FACT SHEET: Stability in the Ceiling Fan Test Procedure

DOE finalized a Test Procedure for ceiling fans in July 2016. Compliance January 23, 2017.

What is the problem?

- The Final Rule creates extremely rigid **stability requirement.**
- The average air velocity for each one of (nine) sensors installed below the fan for testing cannot vary > 5% from test to test, comparing Sensor 1 to Sensor 1, S2 to S2, and so on. Sensors must be installed every few inches under the fan blade.
- This requirement was new in the Final Rule.
- Fans are not designed as precision airflow devices.
- Thus, achieving such a narrow variance is proving nearly impossible for most ceiling fans. Manufacturers cannot achieve "stability" after purchase of new sensors, or repeated tests.
- In order for manufacturers to comply, there would need to be expensive product changes with no advantage to consumers, energy efficiency, or the integrity of the test.

> In this final rule, DOE is establishing stability criteria to minimize test result variation. These stability criteria are in terms of acceptable air velocity and power measurement variation. Subsequent measurements must be made until stable measurements are achieved. Stable measurements are achieved when: (1) The average air velocity for all axes for each sensor varies by less than 5% compared to the average air velocity measured for that same sensor in a successive set of air velocity measurements, and (2) average power consumption varies by less than 1% in a successive set of power consumption measurements. Variations that do not meet those criteria indicate that a significant change in temperature likely occurred during the test and results will vary too significantly. DOE is adopting a provision that measurements that do not meet the definition of stable measurements are prohibited from being used in the test result. Instead, this final rule specifies that the measurement of air velocity and power be repeated until stable measurements are achieved. DOE

- DOE-approved test labs (~12 of these) are also seeing drastic lab-to-lab variability.
- 10 companies have sought extensions from DOE due to difficulty with test procedure.

The Solution: Legislate a new definition of stability modification to the ceiling fan test procedure.

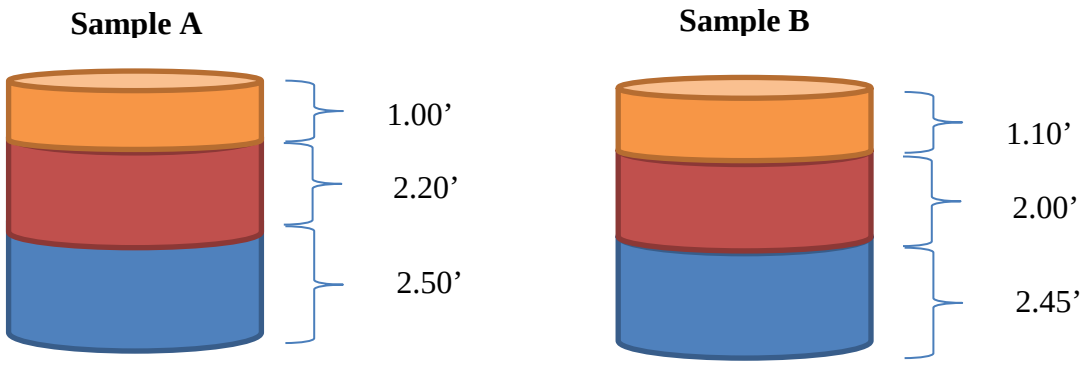
> (a) DEFINITION OF STABILITY CRITERIA FOR CEILING FAN TESTS - Section 323(b) of the Energy Policy and Conservation Act (42 U.S.C. 6293(b) is amended by adding at the end of paragraph 16 the following:
>
> (C) No later than 30 days from the enactment off this Act, the Secretary shall revise the ceiling fan test procedure to reflect that for small-diameter ceiling fans, stability in testing is achieved when:
>
> (a) In a successive set of measurements, the lower recorded value for airflow multiplied by 1.030 is greater than or equal to the higher recorded value for airflow, or these airflow measurements vary less than 15 cubic feet per minute, and
> (b) the average power consumption varies by less than 1% in a successive set of power consumption measurements.

- The new definition of stability would provide for 3% variation in either direction for the overall fan airflow, for a total of 6%.
- It would eliminate the "directionality" problem of DOE's requirement. As written today, stability can depend on whether the lower recorded value was collected first or second.
- The proposed fix would direct DOE to correct the Final Rule, rather than codify the new definition directly. This will allow DOE to address stability in future rulemakings as usual.
- Proposed fix would also exempt any fans that have already tested successfully under the old metric – meaning they wouldn't have to be "double tested" if already in compliance.

The Block Analogy

We are proposing to change the DOE Ceiling Fan Test Procedure stability requirements from “sensor to sensor” based stability to “airflow based” stability.

Imagine that DOE regulated the height of a stack of blocks. Two samples are compared to see if the block building process is compliant the DOE regulations. Samples A and B shown below will be used to evaluate two different methods of evaluation.



Scenario 1 – Block to Block Height Variation

In the block to block method, the height measurement of each of individual block in Sample A is compared to the same measurement in Sample B. The individual A to B variation must be between 95% and 105% to pass the block stability requirement. In this case, none of the measurements meet the stability requirement and the samples would need to be measured again.

Block	Sample A	Sample B	A / B
Green	1.00	1.10	91% - FAIL
Orange	2.20	2.00	110% - FAIL
Blue	2.50	2.45	109% - FAIL
Total	5.70	5.55	-

Scenario 2 – Overall Height Variation

In the overall height method, the total height of the blocks for the shorter stack is compared to the taller stack. The height of the short stack must be within 3% of the tall stack. In this case, the measurement of the short stack is within 3% of the tall stack, so the stack measurements would be considered stable.

Block	Sample A	Sample B	A / B
Total	5.70	5.55	103% - PASS

Scenario 1 is essentially how DOE determines stability for ceiling fan airflow. There is no comparison of the actual airflow, only the individual measurements that are combined to determine the airflow of the fan. Scenario 2 is the method that BAS is proposing to switch to. Since the airflow of the fan (stack height) is the numerator in the efficiency metric, requiring stability of this value is more logical and defendable.