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ANSI/ASHRAE Standard 199-2016 (RA2026)
Method of Testing the Performance of Industrial Pulse Cleaned Dust Collectors

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Preview

NOTE

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(This foreword is not part of this standard. It is merely informative and does not contain requirements necessary for conformance to the standard. It has not been processed according to the ANSI requirements for a standard and may contain material that has not been subject to public review or a consensus process. Unresolved objectors on informative material are not offered the right to appeal at ASHRAE or ANSI.)

FOREWORD

ASHRAE Standard 199 provides a method of testing pulse cleaned dust collectors. The approach uses the "black box" concept, by which the dust collector and test system to be evaluated are operated per the instructions of the dust collector manufacturer without modification. This test procedure is not concerned with the internal operation of the dust collector. The performance assessment elements of the test system (inlet challenge hardware, outlet emissions quantification instrumentation, and means to provide regulated airflow through the system) are physically separated and designed so that they can be arranged and independently fastened to the black box to be evaluated.

Other methods of testing fabric and pulse cleaned filter elements (fabric filters) have been used extensively. Although useful, these methods do not adequately address performance. They do not accurately portray the dynamics of pulsed operations of multiple, full-filter arrangements. Moreover, prior to Standard 199, no standardized test was available to test the full system. Standard 199 addresses this need by requiring sequential cleaning consisting of six distinct stages run continuously.

The approach is to introduce a metered dust challenge using a specified test dust and then measure the concentration of the dust by two methods: gravimetric and photometric. Test stages include the following:

a. Conditioning
  Stage 1: Initial dust loading
  Stage 2: Initial dust loading with on-demand cleaning
  Stage 3: Dust loading with continuous cleaning

b. Performance Test
  Stage 4: Final dust loading with on-demand cleaning

c. Recovery Test
  Stage 5: Up-set condition
  Stage 6: Post-up-set condition

The standard describes the collection of total mass emissions and photometric emissions where no more than 25% of the filter elements are pulsed at one time.

a. Gravimetric Efficiency
  1. The standard includes a gravimetric measurement of total mass.
  2. Performance is measured by isokinetic sampling at the centerline onto a downstream membrane. The weight change of the membrane is used to calculate mass penetration as a decimal fraction of the upstream mass concentration.
  3. The gravimetric efficiency uses a calculated upstream concentration based on measured feed rate.

b. Photometric emissions
  1. The standard includes downstream airborne concentration of particulate as defined by PM_1, $PM_{2.5}$, and PM_{10}.

Before beginning the test, the requestor must provide several operating parameters. These include the following:

a. Specified airflow (the nominal volumetric flow rate for the test)
b. Pulse cleaning system high and low tubesheet differential setpoints
c. Pulse duration (the time the electronic signal indicates the solenoid valve is open)
d. Pulse intervals (the time between initiation of the successive pulses)
e. Pulse cleaning pressure
f. Pulse cleaning system volume
g. Up-set pressure condition limit (minimum of 10 in. of water [2488.4 Pa])

This method of test does not prescribe performance; rather it provides a way to state the performance of a pulse cleaned dust collector. It characterizes performance of a pulse cleaned dust collector system under specified laboratory conditions and under specified operating parameters using a standard test dust. Test results should not be used to predict absolute performance in actual industrial applications of similar equipment; however, these results will be useful in the comparative performance of different systems.

1. PURPOSE

The purpose of this standard is to provide a quantitative laboratory test method for determining the performance of industrial pulse cleaned dust collectors using a test dust.

2. SCOPE

This method of test applies to bag, cartridge, or envelope industrial dust collectors that recondition the filter media by using a pulse of compressed air to discharge the dust cake from the filter media while the air cleaning device remains online.

3. DEFINITIONS AND ACRONYMS

3.1 Definitions

airflow, specified: airflow rate in acfm (m^3/s) at the lab conditions by which the device is tested. In this standard it is specified by the requestor.

black box: device, system, or object that can be viewed in terms of its input, output, and transfer characteristics without any knowledge of its internal workings.

Informative Note: For the purpose of this test procedure, the industrial pulse cleaned dust collector is treated as a black box. The inputs are airflow, test dust, compressed air, pulsing mode, and electricity. The outputs are cleaned air and dust. The transfer functions are the measurements detailed in Section 11, such as pressure differential, compressed-air con-

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