When Quality Matters ™

CLiMET®
INSTRUMENTS COMPANY

Celebrating Over 50 Years In Business!

CERTIFIED QUALITY MANAGEMENT SYSTEM ISO 9001:2008

Rev. 1.0 (Jan. 2017)

Application Note: 172401
Sample Area Lighting

www.climet.com
sales@climet.com
Tel. +1 (909) 793.2788

The Importance of Lighting

Particle counters respond to various light transitions, such as light scattered by a particle passing through the laser beam. When a particle passes through the laser beam, it creates a flash of light for a tiny fraction of a second. Magnetic ballasts 120 Hz will flicker thousands of times a second while electronic ballasts will create even more flicker. If a particle counter is placed underneath a fluorescent light fixture, with nothing over the inlet, then the particle counter will register thousands of counts. Higher frequency flicker causes a larger problem. If light from an overhead fluorescent light fixture shines directly through the sensor from the inlet, the constant flashing simulates particle pulses created when particles pass through the laser beam. Because the on cycle of the flashing fluorescent light matches the duration of the flash of light from a particle, the false counts cannot be filtered electronically. The problem has always persisted, however has become more prevalent specifically when high frequency ballasts are in rooms used for sampling.

Many particle counters are subject to false counts when placed directly underneath a fluorescent light fixture, if there is nothing over the inlet to block the light. Although undetectable from the human eye, the light is turning off and on tens of thousands of times a second when it is an electronic ballast..

In most applications this is not a problem, since the sampling is done in conjunction with an isokinetic probe attached to the inlet with black sample tubing; the black sample tubing does not provide a path for light to enter the sensor.

There has been increasing awareness of particle loss in transport tubing. To avoid this loss, some companies have stopped using the isokinetic probe and transport tubing, so they can avoid the loss of 5 μm and larger particles. Others have decided to sample with a bare inlet simply to avoid the inconvenience of being attached by transport tubing to a probe and probe stand.

Addressing False Counts

The false count problem has become more pronounced in recent years, both by a change in lighting technology and by a change in particle counter technology pioneered by Climet.

As mentioned previously, the on-off frequency of modern electronic lighting versus older lighting technology has made the problem more pronounced than previously. In particle counting, the switch from large, loud, heavy blowers to a more advanced, relatively small, dc-powered vacuum source has required particle counter manufacturers to use inlets with larger diameters than that of the ¼ inch diameter inlets of the 1980's and mid-1990's. Newer and more advanced designs used 3/8 inch inlets for 1 CFM and 50 LPM, and ½ inch diameter inlets for 75 and 100 LPM sensors. The larger diameters make a wider path of acceptance for light to shine in and through the sensor.

It is important to understand that the problem only tends to occur when light has a direct path into the particle counter. If there is no direct path, counts are normal, but if there is a direct path, then counts will be in the tens of thousands, even in the cleanest areas. This can cause false counting issues in sampling areas and may cause unnecessary alarm.

When sampling without the sample probe, one strategy is to make sure the instrument is not placed directly underneath a light. This, however, does not address less obvious issues associated of sampling with a bare inlet.

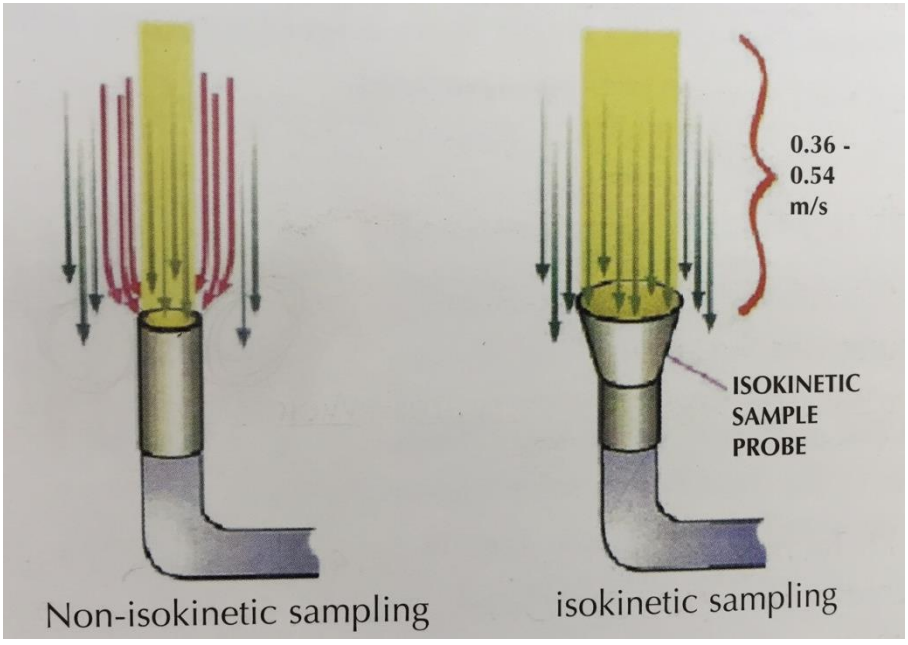
Another practice to initiate in order to prevent false counts is a false count test. Before you begin your daily round of sampling, it is good practice to install a purge filter onto the inlet, and perform a one-minute False Count Test (also known as a Zero Count Test) to ensure the particle counter does not have a fundamental or catastrophic failure. Reduction in false counts will aid in the prevention of further ongoing issues, specifically in regulatory environments.

For more info on zero count testing, click on the following link:

http://www.climet.com/library/tn-033_zero_count_test.htm

What is wrong with sampling with a bare inlet?

Sampling without an isokinetic sample probe can also result in the 5 µm particle loss that is to be avoided in the end result.



Besides providing a path for light to enter the sensor, there are two problems with sampling with a bare inlet:

1. The first issue is a ring of turbulence around the inlet repels large particles that are not falling directly into the inlet
2. The second issue occurs when large particles have inertia, and even without the turbulence, large particles would have to be very close to the inlet to be pulled over to the inlet, this causes the loss of particles that should be part of the sample.

The Solution to The Problem

Climet's light blocking isokinetic probe provides a solution to the high counts caused by fluorescent lighting entering the sensor, while both eliminating the turbulence that would surround a bare inlet, and helping to include large particles that should be part of the sample.

A unique, aerodynamic design avoids impaction losses; the light blocking element pulls particles around it, avoiding impaction.

Since the design is a true, isokinetic sample probe, it prevents turbulence around the opening of the probe, while the funnel shape includes large particles that fall within the opening of the sample probe. The patented design maximizes particle recovery.

The isokinetic light blocking probe is specifically designed to fit directly on the inlet, and comes in four sizes, based on the flow rate of the particle counter.

Climet Instruments Company, a Division of Venturedyne, Ltd.
www.climet.com
+1 (909) 793.2788