

Environmental Protection Agency

§ 53.40

Candidate Method _____

Reference Method _____

Applicant _____

First Set Second Set Type 1 Hour 24 Hour

Concentration Range		Date	Time	Concentration, ppm		Difference	Table C-1 Spec.	Pass or Fail
				Candidate	Reference			
	5							
	6							
	7							
	8							
							Total Failures:	

APPENDIX A TO SUBPART C OF PART 53—REFERENCES

(1) American National Standard—Specifications and Guidelines for Quality Systems for Environmental Data Collection and Environmental Technology Programs, ANSI/ASQC E4-1994. Available from American Society for Quality Control, 611 East Wisconsin Avenue, Milwaukee, WI 53202.

Subpart D—Procedures for Testing Performance Characteristics of Methods for PM₁₀

SOURCE: 52 FR 24729, July 1, 1987, unless otherwise noted.

§ 53.40 General provisions.

(a) The test procedures prescribed in this subpart shall be used to test the performance of candidate methods for PM₁₀ against the performance specifications given in table D-1. Except as provided in paragraph (b) of this section, a test sampler or samplers representative of the sampler described in the candidate method must exhibit performance better than, or equal to, the specified value for each performance parameter, to satisfy the requirements of this subpart.

(b) For a candidate method using a PM₁₀ sampler previously approved as part of a designated PM₁₀ method, only the test for precision need be conducted and passed to satisfy the requirements of this subpart. For a candidate method using a PM₁₀ sampler inlet previously approved as part of a designated PM₁₀ method, the tests for

precision and flow rate stability must be conducted and passed to satisfy the requirements of this subpart; the tests for sampling effectiveness and 50 percent cutpoint need not be conducted if suitable rationale is provided to demonstrate that test results submitted for the previously approved method are applicable to the candidate method.

(c) The liquid particle sampling effectiveness and 50 percent cutpoint of a test sampler shall be determined in a wind tunnel using 10 particle sizes and three wind speeds as specified in table D-2. A minimum of 3 replicate measurements of sampling effectiveness shall be required for each of the 30 test conditions for a minimum of 90 test measurements.

(d) For the liquid particle sampling effectiveness parameter, a smooth curve plot shall be constructed of sampling effectiveness (percent) versus aerodynamic particle diameter (µm) for each of the three wind speeds. These plots shall be used to calculate the expected mass concentration for the test sampler, using the procedure in § 53.43(a). The candidate method passes the liquid particle sampling effectiveness test if the expected mass concentration calculated for the test sampler at each wind speed differs by no more than ±10 percent from that predicted for the “ideal” sampler.*

*The sampling effectiveness curve for this “ideal” sampler is described by column 5 of table D-3 and is based on a model that approximates the penetration of particles into

Continued

(e) For the 50 percent cutpoint parameter, the test result for each wind speed shall be reported as the particle size at which the curve specified in § 53.40(d) crosses the 50 percent effectiveness line. The candidate method passes the 50 percent cutpoint test if the test result at each wind speed falls within $10 \pm 0.5 \mu\text{m}$.

(f) The solid particle sampling effectiveness of a test sampler shall be determined in a wind tunnel using $25 \mu\text{m}$ particles at 2 wind speeds as specified in table D-2. A minimum of three replicate measurements of sampling effectiveness for the $25 \mu\text{m}$ solid particles shall be required at both wind speeds for a minimum of 6 test measurements.

(g) For the solid particle sampling effectiveness parameter, the test result for each wind speed shall be reported as the difference between the average of the replicate sampling effectiveness measurements obtained for the $25 \mu\text{m}$ solid particles and the average of the replicate measurements obtained for the $25 \mu\text{m}$ liquid particles. The candidate method passes the solid particle sampling effectiveness test if the test

result for each wind speed is less than, or equal to, 5 percent.

(h) The precision and flow rate stability of three identical test samplers shall be determined at a suitable test site by simultaneously sampling the PM_{10} concentration of the atmosphere for 10 periods of 24 hours.

(i) For the precision parameter, the test result for each of the 10 periods of 24 hours shall be calculated using the procedure in § 53.43(c). The candidate method passes the precision test if all of the test results meet the specifications in table D-1.

(j) For the flow rate stability parameter, the test results for each of the three test samplers and for each of the 10 periods of 24 hours shall be calculated using the procedure in § 53.43(d). The candidate method passes the flow rate stability test if all of the test results meet the specifications in table D-1.

(k) All test data and other documentation obtained from or pertinent to these tests shall be identified, dated, signed by the analyst performing the test, and submitted to EPA.

TABLE D-1—PERFORMANCE SPECIFICATIONS FOR PM_{10} SAMPLERS

Performance parameter	Units	Specification
1. Sampling effectiveness:		
A. Liquid particles	Percent	Such that the expected mass concentration is within ± 10 percent of that predicted for the ideal sampler.
B. Solid particles	Percent	Sampling effectiveness is no more than 5 percent above that obtained for liquid particles of same size.
2. 50 Percent cutpoint	μm	$10 \pm 0.5 \mu\text{m}$ aerodynamic diameter.
3. Precision	$\mu\text{g}/\text{m}^3$ or percent	5 $\mu\text{g}/\text{m}^3$ or 7 percent for three collocated samplers.
4. Flow rate stability	Percent	Average flow rate over 24 hours within ± 5 percent of initial flow rate; all measured flow rates over 24 hours within ± 10 percent of initial flow rate.

§ 53.41 Test conditions.

(a) Set-up and start-up of all test samplers shall be in strict accordance with the operating instructions specified in the manual referred to in § 53.4(b)(3).

(b) If the internal surface or surfaces of the candidate method's sampler inlet on which the particles removed by the inlet are collected is a dry sur-

face (i.e., not normally coated with oil or grease), those surfaces shall be cleaned prior to conducting wind tunnel tests with solid particles.

(c) Once the test sampler or samplers have been set up and the performance tests started, manual adjustment shall be permitted only between test points for the sampling effectiveness and 50 percent cutpoint tests or between test

the human respiratory tract. Additional information on this model may be found in a document entitled, "Particle Collection Criteria for 10 Micrometer Samplers," which is available from the Quality Assurance Divi-

sion (MD-77), Environmental Monitoring Systems Laboratory, U.S. Environmental Protection Agency, Research Triangle Park, NC 27711.