Docket 0084
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Policy and Standards Development Branch

Efficiency Testers for PAPR
Evaluation of High-Flow Filter

Technology Laboratory
Personal Protective
Efficiency Tester(s)

Operating Procedure(s) for acceptable High-Flow Filter Efficiency Level Determination Testing for PAPR and Filter

Formulate Standard Test Procedure for Particulate Filter Testing

the required testing

Identity High-Flow Filter Efficiency Tester(s) acceptable for

Efficiency Level Determination Testing

Testers for use in PAPR95 and PAPR100 Particulate Filter

and TSI, Inc. (TSI) Model 3120 High-Flow Filter Efficiency

Evaluates Air Techniques International (ATI) Model TDA-500P

Project Description - Planned Activities

Evaluation of High-Flow Filter Efficiency Testers

For PAPR
Identify lab technician issues
- Rates ranging from 100 to 500 Lpm
- Determine the DOP aerosol particle size distribution at flow
- Determine the time required to load 1000 mg of DOP aerosol
- Rates ranging from 100 to 500 Lpm
- Determine DOP aerosol loading as a function of time at flow

- Advertised specifications and PAPR standard

- Verify high-flow filter efficiency testers conform to

Efficiency Tester

Project Goals - Specific Testing for Each High-Flow Filter

Evaluation of High-Flow Filter Efficiency Testers

For PAPR
• Compressed Air Requirements:
  - Flow Rates
  - Additional compressed air required to accommodate higher efficiency testers
  - Operating requirements for ATL and TSI High-Flow Filter

For PAPR Evaluation of High-Flow Filter Efficiency Testers
TSI: 25 acfm at 7.5 inches Hg
ATI: 22.5 acfm at 19 inches Hg

Vacuum Requirements:
Flow rates
Vacuum pump required to overcome higher pressure drop across filter test bed and DOP discharge filter due to higher efficiency testers (cont.)

Operating Requirements for ATI and TSI High-Flow Filter

For PAPR Evaluation of High-Flow Filter Efficiency Testers
aerosol carryover venting

ATI exhaust requirements higher than TSI due to DOP

TSI: 25 scfm

ATI: 48 scfm

DOP aerosol exhaust requirements:

Rates

Higher exhaust rates capable of required due to higher flow

Efficiency Tests (cont.)

Operating requirements for ATI and TSI High-Flow Filter

Evaluation of High-Flow Filter Efficiency Tests

for PAPR
ATI TDA-500P High-Flow Filter Efficiency Tester for PAPR

Evaluation of High-Flow Filter Efficiency Testers
Evaluation of High-Flow Filter Efficiency Testers for PAPR

- TSI 3120 High-Flow Filter Efficiency Tester
prevent filter blowout

A support grid, with 1/2-inch x 1/2-inch openings and a 1/16-inch thick lattice is being used to support the filter and used for collection of the DOP aerosol

Type A/E glass fiber filters, 265-mm in diameter, are being weighed measurements

Collect sufficient DOP aerosol to obtain accurate change in weight measurements

Reduce the pressure drop at the higher flow rates

Inches in diameter:

- Enlargement of the filter test bed to approximately 8-1/2
- Determination of DOP aerosol loadings required and

DOP Aerosol Loading Measurements

for PAPR

Evaluation of High-Flow Filter Efficiency Testers
8-1/2-inch in diameter filter test bed with support grid

ATI TDA-500P High-Flow Filter Efficiency Tester

for PAPR

Evaluation of High-Flow Filter Efficiency Testers
Mass flow controllers installed in place of existing mass flow meters would improve aerosol loading stability.

- Run consistency of DOP aerosol loading measurements from run rate resulted in an improvement in the repeatability and
- Recent testing employing a hand valve to control the flow rate.
- Initial testing indicates DOP aerosol loading is dependent on

Flaw Rate Effect on DOP Aerosol Loading

For PAPR

Evaluation of High-Flow Filter Efficiency Testers
Flow Rate Effect on DOP Aerosol Loading – No Flow Control for PAPR

Evaluation of High-Flow Filter Efficiency Testers
Flow Rate Effect on DOP Aerosol Loading – Flow Control

Evaluation of High-Flow Filter Efficiency Testers

For PAPR
the PAPR test application

Vacuum pump noise may be mitigated by sizing the vacuum pump to final PAPR standard gas flow rate requirements and models

Vacuum pump should be located remotely for commercial efficiency tester, noise level in test lab is high with the vacuum pump close coupled to high-flow filter

Vacuum Pump Noise Generation for PAPR Evaluation of High-Flow Filtration Efficiency Testers
aerosol generator

TSI High-Flow Filter Efficiency Tester vents directly from
requirements

aerosol generator vent, resulting in higher waste gas venting

exhaust to balance excess DOP aerosol generation from

ATI High-Flow Filter Efficiency Tester requires secondary

before venting

gas is filtered upsteam of vacuum pump to remove DOP

ATI and TSI High-Flow Filter Efficiency Tester aerosol carrier

ventilation system such as a ventilated hood

need to be exhausted from the test area through a controlled

higher flow rates result in higher waste gas flow rates that

Waste Gas Venting

FOR PAPR

Evaluation of High-Flow Filter Efficiency Testers