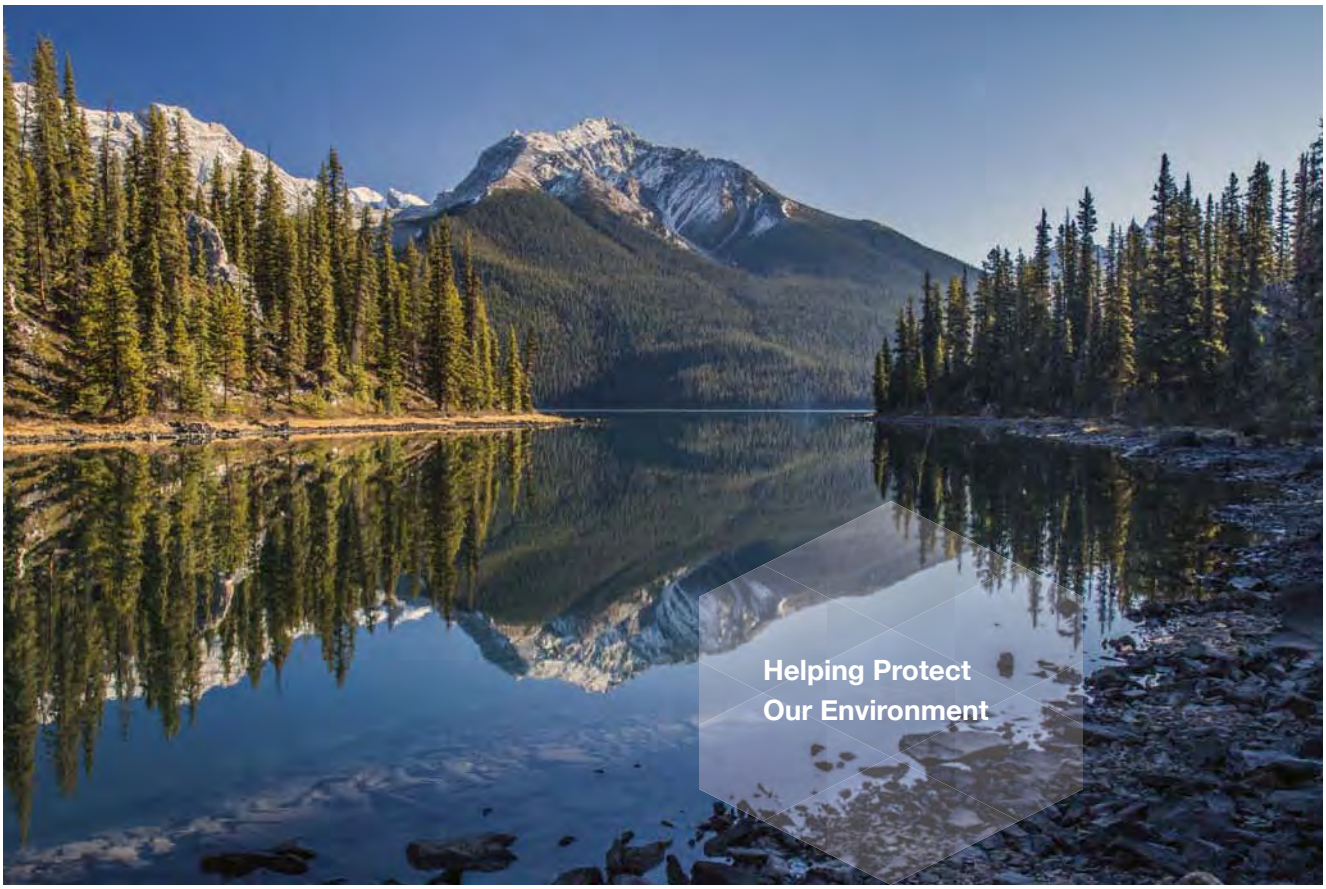
Environmental

Overview



The Praxair Difference

The changing pace of environmental regulations worldwide, coupled with the dynamics of a highly competitive marketplace, produce an array of complex challenges for industries utilizing emissions-monitoring gases. Praxair's environmental monitoring products are designed to provide accurate, cost-effective, and safe solutions while meeting regulatory, service and delivery requirements. As a leading worldwide manufacturer of specialty mixtures, Praxair can meet all your environmental monitoring needs, including:

- Stationary Source Emissions
- Mobile Source Emissions
- Safety and Industrial Hygiene
- Ambient Monitoring

Implicit in these solutions is Praxair's strength as the largest industrial gases company in North and South America and one of the largest worldwide.

- **Comprehensive, High Quality Product Line**
  Certified pure gases and mixtures, an extensive range of gas handling equipment and systems, and a broad range of services provide you with complete environmental monitoring solutions.
- **Application-Based Solutions**
  Sales, production, and research capabilities, and the ability to supply end-use customers with safe, accurate, precise and legally compliant products worldwide.
- **Reliable Production And Distribution Network**
  Maximum reliability throughout North America with 27 specialty gases laboratories/production centers and over 400 distribution locations.
- **Outstanding Technical Support**
  A highly trained team of field sales representatives, technical service personnel and production chemists that provide guidance and support.
- **Global Supplier**
  Application-based research and development at five international technical centers combined with specialty gases production and distribution in over 40 countries around the world.

Praxair's worldwide **ISO 9001: 2000** and **ISO 17025** certified facilities and Declaration of Equivalence agreements between NIST, VSL and others, help ensure that Praxair's mixtures are internationally traceable and consistent.

Environmental

Full Spectrum of Solutions

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Today, industry must carefully monitor its environmental emissions and use precise reference standards to obtain accurate measurements. Praxair is a pioneer in producing highly accurate calibration gas standards and ultra pure zero gases for a wide variety of emissions applications.

Praxair environmental solutions help ensure regulatory compliance, reduce emissions, increase capacity, improve economics and achieve a broad range of environmental benefits.

Key Environmental Segments We Serve

Stationary Source Emissions Monitoring (40 CFR Part 60, 64, 75, 264, 266, and 503)

- CEM Manufacturers
- Utilities
- Co-generation
- Pulp and Paper Plants
- Petrochemical
- Incinerators, including Waste to Energy Plants
- Sewage Plants
- Boilers and Industrial Furnaces
- Cement Kilns
- Steel Mills
- Environmental Testers
- Independent Stack Testing

State-Of-The-Art Production Facilities

Praxair's North American Specialty Gases laboratories are staffed with highly trained and knowledgeable personnel. At each specialty gases facility, they work with the latest cylinder production technology.

- **Cylinder Preparation –** Consistency and stability through pre-treatment, heating, purging and vapor deposition inerting.
- **Blending Systems –** Help ensure your product mixture is produced promptly and accurately to your exact specifications.
- **Analytical Instrumentation –** A full range of the most sensitive instrumentation available.
- **Quality Assurance –** Production technology combines procedures such as EPA methods, ISO certification and interlab audit programs with worldwide standards from NIST, USA; the Netherlands Van Swinden Laboratory (VSL); and the Central Nacional de Metrologia (CENAM), Mexico.

  An internal quality assurance audit program to help ensure your emissions monitoring or measurement systems are performing accurately and according to your specifications. The right procedures and the right standards help ensure the highest quality gases.

Gas Handling Equipment

Further enhancing our pure gases and calibration mixtures offering is our complete line of gas handling, distribution and safety equipment. See Section E for details.

Services

Praxair customers can rely on support services such as:

- **Inventory Management & Cylinder Tracking –** Customer specific gas stocking levels, localized sourcing and delivery schedules reduce inventory carrying costs and improve product lead times.
- **Environmental Gas Management –** Praxair's electronic certificates of analysis and expiration tracking system help to meet your record retention requirements.
- **Technical Consulting and Customer Care –** Technical support, emergency order capability and account management for consistent operation.
- **E-commerce Capabilities –** Online ordering via the Praxair Express™ website provides easy, 24-hour access to product orders, cylinder inventories and safety information.
- **Custom Equipment & Gas Delivery Systems –** Gas delivery systems designed for the critical gas purity and system integrity needed to ensure maximum compliance with process or regulatory purity requirements.
- **EPA Protocol Rush Program –** The maintenance of a continuous inventory of unique environmental mixtures that can be shipped virtually anywhere in the U.S. and Canada at a moments notice.

Declaration of Equivalence agreements between NIST, VSL and other national metrology laboratories help ensure many Praxair mixtures are traceable internationally and all are consistent, regardless of where they are produced.

Environmental

Product Summary

Environmental Grades

Praxair's North American Specialty Gases sales, technical support and production teams will provide you with the right information and products for all your environmental applications.

Our extensive product offering includes:

- **NIST Traceable Reference Materials (NTRM) –** Certified by the National Institute of Standards and Technology (NIST) and accepted by the Environmental Protection Agency (EPA), as the highest accuracy standards commercially available. These standards are the regulatory equivalent to NIST's Standard Reference Materials (SRMs). NTRMS are made using the same components and are within the analytical range of NIST SRMs.
- **EPA Protocols –** These gas mixtures are used for the calibration and audit of Continuous Emission Monitors (CEMs). Praxair EPA Protocols are NIST traceable with a ±1% accuracy and produced in accordance with the latest EPA specifications found in document – EPA 600/R-12/531 Rev. 5/2012.
- **Primary Master –** High accuracy mixtures prepared gravimetrically on electronic high precision scales. These standards are analyzed and named against NIST traceable reference materials.
- **Certified Master –** These routine calibration mixtures are prepared by either gravimetric, volumetric or partial pressure methods and analyzed against NIST traceable reference materials.
- **Dynamic-Blend Master –** These zero blend tolerance mixtures are prepared on an instrument based dynamic blending system. All master gases are analyzed and named against NIST, SRM or NTRMs. Replication for any number of cylinders can be produced with identical concentrations.
- **Dynamic-Blend Standard –** These mixtures are prepared similarly to the Dynamic Blend Master. Certification of the mixtures is based on process accuracy and Praxair Primary Laboratory Standards (PPLS).

Standard Grades

When NIST traceability is not required, Praxair's standard grades are available to meet your working gas requirements.

In addition to Primary, Certified and Non-Certified Standards, Praxair's unique Custom Standard allows you to specify the exact blend tolerance and analytical uncertainty for the mixture.

- **Primary Standard –** Highly accurate mixtures prepared gravimetrically on high-precision electronic balances. These standards are analyzed against Praxair Primary Laboratory Standards (PPLS) and named to a gravimetrically generated concentration.
- **Certified Standard –** These routine calibration mixtures are prepared by either gravimetric, volumetric or partial pressure methods. These standards are analyzed against Praxair Primary Laboratory Standards (PPLS).
- **Non-Certified –** Mixtures are prepared by the same methods and the same care used for Certified Standard Grades. Analyses are not reported.
- **Custom –** Mixtures prepared to the exact blend tolerance and analytical uncertainty requested.

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Mixture Grade	Order Reference	Mixture Component Concentration Range	Blend Pre-Tolerance	Analytical Uncertainty
EV – Environmental Grades[1]				
NTRM	T	N/A	N/A	± 1%
EPA Protocol	E	2 - 25 ppm	± 10%	± 1%
		25.1 - 49.9%	± 5%	± 1%
Primary Master	PM	1 - 9.9 ppm	± 10%	± 0.1 ppm
		10 - 25 ppm	± 10%	± 1%
		25.1 - 9999 ppm	± 5%	± 1%
		1.0 - 49.9%	± 2%	± 1%
Certified Master	CM	1 - 9.9 ppm	± 20%	± 0.2 ppm
		10 - 25 ppm	± 20%	± 2%
		25.1 - 9999 ppm	± 10%	± 2%
		1.0 - 49.9%	± 5%	± 2%
Dynamic Blend Master	DM	1 - 99.9 ppm	Zero	± 2%
		100 ppm - 49.9%	Zero	± 1%
Dynamic Blend Standard	D	1 - 99.9 ppm	Zero	± 5%
		100 ppm - 49.9%	Zero	± 2%
ST – Standard Grades				
Primary Standard	P	1 - 9.9 ppm	± 10%	± 0.1 ppm
		10 - 25 ppm	± 10%	± 1%
		25.1 - 9999 ppm	± 5%	± 1%
		0.1% - 49.9%	± 2%	± 1% or 0.02% abs*
Certified Standard	C	1 - 99.9 ppm	± 20%	± 5%
		100 - 999 ppm	± 10%	± 2%
		0.1 - 49.9%	± 5%	± 2%
Non-Certified Standard	U	1 - 999 ppm	± 20%	N/A
		0.1 - 49.9%	± 10%	
Custom Standard	Z	1 ppm - 49.9%	TBD	TBD

* Whichever is smaller.

[1] All Environmental Grades are NIST traceable. Actual ranges, blend tolerance, and analytical uncertainty are based on available National Institute of Standards and Technology (NIST) SRM concentrations. Please see individual components for specific information.

Note: For all mixtures, blend tolerance and analytical uncertainty specification may vary depending on the chemical characteristics of the component and the cylinder size. For mixtures outside of these ranges, please contact your local Praxair representative.

Environmental Products Cylinder Table

	Pressure		Volume	
Cylinder Style	**psig**	**Bar**	**ft^3**	**m^3**
AS	2000	138	145	4.11
AQ	2200	152	78	2.21
A3	2200	152	29	0.82
T	2640	182	314	8.89
K	2200	152	236	6.68
D7	260	18	8.5	0.24

Note: Nominal contents. Actual volume may vary due to component and/or concentration. Please inquire about other cylinder sizes.

NIST Traceable Reference Materials (NTRMs)

NIST Traceable Reference Materials (NTRM) – Certified by the National Institute of Standards and Technology (NIST) and accepted by the Environmental Protection Agency (EPA), as the highest accuracy standards commercially produced. These standards are the regulatory equivalent to NIST's Standard Reference Materials (SRMs) and are made up of the same components and are within the same analytical range.

The NIST Traceable Reference Materials (NTRM) program, was developed in a consortium with NIST, EPA, and industry participation. The program was intended to increase the availability of NIST traceable primary gas standards to industry. NTRMs supplement the supply of existing gaseous Standard Reference Materials (SRMs) and can be used wherever SRMs have been used in the past. These mixtures are similar in composition to NIST primary and SRM standards. However, because the concentration of the certified component can be bracketed by existing primary NIST standards, NTRM component concentrations can fall above, below or between existing SRM concentrations. This offers end users additional calibration reference points for greater accuracy and lower uncertainty measurements.

NTRMs are manufactured in a batch by Praxair, with NIST assigning the component concentration. The NTRM program was designed to replace the EPA's Certified Reference Material (CRM) program. EPA has stated that it accepts NTRMs in place of CRMs and allows their use as equivalent to SRMs for certification of emissions and production of mixture standards, such as EPA Protocols.

Available mixture components include:

- Carbon Dioxide
- Carbon Monoxide
- Hydrogen Sulfide
- Methane
- Nitric Oxide
- Nitrogen Dioxide
- Oxygen
- Propane
- Sulfur Dioxide

Concentration ranges fall closely above, below or between existing NIST SRM concentrations.

To address any application questions you have, technical support is available from your Praxair Sales Representative or North America Technical Support Center:
1-877-PRAXAIR

EPA Protocols

EPA Protocol gas mixtures are required for the monitoring of emissions from stationary sources and are used for the calibration and Relative Accuracy Test Audit (RATA) of Continuous Emission Monitors (CEMs) as specified under EPA 600/R-12/531.

Praxair EPA Protocols are NIST traceable with a ± 1% accuracy, produced in accordance with the latest EPA specifications. The benefits to you include:

- Certified analytical uncertainty of ±1% is possible for reliable analyzer certification, calibration and audit.
- Multiple production facilities and stocking locations to help ensure an uninterrupted supply of Protocol standards.
- Standards that are labeled and supplied with complete documentation required to help ensure compliance.
- Praxair's cylinder treatment process is designed to provide maximum allowed shelf life within the stated analytical uncertainty. (Please see page D•162 for certification periods).
- Praxair maintains a complete range of NIST Standard Reference Materials (SRMs) and NIST Traceable Reference Materials (NTRMs).

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Component	Balance	Concentration	Certification Period (Years)	CGA	4000 Series Regulator (See Page E•241)
Ammonia	Nitrogen	5 - 50 ppm	1	705	Corrosive
Carbon Dioxide	Air	360 - 420 ppm	8	590	Non-corrosive
Carbon Dioxide	Nitrogen	5 ppm - 20%	8	580	Non-corrosive
Carbon Monoxide	Air	2.5 ppm - 10%	8	590/350	Non-corrosive
Carbon Monoxide	Nitrogen	2.5 ppm - 15%	8	590/350	Non-corrosive
Formaldehyde	Nitrogen	0.5 - 10 ppm	1	330	Corrosive
Hydrogen Chloride	Nitrogen	10 - 5000 ppm	2	330	Corrosive
Hydrogen Sulfide	Nitrogen	1 - 1000 ppm	3	330	Corrosive
Methane	Air	1 - 1000 ppm	8	590/350	Non-corrosive
Methane	Nitrogen	1 ppm - 10%	8	590/350	Non-corrosive
Methanol or Ethanol	Air/Nitrogen	75 - 500 pmm	4	350	Non-corrosive
Natural Gas	Natural Gas	Varies	4	350	Non-corrosive
Nitric Oxide	Nitrogen	0.5 - 50 ppm	3	660	Corrosive
Nitric Oxide	Nitrogen	50 ppm - 1 %	8	660	Corrosive
Nitrous Oxide	Air	1 ppm - 5 %	8	590	Non-corrosive
Oxides of Nitrogen	Air	3 ppm - 1 %	3	660	Corrosive
Oxides of Nitrogen	Nitrogen	10 - 1000 ppm	2	660	Non-corrosive
Oxygen	Nitrogen	10 ppm - 25%	8	590	Non-corrosive
Propane	Air	0.1 - 500 ppm	8	590	Non-corrosive
Propane	Nitrogen	1 ppm - 2 %	8	350	Non-corrosive
Sulfur Dioxide	Air	10 - 100 ppm	2	660	Corrosive
Sulfur Dioxide	Air	100 - 1000 ppm	3	660	Corrosive
Sulfur Dioxide	Nitrogen	1 - 50 ppm	4	660	Corrosive
Sulfur Dioxide	Nitrogen	50 ppm - 1 %	8	660	Corrosive

Important Things to Know

- Multi-component Protocols are assigned a certification period based on the minor component or balance gas with the shortest certification period.
- Protocol concentrations lower than those listed will have an initial 6-month certification period. Upon recertification, acceptable cylinders may have extended certifications.
- Some mixtures may not be available due to critical mixture limitations, safety considerations or SRM availability.
- Analytical uncertainty for certain mixture components and concentrations may vary. The actual analytical uncertainty will be specified on the Certificate of Analysis.
- Trace concentrations of other pollutants in the mixture can be certified on request.
- For CEM zero grade gas products for Air (see pages B•24 and D•163) and Nitrogen (see pages B•65 and D•163).
- Other mixture components or concentrations may be available, please inquire.
- Certification periods apply only to mixtures in aluminum containers.
- EPA Protocol mixtures should not be used below 100 psig.
- Manage your environmental gas and equipment needs online via Praxair Express™.

Zero Gases for Environmental Applications

Setting New Standards of Purity

The U.S. Environmental Protection Agency (EPA) regulations 40 CFR Parts 50, 58, 60, 75 and 266, state that the zero grade air or zero grade nitrogen used for Continuous Emission Monitoring (CEM) must contain no detectable concentration of the pollutant of interest. Furthermore, the zero gas should contain no contaminants that cause a detectable response to the analyzer or that suppress or enhance the analyzer's response. If the zero gas is not certified to be free of critical contaminants, it could be out of compliance.

The Purity and Reliability You Need

Praxair's CEM Zero Air and CEM Zero Nitrogen are developed to meet the stringent requirements of the U.S. EPA 40 CFR Parts 50, 58, 60, 75 and 266. Our manufacturing and certification specifications meet industry standards as well as federal, provincial, state and local regulations.

Clean, Convenient Packaging

Praxair's CEM Zero Air and CEM Zero Nitrogen are packaged in aluminum cylinders. This standard size cylinder (AS) holds 145 ft^3 of air and 143 ft^3 of nitrogen. Larger and smaller containers are also available.

Features

- Meets all U.S. EPA zero and calibration gas standards.
- Stocking programs available.
- Immediate delivery via Praxair truck to most locations
- Over 400 distribution locations nationwide to serve you.
- Available in light-weight aluminum cylinders.

Complete specifications for additional grades of air and nitrogen can be found on page B•24 (Air) and page B•66 (Nitrogen).

Product Specifications

	CEM Zero Air	CEM Zero Nitrogen
Part Number	AI 0.0CE	NI 5.5CE
H_2O	< 2 ppm	< 2 ppm
CO_2	< 1 ppm	< 1 ppm
CO	< 0.5 ppm	< 0.5 ppm
O_2	19.9 - 21.9%	< 0.5 ppm
THC	< 0.1 ppm	< 0.1 ppm
NOx	< 0.1 ppm	< 0.1 ppm
SO_2	< 0.1 ppm	< 0.1 ppm

Industry Leading Customer Support

North America Technical Support Center

Praxair takes your productivity to the next level by giving you easy access to industry-leading technical support. By making a simple call to 1-877-PRAXAIR (1-877-772-9247), you can quickly discuss technical questions or needs with one of our trained experts.

Offers detailed support across Praxair's full line of specialty gases and equipment Praxair experts are ready to help with all of your technical needs, including:

- Application support
- Valve selection guidelines
- Custom safety data sheets
- Mixture feasibility review
- Regulatory compliance inquiries
- Safety guidance
- Up-to-date catalog information

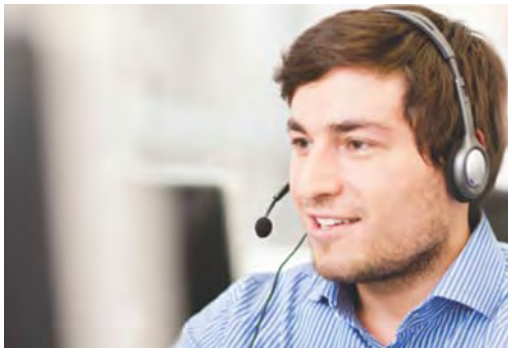
Customer Care Center

Provides a single point of contact for all the information you need about your account. Your dedicated account manager is available to answer any questions you may have, including:

- Account set-up
- Product pricing and quotations
- Order tracking
- Custom specifications
- Delivery inquiries

Our commitment to helping you build your productivity goes beyond just high-quality products and knowledgeable staff – Praxair offers technical service and support, designed to connect you to the breadth and depth of Praxair's expertise acquired over the century we have been in the specialty gas business. The bottom line? No matter what you're looking for, 1-877-PRAXAIR is your right call, first time, every time.

1-877-PRAXAIR is available Monday through Friday, 7:30 a.m. to 6:30 p.m. Eastern time. Prefer email, drop us a line at specialtygases@praxair.com



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Gas Handling Equipment

Further enhancing our Environmental Monitoring Products offering is our complete line of gas handling, distribution and safety equipment. Praxair's gas handling solutions are designed to help you preserve the purity of your mixture and help you ensure the correct gas flow and delivery pressure.

See Section E for our complete line of high quality gas handling solutions.

Critical Purity Regulator for Non-Corrosive Service

Praxair's 4012 Series regulators are intended for primary pressure control of non-corrosive, high purity gases. See page E•244 for complete specifications.

Part Numbers

Zero Air	PRS40122301-590
Zero Nitrogen	PRS40122301-580

High Purity Automatic Changeover System

The 5028B (Brass) and 5028S (316 Stainless Steel) Series high purity automatic switchover systems are designed to provide a continuous supply of high purity gases to the laboratory, process or instrument. See page E•286 for complete details.

Part Numbers

Brass	PRS5028B
316 Stainless Steel	PRS5028S

Protocol Alarm Station

The 5029 Series Protocl Alarm Station combines all of the safety and features of a standard Protocol Station with the added security of a remote alarm system. See page E•283 for complete details.

Part Numbers

Zero Air	PRS50291101-590
Zero Nitrogen	PRS50291101-580