or sorbent tube, depending on analysis
- Calibration device (e.g., Gilibrator or bubble meter)
- Screwdriver (for flow adjustments)
- Calibration adapter (if included)

Sampling procedure:

Before beginning sampling, fully charge the GilAir-5 pump and ensure that it is in proper working condition. Connect the flexible tubing from the pump outlet to the inlet of the sampling media, such as a 37mm cassette or sorbent tube. Use a primary calibrator (e.g. Gilibrator) to verify and adjust the flow rate, typically within the 0.75–5 LPM range. Use the provided screwdriver to make any necessary adjustments. Once calibrated, secure the pump to the worker's belt or place it in the designated area, ensuring that the inlet of the cassette or tube faces the breathing zone or sampling direction. Activate the pump and record all relevant details including sample start time, flow rate, and sample ID. Allow the pump to run undisturbed for the required sampling duration. At the end of sampling, turn off the pump, disconnect the tubing, and seal the inlet and outlet of the sampling media to prevent contamination. Record the end time and check the post-sample flow rate for consistency. Document all sampling data and send the media to the laboratory for analysis.

Photographs of media / sampling:

References:

MANUFACTURER: Zefon GIL-800883-171-1205

SAMPLING GUIDE: Zefon "GILAIR-3 & GILAIR-5 Air Sampling Systems Operation Manual"

SAMPLING VIDEO: Sensidyne "Introduction to Using the GilAir Plus..."

Media:
Bio-Pump (Zefon Item # ZBP-205)

Description: Compact, battery-powered air sampling pump designed for use with Air-O-Cell cassettes, operating at a fixed flow rate of 15 LPM for indoor air quality sampling.

Uses: Compatible with Air-O-Cell cassettes for mold air sampling.

Specifications: (see below)

FLOW RANGE	15 LPM (± 5% accuracy)
DIMENSIONS	4.5” x 2.75” x 8”
POWER	Rechargeable NiMH battery or AC
WEIGHT	1.75 Ibs (0.8 kg)
COMPATIBILITY	Air-O-Cell, Via-Cell

Required Equipment:

- Bio-Pump Plus pump
- Air-O-Cell cassette
- Flow indicator or primary calibrator
- Optional: tripod stand
- Optional: tubing
- Carrying case and battery charger for pump

Sampling procedure:

Ensure the Bio-Pump is fully charged or connected to AC power. Attach an Air-O-Cell cassette firmly to the rubber inlet port, ensuring an airtight seal. Calibrate the pump using the supplied flow indicator or a TSI primary calibrator by entering calibration mode, adjusting the flow to 15 LPM, and saving the setting. Power on the pump and select the desired sampling mode of either Quick Sample (1–10 minutes), Single Sample (1 minute to 9 hours 59 minutes), or Sequential Sample (custom on/off cycles). Use the arrows and ‘SET’ button to enter timing parameters, then press ‘START’ to begin sampling. The pump will automatically run for the programmed time, display “Sample Complete,” and activate the indicator light when finished. After sampling, remove the cassette, seal both ports, label it with sample details, and document the run time and flow rate. Always store the pump in its case, and avoid blocking vents.

Photographs of media / sampling:

FRONT VIEW OF PUMP

1. Rubber Grommet Cassette Attachment
2. LCD Display
3. "Sample Complete" Light
4. START/STOP Button
5. Battery Charging Jack
6. POWER Button
7. UP/DOWN Arrows
8. "Low Battery" Light
9. SET Button
10. QUICK SAMPLE Button
11. "Charging" Indicator Light

References:

MANUFACTURER: Zefon ZBP-205

SAMPLING GUIDE: Zefon "Bio-Pump Plus Operating Instructions"

SAMPLING VIDEO: Zefon "Using the Zefon Bio-Pump Plus"

Media:
Rotary Vane High Volume Pump (Zefon Item # ZHV00)

Description: A heavy-duty, high-volume rotary vane pump designed for sampling a variety of airborne contaminants. Powered by a 1/10 hp motor, this pump supports flow rates up to 30 LPM and includes an internal filter/muffler for quieter operation so no glass muffler jar is required.

Uses: Compatible with PCM, TEM, Air-O-Cell, and viable impactors for high volume sampling.

Specifications: (see below)

TYPE	Rotary Vane
VOLTAGE	120V AC
FLOW RANGE	0-30 LPM
USE	PCM, TEM, Air-O-Cell

Required Equipment:

- Rotary Vane Pump with flow control valves
- Flexible tubing
- Optional: Rotameter (5–30 LPM)
- Cassette sampling stands/tripod
- Optional: carrying case (for transport/storage)

Sampling procedure:

Place the pump on a stable surface near the sampling location. Connect one end of the tubing to the outlet of the pump and the other end to the inlet of the air sampling cassette. Attach the cassette to a stand or holder, making sure it stays upright with the inlet facing the air source. Use a flow meter to calibrate the pump to the desired flow rate for the cassette type. Adjust the flow control valve on the pump as needed, then record the calibration details. Start the pump and note the start time, flow rate, and sample ID. Let the pump run for the required sampling time to collect the proper air volume according to the method. When done, turn off the pump and label samples accordingly.

Photographs of media / sampling:

References:

MANUFACTURER: Zefon ZHV00

SAMPLING GUIDE: Fisher Scientific "Operation Manual - Rotary Vane Pumps"

SAMPLING VIDEO:

Media:
Low Flow (Constant Flow) Module (Sensidyne Item # 800518)

Description: Low flow module has a rate of 1-500cc; Multi flow modules have a rate of 1-750 cc

Uses: Accessory to be used with GilAir 3 & 5 models

Specifications: (see below)

FLOW CONTROL	External Flow Adjust (±5% of set point)
FLOW RANGE	5-500 cc/min to 25”H2O (640 mm Hg)
USE	Multi-Flow Module
COMPATIBLITY	GilAir-3 and GilAir-5

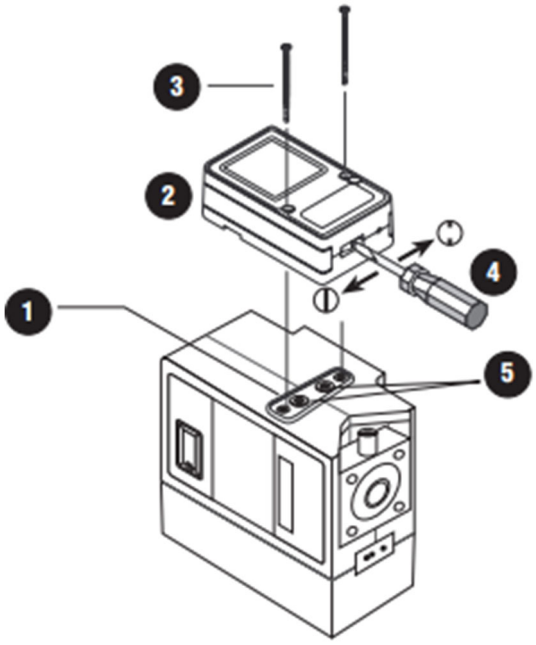
Required Equipment:

- GilAir 3 or 5 Sampling Kits
- Sorbent tube/sampling media
- Calibration device
- Flexible tubing, tube holder, clips
- Screwdriver

Sampling procedure:

Before sampling, connect the low flow module to the pump. Insert the sorbent tube into a holder and attach it to the pump using flexible tubing. Calibrate the flow rate using a primary standard (e.g., bubble meter or dry calibrator). Assemble the full sampling train and adjust the pump to the desired flow rate. Take three readings, average them, and record the pre-sampling flow rate.

Photographs of media / sampling:



References:

MANUFACTURER: Sensidyne #800518

PICTURE: PES "GilAir 5 800883 Permissible Personal Air Sampler Pump"

SAMPLING GUIDE: GilAir-3 & GilAir-5 "Air Sampling Systems Operational Manual"

SAMPLING VIDEO:

Media:
Multi Flow Module (Sensidyne Item # 800519)

Description: This module is designed to enable simultaneous low-flow and high-flow sampling using a single pump.

Uses: Accessory to be used with Gilair 3 & 5 models

Specifications: (see below)

FLOW CONTROL	External Flow Adjust (±5% of set point)
FLOW RANGE	1-7500 cc/min to 18”+ 3” H2O (640±80 mm Hg)
USE	Multi-Flow Module
COMPATIBLITY	GilAir-3 and GilAir-5

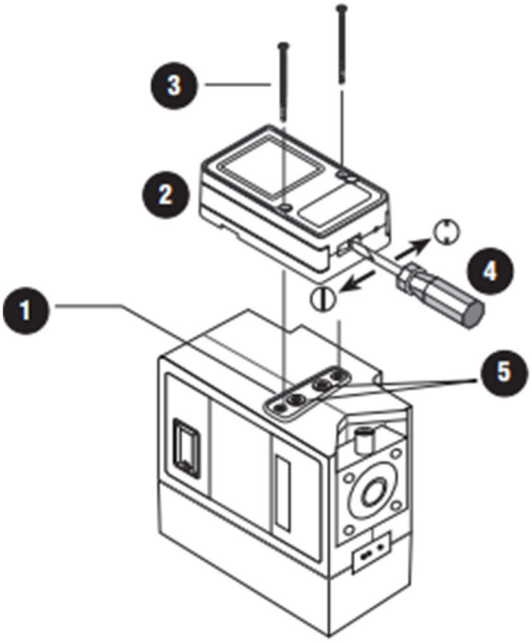
Required Equipment:

- GilAir 3 or 5 Sampling Kits
- Calibration device
- Adapter and Tubing

Sampling procedure:

Before sampling, ensure the module is securely connected. Attach high-flow media (e.g., filters for particulates) directly to the main pump inlet, and connect low-flow media (e.g., sorbent tubes for gases or vapors) to the module using the appropriate tubing. Calibrate each flow path separately using a primary standard depending on the sampling media and method (high-flow side typically between 1–4 L/min and the low-flow side between 0.005 –5 L/min). During sampling, position each media type appropriately (e.g. filter cassette in the breathing zone for particulates, sorbent tube for vapor exposure). Start the pump and verify that both flow paths are stable. After the sampling period, stop the pump, perform post-sampling calibrations for both flow paths, and confirm flow rates remained within ±5% of the pre-sample values.

Photographs of media / sampling:



References:

MANUFACTURER: Sensidyne #800519

PICTURE: GilAir-3 & GilAir-5 "Air Sampling Systems Operational Manual"

SAMPLING GUIDE: GilAir-3 & GilAir-5 "Air Sampling Systems Operational Manual"

SAMPLING VIDEO:

Media:
Aluminum Cyclone (Zefon Item # ZA0060)

Description: Lightweight aluminum cyclone that uses static-conductive to reduce interference for the purpose of separating larger particles from respirable fractions.

Uses: Compatible with 25mm or 37mm 3 piece filter cassettes for Respirable Dust (NIOSH 0600) and Crystaline Silica (NIOSH 7500) collection.

Specifications: (see below)

CUT POINT	4 micron
FLOW RATE	2.5 LPM
MATEIRAL	Aluminum
TYPE	Aluminum

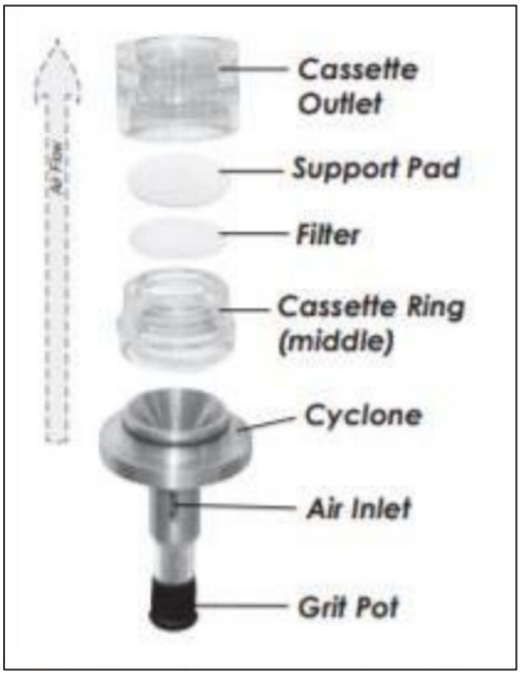
Required Equipment:

- Aluminum Cyclone
- 37mm or 25mm filter cassette with pre-weighted PVC filter
- Sampling pump (capable of 2.5 L/min flow)
- Filter cassette holder with clip (e.g., Zefon ZA0061)
- Flexible tubing to connect cassette to pump
- Cyclone calibration adapter or calibration jar
- Airflow calibrator (e.g., bubble meter)

Sampling procedure:

Inspect the PVC filter cassette for damage or separation between section. Remove the inlet side of the cassette and firmly press into the top of the cyclone until it fits snugly with no visible gap. Connect the cyclone/cassette assembly to a calibrated personal sampling pump using flexible tubing, ensuring all connections are airtight. Mount the setup into a cassette holder and clip it to the worker's collar or shoulder, with the cyclone stem facing downward. Calibrate the pump (typically around 2.5 L/min) using a calibration jar or adapter with the full sampling train in place, and record the pre-sample flow rate. Replace the calibration setup with the sample cassette, then start the pump and record the sample ID, start time, and flow rate. Keep the cyclone upright during sampling to ensure proper particle separation. After sampling, stop the pump, remove the cyclone, and cap the grit pot. Seal both ends of the cassette, label it with sample details, and verify the post-sample flow rate is within ±5% of the initial calibration.

Photographs of media / sampling:



References:

MANUFACTURER: Zefon ZA0060

METHOD: NIOSH 0600

SAMPLING GUIDE: USAPHC "Air Sampling for Silica with Aluminum Cyclone..."

SAMPLING VIDEO: SGS Galson "Pump Calibration with an Aluminum Cyclone"

PICTURE: SKC "Sample Setup Guide"

Media:
Nylon Cyclone (Zefon Item # ZA0080)

Description: Lightweight conductive nylon cyclone used to separate dust particles by size during air sampling with the respirable particles being collected on the filter and larger particles being removed.

Uses: Compatible with 37mm filter cassettes for NIOSH Methods 0600, 7500, 7501, 7601, and 7602.

Specifications: (see below)

CUT POINT	4 micron
FLOW RATE	1.7 LPM
MATEIRAL	Conductive Nylon
TYPE	Dorr-Oliver

Required Equipment:

- Nylon Cyclone (Zefon ZA0080)
- 37mm filter cassette with pre-weighed PVC filter
- Sampling pump (capable of 1.7 L/min flow)
- Filter cassette holder with clip (e.g., Zefon ZA0061)
- Flexible tubing to connect cassette to pump
- Cyclone calibration adapter or calibration jar
- Airflow calibrator (e.g., bubble meter)

Sampling procedure:

Firmly press the inlet side of the cassette into the top opening of the nylon cyclone until it fits securely, with no visible gap. Connect the outlet of the cyclone to a calibrated personal sampling pump using flexible tubing, ensuring all connections are airtight. Clip the cyclone and cassette assembly into a cassette holder and position it on the worker's collar or upper chest area, with the cyclone stem facing downward in a vertical orientation. Set the flow rate to 1.7 L/min (as specified for respirable dust collection), and verify the flow using a calibration device with the full train in place. Start the pump and record the sample ID, flow rate, and start time. After the desired sampling period, stop the pump, remove the cyclone, and cap both ends of the filter cassette. Label the cassette with sample details and confirm that the post-sample flow rate is within ±5% of the initial calibration before submitting for analysis.

Photographs of media / sampling:

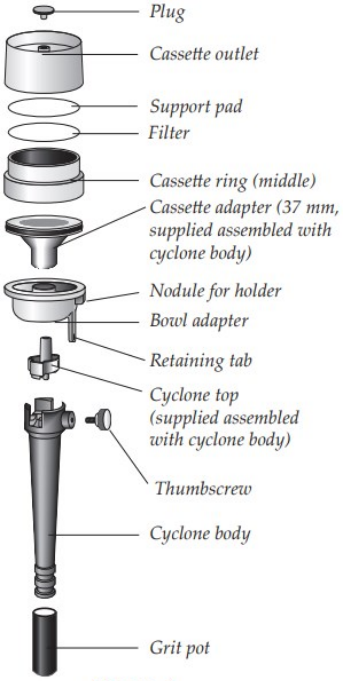


Figure 1.

References:

MANUFACTURER: Zefon ZA0080

SAMPLING GUIDE: SKC "Sample Setup Guide"

SAMPLING VIDEO: SGS Galson "Pump Calibration and Sampling with 10mm Nylon Cyclone"

PICTURE:

- ERE ZE-ZAoo8o
- SKC "GS-1...Plastic Cyclone Instruction Manual"

Media:
Cyclone Calibration Jar (Zefon Item # ZA0085)

Description: A 2-liter plastic calibration chamber designed for accurate airflow calibration of personal sampling pumps when used with a Nylon Cyclone and 37mm cassette. Includes inlet and outlet fittings and tubing to connect a flow calibrator and sampling pump to the cyclone assembly in a sealed environment.

Uses: Pre- and post-sample flow calibration for respirable dust (NIOSH 0600) or silica (NIOSH 7500) air monitoring.

Specifications: (see below)

MATERIAL	Plastic
COMPONENTS	2-liter jar
CONNECTIONS	Dual barbed fittings
USE	Cyclone calibration
COMPATIBLITY	Nylon cyclone

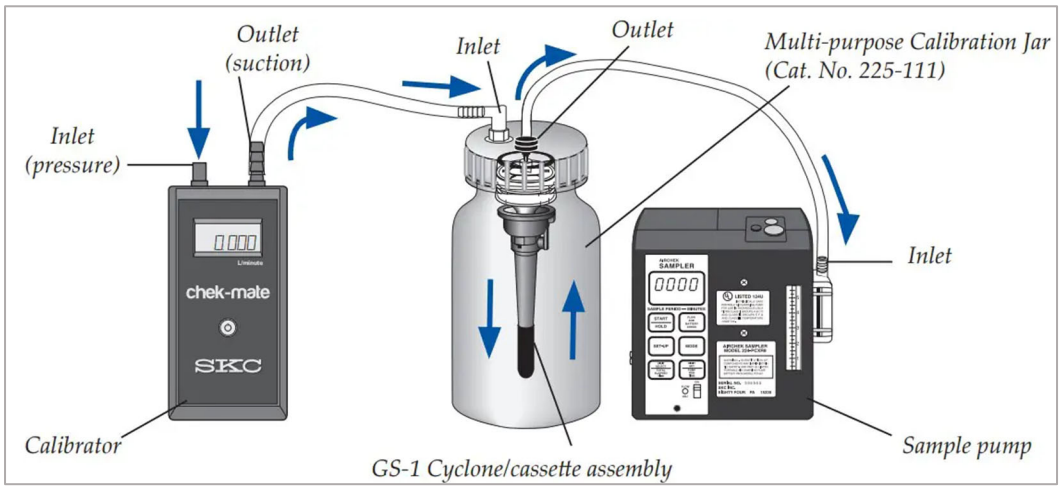
Required Equipment:

- Calibration Jar
- Nylon Cyclone
- 37mm filter cassette (e.g. PVC pre-weighted)
- Sampling pump (capable of 1.7 L/min)
- Flow calibrator (e.g., bubble meter)
- Flexible tubing
- Optional: Calibration adapter (Luer fitting inside lid)

Sampling procedure:

Insert the assembled nylon cyclone and 37mm filter cassette into the calibration jar with the cyclone stem pointing downward. Close the jar and connect the inlet port to a flow calibrator and the outlet port to the inlet of a personal sampling pump using flexible tubing. Ensure all connections are airtight. Turn on the pump and allow air to pass through the cyclone assembly while reading the flow rate on the calibrator. Adjust the pump to the target rate (typically 1.7 L/min for respirable dust sampling per NIOSH 0600). Once the flow rate stabilizes, record the pre-sample calibration data. After sampling, repeat the calibration using the same setup to confirm the post-sample flow remains within ±5% of the original rate. Remove the cyclone assembly from the jar and proceed with sample handling.

Photographs of media / sampling:



References:

MANUFACTURER: Zefon ZA0085

SAMPLING GUIDE:

- SKC "GS-1...Plastic Cyclone Instruction Manual"
- CDC "...Considerations for Sampling Airborne Contaminants"

SAMPLING VIDEO: SGS Galson "Pump Calibration and Sampling with 10mm Nylon Cyclone"

Media:
Calibration Chamber for Aluminum Cyclone 37mm (SKC Item # 225-01-03)

Description: Calibration adapter to be used with either silica or dust air sampling

Uses: Monitors flow through a filter/cyclone when testing

Specifications: (see below)

SIZE	¼ in ID
FLOW RANGE	~ 2.5 L/min
USE	Cyclone calibration with air sampling pump
COMPATIBLITY	37mm aluminum cyclone

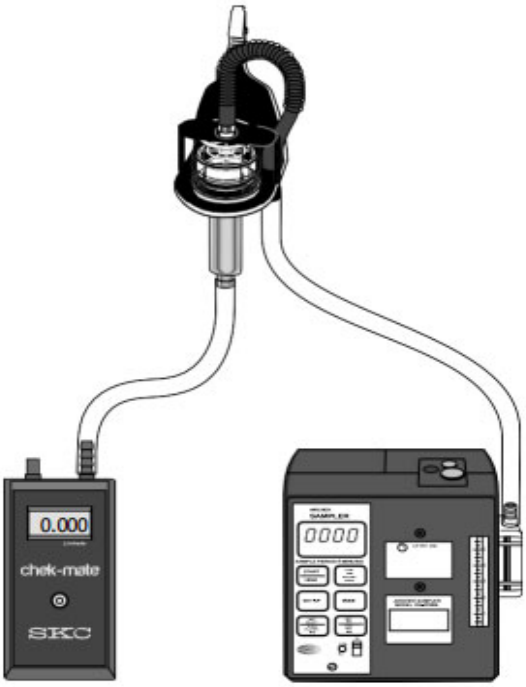
Required Equipment:

- Air sampling pump
- 37mm open-faced cassette
- Aluminum cyclone
- Flow meter or other calibration equipment
- ¼ inch ID tubing

Sampling procedure:

Assemble the filter/cyclone assembly and connect to the sample pump. Moisten the O-ring inside the large end of the adapter and push onto the enlarged section of the cyclone extension. Connect the small end to a flowmeter or other calibration instrument. Use 1/4-inch ID tubing to make the connection and maintain as short as possible. Turn on pump and read flow from the calibrator.

Photographs of media / sampling:



References:

MANUFACTURER: SKC 225-01-03

SAMPLING GUIDE: SKC "Cyclone Calibration Adapter Operating Instructions"

SAMPLING VIDEO: SGS Galson "Pump Calibration with an Aluminum Cyclone"

Media:
OVS Calibration/Adapter Kit (SKC Item # 224-31)

Description: 2 sections of tubing and calibration adapter.

Uses: Facilitates calibration of a sample pump when using an OVS Sorbent Tube

Specifications: (see below)

MATERIAL	Flexible vinyl tubing with adapter fittings
COMPONENTS	2 tubing sections, 1 calibration adapter
USE	Pump calibration for OVS tubes
COMPATIBLITY	OVS sorbent tubes

Required Equipment:

- Sampling pump
- OVS Sorbent tubes
- OVS Tube Holder (for sampling)
- Calibrator
- Optional: Additional tubing/adapters

Sampling procedure:

Attach the OVS Calibration Adapter Kit, which includes specially sized tubing and a connector designed to fit the glass tube. Connect the adapter to a primary flow calibrator (such as a DryCal or bubble meter) and run the pump at the target flow rate (typically 1.0 L/min). Once calibrated, position the OVS tube in the worker's breathing zone (for personal sampling) or at the designated location (for area sampling). Start the pump, record the start time, and sample for the required duration based on the specific method or exposure criteria. Once sampling is completed, cap both ends of the OVS tube.

Photographs of media / sampling:

References:

MANUFACTURER: SKC 224-31

SAMPLING GUIDE: Air-Met "OSHA Versatile Sampler..."

SAMPLING VIDEO: SGS Galson "Sorbent Tube Sampling Sequence"

Media:
OVS Tube Holder (SKC Item # 224-29V)

Description: Protective holder for OVS sorbent tubes during sampling.

Uses: Holds the OVS sorbent tube in a fixed orientation during sampling to protect the glass media and maintain proper airflow alignment. Features a collar clip for easy attachment in the breathing zone.

Specifications: (see below)

MATERIAL	Hard plastic case, metal
COMPONENTS	Tube frame, spring, collar clip
USE	OVS sorbent tube sampling
COMPATIBLITY	OVS sorbent tubes

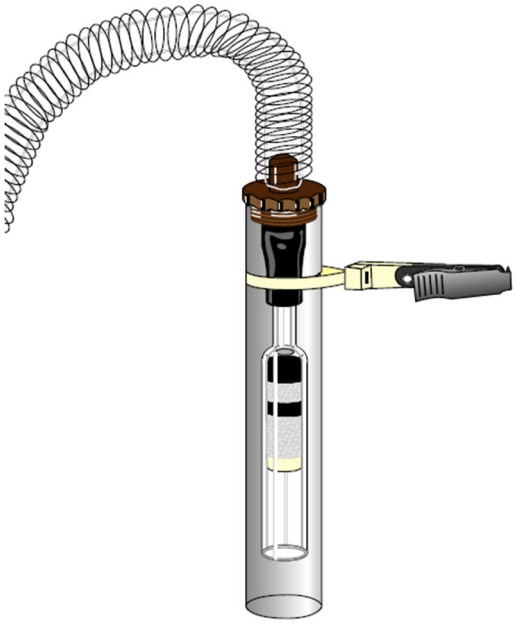
Required Equipment:

- Sampling pump
- OVS Sorbent tubes
- OVS Tube Holder (SKC 224-29V)
- Calibrator
- Optional: OVS Calibration Adapter (for calibration)
- Optional: Additional tubing/adapters

Sampling procedure:

Insert the OVS tube gently into the holder so that the inlet end of the tube is positioned away from the pump intake. Confirm that the tube is centered and fully seated in the frame so the retaining spring does not crack or stress the glass. Clip or attach the holder to the worker's lapel or collar within the breathing zone. Ensure the tubing route is not kinked. If calibration is required prior to sampling, attach the OVS Calibration Adapter Kit (SKC 224-31) between the pump and the tube and calibrate the pump flow rate to the target method flow. After calibration, remove the calibration adapter (if used) and reconnect the tube holder for the sampling run. Start the pump, record start time, collect sample for required duration, then cap the tube ends upon completion.

Photographs of media / sampling:



References:

MANUFACTURER: SKC 224-29V

SAMPLING GUIDE: SKC "Operating Instructions - OVS Tube Holder.."

SAMPLING VIDEO: SGS Galson "Sorbent Tube Sampling Sequence"

Media:
Rotameter, 0-4 LMP, Non-Adjustable Flow (Zefon Item # 116116)
Rotameter, 2-20 LMP (Omega Item #FL-2041)

Description:
A simple, low-cost way to measure airflow; precise and durable flow measurement tool designed for accurate airflow readings from 1-20 LPM with ±3% accuracy. Front scales are large and easy to read. Includes hose barb, Tygon tubing, and Luer adapter.

Uses: Measures the flow rate of gas in a closed tube. Rotameters are secondary calibration standards used to obtain accurate, reliable measurements of pump airflow rates if calibrated to a primary calibration standard on a regular basis.

Specifications: (see below)

SIZE	4 in scale
FLOW RANGE	0.2-4 LPM / 1-20 LPM
ACCURACY	+3%
USE	Secondary calibration to measure pump airflow
CONNECTIONS	Hose barb, Tygon tubing, Luer adapter

Required Equipment:

- Sampling Pump
- Tubing for connection of media to pump
- Filter media appropriate to target analyte

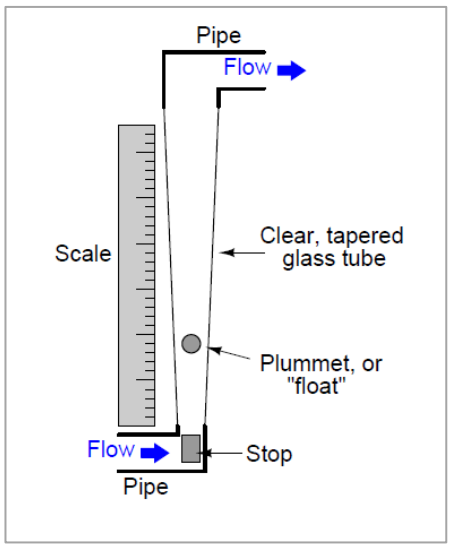
Sampling procedure:

The correct way to setup and use this field rotameter for measuring vacuum during air sampling is to place the sample media in the middle of the “sample train” and connecting the field rotameter as close as possible to the inlet of the sample media. Turn on the vacuum pump. View the rotameter straight-on at eye level. The flow rate is read according to the location of the center of the float ball and the adjacent flow graduation mark. Adjust the vacuum flow rate on the pump up or down as desired.

Photographs of media / sampling:

1-4 LPM Rotameter

2-20 LPM Rotameter



References:

MANUFACTURER:

- Zefon 116116
- DwyerOmega FL-2041

SAMPLING GUIDE: Zefon "Operating Instructions"

SAMPLING VIDEO: Platinum Occupational "Using the Rotameter"

PICTURE: Budak Engineering "Rotameter Construction..."

Media:
Filter Cassette Holder (Zefon Item # ZA0061)

Description: Universal filter cassette and cyclone holder designed to securely attach air sampling devices to a worker's collar or shoulder area for personal air monitoring.

Uses: Compatible with 37mm cassettes, 25mm cassettes, and aluminum/nylon cyclones for air monitoring.

Specifications: (see below)

MATERIAL	Plastic, Metal
COMPONENTS	Metal clip, slot for tubing, plastic frame
USE	Personal air monitoring
COMPATABILITY	25mm / 37mm filter cassettes, aluminum/nylon cyclones

Required Equipment:

- Filter cassette holder (Zefon ZA0061)
- 25mm or 37mm filter cassette or aluminum/nylon cyclone
- Sampling pump
- Flexible tubing for pump connection
- Filter media appropriate for target analyte

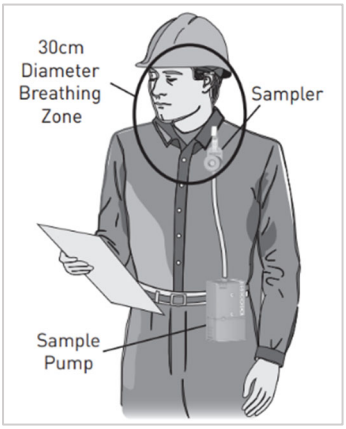
Sampling procedure:

Insert the filter cassette or cyclone into the circular mounting ring of the cassette holder, using the friction-fit or snap-in mechanism to secure it in place. Ensure the cassette is firmly seated with the inlet facing outward. Clip the holder onto the worker's collar or upper torso to position the sampler in the breathing zone. Connect the outlet of the cassette to a calibrated personal sampling pump using flexible tubing, and verify that all connections are airtight. Start the pump and record the sample ID, start time, and flow rate. After the sampling duration is complete, stop the pump, remove the cassette from the holder, and cap both the inlet and outlet to prevent contamination.

Photographs of media / sampling:





References:

MANUFACTURER: Zefon ZA0061

SAMPLING GUIDE: SKC "Step by Step Guide"

SAMPLING VIDEO: Zefon "Personal Air Sampling"

PICTURE: LCS Lab "Respirable Dust Sampling Manual"

Media:
All in One, Low Flow Adapter Tuber Holder (SKC Item #224-27)

Description: Combined Constant Pressure Controller (CPC) and single adjustable low flow holder into one holder. Built-in CPC maintains a constant pressure for flow stability.

Uses: Flow stability

Specifications: (see below)

SIZE	3/8 in outer diameter
MATERIAL	Rubber sleeve tube, plastic fitting
COMPONENTS	Tube holder, threaded fitting, flow adjust screw, built-in CPC
USE	Single sorbent tube sampling
COMPATIBLITY	GilAir-3 and GilAir-5

Required Equipment:

- Sampling pump
- Flathead screwdriver

Sampling procedure:

Set the pump to the required flow rate (typically 1.5–2.0 L/min) using a rotameter, digital flow meter, or burette with a stopwatch. Attach tubing to the pump inlet and connect it to the CPC and low-flow adaptor. Break the tips off a calibration sorbent tube (arrow pointing toward the pump) and insert it into the rubber sleeve on the holder. Ensure the CPC is oriented correctly, with inlet holes on the pump side. Adjust the flow screw on the adaptor using a screwdriver until the target low flow is reached. Avoid fully tightening the screw, which may block flow or damage the valve. Ensure a tight fit in the rubber sleeve to prevent leaks (two sizes provided).

Photographs of media / sampling:

References:

MANUFACTURER: SKC 224-27

SAMPLING GUIDE: All-in-One Low Flow Adapter Single Tube Holder 224-27 OI

SAMPLING VIDEO: SKC "Low Flow Calibration and Sampling with Single Sorbent Tube"

Media:
Low Flow Constant Pressure Controller (SKC Item # 224-26-CPC)

Description: Compact accessory designed for use with SKC low-flow sampling pumps to maintain constant back pressure across sample tubes. Used with an Adjustable Low Flow Holder to enable accurate multi-tube or single-tube sampling in the low-flow range.

Uses: Maintains consistent 20 inches of water back pressure for accurate low-flow sampling with sorbent tubes.

Specifications: (see below)

MATERIAL	Metal / Plastic
COMPONENTS	Short flexible tubing
USE	Low-flow sorbent tube sampling
COMPATIBLITY	Low-flow pumps

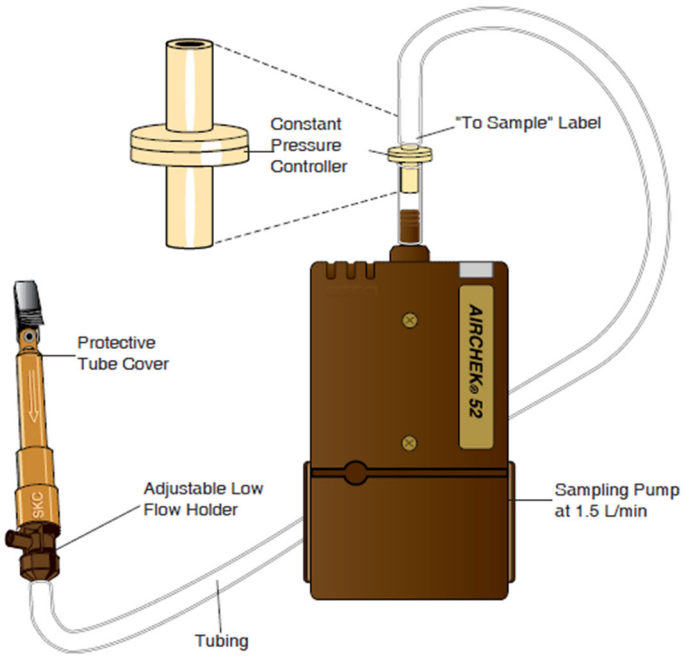
Required Equipment:

- Low Flow Constant Pressure Controller
- Adjustable Low Flow Holder
- Sampling pump (capable of 1.5 L/min)
- Sorbent tubes for target contaminant
- Flexible tubing
- Calibration equipment (e.g., bubble meter)

Sampling procedure:

Before sampling, set the personal sampling pump to a flow rate according to the pump's operating instructions (typically 1.5 L/min). Use a short length of flexible tubing to connect the pump inlet to the CPC outlet (unlabeled side). Connect the inlet side of the CPC (labeled "To Sample") to the Adjustable Low Flow Holder, which holds the sorbent tube(s). Adjust the flow rate through each tube according to the method-specific requirements using the needle valve(s) on the low flow holder. Periodically inspect the small inlet ports at the base of the CPC for dust or debris; if blocked, gently clean using a small pick and compressed air. After sampling, record flow rates, disassemble the setup, and cap the sample tubes for transport to the lab.

Photographs of media / sampling:



References:

MANUFACTURER: SKC 224-26-CPC

SAMPLING GUIDE: SKC "224-26-CPC...Operating Instructions"

SAMPLING VIDEO: SKC "Low Flow Calibration and Sampling..."

Media:
Inner Wall Tubing Adapter (Zefon Item # AOC-WS10)

Description: Tubing attachment designed to connect directly to the inlet of an Air-O-Cell cassette, allowing air sampling from inside wall cavities for the detection of airborne mold and microbial particles.

Uses: Compatible with Air-O-Cell cassettes for inner wall microbial contamination assessments.

Specifications: (see below)

SIZE	3/8 in outer diameter
MATERIAL	Plastic
COMPONENTS	Plastic Adapter, Flexible tubing
USE	Inner-wall mold air sampling
COMPATIBLITY	Bio-Pump, Air-O-Cell cassettes

Required Equipment:

- Inner Wall Tubing Adapter
- Air-O-Cell cassette
- Sampling pump
- Drill with 3/8" bit (or equivalent tool)
- Tape seals or plugs for cassette transport

Sampling procedure:

Calibrate the air sampling pump to the required flow rate for use with an Air-O-Cell cassette (typically 15 L/min). Select a suspect location (e.g. 3 to 6 inches above the floor) and drill a 3/8" hole into the wall using a hand drill, proceeding slowly to minimize the release of dust. Insert the tubing end of the inner wall adapter into the hole with the cap in place to prevent debris from entering the tube. Once inserted, use a plunger rod to push off the cap and expose the tubing inside the wall cavity. Remove the inlet and outlet plugs from the Air-O-Cell cassette and connect the adapter to the cassette inlet. Attach the outlet of the cassette to a calibrated personal sampling pump using flexible tubing. Position the assembly upright and start the pump, recording the sample ID, flow rate, and start time. After sampling, stop the pump, reseal the cassette with the original plugs, and check visibility through the slide by holding it up to a light source. If the slide appears overloaded, discard the sample and repeat with a shorter collection time. Label the cassette with sample details.

Photographs of media / sampling:

References:

MANUFACTURER: Zefon AOC-W10

SAMPLING GUIDE: Zefon "Inner Wall Sampling Attachment Instructions"

SAMPLING VIDEO: Mold Inspection Sciences "Wall Cavity Air Mold Testing..."

Media:
Defender 510 (MesaLabs Item # Defender 510-M)

Description: measures volumetric gas flow with an accuracy of +/- 1% of reading using DryCal Technology for real-time flow data.

Uses: Calibration of volumetric gas flow pumps for more accurate flow rates. This device has a suction mode ranging from 0.05 - 5 mL/min.

Specifications: (see below)

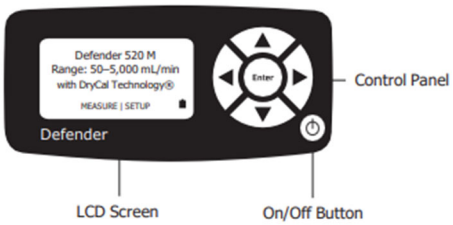
SIZE	5.5 x 6 x 3 in / 140 x 150 x 75 mm
WEIGHT	29 oz / 820 g
FLOW RANGE	0.05 L/min – 5 L/min
ACCURACY	+/- 1 %
VOLUMETRIC FLOW UNITS	Cc/min, mL/min, L/min, cf/min
USE	Integrated flow measuring cell, valve and timing mechanism
CONNECTIONS	1/4 in / 6.35 mm tubing

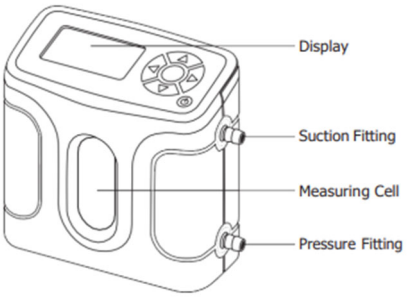
Required Equipment:

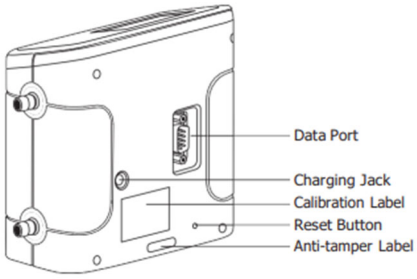
- AC Power Adapter/Charger
- PC Serial Cable
- Leak Test Caps (for leak tests)
- Manual
- ¼ inch Diameter tubing
- Sampling Pump
- Screwdriver
- Media cassette

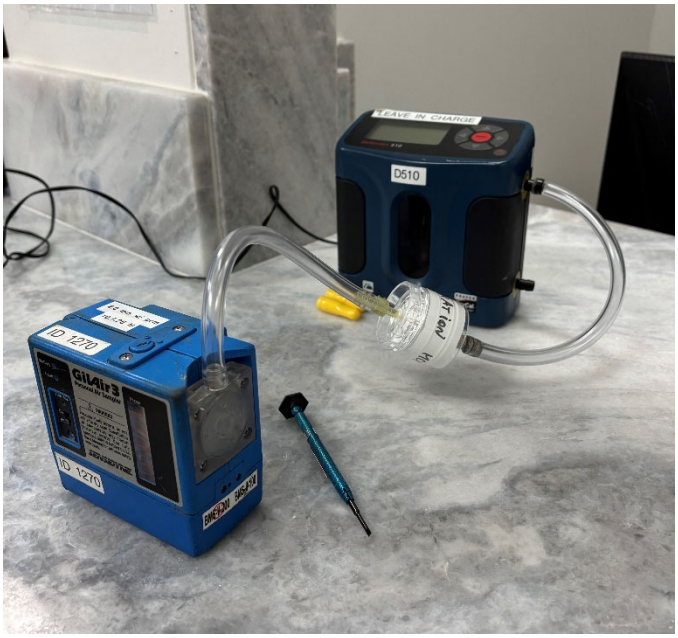
Sampling procedure: Remove both leak test caps and plug in Defender using provided charging cable**.** Connect tubing from the top outlet of the Defender to the inlet of the media, then to the sampling pump. Ensure the outlet of the cassette is facing the sampling pump. Do not cap the unused port. Turn the device on and choose measurement type. For calibration the GilAir pumps, use the Continuous Measurement option. Once this is started, turn the pump on and use a small screwdriver to adjust the pumps volume. Pause the calibration device when the average flow rate needed is achieved. If needed, click “reset” to start the average calculated rate over. When storing, turn the power off and replace the leak caps on both outlets. Leave on charger if possible.

Photographs of media / sampling:









References:

MANUFACTURER: MesaLabs Defender 510-M

SAMPLING GUIDE: Defender 500 Series User Manual

VIDEO GUIDE: MesaLabs DryCal Defender Series Overview

SAMPLING VIDEO: MesaLabs Defender Gas FLow Calibrator

Media:
Dual Port High/Low Flow Manifold (Sensidyne Item # 911-0902-01-R)

Description: Active sampling media system using particulate filter cassettes and/or sorbent tubes to capture particulates, gases; flow rates from 1cc/min to 4000 cc/min.

Uses: For use in applications for sampling of heavy metals or asbestos fibers using two filter cassettes at the same flow rate or simultaneous sampling using a filter cassette and sorbent tube.

Specifications: (see below)

SIZE	58 x 42 x 23 mm / 58 x 63 x 16 mm
WEIGHT	53 g
FLOW RANGE	1 to 4000 cc/min (each port)
USE	Dual filter / filter + sorbent sampling
CONNECTIONS	NIOSH 7400, 7300, 7982, 1501

Required Equipment:

- GilAir Plus pump
- Sorbent tube adapter nipple
- 1/4 inch ID flexible vinyl tubing, 3 feet
- Luer fittings
- Charcoal tube sorbent tube holder
- Filter cassettes or sorbent tubes
- Gilibrator-2 or equivalent air flow calibrator

Sampling procedure: Set the GilAir Plus pump to operate in the constant-pressure high-flow (CPH) mode. Attach the Manifold using the ¼ inch tubing provided. The manifold should be mounted at the worker's lapel so as to represent the breathing zone. Note that the manifold is available in two configurations, allowing the choice of running the tubing over the shoulder (top access) or under the shoulder (bottom access). Using an air flow calibrator with very low pressure drop, measure the flow rate at the sample inlet, and adjust the flow rates individually using the splitter's needle valves. Two simultaneous filter samples may be run at up to 2 LPM each.

Photographs of media / sampling:

References:

MANUFACTURER: Sensidyne 911-0902-01-R

SAMPLING GUIDE: Gilian "Dual Port High/Low Manifold"

SAMPLING VIDEO: Sensidyne "How to Calibrate a High-Flow Splitter Manifold..."

Media:
Drager Accuro Handpump (Drager Item # 6400000)

Description: A bellows-type pump that performs a fast, single-handed operation to areas that are difficult to reach otherwise; draws a calibrated 100 milliliter sample through the short-term Draeger-Tubes.

Uses: For quick, clear gas readings

Specifications: (see below)

SIZE	170 x 45 x 85 mm
STROKE VOLUME	100 + 5 cm^3
WEIGHT	250 g

Required Equipment:

- Drager tube
- Opener for Drager tubes

Sampling procedure: Check number of strokes required from the Instructions for Use of the Dräger tube. Hold pump so that the End-of-stroke indicator and the stroke counter are facing the user (F). Squeeze pump until stop. Release pump until bellows are fully expanded. When the end-of-stroke indicator (F1) appears, squeeze pump completely again. Repeat until the number on the stroke counter (F2) corresponds to that given in the Instructions for Use. Evaluation of the result in accordance with the Instructions for Use of the tube in question. Remove used Dräger tube from socket. Flush pump with a few pump strokes in clean air.

Photographs of media / sampling:

References:

MANUFACTURER: Drager 6400000

SAMPLING GUIDE: Drager "Instructions"

SAMPLING VIDEO: USADraeger "Drager accuro - Pump and Tube Use"

Media:
Low Flow Adapter, Universal Adjustable (Zefon Item # APB-109030)

Description: Sampling addition that allows accurate low-flow sampling onto sorbent tubes using standard sampling pumps in constant pressure mode by controlling the volume of air onto the sorbent medium inside the glass sampling tube, reducing their output to the required flow range.

Uses: Low flow gas and vapor sampling.

Specifications: (see below)

SIZE	6 mm x 70 mm tubing
COMPONENTS	Clear tube holder, adjustable flow
USE	Standard sampling pumps in constant pressure mode
COMPATIBLITY	Sorbent tubes

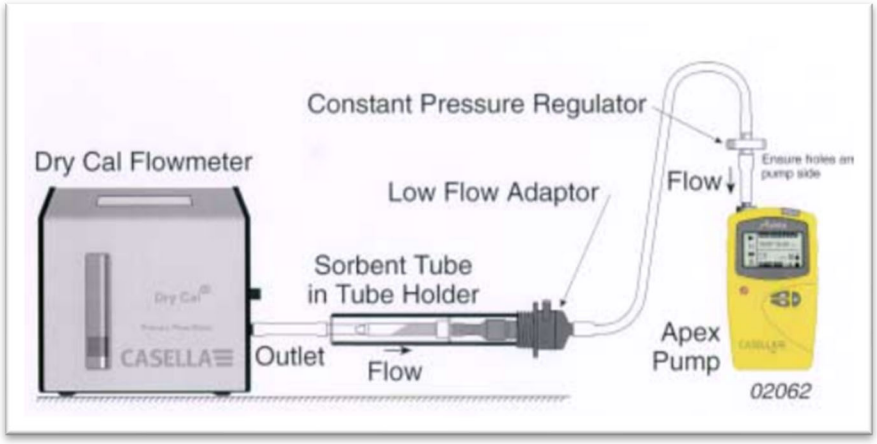
Required Equipment:

- Sampling pump
- 6mm x 70mm tubing
- Sorbent Tube

Sampling procedure:

Calibrate a personal sampling pump capable of low flow rates. Attach the Universal Adjustable Low Flow Adapter (tube holder with built-in flow control) to the inlet of the pump. Carefully insert the sorbent tube into the adapter, aligning the arrow on the tube to indicate airflow direction. Adjust the flow to the method-specified rate, and allow the system to stabilize and confirm the flow rate remains constant. Once calibrated, place the pump in a calibration cradle or clip it to the worker for personal sampling. Record the start time, flow rate, and sample ID. After the designated sampling period, stop the pump, record the stop time and final flow rate, remove the sorbent tube, and seal the tube ends immediately using caps or parafilm.

Photographs of media / sampling:



References:

MANUFACTURER: Zefon APB-109030

SAMPLING GUIDE: Low-flow-adaptor_Datasheet.pdf

PHOTO: Casella Low Flow Adapter Assembly

SAMPLING VIDEO:

Media:
Sampling Train Setup for both PCB Vapor and Particulate Collection:

Purpose: To collect both particulate-bound and vapor-phase PCBs from air using a combined filter and sorbent tube sampling train.

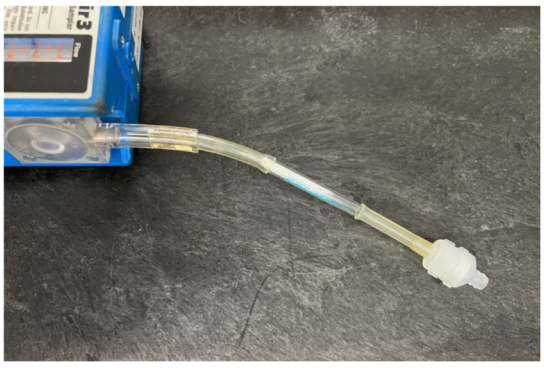
Required equipment:

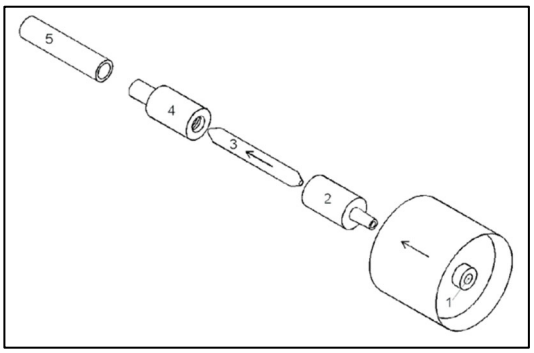
- Swinnex Filter Holder (SKC Item # 225-32)
- Glass Fiber Filters 13mm (SKC Item # 225-16)
- Florisil Sorbent Tube (SKC Item # 226-39 & 226-39-2)
- Sampling pump
- Flexible tubing (e.g. Tygon)
- Calibrator

Sampling Procedure:

Load a 13 mm glass fiber filter inside a Swinnex holder and secure the cassette tightly to prevent leaks (the filter will collect particulate-bound PCBs). Connect the outlet of the Swinnex holder to the inlet of the Florisil sorbent tube using tubing (the sorbent tubes will collect vapor-phase). Attach the outlet of the sorbent tube to the pump inlet, ensure all connections are airtight and aligned properly in a straight line. Set the pump to the recommended flow rate (typically between 100 and 500 mL/min) depending on method requirements. Verify and record the flow rate before and after sampling using a calibrator. Mount the sampling train in the breathing zone or at the desired sampling location and operate the pump for the required sampling period depending on the method (typically 4–8 hours). After sampling, disconnect the tubes and cap both ends of both the sorbent tube with clean PTFE caps and Swinnex cassette immediately; Avoid touching filter surfaces or open ends of tubes. Label each component clearly with sample ID, start/stop time, and flow rate.

Photograph of media / sampling:





References:

INFORMATION: ** refer to pgs 30-35

PHOTO: Kasper Solbu "Figure 2-3: Sketch of the complete sampling train..."

Example: media EMSL provides

Mainly written by Haley Leavitt; reviewed by HAL Mgrs.