AMETEK®
PROCESS INSTRUMENTS

APPLICATION NOTE

REDUCE NOX EMISSIONS WHILE IMPROVING FUEL EFFICIENCY

WDG Series Gas Analyzers

One of the easiest and most cost-effective ways to reduce NOx and improve fuel efficiency is to measure oxygen (O_2) and combustibles (COe).

NOx emissions from combustion sources contribute to the formation of ground-level ozone and fine particles. For this reason, most countries have regulations limiting the amount of NOx which can be emitted from combustion plants. In the USA, the Transport Rule establishes a strict program for NOx reductions in many areas. This makes NOx control an important consideration for plant operators.

What is NOx?

In a combustion process, fuel is burned in air to produce heat. Nitrogen (N_2) and O_2 molecules from the air dissociate to their atomic forms at the high temperatures typically found in flames. These produce NO as they react with the remaining air molecules. The dissociation takes place mainly at temperatures above 1600°C (2900°F).

HOW TO LIMIT NOx EMISSIONS

One of the easiest and most cost-effective ways to limit NOx emissions is to limit the amount of available O_2, which can combine with N_2 to form NO. Because the mixing of air and fuel can never be perfect, some excess air is required to ensure complete COe. If too little excess air is available, the COe in the flue gas rise dramatically. Knowing the O_2 and COe concentrations in the flue gas allows the amount of excess air to be controlled, while maintaining good combustion efficiency. The optimum control point to minimize NOx emissions and efficiency losses is shown in Figure 1.

The optimum operating point depends on load conditions, age of equipment, fuel type and process conditions. By continuously monitoring the amount of O_2 and COe in the flue gas, prompt adjustments can be made to maintain optimum burner conditions.

When relying on an O_2 and COe measurement to control combustion efficiency and minimize NOx, the analyzer needs to be placed as close to the combustion process as practical. Tramp air leakage downstream from the combustion process can cause the analyzer to read incorrectly. Also, the closer to the process the analyzer is placed, the faster the analyzer will respond to changing conditions.

Combustion efficiency

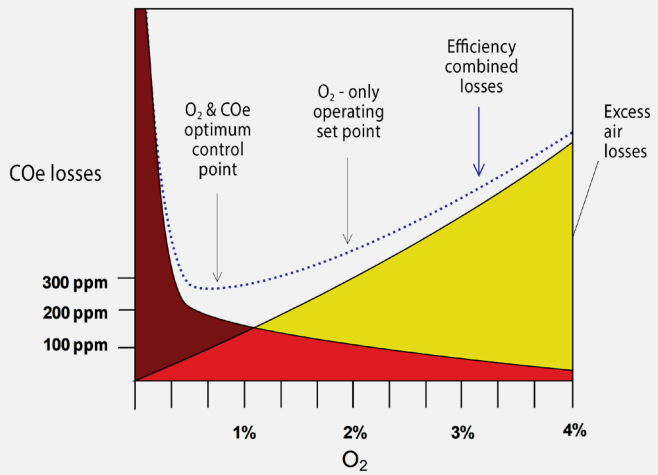

Figure 1. COe vs. excess O_2 showing efficiency losses (this figure for illustration purposes only)

THERMOX FLUE GAS ANALYZERS

The WDG-V monitors both O_2 and COe in flue gases. O_2 is measured using zirconium oxide sensor technology. COe in the flue gas are detected using a catalytic sensor. This flue gas analyzer can be placed close to the flame source (1648°C (2998°F)), thus eliminating tramp air leakage effects on O_2 readings.

The WDG-V sets the standard for fast and accurate response in a flue gas analyzer and is ideal for light oils and gas applications. The analyzer can be used with either the AMEVision Display User Interface or the PC configuration software. The controllers provide analog outputs, alarm contacts and an RS485 interface, which can be integrated into your overall boiler and NOx control system.

SALES, SERVICE & MANUFACTURING

USA - Pennsylvania
150 Freeport Road
Pittsburgh PA 15238
Tel: +1 412 828 9040
Fax: +1 412 826 0399

USA - Delaware
455 Corporate Blvd.
Newark DE 19702
Tel: +1 302 456 4400
Fax: +1 302 456 4444

Canada - Alberta
2876 Sunridge Way NE
Calgary AB T1Y 7H9
Tel: +1 403 235 8400
Fax: +1 403 248 3550

WORLDWIDE SALES AND SERVICE LOCATIONS

USA
Tel: +1 713 466 4900
Fax: +1 713 849 1924

Brazil
Tel: +55 19 2107 4100

France
Tel: +33 1 30 68 89 20
Fax: +33 1 30 68 89 99

Germany
Tel: +49 2159 9136 0
Fax: +49 2159 9136 39

India
Tel: +91 80 6782 3200
Fax: +91 80 6780 3232

Singapore
Tel: +65 6484 2388
Fax: +65 6481 6588

China
Beijing
Tel: +86 10 8526 2111
Fax: +86 10 8526 2141
Chengdu
Tel: +86 28 8675 8111
Fax: +86 28 8675 8141
Shanghai
Tel: +86 21 5868 5111
Fax: +86 21 5866 0969

AMETEK® PROCESS INSTRUMENTS

One of a family of innovative process analyzer solutions from AMETEK Process Instruments. Specifications subject to change without notice.