Evaluating Performance Data of 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**

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.

Particle capture efficiency – is calculated by subjecting the filter to an aerosol spray which delivers precisely control particle sizes to the filter media. Efficiency is then calculated by counting the differences upstream and downstream of the test filter. There can be a slightly differing ranges in particle sizes between two separate standards. It is important relative to a comparison that filter performance be compared with like filter standards.

Dust Holding Capacity – is the capacity of a filter to capture and hold dust at an acceptable resistance for a period of time. The value is typically noted in grams, taken when the airflow resistance reaches a preset maximum. DHC must be compared to the same end of test level or comparison is essentially impossible.

ASHRAE 52.2-2012 MERV (minimum Efficiency Reporting Value) – is an overall rating that provides expected "minimum levels of efficiency". Averaging of particle efficiency is also performed in three separate ranges. E1, E2 and E3. The E1 efficiency level averages the smallest particle size range (0.3µm – 3.0µm) This range is also considered the most challenging for a filter to capture and is reported as the primary cause of 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.

Removal of static charges – Contemporary test standards for both EN779 and ASHRAE have recognized a method to remove retained static fiber charges that have shown to initially improve small particle capture. The growing use of synthetic fibers that can carry or have its static charge enhanced by the manufacturer was addressed by Appendix J (ASHRAE) and IPA static dissipation (EN779).

What to watch for:

Test flow levels – Efficiency and flow resistance can be impacted by variable flow rates should be within a 5%-7% variance 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 ± ıtrolled 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.