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## Using Flammability Analyzers to Protect Thermal Oxidizers

Thermal oxidizers are used to destroy the VOC's present in many industrial ventilation, process exhaust and waste air streams.

As the use of thermal oxidizers increases, so do concerns about safety and cost-effective operation.

This application note shows you how to reduce the costs of owning and operating incinerators by using continuous flammable vapor analyzers.

Copies of NFPA 86, the Standard for the Safe Operation of Ovens, Furnaces and Fume Incinerators can be obtained from the National Fire Protection Association.

To order, call toll free:  
(800) 344-3555

### Safety

The fuel value of VOC's present in the air stream, flowing through a modern thermal oxidizer or incinerator, can greatly reduce the consumption of natural gas as the primary fuel source. Some oxidizers become self-sustaining, with VOC streams as lean as 5% LFL<sup>1</sup>. While the added fuel value of many VOC's reduces the use of natural gas, it can also present a risk of fire or explosion if the concentration rises too high.

Section 8.3 of NFPA 86:2003, the National Fire Protection Association's Standard for the Safe Operation of Ovens and Furnaces, defines direct-fired thermal oxidizers as Class A Furnaces mandating the use of continuous Flammability Analyzers on inlet streams exceeding 25% LFL. The analyzer's job is to activate warning and danger alarms before the inlet stream reaches 50% LFL. This can save the oxidizer from destruction by fire or explosion. Operation above 50% LFL is not permitted.

The inlet streams of most oxidizers contain a mixture of VOC's in differing proportions and concentrations. Oxidizers used for waste gas destruction often process streams of unknown content. In either instance, using an analyzer capable of measuring the true flammability of mixed vapors is imperative.

The Control Instruments Corporation PrevEx® Flammability Analyzers have the unique ability to accurately measure the total flammability of all constituents of the sample stream. Based on a proprietary flame temperature measurement technique, this analyzer requires no recalibration, adjustment or the use of response factors for most common process VOC's.

### Cost Savings

The capacity of an oxidizer is limited by its maximum rated air flow. Sometimes the addition of another VOC-producing process, within a plant, exceeds the handling capacity of the existing oxidizer. This would require purchase of an additional oxidizer or cancellation of the expansion. One solution, often overlooked, is to decrease the volume of air coming from VOC sources that are operating inefficiently. For example, many printing, coating, laminating and other solvent-using processes must use large volumes of heated air to dilute the solvent vapors in the dryers to safe levels. Re-circulating a portion of the hot exhaust stream in each dryer zone reduces the airflow through the oxidizer and lowers the air heating cost considerably<sup>2</sup>. Such a solution is possible when the dryers are equipped with flammability analyzers.

### Summary

When selecting a flammability analyzer, do not assume that one size fits all. The appropriate analyzer for a previous application is not necessarily the right choice for another. It's beneficial to select an analyzer that can cope with future changes in the sample stream composition. However, the specific details of each application need to be examined closely in order to prevent disaster. This is why filling out an application survey, given by a manufacturer's representative or engineer, is crucial to the selection process.

The instrument of choice may vary from one application to the next, but *the correct process flammability analyzer will always be fast, accurate, and fail-safe*. In most cases, it should be able to read a wide range of flammable substances.

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### Control Instruments® Corporation

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

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<sup>1</sup> Lower Flammable Limit.

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<sup>2</sup> See Control Instruments Corporation Application Notes H7APP001 and H7APP008 for more information about NFPA 86 and how to select an analyzer which meets its requirements.