

**COTTON
DUST
SAMPLER**

Introductory Sampling Principles

The irregular shape of cotton dust ranges in size from particles large enough to be visible to the naked eye to those that are submicron in size.

The use of the vertical elutriator for measuring human exposure to cotton dust will produce data which correlates well with indicators of biological response.

The GMW-4000 Vertical Elutriator utilizes the principle that particles with settling velocities less than the velocity of an airstream will be carried upward by a stream of air in a cylinder.

The slow lamina up-flow of air produced by the GMW-4000 Vertical Elutriator assures the particles with falling speeds greater than the up-flow of air (7.4 LPM) will not be carried up to the filter but will fall free and not be sampled.

Sampler Location

The vertical elutriator must be suspended vertically with the inlet positioned near the breathing zone of the worker. The brackets attached to the cylinder of the elutriator may be used for strapping to a post.

Sampler Calibration

Accurate calibration of the sampler is essential. The frequency of calibration is dependent on the use, care and handling of the instrument.

The limiting orifice should be calibrated with a wet test meter or other appropriate air measuring device. Follow manufacturers directions for best results.

The calculated flow rate obtained is compared with the recommended flow rate of 7.4 ± 0.2 LPM. If the flow is not within these limits, replace or modify the orifice and repeat calibration.

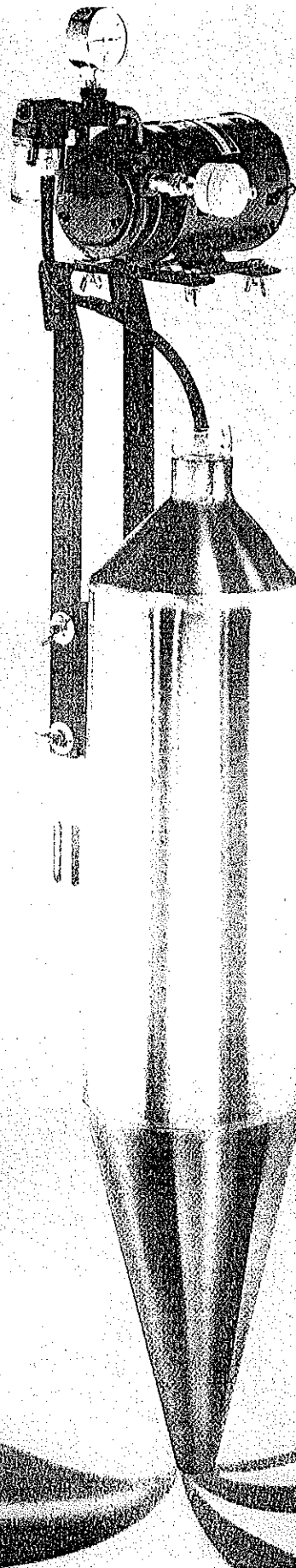
NOTE: Placement of the critical orifice in the calibration train is very important. The small hole end must face the calibrating apparatus and the large hole end must face the pump.

Unit Assembly

The elutriator, pump and pump brackets are packed separately and require assembly. The pump brackets attach to the elutriator as shown in the photo with the four wing nuts.

The pump is placed on top of the brackets and bolted down. Insert the vacuum gage in the metal tee on the inlet of the pump. Next insert the pump filter holder part No. 4001-M25 into the relief valve. (Use replacement filter part No. 4018-M25)

Place one length of the supplied tubing on each end of the critical orifice and observe the hole size at each end of the orifice. The smallest hole faces the three piece cassette and the larger hole faces the pump.



Sampling Procedure

A. SAMPLING DATA SHEETS

Sampling data sheets shall include a log consisting of the following:

- (1) The date of the sample collection
- (2) The time of sampling
- (3) The location of the sampler
- (4) The sampler serial number
- (5) The cassette number
- (6) The time of starting and stopping the sampling and the duration of sampling
- (7) The weight of the filter before and after sampling
- (8) The weight of dust collected (corrected for controls)
- (9) The dust concentration measured
- (10) Other pertinent information
- (11) Name of person taking sample

B. FILTER CASSETTE ASSEMBLY

Assembly of the filter cassette shall be as follows:

- (1) Loosely assemble 3-piece cassette
- (2) Number cassette top and bottom
- (3) Place absorbent pad in cassette
- (4) Weigh filter to an accuracy of 10 ug
- (5) Place filter in cassette
- (6) Record weight of filter in log using cassette number for identification
- (7) Fully assemble cassette using pressure to force parts tightly together
- (8) Install plugs top and bottom
- (9) Put shrink band on cassette covering joint between center and bottom parts of cassette
- (10) Set cassette aside until shrink band dries thoroughly

C. SAMPLING

Sampling collection shall be performed as follows:

- (1) Clean lint out of the motor and elutriator and clean the relief valve screen
- (2) Install vertical elutriator in sampling locations specified above with inlet 4½ to 5½ feet from floor (breathing zone height)
- (3) Remove top section of cassette
- (4) Install cassette in ferrule of elutriator
- (5) Tape cassette to ferrule with 1 in. wide masking tape or similar material for air-tight seal
- (6) Remove bottom plug of cassette and attach hose containing critical orifice
- (7) Start elutriator pump and check to see if gauge reads above 14 in. of Hg vacuum

- (8) Record starting time, cassette number and sampler number
- (9) At end of sampling period stop pump and record time
- (10) Controls: With each batch of samples collected, two additional filter cassettes shall be subjected to exactly the same handling as the samples, except that they are not opened. These control filters shall be weighed in the same manner as the sample filters. Any difference in weight in the control filters would indicate that the procedure for handling sample filters may not be adequate and shall be evaluated to ascertain the cause of the difference, whether and what necessary corrections must be made and whether additional samples must be collected.

D. SHIPPING

The cassette with samples shall be collected along with the appropriate number of blanks and shipped to the analytical laboratory in a suitable container to prevent damage in transit.

E. WEIGHING

Weighing of the sample shall be achieved as follows:

- (1) Remove shrink band
- (2) Remove top section of cassette and bottom plug
- (3) Remove filter from cassette and weigh to an accuracy of 10 ug
- (4) Record weight in log against original weight

F. AIR VOLUME CALCULATION

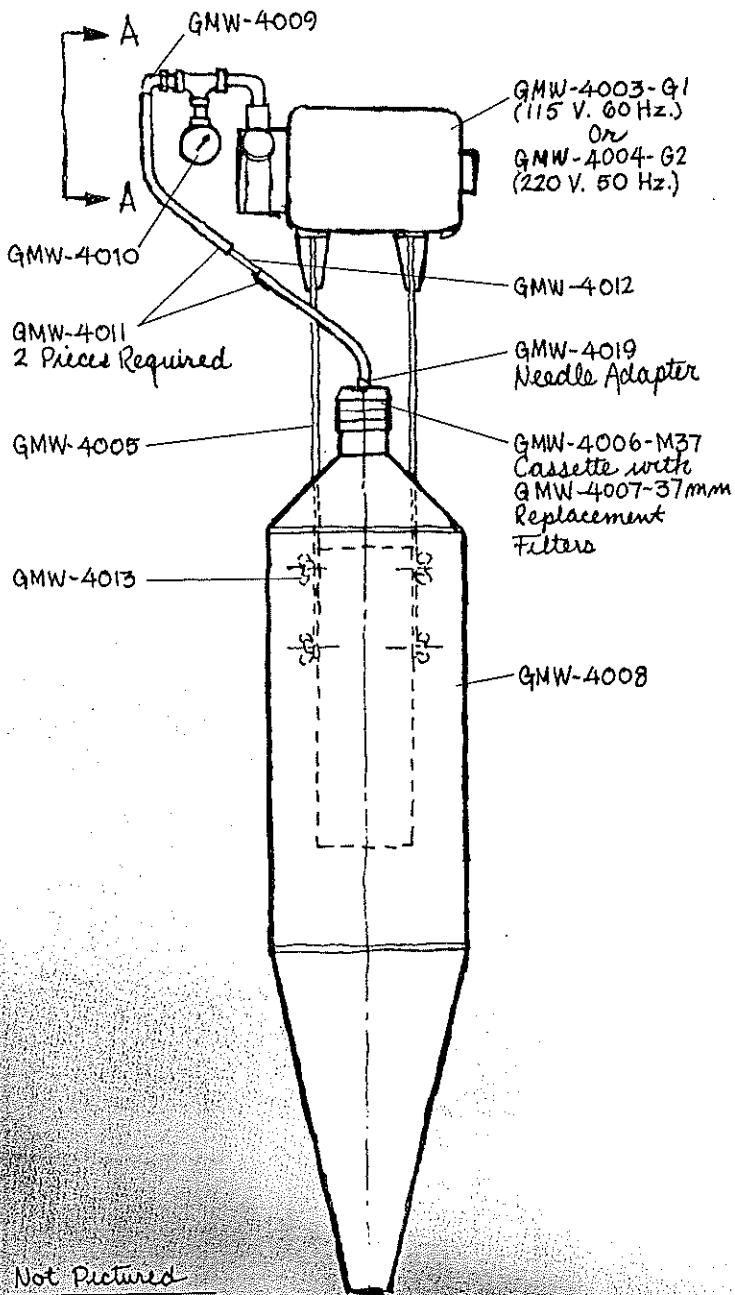
Calculation of volume of air sampled shall be determined as follows:

- (1) From starting and stopping times of sampling period, determine length of time in minutes of sampling period
- (2) Multiply sampling time in minutes by flow rate of critical orifice in liters per minute and divide by 1000 to find air quantity in cubic meters

G. DUST CONCENTRATION CALCULATION

Calculation of dust concentration shall be made as follows:

- (1) Subtract weight of clean filter from dirty filter and apply control correction to find actual weight of sample. Record this weight (in ug) in log
- (2) Divide mass of sample in ug by air volume in cubic meters to find dust concentration in ug/m³. Record in log



MAINTENANCE

The vacuum pump does not require lubrication. After every run, lint should be blown out of the motor housing and the elutriator.

If the motor fails to start or hums, disconnect plug and check the motor name plate ratings. Check the fuse located on the pump. If the fuse is "blown" check the pump to make sure that it rotates freely. If not free, check the rotor clearance as prescribed below.

Excessive dirt, foreign particles, moisture or oil will make the carbon vanes of the pump sluggish or break. Periodic flushing of the pump should alleviate these situations. To flush the pump, remove the filter and muffler assemblies and introduce several teaspoons of solvent into the pump through the intake while the pump is running. Recommended solvents include Inhibisol Safety Solvent and Dow Chemical Chlorothane.

"DO NOT USE KEROSENE"

Periodic adjustment of the clearance between the pump body bore and the rotor is recommended. The procedure is as follows:

- A. Remove the three screws which hold the retainer plate to the body.
- B. Remove the retainer plate and carbon wear plate to obtain access to the vanes.
- C. Use compressed air to clean out the pump chamber.
- D. The carbon wear plates have two usable sides. When one side is worn, simply invert the plate but use it on the same end of the pump.
- E. To reset clearance between top of rotor and top of bore of the pump body, loosen the screws that secure the body to electric motor.
- F. After the screws are loosened, place a .001" feeler gage between the top of the rotor and the body. Hold the body in position while the body bolts are tightened. Withdraw the feeler gauge and rotate the rotor to be sure all points clear the bore.

Not Pictured

GMW-4014 Power Cord
 GMW-4016 Carbon Vanes
 GMW-4017 Cord Connector Box

VIEW A-A