DualDraw Wet Collector Efficiency Test Report

Average Efficiency Curve For A DualDraw Wet Collector

The independent industrial hygiene service company Chemistry & Industrial Hygiene, Inc. (C&IH) in collaboration with resources from Colorado State University performed extensive efficiency testing on DualDraw's wet collector product line. The objective was to create an efficiency curve to demonstrate the specific efficiency of the DualDraw design. The results of this testing are demonstrated graphically using an efficiency curve as shown on the next page of this report.

A lack of precedence of wet collector efficiency testing has created the opportunity for DualDraw to be recognized as the only wet collector vendor in the marketplace today with proven design efficiency. The methodology that C&IH created in collaboration with Colorado State University to achieve these results is documented in the abstract below.

For questions or comments on this test, please contact the DualDraw engineering department at **303-853-4083** or email us at ***service@dualdraw.com***.

BG3072-WC Wet Downdraft Table

WI36X8X8 Wet Walk-In Clean Air Station

WWW.DUALDRAW.COM
800-977-2125

Dualdraw Wet Scrubber Design Testing Methodology

1. Scope

A method of laboratory testing of a self-induced spray collector (Device) also known as a wet scrubber, or wet collector, to measure its performance in removing particles of specific optical size diameter is described. The method defines procedures for constructing the test apparatus, generating a challenge aerosol and provides a method for counting airborne particles of 1.0, 3.0, 5.0 and 10 micron (µm) in optical diameter upstream and downstream of the air cleaning device in order to calculate removal efficiency by particle size (fractional efficiency).

2. Test apparatus

A test duct was fabricated and connected to the device that incorporated an inlet and exhaust duct configuration. The inlet duct included a MERV 14 pre-filter, a variable speed auxiliary blower, a test aerosol injection section, a static mixer and a side stream (upstream) sample duct. The exhaust duct included a side stream (downstream) sample duct and an ASME flow nozzle.

The two isokinetic side stream sampling ducts were of identical size and configuration and each included an electric heater section, a fixed isokinetic particle sampling probe and a downstream balancing damper. Both side stream sample probes were connected to identical discrete particle counters capable of monitoring and recording real time particle counts in the size ranges indicated above. The upstream sampling duct also contained an isokinetic sample tube connected to an aerosol mass monitor capable of measuring and recording the aerosol mass concentration of the challenge aerosol. A heater was installed in the downstream sampling duct to raise the sample airstream temperature to ensure evaporation of residual fine water droplets from the wet collector exhaust air stream. A heater was installed in the upstream sampling duct to match the temperature of the upstream to the downstream air temperature to preclude potential temperature biases on the sampling procedure.

3. Challenge Aerosol

The challenge aerosol consisted of ISO 12103-1 A2 Fine Test Dust. The challenge aerosol was introduced into the upstream duct through a fluidized bed aerosol generator (FBAG) at three challenge concentrations; 0.03 milligrams per cubic meter (mg/m3), 0.07 (mg/m3) and 0.390 (mg/m3).

4. Test methodology

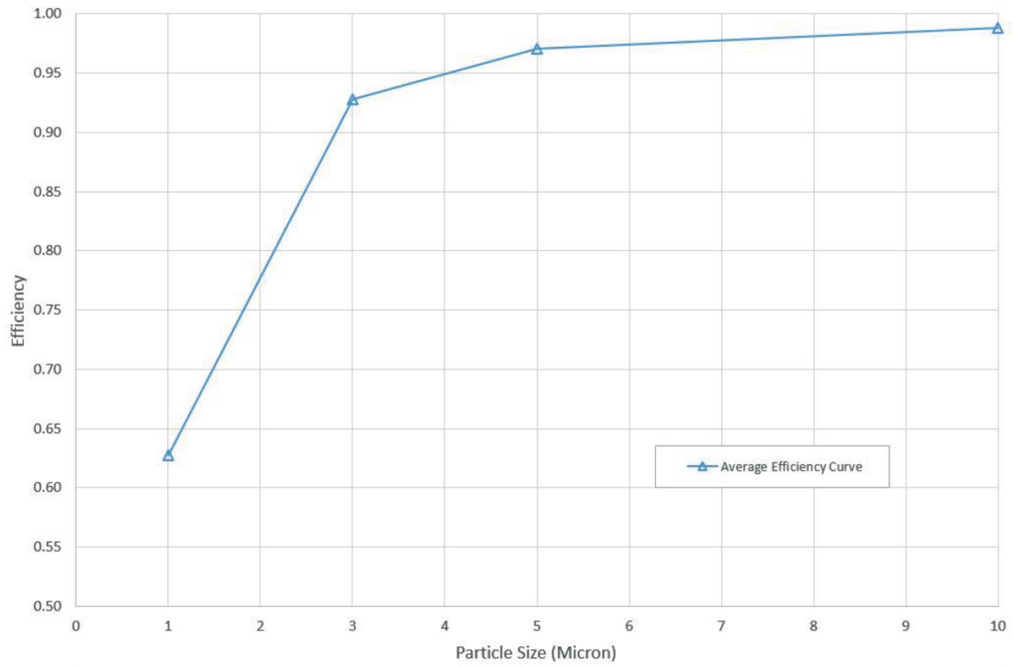
The auxiliary blower and the wet scrubber were energized and pressure drop through the flow nozzle was noted. The heaters were switched on and the temperatures in the two sample ducts were set to approximately the same temperature. The FBAG was switched on and aerosolized dust was delivered to the wet collector. The upstream and downstream particle concentrations were measured and recorded at one minute intervals for various sampling time periods ranging from 30 minutes to 90 minutes per sample run. To eliminate machine counting biases in calculating efficiencies, the upstream and downstream particle counters were swapped after each timed sample set and the particle counts for each one-minute interval were summed and averaged for the upstream particle counts and the downstream particle counts. The procedure was repeated for the various challenge aerosol concentrations.

5. Efficiency Calculations and Results

Efficiency was determined by subtracting the average downstream count from the average upstream count and dividing the difference by the upstream count for each particle size. Efficiencies were plotted for each particle size specified and at each challenge aerosol concentration. The collector efficiency was found to increase with increasing particle size and with increasing challenge aerosol concentration. The one µm particle size efficiency was determined to be approximately 63% at the low and moderate aerosol concentration. At the high concentration, the efficiency dropped to approximately 54% but this efficiency loss was attributed to coincidence effects due to the excessive total particle count which resulted in an underestimation of the upstream challenge concentration.

The collector efficiency at the 3 µm size range was approximately equal for all concentrations at between approximately 92% and 93% with the higher number corresponding to the highest dust load. At the medium and high dust loads the 5 µm and 10 µm particle counts continued to rise to 96 and 97% and 98 and 99%, respectively, with the highest challenge aerosol loads gaining the highest efficiency. At the lowest challenge aerosol concentration, the 5 and 10 µm efficiencies dropped from the efficiencies stated above to approximately 94% at 5 µm and 93% at 10 µm. This drop in efficiency at the low challenge aerosol contribution was attributed to a paucity of large particles in the challenge aerosol.

Average Efficiency Curve For A DualDraw Wet Collector



The efficiency curve for the DualDraw Model BG3036-WC Wet Collector is a composite curve most representative of data collected during a three week sampling period. Such considerations as optimal challenge aerosol loading, particle counter coincidence effects, and discrimination of particle count outliers were all taken into account when generating the efficiency curves.

NOTE: This content is considered confidential and shall not be circulated beyond the specific audience for which it has been shared without permission from DualDraw. Not for external use. Please contact DualDraw at 1-800-977-2125 with questions.

DUALDRAW
WWW.DUALDRAW.COM
800-977-2125

GSA
Contract Holder
FSS Contract
GS-25F-0161M