



Operating Instructions

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SKC Preloaded Disposable Parallel Particle Impactors (PPI)



The patented[†] impaction-based SKC Disposable Parallel Particle Impactor (PPI[®]) Samplers are designed to match precisely the collection efficiency curves for respirable and thoracic dust specified by ISO 7708/CEN and adopted by ACGIH, CEN, and other occupational hygiene organizations. The performance of the respirable PPI samplers also meets the ISO 7708/CEN criteria included in the OSHA final silica rule. The thoracic model meets the requirements of compounds with ACGIH[®] thoracic TLV[®]s. Disposable PPI Samplers offer the convenience of single use to eliminate sampler assembly and cleaning; small size for worker comfort, even under helmets or other PPE; and a choice of flow rates for maximum flexibility in pump options, sample duration, and contaminant concentration. **These instructions are for PPI models pre-assembled with filter, support, and impaction substrates. Note: PPI Cat. No. 225-3852 does not come with a support as its filter is self-supporting; see Ordering Information.**

Preloaded filters in some models are available preweighed by SKC for gravimetric analysis. *See the table below.*

Respirable PPIs*	Preloaded Filter
225-3841 225-3851 225-3871	5.0- μ m PVC filter for chemical analysis, not preweighed . <i>For gravimetric analysis, contact your laboratory to pre and postweigh filter.</i>
225-3841-PW 225-3851-PW 225-3871-PW	5.0- μ m PVC filter preweighed by SKC for gravimetric analysis Preweighed at 70 F \pm 3 F and 50% \pm 5% relative humidity
Thoracic PPIs	Preloaded Filter
225-3861	0.8- μ m MCE filter, not preweighed
225-3862	R-100 Quartz filter, not preweighed

[†] U.S. Patent No. 7,073,402

* Respirable models also include 225-3852, preloaded with 1.0- μ m PTFE filter for chemical analysis, **not preweighed**; for gravimetric analysis, contact your laboratory to pre and postweigh filter.

Performance Profile

Sampling Rate: 2 L/min respirable or thoracic, 4 or 8 L/min respirable

Sample Pump: • Universal XR or AirChek® Series for 2 and 4 L/min
• Leland Legacy for 8 L/min

Sample Time: *Dependent on method used. Note: SKC tests indicate that a particulate mass of up to 6.8 mg on the four impaction substrates would not affect PPI performance. This amount is equivalent to sampling for 6 hours at 4 L/min in environments where respirable mass concentration is 4.76 mg/m³ and equals 50% of total dust. However, labs have reported to SKC that they prefer no more than 2 mg on the filter for analytical reasons. Therefore, SKC recommends that you work with your lab to determine optimum sample times for your unique sampling conditions.*

Sample Media: *Respirable models:* 37-mm, 5.0-µm PVC filter and cellulose support pad; or 37-mm, 1.0-µm PTFE filter, no support
Thoracic model: 37-mm, 0.8-µm MCE filter and cellulose support pad or 37-mm R-100 Quartz filter and cellulose support pad

Impaction

Substrate: Four 3/8-in diameter pre-oiled porous plastic discs
(Assembled in all Disposable PPIs)

Analysis:

Chemical or gravimetric

Body Material: Conductive ABS plastic

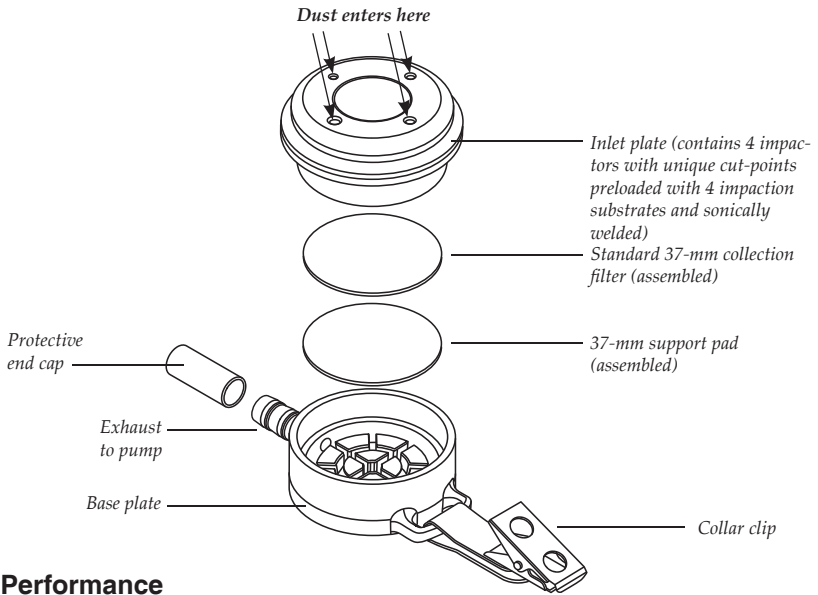
Dimensions: **Height:** 4.25 in (10.8 cm) - clip to exhaust
Diameter: 1.8 in (4.6 cm)
Depth: 1.2 in (3 cm)

Weight: 1.1 oz (31.2 gm)

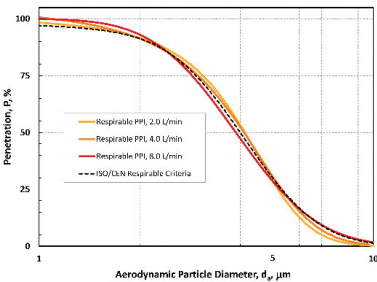
Shelf-life: 18 mos from date of manufacture

Principle of Operation

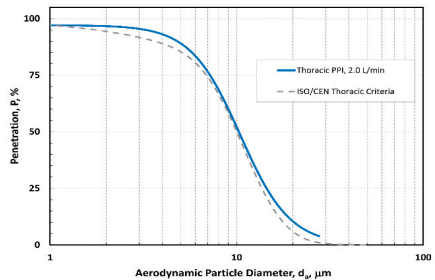
SKC Disposable PPI Samplers are impaction-based filter samplers that perform precise size-selection for either thoracic or respirable dust, depending on the model. PPI Samplers contain four small impactors in the inlet section of the device. Each impactor features a unique 50% cut-point to target a specific one-quarter segment of the ISO/CEN curve resulting in a precise fit along the entire curve. A sample pump operating at 2, 4, or 8 L/min (2 L/min only for thoracic) pulls air through the inlet nozzle of each impactor in the inlet plate. Particles larger than each impactor's 50% cut-point are scrubbed and retained by impaction onto the porous oiled impaction substrate contained in each impactor. Smaller particles continue to the standard 37-mm collection filter for analysis.



PPI Performance



Collection efficiency of the 2, 4, and 8 L/min respirable PPI Samplers compared to the ISO respirable curve



Collection efficiency of the 2 L/min thoracic PPI Sampler compared to the ISO thoracic convention

Sampler Preparation

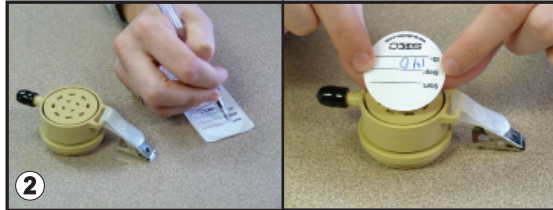
SKC Preloaded Disposable PPIs are supplied assembled and ready to use.

For gravimetric analysis: PPIs 225-3841-PW, 225-3871-PW, and 225-3851-PW are preloaded with a preweighed 5.0- μ m PVC filter. If using PPIs preloaded with a filter that has not been preweighed (Cat. Nos. 225-3841, 225-3871, 225-3851, and 225-3852), contact your laboratory to pre and postweigh filter.

1. Remove shrink wrap.



2. Write sample ID on sampling label. Adhere sampling label to **bottom** of base plate.



3. Remove protective end cap from exhaust.

Calibration and Sampling



As the particle load on the filter increases during sampling, the pressure drop will also increase. Therefore, use a compensating sample pump such as the AirChek Series or Leland Legacy depending on flow rate requirements.

Calibration

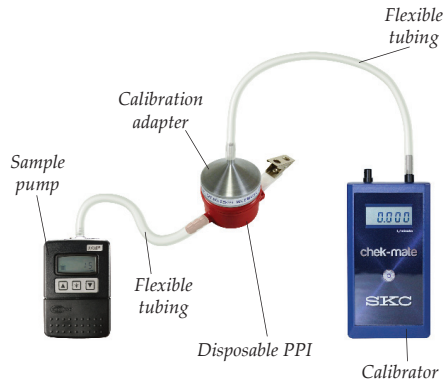
Calibrate the pump flow rate with a representative Preloaded Disposable PPI sampler. *Note: If using SKC High Flow chek-mate Calibrator, Pulsation Dampener Cat. No. 375-150 is also required in line. See pump and calibrator operating instructions.*

1. Ensure the pump has run for 5 minutes before calibrating.
2. Ensure representative impactor is loaded with a support and collection filter and that it is fully assembled. *See Sampler Preparation above.*
3. Align the bottom of the calibration adapter with the inlet plate of an assembled, loaded representative Disposable PPI and press down firmly until the calibration adapter's O-ring is engaged and creates an even seal.
4. Use flexible tubing to connect the exhaust of the Disposable PPI to the inlet of a sample pump.
5. Use flexible tubing to connect the inlet of the calibration adapter to the suction port (outlet) of a calibrator.

6. Calibrate to 2 L/min for the 2 L/min respirable and thoracic model PPIs, 4 L/min for the 4 L/min respirable model, or 8 L/min for the 8 L/min respirable model. Follow the calibration instructions in the pump and calibrator operating instructions.
7. When calibration is completed, disconnect the tubing from the calibrator and calibration adapter.
8. Grasp the Disposable PPI with one hand and the calibration adapter with the other hand. Firmly pull/twist to remove the calibration adapter from the Disposable PPI inlet plate.
9. Replace the representative Disposable PPI used to set the flow with a new, unused preloaded Disposable PPI for sample collection.



Using excessive pressure to seal the calibration adapter to the Disposable PPI may make the calibration adapter difficult to remove.



Sampling



SKC tests indicate that a particulate mass of up to 6.8 mg on the four impaction substrates would not affect PPI performance. This amount is equivalent to sampling for 6 hours at 4 L/min in environments where respirable mass concentration is 4.76 mg/m³ and equals 50% of total dust. However, labs have reported to SKC that they prefer no more than 2 mg on the filter for analytical reasons. Therefore, SKC recommends that you work with your lab to determine optimum sample times for your unique sampling conditions.

1. As per good industrial hygiene practice, replace representative sampler used for calibration with a new, unused preloaded sampler.
2. Record sample start time on label.
3. Clip Disposable PPI onto a worker's collar or lapel in the breathing zone or in the area to be sampled.
4. Clip sample pump at the worker's waist or close to the Disposable PPI.
5. Use flexible tubing to attach the Disposable PPI exhaust to the inlet of the sample pump.
6. Turn on pump and record pertinent sample data.
7. After the desired sample time has elapsed, turn off the pump and unclip sampler from sampling location.
8. Apply Post-use label to inlet plate to seal the sampler.
9. Record sample stop time on label on the bottom of sampler.
10. Disconnect sampler from pump and reinstall protective end cap on the exhaust.
11. Reinstall calibration train with representative Disposable PPI and verify flow rate. *See Calibration.*



Sample Transport and Analysis

Package and transport samples and blanks to an accredited laboratory for gravimetric or chemical analysis.

References

Trakumas, S., Hall, P., *Personal Respirable Sampler Containing Four Impactors Arranged in Parallel*, Abstracts of 23rd Annual AAAR Conference, Atlanta, GA, 2004, p. 78

Trakumas, S., Salter, E., "Parallel Particle Impactor - Novel Size-selective Particle Sampler for Accurate Fractioning of Inhalable Particles," *Journal of Physics: Conference Series* 151 (2009), 16 pp., 012060, [www.skinc.com/instructions/Parallel Particle Impactor Paper.pdf](http://www.skinc.com/instructions/Parallel%20Particle%20Impactor%20Paper.pdf)

Reference 2 is an author-created, non-copyrighted version of an article accepted for publication in the *Journal of Physics: Conference Series* 151. IOP Publishing Ltd. is not responsible for any errors or omissions in this version of the manuscript or any version derived from it. The definitive publisher authenticated version is available online. Go to <http://dx.doi.org>, enter doi: 10.1088/1742-6596/151/1/012060.

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Trakumas, S., "High-flow Personal Sampler to Monitor Exposure to Respirable Crystalline Silica at New Lower TLV," IOHA 2010 8th Conference Book of Abstracts, Rome, p. 59

Trakumas, S., Salter, E., "High-Flow Personal Sampler to Monitor Exposure to Respirable Crystalline Silica at New Lower TLV" PowerPoint Presentation

OSHA Final Rule on Respirable Crystalline Silica, www.osha.gov/silical

ISO 7708:1995 (2008), *Air Quality — Particle Size Fraction Definitions for Health-related Sampling*, www.iso.org, search on 7708

Stacey, P., Thorpe, A., and Echt, A., "Performance of High Flow Rate Personal Respirable Samplers When Challenged with Mineral Aerosols of Different Particle Size Distributions," *Ann. Occup. Hyg.*, 60, 2016, pp. 479-492, <http://annhyg.oxfordjournals.org/content/60/4/479.full.pdf>

Görner, P., Simon, X., Boivin, A., Bau, S., "Sampling Efficiency and Performance of Selected Thoracic Aerosol Samplers," *Annals of Work Exposure and Health*, 2017, Vol. 61, No. 7, 784-796

Ordering Information

Preloaded Disposable Plastic PPI Samplers, select the PPI for the desired convention. Designed for one-time use	Cat. No.
Preloaded Disposable Plastic PPI Samplers contain four porous plastic disc impaction substrates, one 37-mm collection filter, and one 37-mm cellulose support	
Respirable PPI (red) , 8 L/min, 5.0- μ m PVC filter	225-3841
Respirable PPI (red) , 8 L/min, 5.0- μ m PVC filter preweighed to 5 decimals	225-3841-PW
Respirable PPI (orange) , 4 L/min, 5.0- μ m PVC filter	225-3871
Respirable PPI (orange) , 4 L/min, 5.0- μ m PVC filter preweighed to 5 decimals	225-3871-PW
Respirable PPI (gold) , 2 L/min, 5.0- μ m PVC filter	225-3851
Respirable PPI (gold) , 2 L/min, 5.0- μ m PVC filter preweighed to 5 decimals	225-3851-PW
Respirable PPI (gold) , 2 L/min, 1.0- μ m PTFE filter, no support	225-3852
Thoracic PPI (blue) , 2 L/min, 0.8- μ m MCE filter	225-3861
Thoracic PPI (blue) , 2 L/min, R-100 Quartz filter	225-3862
Accessory	
Calibration Adapter for Disposable PPI	225-389

SKC Limited Warranty and Return Policy

SKC products are subject to the SKC Limited Warranty and Return Policy, which provides SKC's sole liability and the buyer's exclusive remedy. To view the complete SKC Limited Warranty and Return Policy, go to skcinc.com/warranty.

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