

Solvent Vapor Monitoring in Coil Coating Oven Atmospheres

COIL COATING LINE MANAGERS report that they experience three basic problems in solvent vapor monitoring.

First and foremost, maintenance is burdensome. Sample lines clog, pumps break down, and analyzer elements become fouled—all resulting in excessive labor and costly downtime.

Second, sensor accuracy is a problem. Because most analyzers become contaminated, they must be checked and adjusted whenever there is a change in the solvents or coatings being run.

Third, under these circumstances, it is difficult to keep oven operation in compliance with applicable fire and safety codes.

As this report highlights, Control Instruments' PreVEx® Flammability Analyzer, Model SNR675, solves all of these problems.

Background

Coil coating ovens typically operate at high temperatures, with some zones at over 800°F. This temperature range is needed to cure organic polymer coatings to their substrate materials.

Solvents are typically vaporized in the early oven zones. At the same time, however, other materials are also vaporized: resins, plasticizers, additives, and other compounds. Most monitoring problems arise because these materials condense when the sample temperature drops. In ordinary solvent vapor monitoring systems, external lines carry the sample 20 to 30 feet to the analyzer.¹ The oven atmosphere materials condense in the sample lines and the analyzer because the temperature is too low to maintain a vapor state. In very little time, the sample lines, analyzer, and sample pump can become fouled and clogged.

Besides the frequent downtime needed to dismantle and clean the system, most analyzers are inaccurate when

monitoring varying types of solvents or coatings. The operator is faced with two unpleasant choices: either take the time to make meter calibration adjustments whenever solvents are changed, or calibrate once to worst-case model and operate inefficiently. (A system calibrated to worst-case will shut down the process too soon when monitoring other solvents.)

In addition, fire codes and safety laws specify that coil coating processes must use continuous solvent vapor analyzers when ovens are designed to operate above 25% of the Lower Flammable Limit (LFL). The analyzer used must meet certain basic requirements as well as several provisions specific to coil coating. Where sensor accuracy is in question, compliance may likewise be an issue.

Because of its unique construction and operating technology, Control Instruments' PreVEx® Flammability Analyzer, Model SNR675, is the optimum solvent vapor analyzer for coil coating atmospheres, for five key reasons:

Excellent in High Temperature Processes

The Model SNR675's operating temperature is high enough to keep all oven atmosphere elements in the vapor state. The analyzer further avoids condensation and maintenance problems through its simple flow system, which has no capillaries that can clog or pumps that can fail. The Model SNR675 mounts directly on the oven wall or exhaust duct without external sample lines.

¹Because of the sensitivity of their electronics and other components, most other analyzers must be installed some distance from primer/topcoat ovens.

The National Fire Protection Association (NFPA) establishes fire safety standards, including standards for the safe operation of processes. NFPA 86, the Standard for Ovens and Furnaces, addresses the safe operation of Class A, B, C and D ovens, dryers and furnaces, thermal oxidizers, and any other heated enclosure used for processing of materials and related equipment.

Copies of NFPA 86 may be obtained from the National Fire Protection Association.

Call toll free to order:
1-800-344-3555

Control Instruments® Corporation

25 Law Drive
Fairfield, NJ 07004-3295
Phone: 973.575.9114
Fax: 973-575-0013
sales@controlinstruments.com

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In addition, the Model SNR675's materials of construction allow sampling in oven atmospheres above 800°F. These very high oven and sample temperatures in no way impede the analyzer's operation.

Ten Times Faster Than Remote Analyzers

The Model SNR675's simplified sampling and mounting design also dramatically improve response time—a fast 1-second response. This is ten times faster overall than systems with external sample lines and remote analyzers (which require 10 seconds or longer to respond).

Universal Calibration

Unlike infrared and flame ionization designs that require response recalibration or correction when solvents are changed, the Model SNR675 gives close-to-linear response for a wide range of solvents. This feature is particularly efficient in coil coating where solvent mixtures can change as different products are manufactured.

Fail Safe Operation

The Model SNR675's proprietary flame temperature sensor technology is 100% reliable. Should a problem of any kind arise—a loss of fuel, air, sample flow or power—the temperature of the sensing flame will reflect the change, alerting you immediately. By contrast, indirect sensing systems can fail yet still register normal operation.

Low Maintenance, Easy Servicing

Because sample condensation is avoided, service is by and large reduced to routine maintenance such as filter changes. The Model SNR675's unique "block" design makes access easy and safe, even when the analyzer is hot.

For more information regarding NFPA 86 and solvent vapor monitoring, please refer to these additional Technical and Application Notes:

Understanding NFPA 86

How to select a continuous solvent vapor monitor to meet NFPA 86 requirements



**Control Instruments®
Corporation**

25 Law Drive
Fairfield, NJ 07004-3295
Phone 973-575-9114
Fax 973-575-0013
sales@controlinstruments.com