



High Flow Respirable - Thoracic Cyclones

Applications

The GK2.69[®] Cyclone was originally developed as dual use cyclone for both Respirable and Thoracic personal sampling applications. It has significant advantages in both size ranges. **As a Thoracic sampler the GK2.69[®] has been adopted by NIOSH in their Manual of Analytical Methods (NMAM) as part of Standard Number 5524** for sampling airborne concentrations of Metalworking Fluids (MWF). There is no other cyclone available which fulfills the requirements of the method. **A stainless steel version has been introduced (below) for any purpose but principally to satisfy the desires of Canadian clients who have a Sulfuric acid sampling requirement.**

Thoracic fiber sampling studies published in the distinguished Annals of Occupational Hygiene demonstrate that the GK 2.69[®] is superior for this application.

The cyclone is also seeing wide use for the measurement of PM₁₀. Although EPA and NIOSH have differing definitions of Thoracic/PM₁₀ they are fundamentally the same.

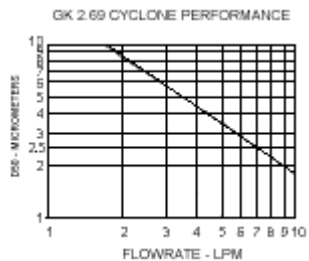
As a high (4.2 lpm) flow rate Respirable sampler it is frequently utilized for the sampling of silica dust to achieve more reliable sensitivities than the current 1.7 or 2.2 lpm flow rates normally utilized. **To facilitate the informational requirements of investigators measuring Crystalline Silica to a standard of 0.05 mg/m³ we have determined that a sampling time of 3.17 hours is required. A spread sheet permitting the calculation of Method Sensitivity is directly available.**

Flow Rates

The D₅₀ cut for respirable sampling is achieved at a flow rate of 4.2 Lpm. A thoracic curve flow rate is recommended at 1.6 Lpm.

Media Type 37 mm	Flow Rate Lpm	Pressure Drop cm of H ₂ O
GF/A Fiberglass	7.3	23.7
GF/A Fiberglass	4.2	11.5*
GF/A Fiberglass	1.8	3.4*
Gelman Teflo	7.3	16.2
Gelman Teflo	4.2	7.4*
Gelman Teflo	1.6	1.8*
0.8 micrometer MCE	7.3	62
0.8 micrometer MCE	4.2	35
0.8 micrometer MCE	1.6	11.9*

*Flow media achievable with AFC123RT pump



The performance curve at the left details real and extrapolated performance which may be of additional interest to investigators interested in exploring "cuts" other than respirable and thoracic.



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Specifications		
Dimensions	(O/A)	
Height	3.9 in (9.9 cm)	3.9 in (9.9 cm)
Width	1.6 in (5 cm)	1.6 in (5 cm)
Depth	2.0 in (5 cm)	2.0 in (5 cm)
Weight	3 oz (86 g)	6.3 oz (178 g)
Materials of Construction	Anodized Aluminum	316 Stainless Steel

Ordering Information	
<i>Click on a part number to add that item to your Price Quote List.</i>	
GK2.69®	Respirable/Thoracic Cyclone (Anodized Aluminum)
GK2.69SS®	Respirable/Thoracic Cyclone (316 Stainless)
GK2.69SS25	Same as GK2.69SS® but with a 25mm Cassette Top
GK2.69AL25®	Same as GK2.69® but with a 25mm Cassette Top
Replacement Parts	
GK2.69OR	O-Ring Kit for the GK2.69® Cyclone
GK2.69SSOR	O-Ring Kit for the GK2.69SS® Cyclone
GK2.69AL25OR	O-Ring Kit for the GK2.69AL25® Cyclone
GK2.69SS25OR	O-Ring Kit for the GK2.69SS25® Cyclone
AFC5	Luer Adapter
10205	Alligator Clip w/ Screw & Washer

1. American Conference of Governmental Industrial Hygienists (1964) Particle Size Selective Sampling in the Workplace. Pub. No. 0830 ACGIH, Cincinnati, OH.
2. Hamilton, R.L.J. and Walton, W.H. (1961) The Selective Sampling of Respirable Dust. "Inhaled Particles and Vapors". (Ed. by Davies, C.N.) pp 465-475. Pergamon Press, Oxford.
3. Maynard, A.D. and Kinney, L. Performance Assessment of Three Personal Cyclone Models using an Aerodynamic Particle Size. (1995), Journal of Aerosol Science (No. 4, Vol. 25).
4. D.L. Bartley et al. Respirable Aerosol Sampler Performance Testing (1994), American Industrial Hygiene Assoc. Journal (No. 11, Vol. 55).
5. Conference of Governmental Industrial Hygienists (1995-1996) Threshold Limit Values. p 47, ACGIH, Cincinnati, OH.
6. L.C. Kinney and Gussman, R.A. Characterisation and Modelling of a Family of Cyclone Aerosol Preseparators (1997), Journal of Aerosol Science (No. 4, Vol. 28).
7. A. Maynard. Measurement of Aerosol Penetration Through Six Personal Thoracic Samplers Under Calm Air Conditions (1999), Journal of Aerosol Science (No. 9, Vol. 30).



Historical

Until 1994 the U.S. considered a D_{50} cut of 3.5 micrometers to be the respirable standard while the rest of the world used 5 micrometers.^{1,2} Since then, there is international agreement that 4 micrometers is the standard value for respirable particulates.^{3,4} Following on this recent intense interest in respirable sampling, criteria has been internationally established for thoracic and inhalable sampling. The thoracic curve has a D_{50} cut of 10 micrometers. The inhalable criteria state that 50% of the particulates are less than 100 micrometers.⁵

With the intensifying interest in size selective sampling, BGI has taken advantage of a recently presented scientific study to produce a dual function, size selective cyclone which will serve as a high flow respirable sampler or a normal flow thoracic sampler.⁶

A study of six personal thoracic samplers⁷ showed the GK2.69[®] to have the closest adherence to the thoracic curve and the least sampling bias. The cyclone has been widely used for the sampling of cutting fluid oil mist.

The instrument shown in the figure is known as the GK2.69[®]. This nomenclature is the same as that used by the authors of the study and indicates the origin of the design model and the internal diameter of the cyclone, in centimeters. It is fabricated from aluminum and protected against wear and corrosion with an electroless nickel plated surface finish. Disposable 37 mm 3 piece cassettes are utilized for sample collection. For high flow respirable sampling, fiberglass or Gelman Teflo media are recommended. For normal flow thoracic sampling, the preceding media may be utilized or membranes, such as 5 micrometer PVC or 0.8 micrometer MCE.