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working together for effective biosafety cabinetry

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Ten Tips for Reluctant Zones
(Part 1 of 2)

One of my least favorite situations in Class II BSC certification is setting the downflow on zoned (AKA non-uniform) downflow cabinets. The most common example of zoned downflows is when you have the typical downflow measurement grid with three rows (front, center, and rear) and each row has a different specification. Thankfully (from a certification perspective), these seem to be less common these days. But in the NSF Listing from July 2008, there is a B2 with a specification for the back row of 42 to 52 fpm, center row at 50 to 60 fpm, and the front row at 58 to 68 fpm. In the same listing, an A2 from a different manufacturer had a four zoned BSC (though the specification for the back two rows was the same).

Per Annex F of NSF/ANSI 49, the corrected average for each zone must be within the acceptable range and each zone must meet the requirements for uniformity.

The main difficulty with zoned downflow occurs when the averages are split. The average velocity of one or more rows is too high but another row is too low. Increasing or decreasing fan speed to bring one row in will put another row out. This Cert Note and the one following will present ten tips for addressing a zoned downflow with split averages. These are what I have been able to put together. If you have techniques that you have found helpful, please send them along.

1. Take the Complete Grid

It is important to determine the situation precisely by measuring all the readings in all the rows and columns. Every once in a while, I would start my readings on the back row and they would seem low. I would turn up the speed and then begin again only to discover that my front row was too high. With zoned units, I want to know exactly what I am dealing with before adjustment.

2. Establish the Correct Inflow

Out of balance Biosafety cabinets can result in skewed row averages. If the inflow/exhaust is very high, this may be seen in relatively low velocities in the front row. Higher inflow means more of the intake grill is being taken up with inflow and the “split” can actually move more to the rear of the BSC. In extreme cases, the downflow air is heading for the rear grill and less downflow air reaches the anemometer six inches from the front. Similarly, if the inflow/exhaust is very low, more air is drawn to the front grille and the back row may appear to have lower velocities. This is very easy to do with the Type B BSCs as the external exhaust can vary considerably from year to year.

3. Make Sure That the Measurement Locations and Zones are Correct

Although the measurements locations for most non-uniform (zoned) downflow areas are in the traditional 6 inch/15 centimeter style grid pattern, some units may have different locations. For example, the front and rear zones of one model Biosafety Cabinet were to be taken 2 inches

(5 cm) from the front and rear instead of 6 inches (15 cm). In some cases, three rows of readings may be grouped into two zones, with the two of the rows to be considered in the same zone. In those cases, a 3 x 7 grid might require the average and uniformity of 14 readings to be within one specification and the average and uniformity of a remaining row of 7 readings to be within another.

4. **Make Sure That the Proper Equipment is Removed or In Place**

   Some Biosafety Cabinets have UV lights or supporting bars to help with the preparation of Intravenous drugs. Determine whether the velocity readings are to be taken with them in place or removed. Some manufacturers will specify that the UV light be removed before taking readings, others will not address this.

5. **5. Make Sure That the Downflow Diffuser is Correctly Positioned**

   Some Biosafety Cabinets have diffusers with gaps, bends or other features to promote the velocity differences in the zones. Sometimes it is difficult to replace the diffuser in 6 ft cabinets. A diffuser that comes loose and sags can disrupt the downflow measurements. More importantly, the BSC is not set up properly. Many certifiers will take the downflow measurements before doing the filter leak test and may not have looked closely at the diffuser placement before taking the velocity measurements.

We welcome your comments and suggestions for this and future CertNotes. Please visit www.thermoscientific.com/certnotes to make suggestions or to view additional resources for certifiers.

The next CertNote will contain Tips 6 through 10 for Reluctant Zones.