

# Gasmeter™ FTIR application note

## Stack testing according to US EPA methods

### KEY WORDS

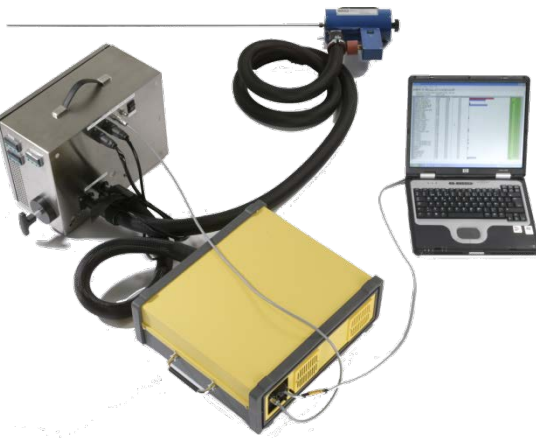
- Emissions monitoring
- Fourier Transform Infrared (FTIR)
- EPA test methods 320, 321
- Hydrogen Chloride (HCl)

### PRODUCTS

- [DX4000](#) Portable FTIR Gas Analyzer
- [PSS](#) Portable Sampling System

### OVERVIEW

US EPA has two stack testing methods for FTIR. Method 320 is a FTIR method for measuring wide range of organic and inorganic pollutants from stack. Method 321 is a specific version for measuring HCl at Portland cement plants. These methods define a QA/QC process to verify the accuracy of the results. The requirements for analytical equipment and software are defined on 40 CFR Part 60 Appendix B Performance Specification 15. GASMET™ analysers and CALCMET™ software are designed taking the requirements of performance specification into account.



Short term measurements can be carried out with the portable analyzer and sampling system (*above*). Test gases can be injected to the probe upstream of particle filter or to the sampling system, downstream of all sample treatment stages. All parts in contact with the sample are heated to 180 °C. Hot particle filters are available in sintered steel (0.1 µm), sintered PTFE (2 µm) and microfiber (0.1 µm)

## Typical analytical procedure to complete method 320 / 321 test

From a paper by Maxwell Lee and John B. Koogler: Gas Emissions Testing By EPA Methods 320: Procedures and Results, Florida Section of the Air and Waste Management Association on Sept. 7-9, 2003

### PRE-TEST

- 1) Background spectrum
  - Evaluate diagnostics of the instrumentation
- 2) Baseline (cylinder UHP-N<sub>2</sub>) (i.e. zero check)
  - Determine the level of background noise
  - Observe spectrum for baseline tilt, i.e., indicates vibrations/perturbations affecting instrument
- 3) Calibration Transfer Standard (cylinder 100-ppm ethylene, i.e. span check)
  - Determine level of response to inert gas (e.g., C<sub>4</sub>H<sub>10</sub>) to evaluate the spectral response and stability of the instrument.
- 4) Direct analyte measure (e.g. cylinder 50-ppm HCl) - Create a field Reference Spectrum
- 5) Baseline
  - Note baseline flush/clean out FTIR sample cell
  - Observe spectrum for baseline tilt
- 6) Spectra of stack gas - Determine approximate stack gas analyte concentration
- 7) Optional - 3 Spectra of QA-spike gas and makeup of UHP-N<sub>2</sub>
  - Create field Reference Spectrum of analyte at approx. stack gas concentration
- 8) Optional - 3 Spectra of QA-spike gas and makeup of ambient air (typical moisture 1-2%)
  - Determine potential interference from low moisture
- 9) Baseline
- 10) 3 Spectra of QA-spike gas - Ensure acceptable analyte recovery

### TEST - Run 1, 2, and 3 (repeat each run)

- 1) Baseline
- 2) 10 sequential spectra of stack gas (typical averaging time is 3 minutes)
- 3) Baseline
- 4) 3 Spectra of QA-spiked stack gas - must indicate  $\pm 30$  percent expected recovery

### POST-TEST

- 1) Baseline
- 2) Calibration Transfer Standard (i.e span check)
- 3) Direct analyte measure
- 4) Baseline

This application note is meant to be an informative example of typical application where Gasmeter analyzers could be used. This is not a technical specification sheet. Information in this document is subject to change without prior notice. Optimal product configuration is application dependent, and exact application details such as detection limits, components included in the application, etc depend on process and/or measurement site details and may vary. Please, contact your local Gasmeter sales representative to get information specific to your needs.

**Gasmeter Technologies Oy**  
Helsinki, Finland  
TEL : +358 (9) 7590 0400  
EMAIL : [contact@gasmet.fi](mailto:contact@gasmet.fi)  
WEB : [www.gasmet.fi](http://www.gasmet.fi)

**Gasmeter Technologies Inc**  
North America  
TEL : +1 866 685-0050,  
EMAIL : [sales@gasmet.com](mailto:sales@gasmet.com)  
WEB : [www.gasmet.com](http://www.gasmet.com)

**Gasmeter Technologies (Asia) Ltd**  
Hong Kong  
TEL: +852 3568-7586  
EMAIL: [sales@gasmet.com.hk](mailto:sales@gasmet.com.hk)  
WEB: [www.gasmet.fi](http://www.gasmet.fi)