

SEMI C14-95 (Reapproved 0913) TEST METHOD FOR PARTICLE SHEDDING PERFORMANCE OF 25 cm GAS FILTER CARTRIDGES

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NOTICE: This Standard or Safety Guideline has an Inactive Status because the conditions to maintain Current Status have not been met. Inactive Standards or Safety Guidelines are available from SEMI and continue to be valid for use.

1 Purpose

1.1 The purpose of this Standard is to define a comprehensive standard test sequence to derive particle-related qualification data for 25 cm (10 in.) filter cartridges.

2 Scope

2.1 This Test Method defines a particle shedding evaluation method for 25 cm filter cartridges of various media (e.g., PTFE, PVDF, polycarbonate, nylon, and polysulfone) commonly used individually or in assemblies to remove particles from gas lines. The filter cartridges are separable from the housings which can be cleaned and tested independently.

NOTICE: SEMI Standards and Safety Guidelines do not purport to address all safety issues associated with their use. It is the responsibility of the users of the Documents to establish appropriate safety and health practices, and determine the applicability of regulatory or other limitations prior to use.

3 Limitations

3.1 These test methods do not apply to point-of-use (POU) filters, for which separate methods have been developed.

3.2 Cartridge filter performance cannot be characterized by a single data point, as conditions of use (e.g., pressure drop, transient pressure surges) determine the importance of a particular measurement. A sequence of tests, designed to measure filter responses under various conditions, is necessary when evaluating cartridge filters.

3.3 The order of the test sequence will affect the test results, and it is designed for fair comparisons of different aspects of filter operations. Hence, it is important to follow the prescribed test sequence.

4 Referenced Standards and Documents

4.1 None.

NOTICE: Unless otherwise indicated, all documents cited shall be the latest published versions.

5 Summary of Method

5.1 The test sequence (shown schematically in Figure 1) consists of three steps:

1. Break-in
2. Pulse
3. Final Purge

6 Apparatus and Facility

6.1 *Gas Source* — Clean, dry nitrogen or dry air with less than 0.5 ppm moisture and less than 0.5 ppm total hydrocarbons.

6.2 *Particle Detectors* — A condensation nucleus counter (CNC) with a counting efficiency of 50%, as reported by the manufacturer, at 0.01 μm is recommended to measure total particle concentration greater than 0.01 μm .

6.3 *Test Environments* — A clean room environment is not required during testing; however, the test component should be unpacked and assembled in a Class 100 clean area to prevent ambient contamination.

6.4 *Configuration for Break-in Test* — The schematic of the test setup apparatus is shown in Figure 2. All components used in the test apparatus, including the flowmeter, valves, tubing, and filter housing, are 2.5 cm (1 in.) components or have 2.5 cm (1 in.) inlet and outlet connections. The apparatus consists of (1) a differential pressure sensor that can accurately measure Δp in the range 0.01 bar (0.15 psid) to 0.2 bar (3.0 psid) between the upstream and downstream pressure of the test component, (2) a flow control system that permits instantaneous change of flow corresponding to a Δp of 0.01 bar to 0.2 bar across the filter, and (3) a CNC downstream of the test filter.

6.5 *Configuration for Pulse Test* — The schematic of the test setup is the same as the break-in test.

6.6 *Sample Installation* — Reasonable precautions should be taken when installing the test filter or spool piece to avoid particle contamination of the system from ambient air. These precautions may include, but are not limited to, installation in a Class 100 laminar flow area, installation in a purged glove bag or other controlled ambient enclosure, use of a purge flow downstream of the sample point so that all parts of the system are under purge, isolation, or termination of the CNC sample flow, and isolation of the isokinetic sampler exhaust from ambient.

6.7 *Sampling System Design* — Customary practices should be employed for the design of the sampling system. Care should be taken to provide an adequate exhaust length so that back diffusion of particles does not affect the system background at two times the sampling flow rate. This length will depend upon the particle concentration in the ambient environment and other factors.

7 Procedure

7.1 Static Background Test

7.1.1 This test applies to all apparatus described in this document and should be performed prior to other tests.

7.1.2 Remove the filter cartridge from the filter housing and replace the test filter in Figure 2 with the empty housing.

7.1.3 Purge the system at 100 m^3/hr (3530 standard cubic feet per hour [scfh]). Measure particle concentration for a minimum of 45 sample intervals, each at least 6 standard liters (0.19 scf) or 4 minutes, whichever is greater. Continue to purge the system until 45 consecutive sample intervals without a particle being detected are recorded.

7.2 Dynamic Background Test

7.2.1 This test applies to the apparatus for pulse test as shown in Figure 2 with the test filter replaced by an empty filter housing.

7.2.2 Purge at a flow rate of 5 m^3/hr (177 scfh) until 5 consecutive 60-second sample intervals without a particle being detected are recorded.

7.2.3 Set the CNC sample interval time to 180 seconds. Synchronize the start of this test with the start of a CNC sample interval.

7.2.4 Purge at a flow rate of 5 m^3/hr (177 scfh) for 190 seconds.

7.2.5 Instantaneously switch to a flow rate of 100 m^3/hr (3530 scfh) by turning ON the solenoid valve and purge for 160 seconds.

7.2.6 Turn OFF the solenoid valve and purge at a flow rate of 5 m^3/hr (177 scfh) for 200 seconds.

7.2.7 Repeat ¶ 7.2.5 and ¶ 7.2.6 until 20 consecutive pulses without a particle being detected are recorded.