TSI FLOW CONDITIONER FOR USE WITH ACCUBALANCE® CAPTURE HOODS

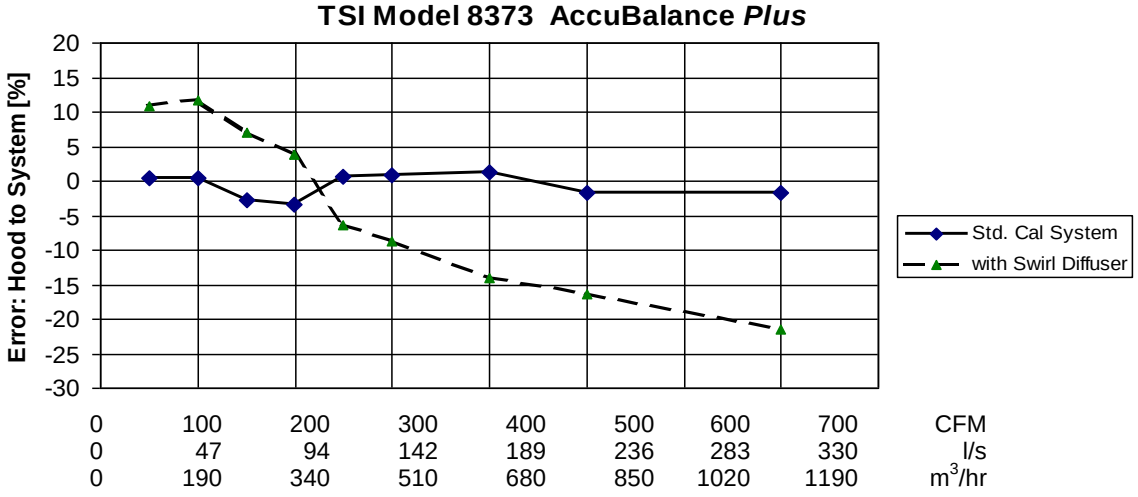
APPLICATION NOTE TI-140

Capture hoods provide a quick and accurate method of making air flow measurements. They are proven instruments for measuring supply airflow from standard 2 ft. x 2 ft. (610 mm x 610 mm), 4-way throw diffusers.

Experience and testing have shown that capture hoods alone can be less accurate in some applications such as with swirl diffusers, 2- or 3-way diffusers, and small registers. As a result, alternative methods, like using pressure taps with K-factors and conducting duct traverses, need to be used to obtain more accurate readings. These time-consuming options are far from an efficient method of making flow measurements.

Swirl Diffusers – A Need for Flow Conditioning

Tests were performed using TSI's capture hood calibration system with 4-way throw and swirl diffusers. The graph below shows readings from the same ACCUBALANCE® Capture Hood when used to measure airflow from a standard 2 ft. x 2 ft. (610 mm x 610 mm) 4-way throw diffuser and from a swirl diffuser.



Graph I: ACCUBALANCE® capture hood error compared to the true[1] flow

Additional tests indicate that swirl diffusers create significant errors when tested with pressure-based capture hoods. It is clear that swirl diffusers affect the measurement accuracy of capture hoods.

[1] "True" flow in this Application Note from this point on indicates flow as determined by a flow standard such as a flow nozzle, orifice plate or multi-point duct traverse.

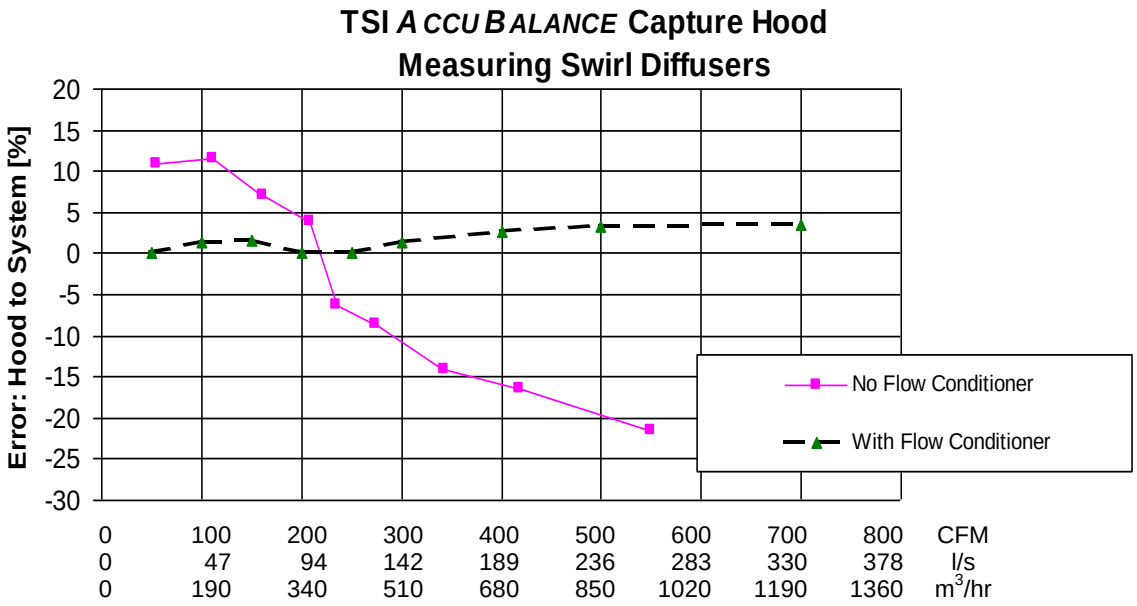
The Solution – A Flow Conditioner for the ACCUBALANCE® Capture Hood

TSI's Flow Conditioner (P/N 1080165) is a triple-layer screen that fits inside the top of the ACCUBALANCE® capture hood. Its main purpose is to straighten the airflow through the hood to improve measurement accuracy with swirl diffusers. Accuracy is also improved when measuring at diffusers that produce non-uniform flow patterns such as 2-way or 3-way throw diffusers and when there is a significant size difference between a smaller diffuser and the hood, for instance, at residential diffusers.

TSI's Flow Conditioner is easy to install and use. It is applied with Velcro® to the inside top rim of the ACCUBALANCE® capture hood. With the Flow Conditioner installed, the ACCUBALANCE® capture hood is used to measure supply flows. The Flow Conditioner is easily removed as recommended for making return flow measurements.

Results

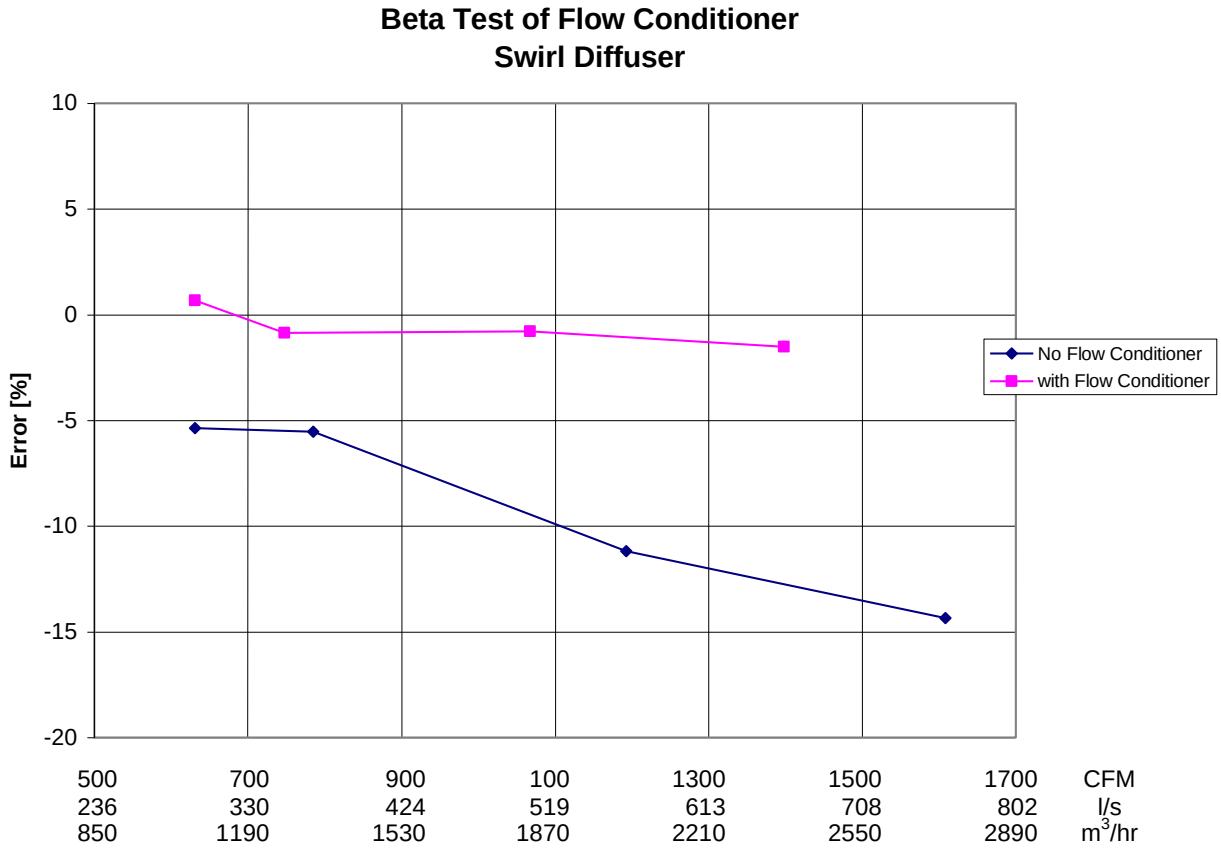
Graph II below shows the results of tests again performed at TSI's Standard Calibration System. Flow measurements through a swirl diffuser were taken using an ACCUBALANCE® capture hood *with and without* the Flow Conditioner installed. Notice that the addition of the Flow Conditioner reduces measurement error to an acceptable range.



Graph II: Improvement of ACCUBALANCE® capture hood by adding Flow Conditioner

Field Verification of Improvement

Additional tests were performed by independent organizations in Europe to verify performance of the ACCUBALANCE® capture hood with Flow Conditioner configuration. The following graph is representative of their findings. As expected, the error is noteworthy without the Flow Conditioner and the error is again acceptable with the Flow Conditioner.



Graph III: ACCUBALANCE® capture hood error versus true flow with and without Flow Conditioner

Conclusion

Factory and independent tests show that the ACCUBALANCE® capture hood with Flow Conditioner improves performance in many non-ideal measurement applications like swirl diffusers. With this configuration, users can take a flow measurement quickly with the push of a button and view flow "real time" since the display is updated every second.

It is important to note that actual results may vary based on system static pressures, flow rates, diffuser models, duct size, diffuser size, and other factors. In many buildings, similar diffusers and ducting arrangements are used throughout the facility. A duct traverse should be performed first to determine if a K-factor is necessary for each situation (see Application Note TI-128 for more information on K-factors).

This Flow Conditioner, when used with the ACCUBALANCE Capture Hood, helps users save time and money. The ability to make damper adjustments and have immediate feedback makes it easier to balance building airflows, improve the comfort of its occupants, and optimize HVAC system performance.

Other Questions

For answers to additional questions, please contact TSI at (800) 874-2811, or send e-mail to answers@tsi.com. You are also welcome to visit our web site at www.tsi.com.

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