Waste to Energy Plants

OPSIS®

Internationally approved

Continuous Emissions Monitoring and Process Control

A1

Continuous Emissions Monitoring and Process Control in Waste to Energy Plants

Local authorities incinerate domestic waste and other kinds of waste that typically include plastics, batteries and a diversity of unknown compounds. These may all produce acidic and other toxic emissions. Therefore, efficient flue-gas cleaning systems are needed to prevent their release into the environment.

Acidic compounds are removed by different methods, including wet scrubbers, lime slurry or dry lime injection, the latter being used together with filters such as ESP or fabric filters to trap particulates. In addition, DENOX systems and charcoal filters are being increasingly used to satisfy environmental legislation and to minimize general environmental concerns.

All flue-gas cleaning methods share a common need for efficient control. This calls for a fast, accurate and cost-effective monitoring system. The system itself clearly needs to withstand the aggressive environment of acidic gases.

The Opsis System

Opsis emissions monitoring systems have been designed for such applications. The systems are based on optical monitoring, DOAS FTIR and tuneable laser diode. The technique used is the most suitable for the current application.

Using DOAS FTIR provides an open-path, non-contact monitoring system unaffected by the gases, temperatures

Performance Data (typical data which may vary depending on application)

Compound	Typical measurement range (1 m path)[1]	Lowest measurement range according to EN15267	Min. detectable quantities (monitoring path 1 m, measurement time 30 sec.)	Zero drift (1 m path, max. per month)[6]	Span drift (per month, better than)	Linearity error (of measurement range, better than)	Max. length of fibre optic cable (when monitoring individual compounds)[5]	Hardware requirement
AR 600/AR 620 Analyser								
NO[2]	0–2000 mg/m³	0–150 mg/m³	1 mg/m³	±2 mg/m³	±2%	±1%	10 m	AR600/620
NO_2	0–2000 mg/m³	0–20 mg/m³	1 mg/m³	±2 mg/m³	±2%	±1%	200 m	AR600/620
SO_2	0–5000 mg/m³	0–80 mg/m³	1 mg/m³	±2 mg/m³	±2%	±1%	100 m	AR600/620
NH_3[3]	0–1000 mg/m³	0–10 mg/m³	0.5 mg/m³	±1 mg/m³	±2%	±1%	10 m	AR600/620
Hg[2]	0–1000 µg/m³	0–150 µg/m³	1 µg/m³	±2 µg/m³	±2%	±1%	50 m	AR600/620
Hg^{tot}	0–1000 µg/m³	—	1 µg/m³	±2 µg/m³	±2%	±1%	50 m	AR600
H_2O	0–100% Vol.	0–30% Vol.	0.5% Vol.	±1% Vol.	±2%	±1%	100 m	AR620
HCl	0–10000 mg/m³	—	10 mg/m³[4]	±20 mg/m³[4]	±2%	±1%	50 m	AR620
HF	0–1000 mg/m³	—	5 mg/m³	±10 mg/m³	±2%	±1%	200 m	AR620
CO_2	0–100% Vol.	—	0.5% Vol.	±1% Vol.	±2%	±1%	50 m	AR620
Benzene	0–1000 mg/m³	—	1 mg/m³	±2 mg/m³	±2%	±1%	25 m	AR600/620
AR 650 Analyser								
HCl	0–5000 mg/m³	0–15 mg/m³	1 mg/m³	±2 mg/m³	±2%	±1%	50 m	AR650
CO	0–10000 mg/m³	0–75 mg/m³	3 mg/m³	±6 mg/m³	±2%	±1%	10 m	AR650
H_2O	0–100% Vol.	0–30% Vol.	0.1% Vol.	±0.2% Vol.	±2%	±1%	100 m	AR650
HF	0–1000 mg/m³	—	0.2 mg/m³	±0.4 mg/m³	±2%	±1%	200 m	AR650
NH_3	0–1000 mg/m³	—	2 mg/m³	±4 mg/m³	±2%	±1%	200 m	AR650
N_2O	0–10000 mg/m³	—	1 mg/m³	±2 mg/m³	±2%	±1%	50 m	AR650
TOC	0–10000 mg/m³	—	1 mg/m³	±2 mg/m³	±2%	±1%	100 m	AR650
CO_2	0–100% Vol.	—	0.1% Vol.	±0.2% Vol.	±2%	±1%	50 m	AR650
Br_2	0–10000 mg/m³	—	5 mg/m³	±10 mg/m³	±2%	±1%	100 m	AR650
I_2	0–10000 mg/m³	—	5 mg/m³	±10 mg/m³	±2%	±1%	100 m	AR650
LD 500 Laser Diode Gas Analyser								
HCl	0–5000 mg/m³	—	0.5 mg/m³	±1 mg/m³	±2%	±1%	500 m*	LD500
CO	0–100% Vol.	—	0.1% Vol.	±0.2% Vol.	±2%	±1%	500 m*	LD500
H_2O	0–100% Vol.	—	0.1% Vol.	±0.2% Vol.	±2%	±1%	500 m*	LD500
HF	0–5000 mg/m³	—	0.05 mg/m³	±0.1 mg/m³	±2%	±1%	500 m*	LD500
NH_3	0–5000 mg/m³	—	0.5 mg/m³	±1 mg/m³	±2%	±1%	500 m*	LD500
CO_2	0–100 g/m³	—	0.1% Vol.	±0.2% Vol.	±2%	±1%	500 m*	LD500
O_2	0–21%	—	0.1% Vol.	±0.2% Vol.	±2%	±1%	500 m*	LD500
CH_4	0–10000 mg/m³	—	1 mg/m³	±2 mg/m³	±2%	±1%	500 m*	LD500
Temperature	0–1400°C	—	5°C	±10°C	±2%	±1%	500 m*	LD500

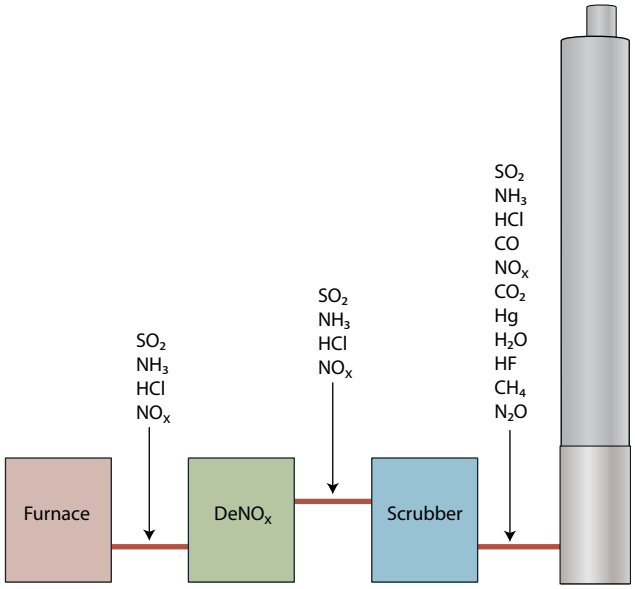
[1] This data refers to a light path of 1 m. For longer paths the maximum range is proportionally smaller. Products are available to create shorter paths in very wide stacks.
[2] Maximum SO_2 concentration: 5 g/m³-× m.
[3] Maximum SO_2 concentration: 500 mg/m³-× m.
[4] Monitoring path 5 m, measurement time 30 seconds.
[5] When monitoring several compounds, the shortest fibre optic cable given by the set of components (refer to product sheet P9) has to be used.
[6] For AR650 the same values are valid as maximum zero drift per year.
[7] Detection limit of 1 mg/m³ is optional with hardware upgrade.
* Laser and communication cables.
- Recommended monitoring path length: 1 to 5 m.
- After wet scrubbers or when particulate concentration averaged over 1 m is higher than 5 g/m3, the monitoring path length may have to be reduced.
- Accuracy is better than 2% of measured value or equal to the detection limit (whichever is the greater)..

and particulate matters typical of stack conditions. The ability of monitoring a range of user-specified compounds continuously in real time with a single system, offers fast response needed for process control.

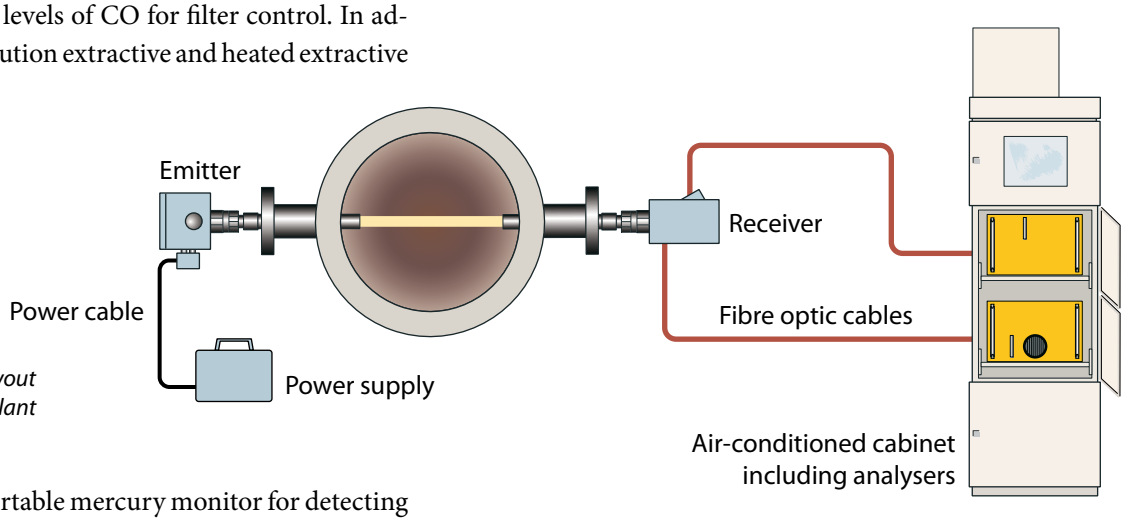
As an example, with SCR and SNCR processes, Opsis is used for the continuous monitoring of nitric oxide (NO), nitrogen dioxide (NO_2) and ammonia (NH_3) in both clean and raw gas and for controlling the NH_3/urea dosage. Another example is the monitoring of sulphur dioxide (SO_2), hydrogen chloride (HCl), mercury (Hg) and hydrogen fluoride (HF) before and after scrubbers used for processes controlling lime dosage.

A single Opsis system will operate several monitoring paths, making before-and-after monitoring with one single system very cost-effective.

Among other compounds, Opsis can be specified to monitor carbon dioxide (CO_2) and water vapour (H_2O), where data is commonly required as part of an emissions control process. The LD500 laser diode analyser can be used to monitor O_2 and temperature. Also, it can be used for monitoring explosive levels of CO for filter control. In addition, Opsis offers dilution extractive and heated extractive systems as well as a portable mercury monitor for detecting Hg total and Hg atomic.



Opsis monitoring system is an effective tool for controlling the different emissions and process control spots in a waste incinerator.



An Opsis DOAS system layout for a waste incineration plant

The Opsis Technique

An Opsis system includes one or several light paths crossing the stacks or ducts. In each path, light is projected from an emitter to a receiver. It is then transmitted to the Opsis analyser via a fibre optic cable. Using Beer Lambert's Law, the analyser then detects and measures compounds specified in the system software and logs data to a hard disk, either in a local or remote PC. This computer may act as a real-time display or, when required, run a data presentation and reporting software.

The Opsis analyser will also accept continuous data from sensors monitoring process variables such as temperature, pressure and flow (4 to 20 mA or digital input). This, combined with the system's ability to provide alarm outputs and/or interface with other plant systems via serial communication, allows Opsis to operate as a process control system. Integrating sensor and measurement data in Opsis software also allows the automatic calculation and generation of reports meeting legislative requirements.

Tests and Approvals

The Opsis System has been tested and approved by a number of internationally recognized institutes and authorities. The system meets the European directive for waste and is approved by German TÜV and British MCERTS. Full details are available on request.

Please contact your Opsis supplier to discuss your particular system requirements, including the compounds you wish to monitor. Separate product and other industrial application sheets are available.
Specifications subject to change without notice

OPSIS®

Continuous Emissions Monitoring and Process Control

Why Opsis?

High-performance, cross-stack monitoring

Multi-gas and multi-path system

Combines the benefits of DOAS FTIR and TDL technology

No sampling required, non-contact measurement system

Operates in harsh environment

Operates with a minimum of maintenance

Low energy consumption

Internationally approved

Hundreds of systems installed worldwide

Experienced and skilled service network

OPSIS AB
Box 244
SE-244 02 Furulund, Sweden
Telephone Int +46 46 72 25 00
Telefax Int +46 46 72 25 01
E-mail info@opsis.se
URL http://www.opsis.se

2010 05 A1