Comparing Test Standards for Gas Turbine Filters

Filter testing was designed to help users compare the specific filtration/operating performance of an air filter.

The most common of these standards are:

- ASHRAE 52.2 – 2012
- EN779 – 2012
- EN1822
- ISO 16890

Each test report should include a description of the filter and include the manufacturers name, media type, dimensions, construction and media area.

Test Conditions – Common variables of the tests should be confirmed and may include: loading dust type, barometric pressure, air temperature and the relative humidity.

Air Flow – Filters are subjected to an air flow rate that is noted in the test request. Flow rates typically mirror those referenced by gas turbine OEM's. It is crucial that when comparing flow rates from one filter test to another the rates are within 5% - 7% of the rated flow.

Initial/Final Resistance – Each filter test should show an initial flow resistance at start up. A full flow curve provides specific points measured during the test. Air flows are typically run up through 120% of rated flow.

Dust-Holding Capacity – Generally accepted as an effective method to compare filter life based upon flow resistance. It measures the capacity to capture and hold dust at an acceptable resistance up to a predetermined DP. Typically noted in grams, values of differing test dusts can vary widely. 3X – 7X ASHRAE vs SAE/ISO.

Particle capture efficiency – An aerosol of particle sizes used to calculate efficiency. Differences counted upstream and downstream of the test filter. Differing ranges in particle sizes in the various standards. Assure comparison of like efficiencies. "Initial or average".

Static Discharge – Is a method to discharge natural or enhanced electrostatic charges that reside in synthetic fibers. Tests performed prior to 2012 may not include this protocol, will impact the efficiency and cannot be effectively compared to today's standards.

ASHRAE 52.2-2012 – MERV (minimum Efficiency Reporting Value): a rating that provides average efficiency in three groups particle size ranges. E1, E2 and E3. The E1 efficiency level (0.3µm – 1.0µm) would identify particle sizes that contribute the most to turbine blade fouling.

EN779 – testing is similar in many respects to the ASHRAE 52-2 standard. 5 particle size ranges versus 12. Efficiencies are reported at the smallest size where the mean diameter of the particles is 0.4µm. An average efficiency is also report at that size.

EN1822 – Primarily used to certify High Efficiency Particulate Air filters. Overall collection efficiency percentages are determined for the particle size with the highest penetration (MPPS = Most Penetrating Particle Size).

ISO 16890 – particle generation and counting is similar to other standards. Efficiency is classified into three distinct ranges. PM10, PM2.5, PM1. Particles with a diameter of less than 10µm, 2.5µm and 1µm. To qualify for a specific group a filter must have 50% efficiency at that size.

WHAT TO WATCH FOR:

Test flow levels – Efficiency and flow resistance can be impacted by different flow rates. A 5%-7% variance is acceptable for comparable results between filters.

Humidity – Relative humidity (RH) was found to contribute to variations in the repeatability and reproducibility of the ASHRAE 52.2-2012 standard on particles from 1.0 to 3.0 microns. RH of test air was recommended to be controlled from 20%-65% and be controlled to 45% 10%

Test Dust – Compare only like test dusts. Up to a 3x-7x difference can be expected. ASHRAE dust and SAE/ISO fine cannot be compared effectively.