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INSTRUCTIONS: Ambient Cyclones for Environmental Samplers

SCC 1.829 – 5 Lpm for PM2.5

SCC 2.654 – 10 Lpm for PM2.5

SCC 0.732 – 2 Lpm for PM1

SCC 1.197 – 5 Lpm for PM1

See below for secondary performance data.

Introduction:

The cyclones SCC 1.829 and SCC 2.654 are intended to be used with any photometer or environmental air sampler which has a $\frac{1}{2}$ inch O.D. (12.7 mm) vertical inlet tube and requires **PM 2.5** performance at either 5 or 10 Lpm in the ambient, industrial or indoor environment.

The cyclones SCC 0.732 and SCC 1.197 are intended to be used with any photometer or environmental air sampler which has a $\frac{3}{8}$ inch O.D. (9.5 mm) vertical inlet tube and requires **PM 1** performance at either 2 or 5 Lpm in the ambient, industrial or indoor environment.

At the stipulated flow rate, the units, which are based on the Sharp Cut Cyclone model^{1,2} conform to EPA ideals for size selective sampling at this cut point. They are fitted with omnidirectional inlets designed to the TSP standard which requires an intake velocity equal to the sedimentation velocity of a 100 μ m AED particle. The use of this type of fundamental design is intended to minimize the aspiration of large particles and aerosol water droplets. The assembled unit is generically depicted in Figure 1 and detailed part numbered views are shown in Figures 2 and 3.

Calibration:

When using the unit on a sampler, for the first time, it will be necessary to audit the flow rate calibration, of the photometers flow management system. The reason for this procedure is to make any necessary adjustments for the increased resistance of the cyclone, upon the system.

SCC 1.829	1.3 cm. of H ₂ O
SCC 2.654	1.4 cm. of H ₂ O
SCC 0.732	10 cm. of H ₂ O
SCC 1.197	10 cm. of H ₂ O

To perform this check it is necessary to remove the omnidirectional inlet in order to

attach a hose, leading to the calibration device. Remove the cap securing screw (10002) and the cap (2279, 2280, 2426 or 2901). Loosen the three set (10004) screws and pull the cap support (2281, 2290 or 2425) from the inlet tube. The cyclone may now be installed on the sampler with a hose leading to the calibration device. Calibrate according to the sampler manufacturers instructions.

BGI calibrators that may be used for this purpose are the TetraCal (formally triCal) and the deltaCal with the DC-11 adapter. Once the flow verification/adjustment is complete, remove the cyclone from the sampler and reassemble the inlet shroud.

Operation:

The Complete cyclone is installed on the sampler and switched on. When using in the ambient environment, some thought must be given to operation in the presence of precipitation and fog. The inlet shroud will minimize but, not eliminate the ingress of particulate water. Therefore, if the photometer or air sampler will, in any way, be damaged by the effect of water being drawn in, it should not be operated during inclement weather.

In the event that the cyclone is inadvertently operated at the wrong flow rate or a different cut point is desired, equations are provided on our web site at (http://www.bgiusa.com/cyc/cyclone_calculator.xls) which will permit calculation of the cut point. Important points are given below:

	Q – Lpm	D₅₀ - μm
SCC 1.829	1.5	10
	3.3	4.0
	5.0	2.5
	11	1.0
SCC 2.654	3.0	10
	6.6	4.0
	10	2.5
	21	1.0
SCC 0.732	2.0	1.0
	0.91	2.5
	0.6	4.0
SCC 1.197	5.0	1.0
	2.27	2.5
	1.51	4.0

The cyclones will exhibit different pressure drops at different flow rates and the effect on the systems pumping capacity must be taken into account. Our web site presents the Q vs. ΔP curves for each cyclone (http://www.bgiusa.com/cyc/cyclone_calculator.xls)

Cleaning:

The cleaning interval for the cyclone is entirely dependent upon the environment in which it is deployed. In ambient environments it should be inspected and cleaned on a weekly basis until sufficient experience is gained, such that longer intervals can be utilized. A month between cleanings is entirely possible. In harsh industrial environments, daily attention may be required,

Remove the grit pot by unscrewing it. Dispose of its contents and clean and dry it. Remove the three screws from the top of the cyclone and remove the top. The parts can now be cleaned, thoroughly. The method of first choice is immersion in an ultrasonic cleaner with water and mild soap. Usually hand wiping with a water dampened lint free cloth will suffice. *PROTRACTED SOAKING IN SOAP/CAUSTIC SOLUTIONS WILL DAMAGE THE ALUMINUM COMPONENTS!*

WARNING: Because of the almost infinite variety of dusts which, may be sampled with this device, it is not possible to give specific recommendations for cleaning substances. Also, it must be noted to be careful not to re-aerosolize hazardous materials when using compressed air for cleaning. Utilize good hygiene practices at all times.

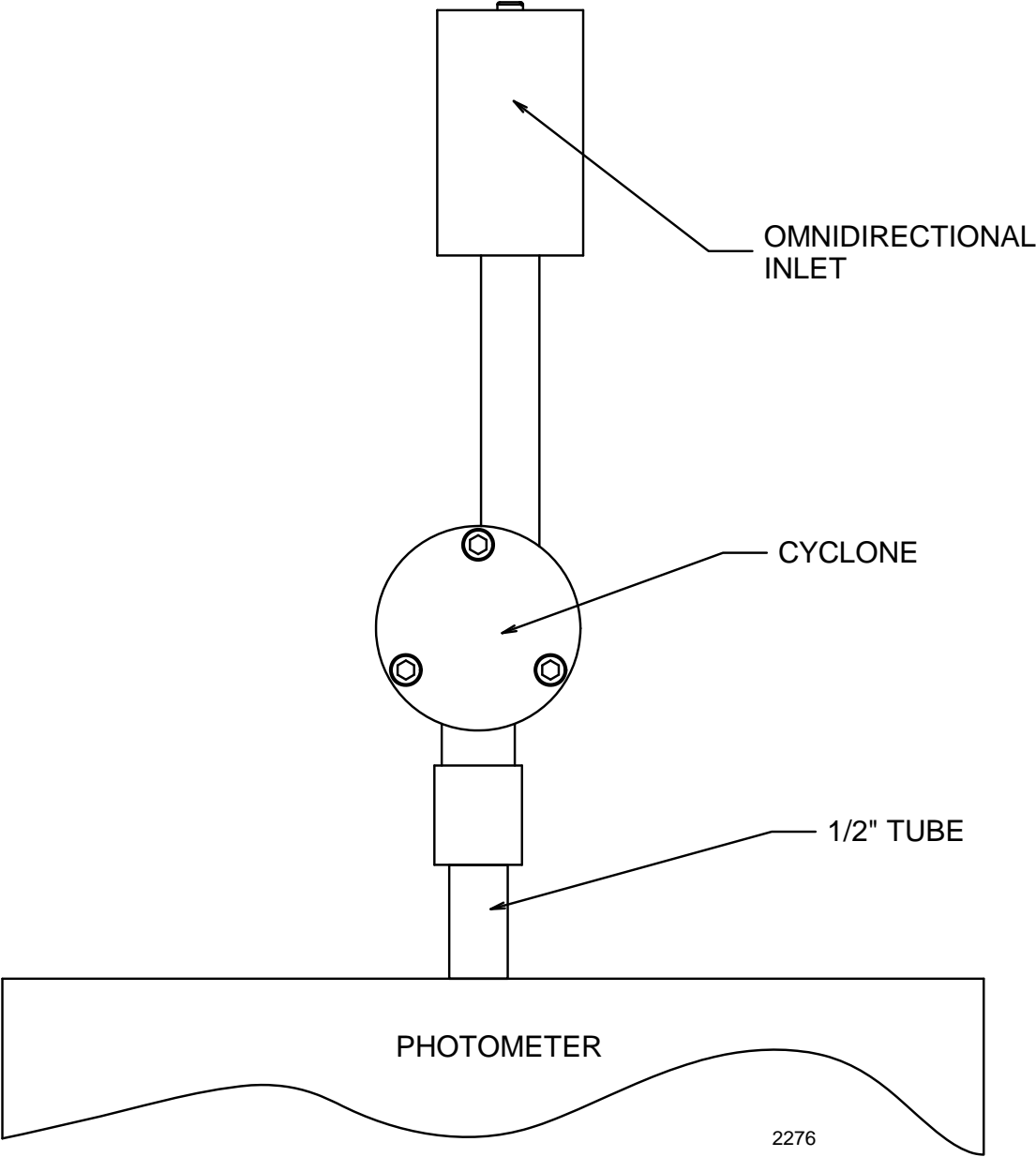


Figure 1 – View of Assembled Cyclone

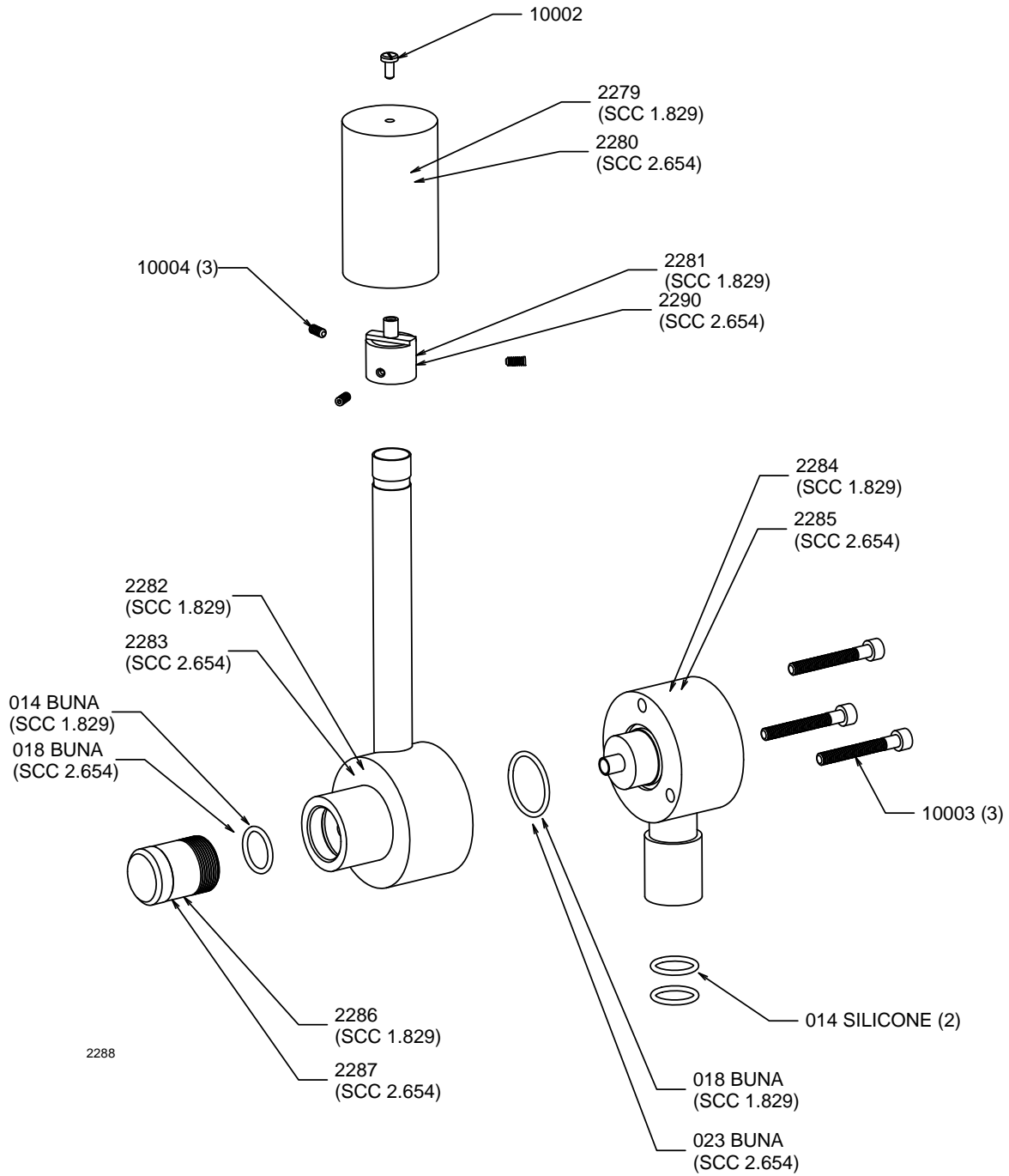


Figure 2 – Exploded View of SCC 1.829 and SCC 2.654 Cyclones

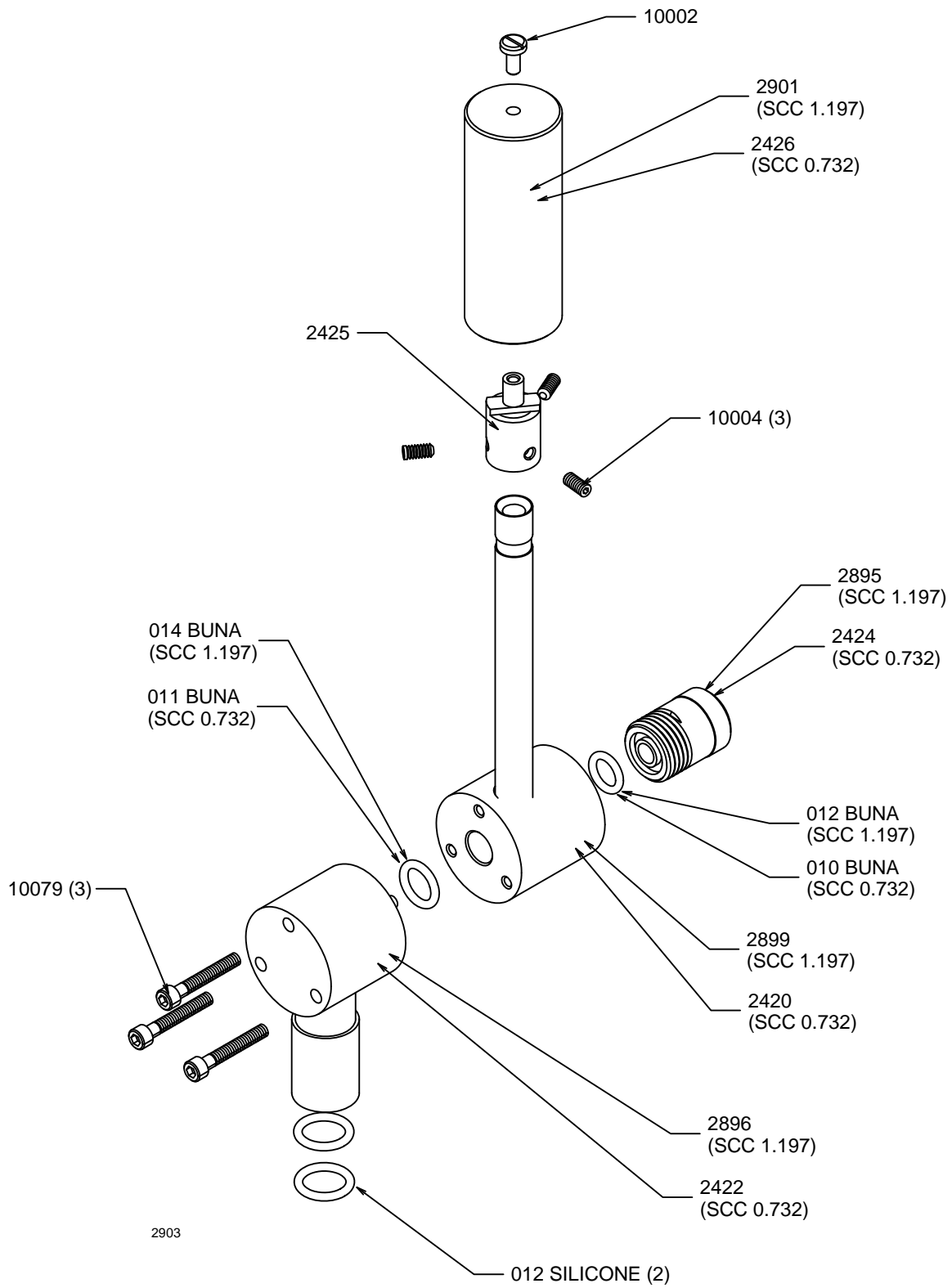


Figure 3 – Exploded View of SCC 0.732 and SCC 1.197 Cyclones

Parts List.

Part No.	Qty	Description	Cyclone
10002	1	#4-40 x ¼ Phillips Pan Head w/Seal	SCC 1.829
10003	3	#8-32 x 1 ¼ SS Allen Cap Screw	SCC 1.829
10004	3	#4-40 x 1/8 SS Set Screw	SCC 1.829
014 Buna	1	#014 Buna O Ring	SCC 1.829
014 Silicone	2	#014 Silicone O Ring	SCC 1.829
018 Buna	1	#018 Buna O Ring	SCC 1.829
2279	1	Inlet Cover	SCC 1.829
2281	1	Inlet Body	SCC 1.829
2284	1	Cyclone Top	SCC 1.829
2286	1	Dust Cup	SCC 1.829
2291	1	Exit Tube	SCC 1.829
2292	1	Inlet Tube	SCC 1.829
2282	1	Cyclone Body	SCC 1.829
10002	1	#4-40 x ¼ Phillips Pan Head w/Seal	SCC 2.654
10003	3	#8-32 x 1 ¼ SS Allen Cap Screw	SCC 2.654
10004	3	#4-40 x 1/8 SS Set Screw	SCC 2.654
014 Silicone	2	#014 Silicone O Ring	SCC 2.654
018 Buna	1	#018 Buna O Ring	SCC 2.654
023 Buna	1	#023 Buna O Ring	SCC 2.654
2280	1	Inlet Cover	SCC 2.654
2285	1	Cyclone Top	SCC 2.654
2287	1	Dust Cup	SCC 2.654
2290	1	Inlet Body	SCC 2.654
2291	1	Exit Tube	SCC 2.654
2293	1	Inlet Tube	SCC 2.654
2283	1	Cyclone Body	SCC 2.654

Part No.	Qty	Description	Cyclone
10002	1	#4-40 x ¼ Phillips Pan Head w/Seal	SCC 1.197
10079	3	#4-40 x 1 1/8 SS Allen Cap Screw	SCC 1.197
10004	3	#4-40 x 1/8 SS Set Screw	SCC 1.197
012 Buna	1	#012 Buna O Ring	SCC 1.197
012 Silicone	2	#014 Silicone O Ring	SCC 1.197
014 Buna	1	#014 Buna O Ring	SCC 1.197
2901	1	Inlet Cover	SCC 1.197
2425	1	Inlet Body	SCC 1.197
2896	1	Cyclone Top	SCC 1.197
2895	1	Dust Cup	SCC 1.197
2898	1	Exit Tube	SCC 1.197
2900	1	Inlet Tube	SCC 1.197
2899	1	Cyclone Body	SCC 1.197
10002	1	#4-40 x ¼ Phillips Pan Head w/Seal	SCC 2.654
10079	3	#8-32 x 1 1/8 SS Allen Cap Screw	SCC 2.654
10004	3	#4-40 x 1/8 SS Set Screw	SCC 2.654
012 Silicone	2	#012 Silicone O Ring	SCC 2.654
011 Buna	1	#011 Buna O Ring	SCC 2.654
010 Buna	1	#011 Buna O Ring	SCC 2.654
2426	1	Inlet Cover	SCC 2.654
2422	1	Cyclone Top	SCC 2.654
2424	1	Dust Cup	SCC 2.654
2425	1	Inlet Body	SCC 2.654
2423	1	Exit Tube	SCC 2.654
2421	1	Inlet Tube	SCC 2.654
2420	1	Cyclone Body	SCC 2.654

References:

1. Kenny L.C. *et al* (2000) Development of a Sharp Cut cyclone for Ambient Aerosol Monitoring Applications, *J. Aerosol Science and Technology*, Vol.32: 338-358
2. Kenny L.C. *et al* (2000) A Direct Approach to the Design of Cyclones for Aerosol-Monitoring Applications, *J. Aerosol Science*, Vol. 31: 1407-1420.

Revision history:

Version 2.0	Added SCC 0.732 and SCC 1.197 Cyclones	Sept. 2005
Version 2.1	Added pressure drops for SCC0.732 & 1.197	Dec. 2005
May,2007	Added “tetraCal”, Ch’d version to date revision	