



NATURAL GAS STANDARDS

“Experience the MATHESON Commitment to Supply Chain Excellence”



MATHESON

ask. . .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

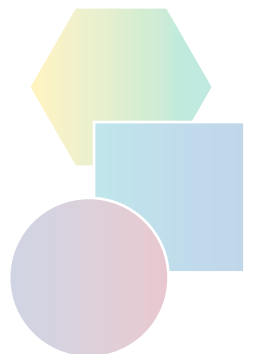
The accuracy of the Natural Gas Cylinder Standard used to calibrate BTU analyzers can have a significant impact on your company's bottom line. Inaccurately measured BTU content can add up to tens of thousands of dollars in lost revenue when applied to millions of cubic feet of natural gas.

The **MATHESON Program for Natural Gas Standards** 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** products and processes to ensure consistent reliability and safety
- **PRODUCTS** specifically designed for natural gas applications and with long shelf lives
- **HEALTH & SAFETY** programs, products and design integrity to protect your personnel and work environment
- **SUPPORT** whenever you need it from our technical and service support teams
- **DELIVERY** options tailored to your operating needs

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.



CONVENIENCE


The MATHESON Item Master Process

MATHESON works with our customers to capture all gas or liquid mixture components, concentrations, calculated values, hydrocarbon dew point, and temperature. 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 products stocked to provide emergency or "24-hour" delivery service
- Additional Certificate of Analysis copy available on request

Certificate of Analysis



MATHESON
est. 1968 "The Gas Professionals"

**Primary Standard Mixture Grade
Certificate of Analysis**

MATHESON
206 Alessio Drive
Joliet, IL 60433
Phone: 815-727-2282
Fax: 815-727-1676

TO AVOID BACKFILL, CYLINDER PRESSURE MUST BE GREATER THAN PROCESS PRESSURE

TO: _____

PHONE: _____
FAX: _____

PRODUCT: 13 Comp. Primary Gas Mixture

CYLINDER NUMBER: 39373
SIZE: 1A
CGA/ISS OUTLET: 350
CONTENT: 62 cu. ft.
PRESSURE: 600 psia

SALES ORDER NUMBER: _____
P.O. NUMBER: _____
LOT NUMBER: _____

FILL DATE: Jun 29, 2005
CERT. DATE: Jul 14, 2005
EXP. DATE: Jul 14, 2006

COMPONENT	REQUESTED CONCENTRATION	GRAVIMETRIC CONCENTRATION	CERTIFIED CONCENTRATION	CERTIFICATION ACCURACY
N-OCTANE	0.017 %	0.0171 %	0.0171 %	±0.5%
N-HEPTANE	0.035 %	0.0354 %	0.0354 %	±0.2%
N-HEXANE	0.047 %	0.0475 %	0.0475 %	±0.2%
N-PENTANE	0.250 %	0.2488 %	0.2488 %	±0.1%
I-PENTANE	0.250 %	0.2582 %	0.2502 %	±0.1%
NEOPENTANE	0.125 %	0.1255 %	0.1255 %	±0.1%
N-BUTANE	0.500 %	0.5006 %	0.5006 %	±0.1%
I-BUTANE	0.500 %	0.5015 %	0.5015 %	±0.1%
CARBON DIOXIDE	0.500 %	0.5073 %	0.5073 %	±0.2%
NITROGEN	0.750 %	0.7542 %	0.7542 %	±0.2%
PROPANE	1.000 %	0.9997 %	0.9997 %	±0.5%
ETHANE	2.000 %	2.0088 %	2.0088 %	±0.3%
METHANE	BAL %	84.0024 %	84.0024 %	±0.10%
NOTE: C6 PLUS = 4705/17 Total Mole %	0.0990 %	0.1000 %	0.1000 %	

All calculations based on ASA Standard data and are at 14.73 psia, 60°F dry, ideal conditions unless otherwise stated.
This Primary Standard Mixture Cylinder's BTU Accuracy is derived from the gravimetric and analyzed concentration's error propagation confirming gross heating values within ±1 BTU.
CAUTION: This Certified calibration gas mixture has a component dewpoint of 41.17 F (±0.3 F). For initial use, this blend must be heated to a minimum of 80 F for a minimum of 24 hours using a vendor approved cylinder heating blanket only. Put the cylinder cap on the cylinder and roll the cylinder 15 minutes indoors. After initial installation, do not use this product unless the temperature is maintained at 100 F. DO NOT OPERATE if temperature is below the Dew Point of the gas mixture.

BTU: @ 60 °F and 14.73 psia
REAL DRY BTU VALUE: 1076.05
REAL SATURATED BTU VALUE: 1057.85

INSTRUMENT USED: CARDINAL GRAVIMETRIC BALANCE
SPECIFIC GRAVITY (REAL): 0.60788
HYDROCARBON DEWPOINT: 41.17 °F

TRACEABLE TO REFERENCE STANDARD SOURCE NUMBER: NTRM #011101
TRACEABLE TO NIST TRACEABLE WEIGHT CERTIFICATE: 308973-1

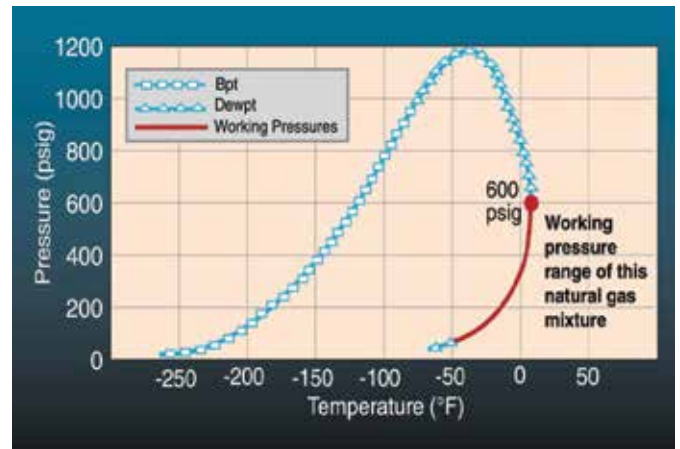
The product listed above and furnished under the referenced purchase order has been tested and found to contain the component concentration listed above. All values in mole/mole basis gas phase unless otherwise indicated. Matheson Tri-Gas Inc. warrants that the above product(s) conforms at the time of shipment to the above description. Matheson Tri-Gas Inc. liability does not exceed the value of the product purchased.

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QUALITY

Optimal Calibration

- NIST NTRM for Natural Gas give NIST traceability by analysis.
- Certificates of Analysis fully documented with components and certified concentrations, NIST traceability, calculated Specific Gravity and BTU content using industry software
- Only MATHESON purified research grade Methane, Ethane, Propane, i-Butane, and n-Butane are used eliminating raw material inconsistency and surprise chromatogram peaks
- The MATHESON technical team works with customers to optimize the cylinder fill contents with the hydrocarbon condensation (dewpoint) temperature specified by the customer



Natural Gas Phase Diagram that MATHESON uses to optimize cylinder contents vs hydrocarbon dewpoint.

- Calculated values are referenced to the latest document revisions from the Gas Processors Association, or other references specified by the customer

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PRODUCTS

Natural Gas Calibration Standards

- MaxiTherm: Statistically valid 1 BTU uncertainty with both NIST traceable analytical and gravimetric validation. MATHESON has the Natural Gas NTRM to provide directly NIST traceable certifications. This grade is ideal for Central Laboratory instrument calibration
- UniTherm: Two to 30 identical cylinders to calibrate every pipeline BTU analyzer equally
- Primary Standard is the “industry standard” grade using high purity raw materials, high resolution gravimetric blending, and laboratory validation
- For less demanding applications Certified Standard and Gravimetric grade are available
- All mixture grade specifications are available (see chart)

MATHESON Natural Gas Grades

MATHESON Grade	Certification	BTU Accuracy	Mixture Preparation	Blend Tolerance	Cert. Accuracy % Rel
MaxiTherm	Dual: NIST NTRM plus Gravimetric	+/- 1.4 BTU/CF	High-resolution Gravimetric Preparation; & best purity Matheson hydrocarbon raw materials	Methane <0.1% - ≤ 1% rel. for % concentrations	≤ 0.1% Methane ≤ 0.2% Ethane ≤ 0.3% Propane ≤ 0.5% Butanes ≤ 1% Pentanes ≤ 2% N ₂ , CO ₂ , C ₆₊
MaxiTherm Custom	Dual: NIST NTRM plus Gravimetric	+/- 1.4 BTU/CF	High-resolution Gravimetric Preparation	This grade allows for components and concentrations that are not directly traceable to the NIST NTRM	
Primary	Gravimetric Cert. confirm by analysis NTRM-Traceable Standard	+/- 1.5 -2 BTU/CF	High-resolution Gravimetric Preparation	Methane <0.2% 1% for % concentrations	≤ 0.15% Methane ≤ 0.3% Ethane ≤ 0.5% Propane ≤ 1% Butanes ≤ 1% Pentanes ≤ 2% N ₂ , CO ₂ , C ₆₊
Gravimetric	Gravimetric only	+/- 2 BTU/CF	Gravimetric Preparation	1% for % concentrations	0.2% CH ₄ by weight
Certified Standard	Lab Standard or Gravimetric	No BTU accuracy claim or calculation (generally 2 -3 BTU)	Gravimetric or Volumetric Preparation	2-5% depends on concentration	0.2% CH ₄ by analysis
UniTherm (identical BTU cyls)	Dual: NIST NTRM plus Gravimetric	1 - 2 BTU/CF depending on grade desired	UniTherm Gravimetric Process	- ≤ 1% for % concentrations	≤ 0.1% CH ₄ and increases

Environmental Monitoring

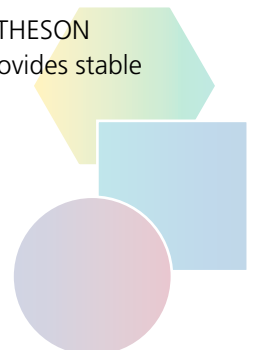
- For Compressors with CEMs and Gas Processing Facilities
- EPA Protocols and CalMat 1 and 2 grades

Nitric Oxide/N₂	CO/N₂	Nitrogen Dioxide/N₂ or Air
≥ 2.5 ppm	≥ 2.5 ppm	≥ 20 ppm

- UHP or MATHESON Nitrogen for NDIR and Chemiluminescent instrument zero gas
- Zero Air or Oxygen CP grade for Chemiluminescent instrument ozonators

Pipeline Monitoring of Sulfur Compounds and Water Impurity

- H₂S, COS, and Methyl Mercaptan ≥ 1 ppm in Methane or N₂ in Microshield treated aluminum cylinders for long term stability (other sulfur compounds available!)
- UHP or MATHESON grade Helium for sulfur instrument carrier gas
- Water in Methane or Nitrogen in the MATHESON Microshield treated aluminum cylinder provides stable water measurement calibrations



MATHESON Equipment for Pipeline and Central Laboratory Support

- Regulators for Gas Cylinders

Natural Gas Standard Regulator	Delivery Pressure Gauge	Cylinder Pressure Gauge
Model 3537-350	0-60 psig	0-3000 psig
Model 3538-350	0-60 psig	0-1000 psig

- Gas Panels for Instrument Gases
Models 53 and 54 Single Station Manifolds
- Gas Detection for Flammable Gases and Oxygen Concentration

Handheld Detectors

- Model 8067 Multigas Leak Detector
- Model GX-2003: 1 to 5 gases including Methane, Oxygen deficiency, % LEL, Carbon Monoxide, Hydrogen Sulfide

Fixed Gas Detection System

- Gas Scanner Series for 1, 2, 4 or 8 channels including sensors for any of LEL, Oxygen, H₂S, Carbon Monoxide, or CO₂
- Cylinder Heat Blankets
 - Model HQ2015 Series Therma-Cal Gas Cylinder Blankets
 - HQ2015A-1A fits 1A cylinders
 - HQ2015A-1F fits 1F cylinders

Note: For indoor temperature greater than 50° F (10° C)



Model 3537-350 Regulator



Model 53 Single Station Manifolds



Model 8067 Multigas Leak Detector



Model HQ2015 Therma-Cal Gas Cylinder Blanket



Model GX-2003 Multigas Leak Detector



“Experience the MATHESON Commitment to Supply Chain Excellence”

HEALTH & SAFETY

Monitoring for OSHA Compliance

- MATHESON Portables LEL and H₂S/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 hazardous 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 Teams

- Expert natural gas mixture engineering that includes the latest hydrocarbon mixture phase envelope software
- Specialty Gas Team who understand natural gas mixtures: Product Manager, Technical Service Coordinator, Gas Operations Team and Customer Service
- Personalized service at your door with field sales, and on the phone with dedicated customer service representatives

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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