MATHESON STACK EMISSION CALIBRATION PROGRAM

"Experience the MATHESON Commitment to Supply Chain Excellence"

MATHESON
The Gas Professionals

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MATHESON is a single source for industrial, medical, specialty, and electronics gases ... as well as gas handling equipment, high-performance purification systems, engineering and gas management services, and onsite gas generation.

MATHESON is the largest subsidiary of the Taiyo Nippon Sanso Corporation, one of the five largest suppliers of gases in the world. We have a depth of technology and resources that can come only from a global enterprise.

We also work hard to hold onto our local values, with personalized service and a real interest in understanding – and resolving – your gas use and management requirements.

Our mission is to deliver innovative improvements ... in ways that have tangible benefit and cost effectiveness for our customers.

MATHESON is an established manufacturer of NIST traceable calibration gas mixtures for Stack Emissions Monitoring and environmental compliance. MATHESON offers standard and custom EPA Protocol and daily standard gas mixtures complying with Federal and State regulations. The MATHESON EPA Protocol gases are in aluminum cylinders, with 1% certification accuracy validated using direct NIST traceability. MATHESON Acid Rain CEM grade Air and Nitrogen meet the U.S. EPA zero gas specifications.

MATHESON's commitment to accuracy and quality is validated by our accomplishment of ISO 17025 accreditation of EPA Protocol and Cal-MAT grade standards in 2015.

For U.S. EPA regulated minor components, MATHESON has an automated dynamic blending system. Dynamic blending ensures very tight blend tolerances, plus the system has capability to conduct +/-1.0% certification accuracy that is required of 40CFR60 daily standards. For the 40CFR75 and 40CFR60 compliant EPA Protocols with +/-1% certification accuracy, MATHESON always conducts individual cylinder analysis and certification on our automated NDIR/ chemiluminescent instrument benches. MATHESON maintains NIST SRM, NIST NTRM, and VSL PRM to achieve the +/-1% accuracy – and minimize cylinder to cylinder biases.

The MATHESON Microshield treatment of the inner cylinder surfaces maximizes the reactive minor component stability. While all EPA Protocol manufacturers must apply the standard U.S. EPA shelf-lives, MATHESON Microshield treatments ensure that the minor component concentrations stay within the +/-1% certification accuracy for the duration of the shelf-life.

When repeatability and high volume are keys to your success, MATHESON also uses the UniBlend automated batch blending technology for 2-12 identical cylinders.

Our 85+ years of experience in industrial gas applications and equipment makes MATHESON an ideal provider for your gas, equipment, and services requirements.

Call us at **800-416-2505** or email us at **info@mathesongas.com** and let us know how we can help you.

The MATHESON Stack Emission Calibration Program will maximize your operating efficiencies by addressing the six key parameters that customers must have from their suppliers to achieve supply chain excellence.

- **CONVENIENCE** using the MATHESON Item Master process that ensures fast re-ordering
- **QUALITY** system certification to ensure consistent reliability and safety; plus continuous efforts to reduce lead-times and on-time deliveries. MATHESON participates in the U.S. EPA Protocol Gas Verification Program
- **PRODUCTS** and measurement systems designed to comply with the certification accuracy for the duration of the shelf-life; also NO_x mixtures often have less than 1% relative NO_2 impurity
- **HEALTH & SAFETY** hazardous gas monitoring products plus equipment design integrity to protect your personnel and work environment
- **SUPPORT** whenever you need it from our sales, technical and service support teams
- **DELIVERY** options tailored to your operating needs

CONVENIENCE

The MATHESON Item Master Process

MATHESON works with our customers to capture all gas mixture components, concentrations, mixture grade and cylinder size. All of this information is applied order after order, and cylinder after cylinder. All you have to tell us is your item number.

Additional MATHESON Convenience Features:

- Selected stocked products to provide emergency or "24-hour" delivery service
- Additional Certificate of Analysis copy available on request

QUALITY

Systems Designed for EPA Protocol Gas Mixture Optimization

- **ISO 9001:2008 Certified Manufacturing Facilities:** Gas and equipment products manufactured to international industry standards
- **ISO 17025: 2005 Accreditation:** Confirms laboratory and technical programs capable of the accuracy and stability of EPA Protocols
- **U.S. EPA Verified:** Participation in the U.S. EPA Protocol Gas Verification Program
- **Direct NIST Traceability:** EPA Protocols with direct NIST traceability from use of NIST SRM and NTRM during laboratory analysis
- **Stability:** Microshield cylinder treatments that ensure the long term stability of reactive minor components, plus minimization of the NO_2 impurity in NO_x EPA Protocols
- **"C of A's":** Certificates of Analysis that provide the U.S. EPA contents for EPA Protocols, plus MATHESON includes the measurement triad data to gauge the high precision of the MATHESON measurement systems
- **Automation:** Automated analysis, data acquisition, calculations, and generation of the Certificate of Analysis that provides high volume capacity plus enhances accuracy of the certificate of analysis contents

Analyzers used for MATHESON EPA Protocol Mixture Testing and Certification

Analyzer Principle	Measures
NDIR: Non Dispersive Infrared	▪ Carbon Monoxide ▪ Sulfur Dioxide ▪ Carbon Dioxide
Chemiluminescent	▪ Nitric Oxide ▪ Nitrogen Dioxide ▪ Total NOx
FID (Flame Ionization Detector)	▪ Methane ▪ Propane ▪ Total Hydrocarbons
Paramagnetic	▪ Oxygen

PRODUCTS

Products for Stack Emissions and Monitoring

Utility Analyzer	Test for	Zero Gases	Quarterly Calibration Gases	40CFR60 Daily Gases
NDIR	Carbon Monoxide	Nitrogen, CEM	EPA Protocol Concentrations from: ≥ 2 ppm in Nitrogen	CalMat 1, CalMat 2 Certified Plus Grade Concentrations from: ≥ 2 ppm in Nitrogen
NDIR	Carbon Dioxide	Nitrogen, CEM	EPA Protocol Concentrations from: ≥ 100 ppm in Nitrogen	CalMat 1, CalMat 2 Certified Plus Grade Concentrations from: ≥ 100 ppm in Nitrogen
NDIR	Sulfur Dioxide	Nitrogen, CEM	EPA Protocols Concentration from: ≥ 10 ppm	CalMat 1, CalMat 2 Certified Plus Grade Concentrations from: ≥ 10 ppm
Chemiluminescent	NO and NO_x	Nitrogen, CEM	EPA Protocol Concentrations from: ≥ 2 ppm in Nitrogen	CalMat 1, CalMat 2 Certified Plus Grade Concentrations from: ≥ 2 ppm in Nitrogen
FID	Propane, Methane	▪ FID Fuel ▪ 40% Hydrogen/Balance Helium ▪ Air CEM grade	EPA Protocol Concentrations from: ≥ 0.3 ppm in Air	CalMat 1, CalMat 2 or Certified Plus Concentrations from: ≥ 0.3 ppm in Air

Calibration Gas Chart for Stack Emissions and Monitoring

Polluter	U.S. Regulation	Daily CEMs	Quarterly CEMs	Annual CEMs
Stationary Gas Turbines NO_x O_2, SO_2, CO	40CFR Part 60 subpart GG	▪ Daily Zero and Span Check ▪ CEM Zero Air or N_2 Gas ▪ Span Gas CalMat 2	▪ Linearity ▪ 3-Point Test ▪ EPA Protocols	RATA/once/yr EPA Protocols; Agree with Auditor at 15% Accuracy
Industrial & Utility Stacks Plus Cogeneration Plants SO_2, NO_x, O_2 or CO_2	40CFR Part 60	▪ Daily Zero and Span Check ▪ CEM Zero Air or N_2 Gas ▪ Span Gas CalMat 2	▪ Cyl. Gas Audit ▪ 2-Point Test ▪ EPA Protocols	RATA/once/yr EPA Protocols; Agree with Auditor at 20% Accuracy
Acid Rain Utilities SO_2, NO_x, CO_2 Diluent Also: HCl	40CFR Part 75 MACT issued December, 2011	▪ Daily Zero and Span Check ▪ EPA Protocols ▪ Acid Rain CEM Zero Air or N_2 Gas HCl is periodically measured to validate the system as meeting the U.S. EPA MACT standard	▪ Linearity ▪ 3-Point Test ▪ EPA Protocols	RATA/once/yr EPA Protocols; Agree with Auditor at 10% Accuracy; If agree < 7.5% can exempt one quarterly test
Boiler & Industrial Furnaces SO_2, NO_x, O_2 or CO_2	40CFR Part 266	▪ Daily Zero and Span Check ▪ CEM Zero Air or N_2 Gas ▪ Span Gas CalMat 2	▪ Linearity ▪ 3-Point Test ▪ EPA Protocols	RATA/once/yr EPA Protocols; Agree with Auditor at 15% Accuracy
Municipal Waste Combustors SO_2, NO_x, O_2 or CO_2 Some states require HCl	40CFR Part 60 subpart Ea	▪ Daily Zero and Span Check ▪ CEM Zero Air or N_2 Gas ▪ Span Gas CalMat 2	▪ Linearity ▪ 3-Point Test ▪ EPA Protocols	RATA/once/yr EPA Protocols; Agree with Auditor at 15% Accuracy
Portland Cement Kilns CO, SO_2, NO_x Also: THC, HCl	40CFR Part 60 subpart F New Source Performance Standard in 2013	▪ Daily Zero and Span Check ▪ CEM Zero Air or N_2 Gas ▪ Span Gas CalMat 2 ▪ NSPS requires validation	▪ Linearity ▪ 3-Point Test ▪ EPA Protocols	RATA/once/yr EPA Protocols; Agree with Auditor at 15% Accuracy
Refineries	40CFR Part 60 subpart J	Refer to the Refinery Brochure		

EPA Protocol Certificate of Analysis Content

- Certificates of Analysis and Cylinder Tags Comply with U.S. EPA Protocol documentation requirements
- MATHESON reports NOx as a reported value per the latest revision of U.S. EPA Method 7E for Nitric Oxide EPA Protocols
- MATHESON adds the measurement triad data to demonstrate our excellent measurement precision

HEALTH & SAFETY

Monitoring for OSHA Compliance

- MATHESON Portables LEL and H_2S/CO/Methane/Air mixtures for your safety and industrial health programs. Many more standard and custom mixtures and pure gases, and gas delivery products are available (see the MATHESON Portables Catalog)
- Gas Cabinets and Panels for safe gas handling and delivery to point of use
- Hazardous gas monitoring systems including fixed and portable instruments, plus Kitagawa tubes
- On-site safety training programs and education products to enhance and improve safety awareness

SUPPORT

MATHESON Technical and Service Support:

- Expert Mixture Phase Engineering using state-of- the-art software
- Specialty Gas Team who understand stack emissions products and cylinder package options - (Product Manager, Technical Service Coordinator, Gas Operations Team, and Customer Service Team)
- Personalized service at your door with field sales, and on the phone with dedicated customer service representatives
- Dedicated customer service representatives assigned to your account
- MATHESON's Customer Arrangements systematize your products and pricing

MATHESON Equipment To Support Facility Gas Usage:

- Cylinder regulators for quantitative gas delivery
- Gas panels for control of gas supplies
- Automated manifolds and alarms for control of high volume gas usage

DELIVERY

- Designed to suit your facility and operating hours
- Options for delivery

MATHESON is committed, without limitation, to be your "go to" company for maximizing profits and minimizing operating costs.

Thank you for your interest in our specialty gas and equipment products. For more information, please visit the MATHESON website @ **www.mathesongas.com**, or call our customer service center @ **800-416-2505** to have one of our sales representatives contact you directly.

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MATHESON'S EPA Protocol Certificate of Analysis: The passport to Measurement Quality and Reliability

MATHESON
The Gas Professionals

1700 Scepter Rd
Waverly, TN 37185
931-296-3357

Certificate of Analysis - EPA Protocol Mixtures

Customer:

Protocol:	Reference #	Lot#
G1	T199466-01	9304610861

Cylinder Number: SX48990
Cylinder Pressure: 1900psig
Last Analysis Date: 8/27/2014
Expiration Date: 8/28/2022

DO NOT USE THIS CYLINDER WHEN THE PRESSURE FALLS BELOW 100 PSIG

			REPLICATE RESPONSES		
Component:		Sulfur Dioxide	Date: 8/20/2015	Date: 8/27/2015	
			199.3	199.3	
Certified Conc:	199.4ppm	+/-0.6ppm ABS	199.5	199.4	
			199.6	199.5	
Component:		Nitric Oxide	Date: 8/13/2015	Date: 8/20/2015	
			199.4	198.2	
Certified Conc:	198.7ppm	+/-0.6ppm ABS	199.3	198.2	
			199.0	198.0	
Component:		Carbon Monoxide	Date: 8/13/2015		
			199.0		
Certified Conc:	198.9ppm	+/-0.7ppm ABS	198.8		
			198.9		
Component:		Carbon Dioxide	Date: 8/13/2015		
			8.94		
Certified Conc:	8.93%	+/-0.03% ABS	8.93		
			8.93		
NOx	198.7ppm	REFERENCE ONLY			
BALANCE GAS:		Nitrogen			

REFERENCE STANDARDS:

Component: Sulfur Dioxide	Component: Nitric Oxide	Component: Carbon Monoxide	Carbon Dioxide
Reference Standard: SRM	Reference Standard: SRM	Reference Standard: SRM	PRM
Cylinder #: FF22324	Cylinder #: CAL017987	Cylinder #: FF20783	D249793
Concentration: 494.6ppm	Concentration: 493.1ppm	Concentration: 494.8ppm	19.814%
Exp. Date: 6/30/2021	Exp. Date: 10/8/2017	Exp. Date: 9/20/2021	10/3/2017
NIST Sample# 94-I-31	NIST Sample# 42-M-06	NIST Sample# 2-K-08	VSL Primary
Component: Sulfur Dioxide	Component: Nitric Oxide	Component: Carbon Monoxide	Carbon Dioxide
Make/Model: Horiba VIA-510	Make/Model: Horiba CLA-510SS	Make/Model: Horiba VIA-510	Horiba VIA-510
Serial Number: G0200DLR	Serial Number: M60VVSNN	Serial Number: RL77YOOG	41679080021
Measurement Principle: NDIR	Measurement Principle: Chemi	Measurement Principle: NDIR	NDIR
Last Calibration: 8/20/2014	Last Calibration: 7/21/2014	Last Calibration: 7/14/2014	8/11/2014

Notes:

The certification was performed according to EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards May 2012, using procedure G1 and/or G2. U.S EPA Vendor ID Number: D62014, PGVP Participation Date: 01/01/15, PGVP Renewal Date: 01/01/16

Analyst: _____ Date: 8/27/2015

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