The SKC Particle Size-

Use this convenient guide to help select

Select a 50% Cut-point or Classification	< 1 µm	< 0.25 to > 2.5 µm	2.5 µm					3.5 µm		4 µm			
	Sub-micron	Ultrafine, Fine, and > PM2.5	PM2.5					Respirable		Respirable			
Select a Flow Rate (L/min)	1.7 or 2	9	2	3	4	10	10	2.8	3.7	2	2.5	2.75	4 and 8
SKC Size-selective Samplers	DPM Cassette	Sioutas Impactor	PEM	PMI	PEM	IMPACT	PEM	Aluminum Cyclone	GS-3 Cyclone	PPI	Aluminum Cyclone	GS-3 Cyclone	PPI
Main Feature/ Benefit	Ideal for DPM and nano-particles	Samples ultrafine, fine, and > PM2.5 particles simultaneously	Referenced in EPA IP-10A	High collection efficiency	Referenced in EPA IP-10A	High flow for increased sensitivity	Referenced in EPA IP-10A	Specified in NIOSH 7500 and 0600	Conductive plastic	Closest match to ISO/CEN curve	Specified in NIOSH 7500 and 0600	Conductive plastic	High flow for enhanced sensitivity
Page	95	117	114	115	114	116	114	111	110	112	111	110	112

Diesel Particulate Matter (DPM) Cassette
Page 95

Sioutas Personal Cascade Impactor Ultrafine/Fine/> PM2.5
Page 117

IMPACT PM2.5/PM10/Coarse Sampler
Page 116

For sample pumps
see pages 8-10, 14-15, and 18-19

Personal Modular Impactor (PMI) PM2.5/PM10/Coarse Sampler
Page 115

Parallel Particle Impactor (PPI)
Reusable and disposable models available
Respirable and Thoracic
Page 112

selective Sampler Guide

sampling devices to meet your applications.

Select a 50% Cut-point or Classification	10 µm						100 µm		Particles < 10 µm but > 2.5 µm	
	Thoracic or PM10						Inhalable		PM Coarse	
Select a Flow Rate (L/min)	2	2	3	4	10	10	2	4	3	10
SKC Size-selective Samplers	PPI	PEM	PMI	PEM	PEM	IMPACT	IOM	Button Sampler	PMI	IMPACT
Main Feature/ Benefit	Closest match to ISO/CEN curve	Referenced in EPA IP-10A	High collection efficiency	Referenced in EPA IP-10A	Referenced in EPA IP-10A	High flow for increased sensitivity	Meets U.S. international standards	Low-level PM sampling	High collection efficiency	High flow for increased sensitivity
Page	112	114	115	114	114	116	108	109	115	116

Respirable Dust Aluminum Cyclone
Page 111

GS-3 Respirable Dust Cyclone
Page 110

Button Inhalable Sampler
Page 109

IOM Inhalable Sampler
Page 108

Personal Environmental Monitor (PEM)
PM2.5/PM10 Sampler
Page 114

For electronic real-time particulate monitors
see pages 128

Professionals choose the authentic IOM!

IOM Sampler

A Gold Standard for Personal Inhalable PM Sampling

Filter Heads

Although the Single Hole and Seven Hole heads may have been replaced by the IOM in some MDHS methods, they are still popular.

Single Hole "Lead Head"

Cat. No. 225-52

Seven Hole Head

Cat. No. 225-50

Asbestos Head

The 25-mm Asbestos Head is a cowled aluminum sampler designed for use with a gridded filter as per HSG 248 for asbestos fibers.

Cat. No. 225-54A

MultiDust Foam Discs

Separates and Collects Two PM Fractions

Use with a 25-mm filter in the IOM Sampler for simultaneous sampling of respirable and inhalable PM.

Cat. No. 225-772 ..... pk/10
Cat. No. 225-772-50..... pk/50

IOM Plastic Cassette with Transport Clip and Cover Cat. No. 225-71A

Meets U.S. and international standards

- ACGIH sampling criteria for inhalable particulate
- ISO/CEN health-related fractions of bioaerosols
- Preferred sampler for HSE Method MDHS 14/4
- NIOSH 5700 for particulate formaldehyde
- Australian standard for inhalable particulate
- OSHA-equivalent method for particulates not otherwise regulated (PNOR)‡

Small and lightweight

- Plastic model weighs less than 55 grams (2 ounces)

Maintains sample integrity

- Removable 25-mm cassette system eliminates filter handling
- Cassette and filter are weighed as a single unit to include all collected particles in analysis

Stainless steel cassette available for chemical analysis

- Autoclavable for bioaerosol sampling

Worker wearing the IOM Personal Inhalable Sampler

Sample Time:	*Varies*
Sample Rate:	*2 L/min*
Sample Pump:	*Universal XR or AirChek Series*
Sample Media:	*25-mm filters†*
Tubing:	*1/4-inch ID*

‡ *Reference: OSHA letter November 8, 2011; contact SKC for a copy*

Choose the original IOM Sampler for optimal performance! The patented* IOM Personal Inhalable Sampler houses a reusable 25-mm filter cassette that holds a specified filter for the collection of inhalable particles. When attached to a personal sample pump operating at 2 L/min and clipped near a worker's breathing zone, the IOM effectively traps particles up to 100 µm in aerodynamic diameter. This collection method closely simulates how airborne workplace particles are inhaled through the nose and mouth. Both the plastic cassette and the filter are pre and postweighed as a single unit for gravimetric analysis. Alternatively, the stainless steel cassette can be used for chemical analysis.

Description	Cat. No.
IOM Sampler and cassette,† in conductive plastic, with transport clip and cover	**225-70A**
IOM Sampler and cassette,† in stainless steel, with transport clip and cover	**225-76A**
IOM Sampler,† in conductive plastic, with stainless steel cassette, transport clip, and cover	**225-79A**

* *U.S. Patent No. 4,675,034* † *A 25-mm filter is required for sampling with the IOM; see below.*

25-mm Filters for IOM Sampler

The IOM Sampler requires a 25-mm filter for sampling. Select from the filters below to meet your application.

Description	Cat. No.	Qty.
PVC, 5.0 µm, 25 mm	**225-5-25**	**100**
Glass Fiber, 25 mm	**225-702**	**500**
MCE, 0.8 µm, 25 mm	**225-1930**	**100**
Polycarbonate, 0.8 µm, 25 mm	**225-1601**	**100**
Gelatin, sterilized, 25 mm	**225-9551**	**50**

Accessories

Description	Cat. No.
Cassette assembly, in conductive plastic, with transport clip and cover	**225-71A**
Cassette assembly, in stainless steel, with transport clip and cover	**225-75A**
Transport Clip and Cover	**225-72A**
IOM Calibration Adapter	**391-01**

Button Aerosol Sampler

Chemical or Biological Inhalable Sampler

- 4 L/min flow rate enhances sensitivity
- Closely follows the ACGIH/ISO sampling criteria for inhalable particulate mass
- Inlet design reduces oversampling of very large particles and sensitivity to wind direction/velocity
- Suitable for area or personal sampling
- Stainless steel construction reduces electrostatic effects
- Suitable for collecting bioaerosols for viable or non-viable analysis
  - Autoclavable

Sample Time:	*Varies*
Sample Rate:	*4 L/min optimum*
Sample Pump:	*AirChek XR5000 or TOUCH*
Sample Media:	*25-mm filters*
Tubing:	*1/4-inch ID*

The patented* reusable SKC Button Aerosol Sampler features a porous curved-surface inlet designed to improve the collection characteristics of inhalable dust (< 100-µm aerodynamic diameter), including bioaerosols for viable or non-viable analysis. The conductive stainless steel inlet contains evenly spaced holes that act as sampling orifices for multi-directional sampling and low sensitivity to wind direction and velocity. The proximity of the filter to the inlet minimizes transmission losses and provides for equal distribution of particle loading and low intersample variation. The Button Sampler follows closely the ACGIH/ISO sampling criteria for inhalable particulate mass at 4 L/min. A convenient conductive plastic transport case is available for shipping samples to a laboratory for analysis.

Description		Cat. No.
Button Sampler, *requires a 25-mm filter; see below*		225-360
Button Sampler Pump Kit includes Button Sampler, standard XR5000 Sample Pump, single charger, 0.9 meter (3 feet) of Tygon tubing, and calibration adapter, *requires a 25-mm filter; see below*	100-240 V	210-4121
Abrasive Blasting Kit includes Button Sampler and protective shield, *requires a 25-mm filter; see below*		225-367
Accessories		
Protective Shield, for abrasive blasting environments		225-366
Button Sampler Calibration Adapter		225-361
Filter Transport Case, for 25-mm filters, conductive plastic		225-67

* *U.S. Patent Nos. 5,954,845 and 5,958,111*

Recommended 25-mm Filters for Button Sampler

The Button Sampler requires a 25-mm filter for sampling. SKC recommends pore sizes greater than 1 micron to lower back pressure and enhance sample time with personal sample pumps. Select from the filters below to meet your application.

Description	Cat. No.	Qty.
PVC, 5.0 µm, 25 mm	225-5-25	100
Glass Fiber, 25 mm	225-702	500
MCE, 1.2 µm, 25 mm	225-1912	100
PTFE,† 3.0 µm, 25 mm	225-1711	50
Gelatin, sterilized, 25 mm	225-9551	50

† *Back pressure on PTFE filters can vary within the same lot.*

Tech Tips

Sampling Bioaerosols with the Button Sampler

▶ *For growth cultures, use the Button Sampler with a sterile gelatin filter to help maintain microorganism viability.*

Recommended Pumps for Button Sampler
AirChek TOUCH or AirChek XR5000
see pages 8-10 or 14-15

More Information
www.skcinc.com

GS-3 Respirable Dust Cyclone

Listed in OSHA Final Silica Rule

Tech Tips

▶ *Traditionally, respirable dust sampling with a cyclone has been performed using a clear styrene cassette.* ***NIOSH now suggests that conductive black polypropylene cassettes are a better option*** *for this application to minimize cassette wall losses (Journal of Occ. and Env. Hygiene, 10:3, 2013, pp. D29-D33). For conductive black polypropylene cassettes, see page 90.*

GS Cyclones Accessories/ Replacement Parts

Replacement Cassette Adapter 37 mm..... **Cat. No. 225-102** 25 mm..... **Cat. No. 225-101**
Filter Cassette/Cyclone Holder, *see p. 102 for details* **Cat. No.**.....**225-1**
Standard-size Multi-purpose Calibration Jar, *see p. 104 for details* **Cat. No.**.....**225-111**
Replacement Grit Pots, pk/25 **Cat. No.**..... **P225012**

More Information

Gautam, M. and Sreenath, A., "Performance of a Respirable Multi-inlet Cyclone," Jnl. of Aerosol Science (U.K.), Vol. 28, No. 7, 1997, pp. 1265-1281

Kar, K. and Gautam, M., "Orientation Bias of the Isolated 10 mm Nylon Cyclone at Low Stream Velocity," AIHA Journal, Vol. 56, 1995, pp. 1090-1098

www.skcinc.com

- **Operates at 2.75 L/min to conform to the ISO 7708 standard**
  - Listed in OSHA rule for silica
  - Meets ACGIH respirable TLVs
  - Higher flow rate increases sensitivity for lower concentrations
- **Unique design overcomes issues experienced with the 10-mm nylon cyclone**
  - Tangentially arranged inlets decrease particle loss caused by impaction
  - Multiple inlets eliminate ambient wind speed and orientation effects
- **Conductive plastic eliminates electrostatic effects**
  - Safe for underground mine use

Sample Time:	*Varies*
Sample Rate:	*2.75 L/min for 4-µm cut-point* (ISO 7708 standard)* *(3.7 L/min for 3.5-µm cut-point† - 1971 OSHA standard)*
Sample Pump:	*Universal XR or AirChek Series*
Sample Media:	*25 or 37-mm filters in 3-piece cassettes*
Tubing:	*1/4-inch ID*

Use the lightweight 10-mm GS-3 Cyclone with a 25 or 37-mm three-piece filter cassette. *See Tech Tip at above left.*

Description		Cat. No.
GS-3 Cyclone with bowl adapter, cassette adapter, and grit pot	**37 mm**	**225-100**
	25 mm	**225-103**

* *Calibrated at U.K. Health and Safety Laboratory; visit www.skcinc.com/prod/225-100.asp to view the collection efficiency curve*
† *Determined using experimental data obtained at flows from 2 to 4 L/min*

GS-1 Respirable Dust Cyclone

Equivalent to 10-mm Nylon Cyclone Without Static Concerns

- **2 L/min flow rate provides sharp size selection at 4 µm**
  - Meets ISO 7708 standard, OSHA rule for silica, and ACGIH respirable TLVs
- **Use at 1.7 or 2 L/min with DPM Cassette for MSHA DPM compliance sampling**
  - Screens out large particles to prevent DPM Cassette impactor and filter overload
- **Conductive plastic construction**
  - Eliminates electrostatic effects experienced with the 10-mm nylon cyclone
  - Safe for underground mine use

Sample Time:	*Varies*
Sample Rate:	*2 L/min for 4-µm cut-point‡ (ISO 7708 Standard)* *3 L/min for 3.5-µm cut-point† (1971 OSHA Standard)* *1.7 or 2 L/min with DPM Cassette (MSHA DPM sampling)*
Sample Pump:	*Universal XR or AirChek Series*
Sample Media:	*DPM Cassette or 37-mm filters in 3-piece cassettes*
Tubing:	*1/4-inch ID*

Use the lightweight 10-mm GS-1 Cyclone with a standard 37-mm three-piece filter cassette or the SKC DPM Cassette.

Description	Cat. No.
GS-1 Cyclone includes bowl adapter, 37-mm cassette adapter, and grit pot	**225-105**

‡ *Trakumas, S., et al., "Performance Assessment of Personal Respirable Cyclone Samplers," AIHce Presentation 191, 2003*
† *Determined using experimental data obtained at flows from 2 to 4 L/min*

Respirable Dust Aluminum Cyclone

Specified in NIOSH Respirable Dust Methods

- **Operates at 2.5 L/min to conform to the ISO 7708 standard**
  - Meets requirements in the OSHA rule for silica
  - Meets ACGIH respirable TLVs
- **Specified in NIOSH Method 7500 for silica and NIOSH 0600 for respirable particulates**
- **Eliminates adverse electrostatic effects**
- **Small and lightweight**
  - 6.6 x 3.8 cm (2.6 x 1.5 inches)
- **Used with an open-face three-piece cassette for more even particle deposition on the filter**
  - Available in 25 or 37 mm
  - Inserts into middle ring of cassette

Sample Time:	*Varies*
Sample Rate:	*2.5 L/min for 4-µm cut-point* (2.8 L/min for 3.5-µm cut-point†)*
Sample Pump:	*Universal XR or AirChek Series*
Sample Media:	*25 or 37-mm filters in 3-piece cassettes*
Tubing:	*1/4-inch ID*

The SKC Aluminum Cyclone is a lightweight respirable dust sampler that is placed into the middle ring of a three-piece cassette loaded with the appropriate filter *(see Tech Tips at right)*. When attached to a sample pump, respirable particles collect on the filter and larger particles fall into the grit pot to be discarded. Available in 25 or 37 mm, the SKC Aluminum Cyclone provides sharp size selection of the respirable fraction. The SKC Aluminum Cyclone eliminates the electrostatic problems associated with nylon (non-conductive) cyclones and allows the cyclone to sample particles more efficiently.

ACGIH, NIOSH, the European Standard Committee (CEN), and the OSHA rule on silica specify a respirable collection efficiency curve with a median cut-point of 4 µm. A leading aerosol research organization calibrated the SKC Aluminum Cyclone. Results showed that using the cyclone at a flow rate of 2.5 L/min* provided the optimum match to the respirable curve specified in the ISO 7708 standard.

Cassette Holder

The lightweight SKC Filter Cassette Holder is designed for attachment to a worker's collar and will accommodate either two or three-piece 37-mm cassettes with or without a cyclone, 25-mm cassette with cowl, or DPM Cassette with a GS-1 Cyclone.

Cat. No. 225-1

Easy-to-use Calibration Adapter

The aluminum calibration adapter fits both the 25 and 37-mm Aluminum Cyclones and allows standard 1/4-inch ID Tygon tubing to be attached for simple calibration.

Cat. No. 225-01-03

Description		Cat. No.
Cyclone‡ with grit pot	**25 mm**	**225-01-01**
	37 mm	**225-01-02**
Accessories		
Calibration Adapter, 25/37 mm		**225-01-03**
Filter Cassette Holder, 25/37 mm		**225-1**
Replacement Grit Pots, pk/25		**P225011**
Replacement O-rings, for 37-mm cyclones, pk/5		**P22501**

* *As previously published, a flow rate of 2.6 L/min will yield a 4-µm 50% cut-point, however, a 2.5 L/min flow rate will provide a better match over the entire curve.*

† *Determined using experimental data obtained at flows from 2 to 4 L/min*

‡ *Three-piece cassettes are required for use with SKC Aluminum Cyclones; see filter cassettes on pages 88-96.*

Tech Tips

- *A cyclone will not sample optimally if it is influenced by electrostatic charge. SKC cyclones are constructed of conductive plastic or aluminum that eliminates the static problem associated with non-conductive nylon cyclones.*
- *Cleaning cyclones before sampling prevents deviation in the collection efficiency curves.*
- *The cyclone grit pot must be in place during sampling for size selection to occur. Do **not** remove the grit pot during calibration and sampling.*
- *When calibrating size-selective samplers such as cyclones, use the sampler's calibration adapter. If an adapter does not exist, use the multi-purpose calibration jar with the smallest volume. See page 104.*

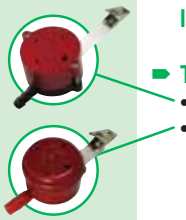
Plastic Cyclone

The SKC Plastic Cyclone is designed to sample respirable dust as per MDHS 14/4 and the ISO/CEN criteria. The static-dissipating cyclone features a snap-together cassette system and is used at a 2.2 L/min flow rate with a 25 or 37-mm cyclone cassette. Cyclones include a grit pot. The Plastic Cyclone is also suitable for MDHS 10/2 and 91.

Description	Cat. No.
Plastic Cyclone with 25-mm plastic cassette	**225-69**
Plastic Cyclone with 37-mm plastic cassette	**225-69-37**
Filter Transport Cassette for 25-mm filters	**225-67**
Cassette, 25 mm	**225-62**
Cassette, 37 mm	**225-62-37**

Parallel Particle Impactors (PPIs)

Designed for a Precise Match to the ISO 7708 Standard



- **Collection efficiency precisely matches ISO 7708 standard**
- **Two sampler configurations available**
  - **Reusable** conductive aluminum samplers
  - **Disposable** anti-static plastic samplers designed for one-time use, pre-assembled with:
    - Filter, support pad, and impaction substrates for chemical analysis
    - Substrates only for gravimetric analysis (add your own weighed filter)
- **Sampling options:**
  - **8 L/min respirable model:** Enhanced sampling sensitivity for TLV-TWA silica and other compounds with low target concentrations, such as respirable manganese. Ideal for short-term task monitoring
  - **4 L/min respirable model:** Provides higher flow option and use of intrinsically safe personal pumps
  - **2 L/min respirable model:** Standard TWA sampling
  - **2 L/min thoracic model:** Metalworking fluids (NIOSH Method 5524) or TLV-TWA sulfuric acid or cotton dust sampling
- **Performance published in *Journal of Physics* and submitted to OSHA docket on silica**

ABOUT
Using PPI Samplers on Welders

Several professionals report that they prefer using PPI Samplers.

- Smaller and more comfortable, PPIs fit easily under a welding helmet.
- Welders are often in awkward positions, which can cause a cyclone to tip and larger particles in the grit pot to land on the filter. This is not a problem for PPIs!

The PPI 4-in-1 Advantage

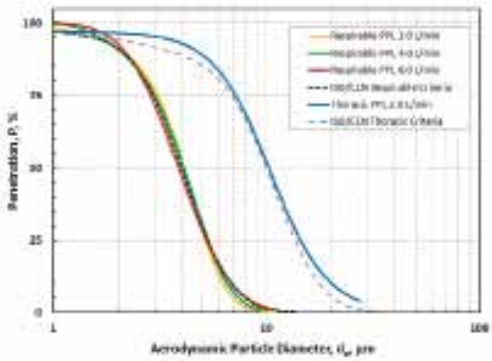
Only the patented‡ SKC Parallel Particle Impactor (PPI) has the power of four impactors in one small sampler to provide a precise match to the ACGIH/ISO/CEN (7708:1995) thoracic or respirable conventions: a job no other single personal impactor can do alone!

Sample Rate:	*2, 4, or 8 L/min*
Sample Pump:	*Universal XR or AirChek Series; Leland Legacy for 8 L/min*
Sample Media:	*37-mm filter (requires support and impaction substrates)*
Tubing:	*1/4-inch ID*

Reduce Particle Buildup/Bounce Effects

Disposable pre-oiled porous plastic impaction substrates reduce the negative effects of particle buildup and bounce on sample accuracy by firmly trapping larger particles. Unlike other samplers, SKC PPI sampling efficiency does not depend on collected particle type. In addition, PPI Samplers can be inverted without larger particles invalidating results.

‡ *U.S. Patent No. 7,073,402*



Comparison of PPI Samplers' performance with thoracic and respirable conventions

Parallel Particle Impactors (PPIs)

Available in Reusable Aluminum or Disposable Plastic

Reusable Aluminum PPI Samplers

Select the PPI for the desired convention, choose an application-appropriate filter and support, and order impaction substrates.

Description	Cat. No.	Qty.
Reusable PPI Samplers, *require substrates, filters, and supports*		
Respirable PPI (red), 8 L/min, aluminum 	225-383	ea
Respirable PPI (orange), 4 L/min, aluminum 	225-382	ea
Respirable PPI (gold), 2 L/min, aluminum 	225-380	ea
Thoracic PPI (blue), 2 L/min, aluminum 	225-381	ea

Impaction Substrates, *four required for each sample for Reusable Aluminum PPI models*	Cat. No.	Qty.
Porous Plastic Discs,† 9.53-mm (3/8-inch) diameter, pre-oiled, ready to use, disposable	225-388	200

Disposable Plastic PPI Samplers**

Select the PPI for the desired convention. Choose from models preloaded with filter and support or load your own.

Description	Cat. No.	Qty.
Preloaded Disposable PPI Samplers contain four porous plastic disc impaction substrates, one 37-mm cellulose support, and one collection filter as noted		
Respirable PPI (red), 8 L/min, plastic, with 5.0-µm PVC filter	225-3841	ea
Respirable PPI (orange), 4 L/min, plastic, with 5.0-µm PVC filter	225-3871	ea
Respirable PPI (gold), 2 L/min, plastic, with 5.0-µm PVC filter	225-3851	ea
Thoracic PPI (blue), 2 L/min, plastic, with 0.8-µm MCE filter	225-3861	ea
Disposable PPI Samplers contain four porous plastic disc impaction substrates, *require collection filter and support; see information below and select based on application*		
Respirable PPI (red), 8 L/min, plastic 	225-384	ea
Respirable PPI (orange), 4 L/min, plastic 	225-387	ea
Respirable PPI (gold), 2 L/min, plastic 	225-385	ea
Thoracic PPI (blue), 2 L/min, plastic 	225-386	ea

Filters for User-loaded PPI Samplers	Cat. No.	Qty.
PVC Filters, 37 mm, 5.0-µm pore size	225-5-37	100
PTFE Filters,* 37 mm, 2.0-µm pore size for metalworking fluids (NIOSH 5524)	225-27-07	50
MCE Filters, 37 mm, 0.8-µm pore size	225-5	100

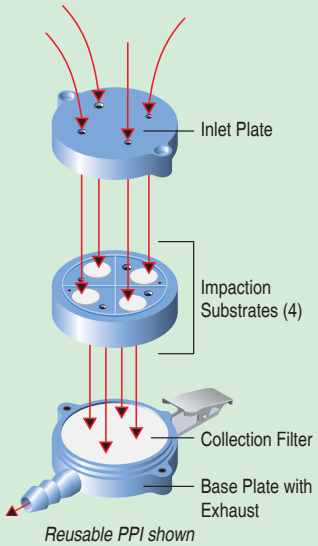
Filter Supports for User-loaded PPI Samplers	Cat. No.	Qty.
Support Pads, cellulose, 37 mm	225-27	100
Stainless Steel Screen, 37 mm, wide mesh	225-26	ea

Accessory	Cat. No.	Qty.
Calibration Adapter, for Disposable PPI Samplers only	225-389	ea

* *Back pressure on PTFE filters can vary within the same lot.*
** *Designed for one-time use*
† *Limited shelf-life*

Standard of Good Practice

Before and after sampling, weigh filters in a weighing room using the same analytical balance and conditions each time. With this good practice in mind, SKC does not supply PPI Samplers loaded with preweighed filters. Contact a laboratory to request preloaded, preweighed PPI samplers for higher accuracy.



Reusable PPI shown

Personal Environmental Monitor (PEM)

Choice of Flows for PM10 and PM2.5 in Indoor Air

Pumps for sampling with the PEM

- *2 or 4 L/min flow rates, see pages 8-10 or 14-15*
- *10 L/min flow rate and 24-hour sampling, see pages 22-23*

- **Referenced in EPA Method IP-10A**
  - For particles in indoor air
- **Small and unobtrusive**
  - Can be connected to a personal sample pump and worn in the breathing zone
- **Suitable for LEED Green Building sampling**

Sample Time:	*Varies*
Sample Rate:	*2, 4, or 10 L/min*
Sample Pump:	*Universal XR, AirChek Series, or Leland Legacy*
Sample Media:	*37-mm PTFE filters**
Tubing:	*3/16-inch ID*

The Personal Environmental Monitor is a small, lightweight impaction device used with a personal sample pump to provide effective sampling of PM10 and PM2.5 in indoor air. Personal exposure is determined through gravimetric analysis for particle mass and chemical analysis for specific compounds.

How the PEM Works

The PEM consists of three major parts: cap, impaction ring assembly, and base. A 37-mm after-filter is inserted in the base and the PEM assembled. When used with a personal sample pump at the required flow rate, aerosol is accelerated through a number of nozzles in the cap. Through inertia, particles larger than the 50% cut-point of the sampler impact onto a greased impaction ring and can be discarded after sampling. Particles smaller than the 50% cut-point pass through the impactor and collect on the 37-mm after-filter. Six models of PEM are available for the collection of PM10 or PM2.5 at three different flow rates.

PEM Applications

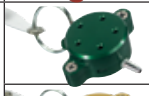
- Childhood asthma studies
- Green Building certification
- IAQ studies
- School zone investigations

Data Interpretation

Particulates as PM2.5

▶ ***LEED Green Buildings***
Indoor Air Maximum Concentration: 15 µg/m³

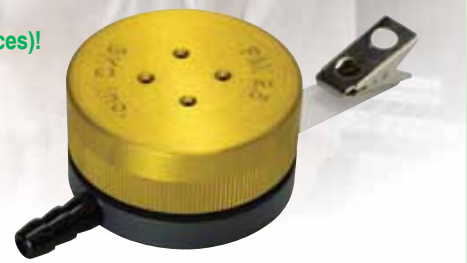
Source: LEED for New Construction Rating System v4 (U.S. Green Building Council, http://www.usgbc.org)

Cut-point	Model	Flow Rate	Cat. No.
2.5 µm		2 L/min	761-203
		4 L/min	761-203A
		10 L/min	761-203B
10 µm		2 L/min	761-200
		4 L/min	761-200A
		10 L/min	761-200B
Accessories			
PEM Calibration Adapter			761-202
After-filter, 37-mm, 2.0-µm PTFE* with PMP support ring, pk/50			225-1709

* *Back pressure on PTFE filters can vary within the same lot.*

Personal Modular Impactor (PMI)

Personal PM10, PM2.5, or PM Coarse Sampling at 3 L/min



- **Models available for PM10, PM2.5, or PM Coarse $_{(10\text{-}2.5)}$ sampling**
- **Use with any constant flow pump at 3 L/min**
- **Disposable ready-to-use pre-oiled impaction discs — no cleaning or greasing**
  - Reduce particle bounce for high collection efficiency
- **Compact and lightweight — only 71 grams (2.5 ounces)!**
  - Ideal for personal or micro-environmental sampling
- **Closely follows PM2.5 or PM10 as defined by EPA *(see right)***
- **Convenient modular design for easy operation**
  - Removable filter cassette for easy media changes
  - Convenient clip for mounting sampler in the breathing zone
- **PMI PM10 model is easily converted with accessory ring to measure PM Coarse**

Sample Time:	*Varies*
Sample Rate:	*3 L/min*
Sample Pump:	*Universal XR or AirChek Series*
Sample Media:	*37-mm filter (requires impaction substrate)*
Tubing:	*1/4-inch ID*

The patented* SKC single-stage Personal Modular Impactors are designed for the highly efficient collection of PM10, PM2.5, or PM Coarse $_{(10\text{-}2.5)}$. The samplers are easy to use with a removable filter cassette and pre-oiled impaction disc. The 25-mm pre-oiled impaction disc mounts directly on top of the filter cassette and reduces particle bounce for high collection efficiency. A 25-mm filter may be used as an alternative impaction substrate for chemical analysis of particles. The PMI Coarse model includes a second filter cassette to allow collection of particles < 10 µm but larger than 2.5 µm.

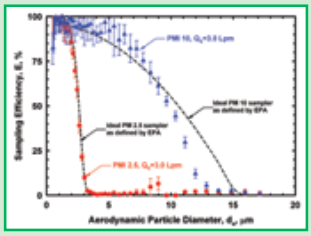
PMI Sampler	Cat. No.	Qty.
Personal Modular Impactor includes impactor and filter cassette with support screen, *requires collection media and impaction substrate sold separately; see below*		
PM2.5 (gold)	225-352	ea
PM10 (silver)	225-350	ea
PM Coarse includes 2 filter cassettes and filter retainer	225-351	ea
Recommended Collection Filters		
Quartz Filters, 37 mm, Tissuquartz, 432 µm thick	225-1822	25
PTFE Filters,† 37 mm, 2.0-µm pore size, with PMP support ring	225-1709	50
PTFE Filters,† 37 mm, 1.0-µm pore size, with laminated PTFE support	225-2705	50
Recommended Impaction Substrate, *required for sampling; limited shelf-life*		
Pre-oiled Porous Plastic Discs,‡ 25 mm, ready to use, disposable	225-355 225-355A	25 50
Accessories		
PM Coarse Ring includes filter cassette, adapts a PMI 10 to a PMI Coarse	225-3512	ea
Replacement Filter Cassette	225-356	ea
PMI Cassette Opener	225-357	ea
Forceps, stainless steel, non-serrated flat tips, *see p. 104*	225-8371	ea
Filter-Keepers, 37 mm, for filter transport, *see p. 105*	225-8303 225-8303A	100 10
PMI Calibration Adapter	225-358	ea
Filter Retainer, secures filter in impaction substrate position on top of cassette	225-354	ea

* *U.S. Patent No. 7,334,453* † *Back pressure on PTFE filters can vary within the same lot.*
‡ *A 25-mm filter may be used as an alternative impaction substrate for chemical analysis.*

ABOUT

PMI Performance

The graph below demonstrates the high sampling efficiency of the PMI PM2.5 and PM10 Samplers when compared to the EPA PM2.5 and PM10 criteria curves. *For more information, see the Modular Impactor Poster Presentation at www.skcinc.com/instructions/Modular_Impactors_Poster.pdf.*



10 L/min IMPACT Single-stage Impactor
see page 116

Data Interpretation

Particulates as PM10

▶ ***LEED Green Buildings***
Indoor Air Maximum Concentration: 50 µg/m³

Health Care Facilities have a maximum of 20 µg/m³

Source: LEED for New Construction Rating System v4 (U.S. Green Building Council, http://www.usgbc.org)

IMPACT Sampler

For PM10, PM2.5, or PM Coarse Sampling at 10 L/min

- **Ideal for environmental PM sampling and indoor air studies**
- **Use with Leland Legacy or any pump at 10 L/min**
- **Compact design**
- **Higher flow rate provides increased sensitivity**
- **Convenient operation**
  - Removable filter cassette for fast media changes
  - Disposable ready-to-use pre-oiled impaction discs reduce particle bounce — no cleaning or greasing
  - Included rain cover protects sampler during outdoor use
  - Optional quick-mount bracket secures sampler virtually anywhere

Sample Time:	*Varies*
Sample Rate:	*10 L/min*
Sample Pump:	*Leland Legacy*
Sample Media:	*47-mm filter (requires impaction substrate)*
Tubing:	*3/8-inch ID*

The patented‡ SKC IMPACT single-stage inertial impactor is designed for the efficient collection of PM10, PM2.5, or PM Coarse $_{(10\text{-}2.5)}$ in ambient air. A sample pump operating at 10 L/min draws particulate matter (PM) through the impactor; larger particles are captured on a disposable pre-oiled impaction disc while smaller particles collect on a 47-mm filter. IMPACT media changes are as easy as removing the filter cassette and replacing it with one already loaded. The impaction disc fits into the top of the cassette. IMPACT's higher flow rate requirement provides increased sensitivity for low levels of PM. Go to *www.skcinc.com/instructions/Modular_Impactors_Poster.pdf* for sampling efficiency data.

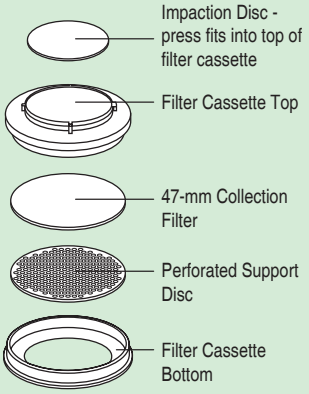
IMPACT Sampler	Cat. No.	Qty.
IMPACT Sampler includes filter cassette, calibration adapter, and rain cover for sampler; *requires collection media and impaction substrate sold separately; see below*		
PM2.5	225-392	ea
PM10	225-390	ea
PM Coarse includes 2 filter cassettes	225-3911	ea
Collection Filters for IMPACT Sampler (not supplied with IMPACT or DPS System) *Select a filter based on your application; required for sampling*		
Quartz Filters, 47 mm, Tissuquartz, 432 µm thick	225-1823	25
PTFE Filters,§ 47 mm, 2.0-µm pore size, with PMP support ring	225-1747	50
Impaction Substrate		
Impaction Discs, 37 mm, pre-oiled, ready to use, disposable, *required for sampling; limited shelf-life*	225-395 225-395A	25 50
Accessories		
Replacement Filter Cassette	225-396	ea
Filter Cassette Opener	225-397	ea
Mounting Bracket	225-399	ea
PM Coarse Ring includes filter cassette, adapts IMPACT PM10 to an IMPACT PM Coarse	225-3912	ea
Petri Dish Slide, for filter transport	225-2-01	100
Calibration Adapter	225-394	ea

‡ *U.S. Patent No. 7,334,453*
§ *Back pressure on PTFE filters can vary within the same lot.*

IMPACT and the Leland Legacy Sample Pump

While IMPACT can be used with any pump at 10 L/min, partnering IMPACT with the Leland Legacy sample pump provides a highly efficient sampling system. The quiet, fully programmable Leland Legacy pump can provide a constant 10 L/min flow rate for 24 hours, making it ideal for environmental monitoring or indoor air studies. *For more information on the Leland Legacy Sample Pump, see pages 22-23. IMPACT and the Leland Legacy Sample Pump are both included in the DPS System on pages 24-25.*

Convenient All-in-one Filter Cassette



For a deployable particulate sampling system featuring the IMPACT Sampler, see the DPS System on pages 24-25.

Sioutas Personal Cascade Impactor

Separates Ultrafine, Fine, and > 2.5-µm Particles Simultaneously

- **Precise particle separation**
  - Particle size cut-points: 2.5 µm, 1.0 µm, 0.50 µm, and 0.25 µm
  - The only personal impactor that efficiently samples ultrafine, fine, and > 2.5-µm particles simultaneously
  - Maintains high collection efficiency even at high particle concentrations
- **Optimized at a 9 L/min flow rate with low pressure drop for 24-hour sampling**
  - Improves analytical sensitivity
  - Minimizes non-detectable samples
- **Preserves unstable compounds**
  - Chemically inert collection substrate
  - No impaction grease to contaminate sample
- **Minimal particle bounce and internal wall losses**
- **Suitable for indoor and outdoor sampling****
- **Size-fractionated samples can be analyzed gravimetrically, chemically, and microscopically**
- **Small and lightweight**
  - Suitable for personal or area sampling

Sample Time:	*Varies*
Sample Rate:	*9 L/min*
Sample Pump:	*Leland Legacy*
Sample Media:	*25 and 37-mm filters*
Tubing:	*3/8-inch ID*

Leland Legacy Sample Pump

The compact, portable, and battery-operated Leland Legacy Sample Pump provides 9 L/min flow rate for optimum Sioutas Impactor performance.

For more information, see pages 22-23.

The patented† Sioutas Personal Cascade Impactor* separates and collects airborne particles in five size ranges: > 2.5 µm, 1.0 to 2.5 µm, 0.50 to 1.0 µm, 0.25 to 0.50 µm, and < 0.25 µm. When used with PTFE filters,‡ the Sioutas Impactor is highly efficient at collecting particles without using impaction grease or substrate coatings and at retaining unstable compounds for size-fractionated chemical analysis.

Use the Sioutas Impactor with the Leland Legacy Sample Pump at 9 L/min to ensure precise particle separation at the specified cut-points. Particles above each cut-point are collected on a 25-mm filter in the appropriate stage with particles less than 0.25 µm collecting on the 37-mm after-filter *(optional)*. The small, lightweight Sioutas Impactor simply clips to a worker's collar or lapel for personal sampling and is also suitable for area sampling.

Description	Cat. No.
Sioutas Personal Cascade Impactor	**225-370**
Tubing, Tygon, 9.53-mm (3/8-inch) ID, fits Sioutas Impactor and Leland Legacy pump, 3 meters (10 feet)	**225-1351**

Filters for Sioutas Impactor

Description	Cat. No.	Qty.
After-filter, PTFE,‡ 37 mm, 2.0 µm *(optional)*	**225-1709**	**50**
Collection Filter (filter for 4 stages), PTFE,‡ 25 mm, 0.5 µm, *required*	**225-2708**	**100**

* *Developed by Dr. Constantinos Sioutas of the University of Southern California in partnership with the Mickey Leland National Urban Air Toxics Research Center (NUATRC)*

† *U.S. Patent No. 6,786,105 (University of Southern California)*

‡ *Back pressure on PTFE filters can vary within the same lot.*

** *Requires special provisions; see product operating instructions*

the Sioutas Impactor Advantage!

Choose the Sioutas Personal Impactor for the highly efficient collection of airborne particles in five size ranges:

- ☑ > 2.5 µm
- ☑ 1.0 to 2.5 µm
- ☑ 0.50 to 1.0 µm
- ☑ 0.25 to 0.50 µm
- ☑ < 0.25 µm

Recent epidemiological studies show that ultrafine, fine, and > 2.5-µm particles may have greater pulmonary inflammatory potency than larger particles and associate increased morbidity and mortality with increased exposure to these particles. The Sioutas Impactor is the only personal impactor that precisely separates and collects ultrafine, fine, and > 2.5-µm particles simultaneously.

More Information

Misra, C., et al., "Development and Evaluation of a Personal Cascade Impactor Sampler (PCIS)," Journal of Aerosol Science, 33, 2002, pp. 1027-1047

ABOUT

Monitoring Exposure to CNTs and CNFs

In its Current Intelligence Bulletin 65: *Occupational Exposure to Carbon Nanotubes (CNTs) and Nanofibers (CNFs),* NIOSH recommends use of a respirable mass-based airborne concentration measurement to monitor worker exposure to all types of CNTs and CNFs until additional data are available. A reasonable estimate of worker respirable exposure to CNTs/CNFs at the NIOSH REL (1 µg/m³, 8-hour TWA) can be determined as elemental carbon (EC) by NIOSH Method 5040.