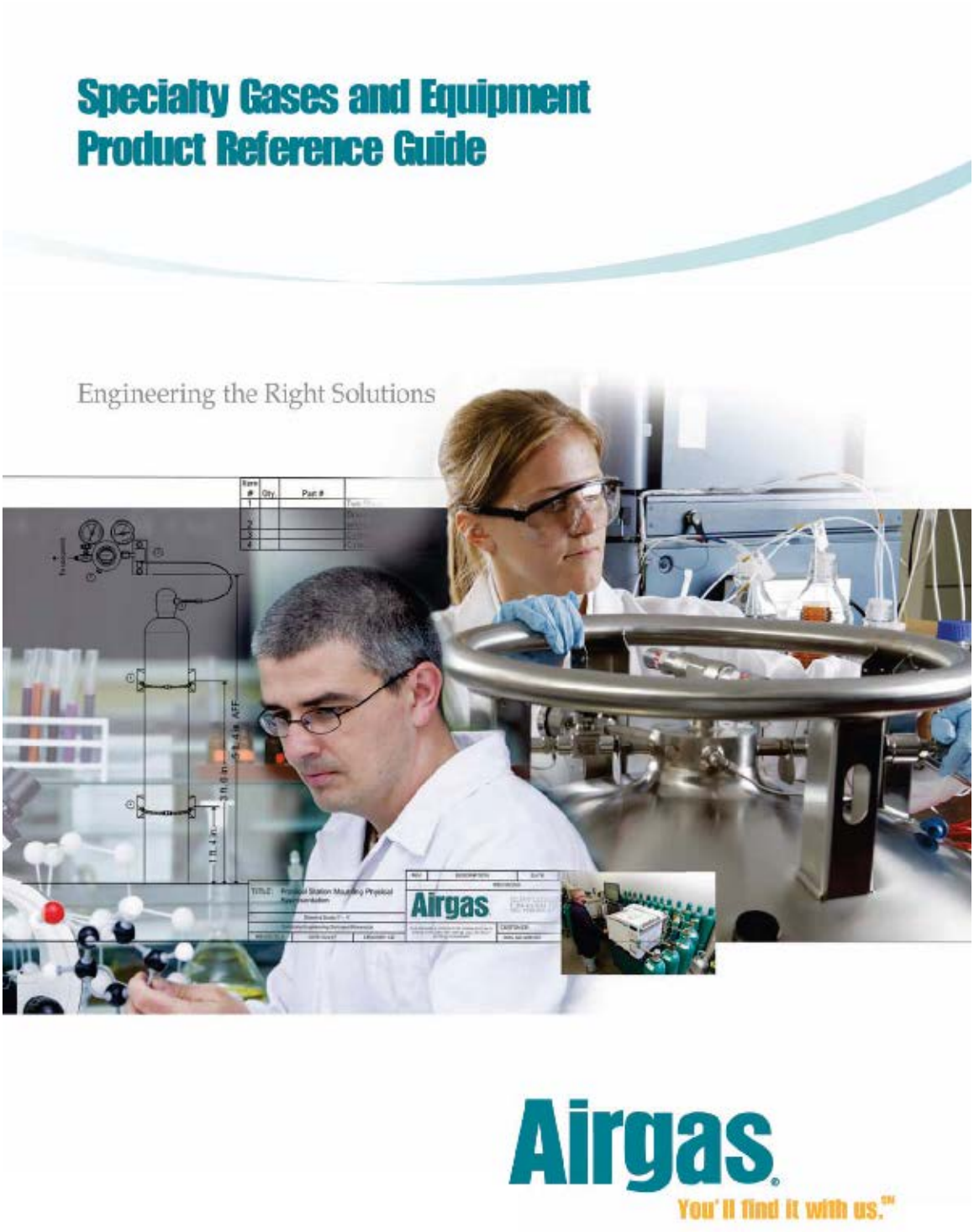
Special Applications



Special Applications

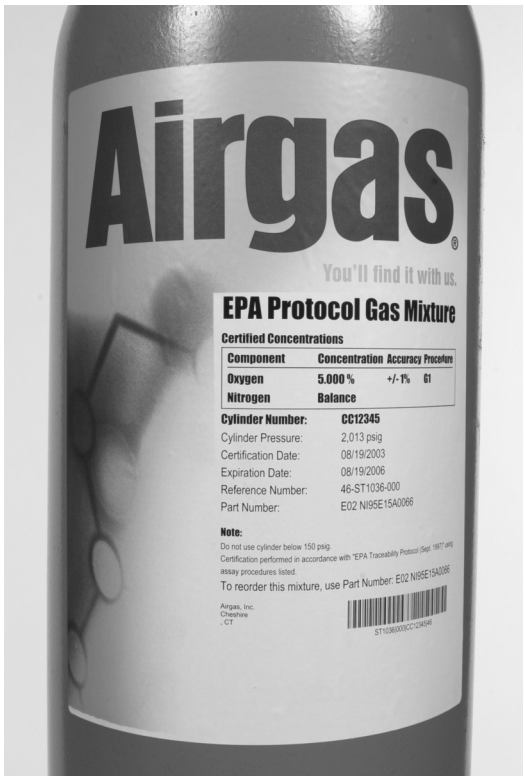
Airgas
an Air Liquide company

Contents

As the largest U.S. distributor of specialty gases, Airgas® has the expertise to prepare pure gases and mixtures designed for specific analytical, regulatory or industry processes. This section includes Analytical Gases, Environmental Monitoring Gases, Mobile Emissions Testing Gases. This section also includes refrigerants, process chemicals and other unique products that you'll find with Airgas.

Airgas Quality Policy

The purpose of the Airgas Quality System is to continually improve our manufacturing and related processes to provide our customers with the highest product purity, consistency, and service.



Among the Special Applications Gases are a full line of gases used in Environmental Monitoring, including EPA Protocols and Traceability Standards. Airgas produces its own EPA Protocol Gases at six national specialty gas laboratories and then stocks and distributes them throughout the largest specialty gas network in the U.S., helping you reduce the headaches and hassles of finding the right EPA Protocol for your facility anywhere in the country.

ANALYTICAL GASES — Flame Ionization Detector (FID) Fuel Gases

Used with FIDs in gas chromatography and continuous stream hydrocarbon analyzers.

Concentration	Cylinder Size	≈Contents ft³	Product Number	Equipment Recommendations	Page Number
40% Hydrogen Balance Helium THC ≤ 0.5 ppm	300 200 80	298 200 76	X02HE60A3003005 X02HE60A2003005 X02HE60A803005	**Two-Stage Regulators** Y12-N145D350 Y12-244D350	**E21 E12**
40% Hydrogen Balance Nitrogen THC ≤ 0.5 ppm	300 200 80	298 200 76	X02NI60A3003006 X02NI60A2003006 X02NI60A803006		
***39-41% Hydrogen Balance Helium THC ≤ 0.05 ppm**	300 200 80	298 200 76	X02HE60A300C3K1 X02HE60A200C146 X02HE60A80C558		

Individual Certificate of Analysis or Certificate of Batch Analysis available upon request.
Minimum of Ultra Zero Air recommended for optimal analytical results.
Standard valve outlet: 350
*Product meets 40 CFR PART 1065— Engine Testing Procedure requirements.

Technical Data

Cylinder Pressure:	
Size 300	2400 psig
All Other Sizes	2000 psig
DOT Class	2.1
DOT Label	Flammable Gas
ID No.	UN1954

ANALYTICAL GASES — Electron Capture Detector (ECD) Gases

A minimum of UHP grade gases are recommended for optimal analytical results.

Concentration	Cylinder Size	≈Contents ft³	Product Number	Equipment Recommendations	Page Number
Ultra ECD Grade P-5 5% UHP Methane Balance UHP Argon	300 200 80	302 223 85	X02AR95J3001826 X02AR95J2000286 X02AR95J800995	**Two-Stage Regulators** Y12-N245D350 Y12-244D350	**E21 E12**
Ultra ECD Grade P-10 10% UHP Methane Balance UHP Argon	300 200 80	302 223 85	X02AR90J3000339 X02AR90J2000288 X02AR90J804972		

Individual Certificate of Analysis or Certificate of Batch Analysis available upon request.
Standard valve outlet: 350
Performance qualified to confirm <1 ppb SF6 equivalent ECD response.

* Insert Delivery Pressure Range Code

Technical Data

Cylinder Pressure	2000 psig
DOT Class	2.2
DOT Label	Nonflammable Gas
ID No.	UN1956

Leak Detection Gases | ANALYTICAL GASES

Gas mixtures containing helium allow for more sensitive and accurate leak detection than a simple pressure test.

Concentration	Cylinder Size	≈Contents ft³	Product Number	Equipment Recommendations	Page Number
0.5 - 10% Helium Balance Nitrogen	300 200 80	278 208 82	Inquire Inquire Inquire	**Two-Stage Regulators** Y12-N145D580 Y12-244D580	**E21** **E12**

Individual Certificate of Analysis or Certificate of Batch Analysis available upon request.
Standard valve outlet: 580

Technical Data

Cylinder Pressure	2000 psig
DOT Class	2.2
DOT Label	Nonflammable Gas
ID No.	UN1956

Nuclear Counter Gases | ANALYTICAL GASES

Formulated for instrumentation measuring radioactivity and ionization.

Concentration	Cylinder Size	≈Contents ft³	Product Number	Equipment Recommendations	Page Number
P-10 **10% Methane** **Balance Argon**	300 200 80	302 223 85	X02AR90D3000979 X02AR90D2000291 X02AR90D804302	**Two-Stage Regulators** Y12-N245D350 Y12-244D350	**E21** **E12**
P-5 **5% Methane** **Balance Argon**	300 200 80	302 223 85	X02AR95D3002178 X02AR95D2000994 X02AR95D800995		
Quench Gas **1.3% n-Butane** **Balance Helium**	200	163	X02HE98D2005171		
Geiger Flow Gas **0.95% Isobutane** **Balance Helium**	200	196	X02HE99D200R767		

Individual Certificate of Analysis or Certificate of Batch Analysis available upon request.
Standard valve outlet: 350

Technical Data

Cylinder Pressure	
Size 300	2400 psig
Quench Gas	1650 psig
All Other Sizes	2000 psig
DOT Class	2.2
DOT Label	Nonflammable Gas
ID No.	UN1956

Airgas
an Air Liquide company

EPA Protocol Gases

As the largest producer of EPA Protocol gases with six locations throughout the U.S., Airgas® has the EPA Protocol gases that customers need.

- Airgas has six laboratories with ISO 17025 accreditation through A2LA covering all EPA Protocol gases and Traceability Standards, including three laboratories with over 10 years ongoing accreditation.
- Produces and owns more NTRMs than any other gas vendor.
- The exclusive producer of EPA Protocols via the AcuGrav®, AutoFTIR™, and Automated LabPack™ technologies.
- Exclusive SRM provider to NIST.
- Able to provide both online certifications and online cylinder expiration notifications.
- One of only two producers of elemental mercury calibration gases.
- Provides accurate HCl calibration gases.
- The leading supplier of ammonia calibration gases for both ammonia slip and health and safety monitoring with ±1% analytical traceability to Primary Reference Materials, with traceability down to 2.5ppm.
- NO down to 0.4 ppm, NO_2 down to 2.5 ppm and N_2O down to 0.3 ppm concentrations.
- Proven accuracy of EPA Protocols has saved utilities millions of dollars by optimizing emissions credits (allowances) for SO_2 and NOx.
- Member of PGVP audit program, which Airgas helped to author.

Airgas EPA Protocols are prepared and analyzed in strict accordance with the EPA's most current guideline entitled "EPA Traceability Protocol Assay and Certification of Gaseous Calibration Standards." The guideline specifies methods for traceability to National Institute of Standards and Technology (NIST) SRMs or other NIST-approved reference materials, which include Airgas produced and NIST certified NTRMs.

The majority of EPA Protocol mixtures from Airgas are certified to a ≤1% overall uncertainty guarantee, except where limited by the higher uncertainty of the NIST SRMs or NTRMs. All analytical certifications are performed under completely interference-free conditions. Maximum allowable shelf life is guaranteed. Documentation fully conforms to the requirements of the EPA Protocol program, in compliance with the Clean Air Act.

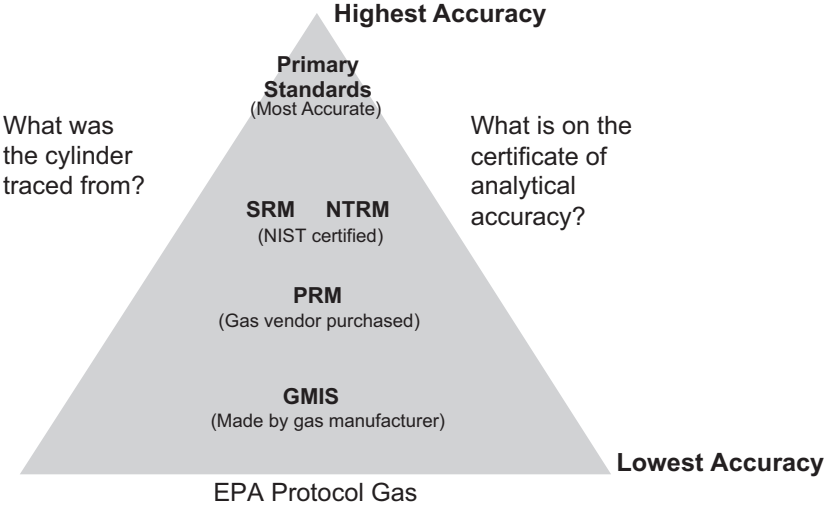
Traceability Standards

To meet customer and regulatory requirements for analytically NIST Traceable calibration mixtures, Airgas offers Traceability Standards, which are analytically certified directly against either NIST SRMs or NTRMs, within a comprehensive quality system. The analytical testing process is based upon EPA Protocol production processes, including triad analysis, comprehensive instrumentation characterization, and statistical data analysis. This results in a ± 1% overall uncertainty (accuracy) with direct traceability to NIST Reference Materials. Traceability Standards are primarily used for the calibration of continuous emissions monitoring systems and engine emissions analyzers.

Combined with Airgas' Precision Blend dynamic processes, Airgas will upon request offer Traceability Standard gas mixtures with blend tolerances equal to the accuracy of the analytical system monitoring the filling operations. The analytical value of each gas mixture is validated against a NIST SRM or NTRM. Every cylinder is certified accurate within ± 1% of NIST reference material.

Airgas' line of Traceability Standards assures ongoing compliance with the calibration requirements imposed by federal, state and local authorities. Traceability Standards offer precise concentrations, homogenous composition of all cylinders within a lot, and consistency of mixtures from order to order.

Upon request, Airgas can produce Traceability Standards at one of several Airgas specialty gas laboratories accredited to the ISO 17025 standard by the American Association of Laboratory Accreditation (A2LA). ISO 17025 is the international standard for calibration and testing laboratories and recognized in many industries, including the automotive and aerospace industries. In these cases, Airgas can include the accreditation body's logo and ISO 17025 notation on the accompanying Certificate of Analysis.



EPA Instrumental Test Methods as Defined by 40 CFR Part 60

# EPA Method	Test Method Determines	Components Tested	Zero Gas*
3A*	O_2% & CO_2%	O_2% &/or CO_2% in N_2 or mixtures of SO_2 ppm &/or NO_2 ppm + O_2% &/or CO_2% in N_2	Defined by CFR 40 72.2
3 & 3B	O_2% & CO_2% using an ORSAT	O_2% &/or CO_2% in N_2 for Audit	
3C	CO_2%, O_2%, N_2% & CH_4 ppm using a thermal conductivity detector (TCD) gas chromatograph	CO_2, CH_4, N_2, O_2, and other gas components	Carrier Gas. Helium, high-purity
6C*	SO_2 ppm from stationary sources	SO_2 ppm in Air or N_2 SO_2 ppm &/or O_2% &/or CO_2% in N_2	Defined by CFR 40 72.2
7E*	NO_x ppm from stationary sources	NO_x ppm in N_2 other mixtures may be used if no interference is caused. NO_2 for Converter Efficiency	Defined by CFR 40 72.2
10*	CO ppm from stationary sources	CO ppm in N_2 other mixtures may be used if no interference is caused	Defined by CFR 40 72.2
10A	CO ppm CEM at petroleum refinery	CO ppm in N_2	Defined by CFR 40 72.2
10B	CO ppm from stationary sources	CO ppm in N_2 & CH_2 in air	(Helium zero/Hydrogen zero)
15	TRS Emissions from sulfur recovery plants in petroleum refinery	H_2S in N_2 & COS in N_2 & CS_2 in N_2 traceable	<0.5 ppm TRS with <10 ppm H_2O & (Oxygen Zero/Zero Nitrogen)
15A	TRS Emissions from sulfur recovery plants in petroleum refinery	COS in N_2	<50 ppb TRS with <10 ppm Hydrocarbons
16	TRS Emissions from Kraft Pulp Mills	H_2S in N_2 & MeSH in N_2 & DMS in N_2 & DMDS in N_2 traceable	<50 ppb TRS with <10 ppm Hydrocarbons
16A	TRS Emissions from Kraft Pulp Mills	H_2S in N_2	<50 ppb TRS with <10 ppm Hydrocarbons
16B	TRS Emissions from Kraft Pulp Mills	SO_2 in N_2 & H_2S in N_2	<50 ppb TRS with <10 ppm Hydrocarbons
18	Gaseous Organic Compound Emissions by Gas Chromatography	VOC ppm in N_2 <1-2% or NIST traceable	Defined by CFR 51 Appendix M Method 205
21	Volatile Organic Compound Leaks	VOC ppm in N_2 or Air <2%	<10 ppm VOC
25	Total Gaseous Nonmethane Organic Emissions (TGNMO) as Carbon	CO, CH_4, C_3H_8, CO_2, hexane, toluene, and methanol each in air <1%	He, Air & O_2 <1ppm HC & CO_2 <1ppm & <0.1ppm HC
25A	Total Gaseous Organic Emissions using FID	C_2H_6, C_3H_8, C_4H_{10} or appropriate in N_2 or Air <2%	Defined by CFR 51 Appendix M Method 205
25B	Total Gaseous Organic Emissions using NDIR	C_2H_6, C_3H_8, C_4H_{10} or appropriate in N_2 or Air <2%	Defined by CFR 51 Appendix M Method 205
25C	Non Methane Organic Compounds (NMOC) in MSW landfill gases	CO, CH_4, C_3H_8, CO_2, hexane, toluene, and methanol each in air <1%	<10 ppm VOC
25D	Volatile Organic Concentration of Waste Samples	% propane and % 1,1-dichloroethylene in N_2	N_2, Air & O_2 <1ppm C
25E	Phase Organic Concentration in Waste Samples	% propane in N_2 or Air NIST traceable	N_2, Air & O_2 zero grade <ppm C
30A	Hg^0 µg/m³ from stationary sources	Hg^0 & $HgCl_2$ µg/m³ in N_2 or Air NIST traceable	No measurable Hg
30B	Hg^0 µg/m³ from stationary sources	Hg^0 & $HgCl_2$ µg/m³ in N_2 or Air NIST traceable	No measurable Hg

*These test methods were revised in August 2006 and advise using Zero Air / Zero Nitrogen that fits the definition of CFR 40 72.2 as the low point, oppose to a low level concentration pollutant.

EPA PS#	CEM Performance Specification for	Components (recommended but need not be certified)	Zero Gas (need not be certified)
PS 2	SO_2 ppm &/or NO_2 ppm	SO_2 ppm &/or NO_2 ppm in N_2	
PS 3	O_2% &/or CO_2%	O_2% &/or CO_2% in N_2 for Audit	
PS 4	CO ppm	1000 CO ppm on N_2	
PS 4A	CO ppm	<200 CO ppm on N_2	
PS 5	TRS ppm	H_2S ppm or other TRS in N_2	
PS 7	TRS ppm	H_2S ppm or other TRS in N_2	
PS 8	VOC ppm	CH_4, C_2H_6, C_3H_8, C_4H_{10}ppm or appropriate in N_2 or Air	
PS 9	Specific VOC ppm by GC	Specific VOC ppm in N_2 or Air <2%	Defined by CFR 40 72.2
PS 12	Hg	Hg in N_2	
PS 12A	Hg	Hg in N_2	
PPS 011 ETV Verification	NH_3 ppm	NH_3 in N_2 NIST or N_{mi} <3%	
PS-18	HCl ppm	HCl in N_2	Defined by CFR 40 72.2

Proposed Method 322 - HCl Emissions from Portland Cement Kilns by GFCIR 3/11/98 (WordPerfect version).
Proposed Method 323 - Measurement of Formaldehyde Emissions from Natural Gas-Fired Stationary Sources - Acetyl Acetone Derivitization Method (FR Vol. 68, No. 9, Tuesday, Jan. 14, 2003 Pgs. 1925-1929).

ENVIRONMENTAL MONITORING

EPA Protocols and Traceability Standards

EPA Protocol Gas Mixtures — Equipment Recommendations

	Concentration Range	CGA Connection	Cylinder Size*	Contents ft³**	Recommended Two-Stage Regulator
Carbon Dioxide in Air	300 ppm - < 1% 1% - 30%	590	150A	143	Y12-T265D590 **E23**
Carbon Dioxide in Nitrogen	300 ppm - < 1% 1% - 30%	580	150A	140	Y12-T265D580 **E23**
Carbon Monoxide in Air	2 ppm - <100 ppm 100 ppm - <1% 1% - 6.25%	590	150A	143	Y12-T265D590 **E23**
Carbon Monoxide in Nitrogen	2 ppm - <100 ppm 100 ppm - <1% 1% - 13%	350	150A	140	Y12-T265D350 **E23**
Hydrogen Sulfide in Nitrogen	2 ppm - <100 ppm 100 ppm - 1000 ppm	330	150A	140	Y12-C445D330 **E28**
Methane in Air	0.5 ppm - <100 ppm 100 ppm - 1000 ppm	590	150A	143	Y12-N245D590 **E21**
Nitric Oxide in Nitrogen	0.4 ppm - <100 ppm 100 ppm - 5000 ppm	660	150A	140	Y12-C445D660 **E28**
Oxygen in Nitrogen	1000 ppm - <1% 1% - 30%	<5% CGA 580 ≥5% - 23.5% CGA 590 >23.5% CGA 296	150A	140	Y12-N245D (CGA) **E21**
Propane in Air	0.25 ppm - <100 ppm 100 ppm - <0.1% 0.1% - 1%	590	150A	143	Y12-N245D590 **E21**
Propane in Nitrogen	0.25 ppm - <100 ppm 100 ppm - <0.1% 0.1% - 1%	350	150A	140	Y12-N245D350 **E21**
Sulfur Dioxide in Air	2 ppm - <100 ppm 100 ppm - <1000 ppm 1000 ppm - 5000 ppm	660	150A	143	Y12-C445D660 **E28**
Sulfur Dioxide in Nitrogen	2 ppm - <100 ppm 100 ppm - <1000 ppm 1000 ppm - 5000 ppm	660	150A	140	Y12-C445D660 **E28**
Sulfur Dioxide, Nitric Oxide in Nitrogen	2 ppm - 5000 ppm 0.4 ppm - 5000 ppm	660	150A	143	Y12-C445D660 **E28**
Sulfur Dioxide, Oxygen in Nitrogen	2 ppm - 5000 ppm 0.1% - 30%	660	150A	143	Y12-C445D660 **E28**
Carbon Dioxide, Oxygen in Nitrogen	300 ppm - 30% 0.1% - 30%	<5% CGA 580 ≥5% - 23.5% CGA 590 >23.5% CGA 296	150A	143	Y12-N245D (CGA) **E21**
Sulfur Dioxide, Nitric Oxide, Carbon Dioxide in Nitrogen	2 ppm - 5000 ppm 2 ppm - 5000 ppm 300 ppm - 30%	660	150A	143	Y12-C445D660 **E28**
Sulfur Dioxide, Nitric Oxide, Carbon Monoxide in Nitrogen	2 ppm - 5000 ppm 2 ppm - 5000 ppm 2 ppm - 13%	660	150A	143	Y12-C445D660 **E28**
Sulfur Dioxide, Nitric Oxide, Carbon Dioxide, Carbon Monoxide in Nitrogen	2 ppm - 5000 ppm 2 ppm - 5000 ppm 300 ppm - 30% 2 ppm - 13%	660	150A	143	Y12-C445D660 **E28**

* Airgas® EPA Protocol gases are supplied in aluminum cylinders, sizes 150A, 80A, and 33A.
** Contents represent approximations; actual volumes are determined by the concentrations of the minor components.

Where EPA Protocol Standards are not required, Continuous Emissions Monitoring (CEM) Daily Calibration Standards are blended to the same exacting standards, are NIST Traceable, and have an analytical accuracy of ± 2%. In addition to those components and combinations of components listed as EPA Protocol Standards, the following mixtures are available as daily calibration standards:

CEM Daily Calibration Gases					Equipment Recommendations
Daily Calibration Standards	**Concentration Range**	**CGA Connection**	**Cylinder Size**	**Contents ft³**	**Recommended Two-Stage Regulator**
Ammonia in Nitrogen	5 ppm - <100 ppm 100 ppm - <1% 1% - 4%	705	150A	140	Y12-T265D705 **E23**
Carbon Dioxide in Air	300 ppm - <1% 1% - 30%	590	150A	143	Y12-T265D590 **E23**
Carbon Dioxide in Nitrogen	300 ppm - <1% 1% - 30%	580	150A	140	Y12-T265D580 **E23**
Carbon Monoxide in Air	2 ppm - <100 ppm 100 ppm - <1% 1% - 6.25%	580	150A	143	Y12-T265D590 **E23**
Carbon Monoxide in Nitrogen	2 ppm - <100 ppm 100 ppm - <1% 1% - 20%	350	150A	140	Y12-T265D350 **E23**
Hydrogen Chloride in Nitrogen	2 ppm - <100 ppm 100 ppm - 1000 ppm	330	150A	140	Y12-T265D330 **E23**
Hydrogen Sulfide in Nitrogen	2 ppm - <100 ppm 100 ppm - 1000 ppm	330	150A	140	Y12-T265D330 **E23** **E23**
Nitric Oxide in Nitrogen	2 ppm - <100 ppm 100 ppm - <1% 1% - 6.25%	660	150A	140	Y12-T265D660 **E23**
Oxygen in Nitrogen	100 ppm - <1% 1% - 30%	<5% CGA 580 ≥5% -23.5% CGA 590 >23.5% CGA 296	150A	140	Y12-T265D590/296 **E23**
Propane in Air	1 ppm - <100 ppm 100 ppm - <1000 ppm 1000 ppm - 1%	590	150A	143	Y12-T265D590 **E23**
Propane in Nitrogen	1 ppm - <100 ppm 100 ppm - <1000 ppm 1000 ppm - 2%	350	150A	140	Y12-T265D350 **E23**
Sulfur Dioxide in Air	5 ppm - <100 ppm 100 ppm - <1000 ppm 1000 ppm - 2%	660	150A	143	Y12-T265D660 **E23**
Sulfur Dioxide in Nitrogen	5 ppm - <100 ppm 100 ppm - <1000 ppm 1000 ppm - 2%	660	150A	140	Y12-T265D660 **E23**

CEM Zero Gases					Equipment Recommendations
Gas	**Purity Specifications**	**CGA Connection**	**Cylinder Size**	**Contents ft³**	**Recommended Two-Stage Regulator**
CEM Zero Air*	O_2 20% - 21% CO ≤ 0.5 ppm CO_2 ≤ 1 ppm NO_x ≤ 0.1 ppm SO_2 ≤ 0.1 ppm THC ≤ 0.1 ppm	80A	150A 76	144 **E23**	Y12-T265D590
CEM Zero Nitrogen*	CO ≤ 0.5 ppm CO_2 ≤ 1 ppm NO_x ≤ 0.1 ppm SO_2 ≤ 0.1 ppm THC ≤ 0.1 ppm	580	150A 80A	140 76	Y12-T265D580 **E23**

Follows CFR Specifications for zero ambient air material.
Batch Certificates of Analysis included with each cylinder.
*Meets the requirements of CFR 72.2

ENVIRONMENTAL MONITORING | Non EPA Protocol Calibration Gases

Elemental Mercury Gas Specifications

- Concentrations range from 1 µg/M³ to 60 µg/M³ (100ppT to 6ppB)
- Balance Air or Nitrogen
- Pressure (depending on cylinder size) 300A's = 2000 PSIG (5500 Usable Liters) 150A's = 1800 PSIG (3600 Usable Liters)
- Directly traceable to NIST certified Vendor Prime Mercury Generator
- Analytical Accuracy ±5% (currently)
- 6 month stability

How will elemental mercury calibration gas cylinders be used

- Traceability Protocol for Elemental Mercury Gas Generators routine audit test.
- Instrumental Test method 30b (spiking)
- Substitute for mercury gas generators (broken, failures, etc.)
- Overall independent spot check for systems.

Ammonia Calibration Standards

Accurate to keep you compliant and safe

- Comply with your Title V monitoring requirements.
- Traceable to VSL (Dutch National Laboratory) and NIST
- Non Traceable available
- Meets the requirements of EPA tests for stationary source monitoring such as:
  Preliminary Performance Specification 001 (PPS-001) Ammonia CEMS
  http://www.epa.gov/ttn/emc/prelim.html
  Molybdenum vs. Stainless Steel differential converter test Method 7E – NOx – Instrumental
  http://www.epa.gov/ttn/emc/promgate.html
- OSHA monitoring test gas for:
  OSHA permissible exposure limit (PEL) of 50 parts per million (ppm)
  The OSHA (former) standard of 35 ppm (as a 15 minute Short Term Exposure Limit (STEL))
  http://www.ufcw.org/your_industry/manufacturing/safety_health_news_and_facts/ammonia_hazards.cfm

FEATURES:

- Ranges from 5 ppm to 1,000 ppm
- 12 month stability
- Traceable to VSL and NIST
- Available in Air and Nitrogen

ZERO GAS

EPA requires the use of Zero gas that meets the requirements of 40 CFR 72.2 in EPA CFR 40 part 60 EPA test methods, and EPA CFR 40 Part 75.

Airgas® Standard Operating Procedures assure that we provide a certification verifying that the contents meet CFR 40 72.2 that the calibration gas does not contain concentrations of SO_2, NOx, or total hydrocarbons above 0.1 parts per million (ppm), a concentration of CO above 1 ppm, or a concentration of CO_2 above 400 ppm.

Hydrogen Chloride (HCl)

Airgas has performed extensive stability studies and has documented the stability of HCl mixtures supporting the 12 month certification period. Airgas provided HCl mixtures pass the stringent PADEP requirements for HCl used for calibration of CEMS as well as many applications including incineration, waste to energy facilities, and industrial hygiene.

HCl mixture specifications:

Cylinder size: 150A
300A

Concentrations: 2 ppm–1000 ppm

Shelf Life: 6 months for PADEP HCl (or other states requiring 6 months)
12 months elsewhere

Meets the requirements of US EPA HCl Performance Specification PS-18

Certification Periods for EPA Protocol gases in accordance with the May 2012 "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards"

Certified Component	Balance Gas	Applicable range	Certification period (months)
Ammonia	Nitrogen	≥5 ppm	12
Carbon dioxide	Air	≥360 ppm	96
Carbon Dioxide	Nitrogen	≥100 ppm	96
Carbon monoxide	Nitrogen or Air	≥2 ppm	96
Hydrogen Sulfide	Nitrogen	≥2 ppm	36
Methane	Nitrogen or Air	≥1 ppm	96
Nitric Oxide	Nitrogen (O_2-free)	0.5 to 50 ppm	36
Nitric Oxide	Nitrogen (O_2-free)	≥50 ppm	96
Nitrous Oxide	Air	≥0.3 ppm	96
Oxides of Nitrogen (NO_2)	Air	≥3 ppm	36
Oxides of Nitrogen (NO_2)	Nitrogen (O_2 doped)	≥3 ppm	36
Oxygen	Nitrogen	≥0.2%	96
Propane	Air	>0.25 ppm	96
Propane	Nitrogen	>0.25 ppm	96
Sulfur Dioxide	Nitrogen or Air	1 to 50 ppm	48
Sulfur Dioxide	Nitrogen or Air	≥50 ppm	96
Mixtures with lower concentrations are certified for 6 months.			

An EPA Protocol mixture can be recertified if the residual pressure after analysis is >100psig
EPA Protocol mixtures are certified down to a minimum use pressure of 100psig
O_2-free Nitrogen contains <100ppB of oxygen

Check your Certificates of Analysis (COA):

The contents of the Certification of Analysis and sidewall label that are provided with each EPA Protocol gas cylinder are extremely important. These are frequently reviewed by local, state and EPA air quality enforcement personnel to ensure they meet mandatory requirements. A quick check of your COA can save you fines and aggravation. The following are the minimum requirements for information on an EPA Protocol gases COA:

1. Cylinder identification number (e.g. stamped cylinder number)
2. The certified concentrations for the assayed components of the Protocol gas, with values provided to at least 3 significant figures, and the balance gas
3. The calculated estimate of 95% uncertainty for each named component
4. Cylinder pressure at certification and statement that the Protocol gas cannot be used below 100psig, i.e. 0.7 megapascals
5. Dates of the assays and certification. The certification date is the date of the last assay
6. Certification expiration date
7. Information about each reference standard used in the assay:
   a. For an NTRM, RGM or PRM: standard type, cylinder number, certified concentration, expanded uncertainty, certification expiration date
   b. For a GMIS: cylinder number, certified concentration, expanded uncertainty, expiration date – plus information (7.a.) about the reference material used in certifying the GMIS
8. Statement that the assay/certification was performed according to EPA Protocol document EPA 600/R-12/531 – plus the Procedure used: G1 or G2
9. The analytical method(s) used in the assays and date of the most recent multipoint calibration for each instrument used in the assays
10. Identification of the specialty gas producer: Company, laboratory name, city and state, PGVP vendor ID
11. Chronological record of all certifications for the standard

* As required by "EPA Traceability Protocol Assay and Certification of Gaseous Calibration Standard (EPA 600/R-12/531 May 2012) Documentation"
** In some cases the states and local air agencies can ask for more information on a Certificate of Analysis.

ENVIRONMENTAL MONITORING | Air Toxics Monitoring

EPA TO-14 Calibration Standard - 42 Components, 100 ppb or 1 ppm each in Nitrogen

Benzene	Dichlorodifluoromethane	4-Ethyltoluene	Trichloroethylene
1,3-Butadiene	1,1-Dichloroethane	Ethyl Chloride	Trichlorofluoromethane
Carbon Tetrachloride	1,2-Dichloroethane	Hexachloro-1,3-butadiene	1,1,2-Trichloro-1,2,2-trifluoroethane
Chlorobenzene	1,1-Vinylidene Chloride	Methyl Bromide	1,2,4-Trimethylbenzene
Chloroform	cis-1,2-Dichloroethylene	Styrene	1,3,5-Trimethylbenzene
Chloromethane	Dichloromethane	1,1,2,2-Tetrachloroethane	Vinyl Chloride
3-Chloropropylene	1,2-Dichloropropane	Tetrachloroethylene	m-Xylene
1,2-Dibromoethane	cis-1,3-Dichloropropene	Toluene	o-Xylene
1,2-Dichlorobenzene	trans-1,3-Dichloropropene	1,2,4-Trichlorobenzene	p-Xylene
1,3-Dichlorobenzene	1,2-Dichloro-1,1,2,2-tetrafluoroethane	1,1,1-Trichloroethane	
1,4-Dichlorobenzene	Ethylbenzene	1,1,2-Trichloroethane	

EPA TO-14 Chlorinated Hydrocarbon Mixture (16 Components, 100 ppb or 1 ppm each in Nitrogen)

Carbon Tetrachloride	Chloromethane	1,2-Dichloroethane	cis-1,2-Dichloroethylene
1,2-Dichloropropane	Hexachloro-1,3-butadiene	Tetrachloroethylene	Trichloroethylene
Chloroform	1,1-Dichloroethane	1,1-Dichloroethylene	Dichloromethane
cis-1,3-Dichloropropene	1,1,2,2-Tetrachloroethane	1,1,2-Trichloroethane	Vinyl Chloride

EPA TO-14 Aromatics Mixture (14 Components, 100 ppb or 1 ppm each in Nitrogen)

Benzene	1,2-Dichlorobenzene	1,4-Dichlorobenzene	Styrene
Toluene	1,2,4-Trimethylbenzene	m-Xylene	p-Xylene
Chlorobenzene	1,3-Dichlorobenzene	Ethylbenzene	
1,2,4-Trichlorobenzene	1,3,5-Trimethylbenzene	o-Xylene	

EPA TO-14 CFC/HCFC Mixture (4 Components, 100 ppb or 1 ppm each in Nitrogen)

Halocarbon 11	Halocarbon 113
Halocarbon 12	Halocarbon 114

EPA TO-14 GC/MS Internal Standard (3 Components, 100 ppb or 1 ppm each in Nitrogen)

Bromochloromethane	Chlorbenzene - D5	1,4-Difluorobenzene

EPA TO-14 Internal/Tuning Standard (3 Components, 100 ppb or 1 ppm each in Nitrogen)

Bromochloromethane	Chlorbenzene - D5	Bromofluorobenzene

BTEX Mixture (6 Components, 100 ppb or 1 ppm each in Nitrogen)

Benzene	m-Xylene
Ethylbenzene	o-Xylene
Toluene	p-Xylene

Special Applications

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Mobile Emissions Monitoring | ENVIRONMENTAL MONITORING

Airgas® provides a complete range of certified California BAR (Bureau of Automotive Repair) blends for emissions certification, state vehicle inspection and IM testing, and independent testing laboratories. Products include both standard and enhanced emission monitoring gases, multiple component gases for test equipment calibration, and Vehicle Emission Zero Air used prior to every vehicle test. Gases are produced in California BAR-certified facilities using a dynamic blending process that ensures repeatable calibration accuracy.

Bar-97 Calibration Gases

State auto emissions programs using either 2-speed idle testing or loaded mode testing

Calibration & Audit Gases	Concentrations	
Low-Range BAR-97 with Nitric Oxide (NO) Blend Code 32	200 ppm 0.50% 6.0% 300 ppm Balance:	Propane (HC) Carbon Monoxide (CO) Carbon Dioxide (CO_2) Nitric Oxide (NO) (< 3 ppm NO_2) Oxygen-free Nitrogen (N_2)
High-Range BAR-97 with Nitric Oxide (NO) Blend Code 35	3200 ppm 8.00% 12.0% 3000 ppm Balance:	Propane (HC) Carbon Monoxide (CO) Carbon Dioxide (CO_2) Nitric Oxide (NO) (< 3 ppm NO_2) Oxygen-free Nitrogen (N_2)
BAR-97 Vehicle Emission Zero Air Blend Code 37	<1 ppm <1 ppm <400 ppm <1 ppm 20.9% Balance:	Total Hydrocarbons (THC) Carbon Monoxide (CO) Carbon Dioxide (CO_2) Nitric Oxide (NO) Oxygen (O_2) Oxygen-free Nitrogen (N_2)
High-Range BAR-97 Blend Code 34	3200 ppm 8.00% 12.0% Balance:	Propane (HC) Carbon Monoxide (CO) Carbon Dioxide (CO_2) Oxygen-free Nitrogen (N_2)

Bar-90ET & Earlier Calibration Gases

Used for auto emissions inspection and IM programs using 2-speed idle testing

Calibration & Audit Gases	Concentrations	
Low-Range BAR-90ET Blend Code 11	300 ppm 1.00% 6.0% Balance:	Propane (HC) Carbon Monoxide (CO) Carbon Dioxide (CO_2) Nitrogen (N_2)
Mid-Range BAR-90ET Blend Code 12	1200 ppm 4.00% 12.0% Balance:	Propane (HC) Carbon Monoxide (CO) Carbon Dioxide (CO_2) Nitrogen (N_2)
Low-Range BAR-84 Blend Code 13	600 ppm 1.60% 11.0% Balance:	Propane (HC) Carbon Monoxide (CO) Carbon Dioxide (CO_2) Nitrogen (N_2)

Note: For a complete listing of blends and audit standards contact your local Airgas® representative.

IM240 NOx Converter Efficiency Test Mix

A mixture of 200 ppm Nitrogen Dioxide (NO_2) in Air, which is used for the weekly check of the NOx converter in a Chemiluminescent analyzer.

Blend tolerance: +/– 100 ppm absolute
Analytical tolerance: +/– 2%
Expiration date: 12 months

IM240 FID CHECK GAS

The mixture is 50 ppm Methane in Air used for the monthly check of the response of the Hydrocarbon analyzer.

Blend tolerance: +/– 5% relative
Analytical tolerance: +/– 2% relative
Expiration date: 36 months

IM240 SPAN GAS*

Components	Balance Gas	Accuracy	Expiration
Carbon Monoxide	Air or Nitrogen	+/– 2%	36 months
Carbon Dioxide	Air or Nitrogen	+/– 2%	36 months
Propane	Air only	+/– 2%	36 months
Nitric Oxide	Nitrogen only	+/– 2%	24 months

Analytical results are directly traceable to NIST.
Blend tolerance shall be no more than +/– 5% relative.

IM240 Audit Gas IM240 Calibration Gas*

These products can be single or multicomponent gases with the following limitations:

Components	Balance Gas	Accuracy	Expiration
Carbon Monoxide	Air or Nitrogen	+/– 1%	36 months
Carbon Dioxide	Air or Nitrogen	+/– 1%	36 months
Propane	Air only	+/– 1%	36 months
Nitric Oxide	Nitrogen only	+/– 1%	24 months

Analytical results are directly traceable to NIST.
Blend tolerance shall be no more than +/– 5% relative.

IM240 FID OXIDIZER

A mixture of 18-21% Oxygen in Nitrogen or Argon, used as the oxidant gas for the Hydrocarbon analyzer.

THC < 1 ppm

IM240 FID FUEL GAS

A mixture of 40% Hydrogen in Helium used as the fuel gas for the Hydrocarbon analyzer. Blend tolerance: +/– 2% absolute

THC < 1 ppm

*IM240 Calibration and Span gases will be supplied with a Certificate of Analysis.

Special Applications

Special Applications

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AIRGAS® LASER*PLUS*™ GASES | Pure Laser Gases

Airgas® offers a complete line of Airgas® Laser*PLUS*™ gases. To meet the precise and consistent purity specifications needed for optimal laser performance, we produce our Airgas® Laser*PLUS*™ gases under the strictest quality control. Our manufacturing facilities incorporate the highest standards to help ensure that each cylinder meets or exceeds required purity and tolerance levels.

Purity Specifications	Minimum Purity	O_2	H_2O	THC
Airgas® Laser*PLUS*™ Helium	99.998%	-	<5	<1
Airgas® Laser*PLUS*™ Nitrogen	99.998%	-	<5	<1
Airgas® Laser*PLUS*™ Carbon Dioxide	99.995%	-	<5	<5
Airgas® Laser*PLUS*™ Helium Ultra	99.999%	<1	<2	<0.5
Airgas® Laser*PLUS*™ Nitrogen Ultra	99.999%	<1	<2	<0.5
Airgas® Laser*PLUS*™ Carbon Dioxide Ultra	99.996%	<10	<5	<1
Airgas® Laser*PLUS*™ Argon	99.998%	-	<5	<1
Airgas® Laser*PLUS*™ Oxygen	99.98%	-	<5	<1

PRODUCT	Ordering Information			
	Cylinder Size	Volume ft³	Cylinder Pressure at 70°F (psig)	Product Number
Airgas® Laser*PLUS*™ Helium	300	291	2,640	Inquire
	Individual or batch Certificate of Analysis is available upon request. Standard value outlet: CGA 580			
Airgas® Laser*PLUS*™ Nitrogen	300	304	2,640	Inquire
	Individual or batch Certificate of Analysis is available upon request. Standard value outlet: CGA 580			
Airgas® Laser*PLUS*™ Carbon Dioxide	200	60 lb	838	Inquire
	Individual or batch Certificate of Analysis is available upon request. Standard value outlet: CGA 320			
Airgas® Laser*PLUS*™ Helium Ultra	300	291	2640	Inquire
	Individual or batch Certificate of Analysis is available upon request. Standard value outlet: CGA 580			
Airgas® Laser*PLUS*™ Nitrogen Ultra	300	304	2640	Inquire
	Individual or batch Certificate of Analysis is available upon request. Standard value outlet: CGA 580			
Airgas® Laser*PLUS*™ Carbon Dioxide Ultra	200	60 lb	2640	Inquire
	Individual or batch Certificate of Analysis is available upon request. Standard value outlet: CGA 320			
Airgas® Laser*PLUS*™ Argon	300	336	2640	Inquire
	Individual or batch Certificate of Analysis is available upon request. Standard value outlet: CGA 580			
Airgas® Laser*PLUS*™ Oxygen	300	337	2640	Inquire
	Individual or batch Certificate of Analysis is available upon request. Standard value outlet: CGA 540			

Technical Data & Shipping Information	
DOT Class	2.2
DOT Label	Nonflammable Gas
ID No.	Helium: UN1046 Nitrogen: UN1066 Carbon Dioxide: UN1013 Argon: UN 1006 Oxygen: UN 1072

Special Applications

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Laser Gas Mixtures | AIRGAS® LASER*PLUS*™ GASES

Product Name	CO_2 (%)	N_2 (%)	He (%)	CO (%)	H_2 (%)	O_2 (%)	Xe (%)
Airgas® Laser*PLUS*™ 201		90				10	
Airgas® Laser*PLUS*™ 302	1.7	23.4	74.9				
Airgas® Laser*PLUS*™ 320	4.5	13.5	82				
Airgas® Laser*PLUS*™ 321	5	55	40				
Airgas® Laser*PLUS*™ 323	6	20	74				
Airgas® Laser*PLUS*™ 324	3.4	15.6	81				
Airgas® Laser*PLUS*™ 327	6	18	76				
Airgas® Laser*PLUS*™ 328	12	12	76				
Airgas® Laser*PLUS*™ 331	5	35	60				
Airgas® Laser*PLUS*™ 471	15	2	79		4		
Airgas® Laser*PLUS*™ 472	8	16	74	2			
Airgas® Laser*PLUS*™ 475	8	8	82	2			
Airgas® Laser*PLUS*™ 477	8	16	72	4			
Airgas® Laser*PLUS*™ 483	8	60	28	4			
Airgas® Laser*PLUS*™485	10	23.7	65.1		1.2		
Airgas® Laser*PLUS*™ 579	9	18	68.7	4	0.3		
Airgas® Laser*PLUS*™ 581	7.5	15	74.25	3	0.25		
Airgas® Laser*PLUS*™ 584	8	16	71.6	4	0.4		
Airgas® Laser*PLUS*™ 690	4	19	65	6		3	3

PRODUCT	Ordering Information			
	Cylinder Size	Volume* ft^3	Connection	Product Number
Airgas® Laser*PLUS*™ 201	300 200	304 216	590 590	Inquire Inquire
Airgas® Laser*PLUS*™ 302	300 200	258 196	580 580	Inquire Inquire
Airgas® Laser*PLUS*™ 320	300 200	259 196	580 580	Inquire Inquire
Airgas® Laser*PLUS*™ 321	300 200	268 203	580 580	Inquire Inquire
Airgas® Laser*PLUS*™ 323	300 200	259 196	580 580	Inquire Inquire
Airgas® Laser*PLUS*™ 324	300 200	259 196	580 580	Inquire Inquire
Airgas® Laser*PLUS*™ 327	300 200	260 197	580 580	Inquire Inquire
Airgas® Laser*PLUS*™ 328	300 200	262 198	580 580	Inquire Inquire
Airgas® Laser*PLUS*™ 331	300 200	262 199	580 580	Inquire Inquire
Airgas® Laser*PLUS*™ 471	300 200	262 200	350 350	Inquire Inquire
Airgas® Laser*PLUS*™ 472	150A	133	350	Inquire
Airgas® Laser*PLUS*™ 475	150A	132	350	Inquire
Airgas® Laser*PLUS*™ 477	150A	133	350	Inquire
Airgas® Laser*PLUS*™ 483	150A	140	350	Inquire
Airgas® Laser*PLUS*™ 485	300 200	261 197	350 350	Inquire Inquire
Airgas® Laser*PLUS*™ 579	150A	133	350	Inquire
Airgas® Laser*PLUS*™ 581	150A	132	350	Inquire
Airgas® Laser*PLUS*™ 584	150A	133	350	Inquire
Airgas® Laser*PLUS*™ 690	650RAL	285 (liters)	350	Inquire

*Actual volume may vary depending on fill pressure

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Think Airgas for Refrigerants

Refrigerant Gases

Free next day delivery

Airgas Refrigerants, Inc., is the leading, nationwide, refrigerant supplier, offering the widest selection of refrigerants available from coast-to-coast. We provide free next day delivery to anywhere in the contiguous United States. Whether you're looking for out-of-production CFC's such as R-12, R-11 or R-113 or one of the new alternative refrigerants such as R-407A, R-407C, R-407F, R-422D or R-438A, Airgas has what you need.

Call us today and join the thousands of refrigerant buyers across the country who have discovered Airgas for all their refrigerant supply needs.

Used Refrigerant Return Programs

Highest buy-back prices offered

Airgas Refrigerants is an EPA Certified Refrigerant Reclaimer operating multiple state-of-the-art reclamation facilities. We offer the most competitive buy-back prices in the industry, flexible used refrigerant return programs, refrigerant banking plans, refrigerant process and exchange, disposal, analytical testing, cylinder recertification and refurbishing, and much more. Whether you're working on a one time retrofit or maintenance project or you need a program for repeated returns of used refrigerants, Airgas has what you need.

Call us today and discover how easy returning your used refrigerant can be.

Refrigerant On-Site Services

Certified Airgas field technicians

Airgas Refrigerants has the capability to reclaim refrigerant to AHRI-700 standards on site. Our patented technologies of our transportable recovery reclamation units RPS and MPS, can return your refrigerant to AHRI-700 purity standards on site at speeds of up to 2,700 pounds per hour. Airgas also provides dehydration and flushing services designed to remove moisture from any refrigerant system regardless of size. Most importantly Airgas Refrigerants' on-site services are run by certified Airgas field technicians who work safely and conscientiously on-site throughout the entire process.

Call us today and partner with Airgas for your refrigerant service requirements.

Contact an Airgas Representative

www.airgas.com

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Refrigerant Listing

COLOR PMS #	TYPE	CHEMICAL NAME OR COMPONENTS	CONTAINER SIZES (lbs.)
CFC	**EPA Technician Certification required to purchase CFC refrigerants**		
021	**R-11**	Trichlorofluoromethane	30, 100, 200, 650, 1000, 2200
White	**R-12**	Dichlorodiflouromethane	15, 30, 50, 145, 1000, 2000
2975	**R-13**	Chlorotrifluoromethane	5, 9, 23, 70, 80
177	**R-13B1**	Bromotrifluoromethane	10, 50, 150, custom
124	**R-14**	Tetrafluoromethane	15, 70
266	**R-113**	Trichlorotrifluoroethane	100, 200, 690
302	**R-114**	1,2-Dichloro-1,1,2,2-Tetrafluoroethane	30, 150, 2200
103	**R-500**	Dichlorodifluoromethane, Difluoroethane	15, 30, 50, 125, 1000, 1750
251	**R-502**	Chlorodifluoromethane, Chloropentafluoroethane	15, 30, 50, 125, 1000, 1750
3268	**R-503**	Chlorotrifluoromethane, Trifluoromethane	5, 9, 20, 70, 80, 1200
HCFC	**EPA Technician Certification required to purchase HCFC refrigerants**		
352	**R-22**	Chlorodifluoromethane	15, 30, 50, 125, 1000, 1750
428	**R-123**	Dichlorotrifluoroethane	100, 200, 630, 2200
335	**R-124**	1-Chloro-1,2,2,2-Tetrafluoroethane	30, 150, 1750, 2000
177	**R-401A**	Chlorodifluoromethane, Chlorotetrafluoroethane	30, 125, 1700
124	**R-401B**	Chlorodifluoromethane, Chlorotetrafluoroethane	30, 125, 1700
461	**R-402A**	Chlorodifluoromethane, Pentafluoroethane	27, 110
385	**R-402B**	Chlorodifluoromethane, Pentafluoroethane	13
248	**R-408A**	Trifluoroethane, Chlorodifluoromethane	24, 100
465	**R-409A**	Chlorodifluoromethane, Chlorotetrafluoroethane	30, 125
none	**R-412A**	Chlorodifluoromethane, 1-Chloro-1,1-Difluoroethane and Octafluoropropane	4.4
4545	**R-414B**	Chlorodifluoromethane, Chlorodifluoroethane, Chlorotetrafluoroethane	25
381	**R-416A**	1-Chloro-1,2,2,2-tetrafluoroethane, 1,1,1,2-Tetrafluoroethane	25, 125
HFC	**No EPA Technician Certification needed to purchase HFC refrigerants**		
428	**R-23**	Trifluoromethane	9, 20, 70
424	**R-116**	Hexafluoroethane	26, 90, 95
2975	**R-134a**	1,1,1,2-Tetrafluoroethane	30, 125, 1000, 1750
021	**R-404A**	Pentafluoroethane, 1,1,1,2-Tetrafluoroethane, Trifluoroethane	24, 100, 800, 870, 1300
368	**R-407A**	Difluoromethane, Pentafluoroethane, 1,1,1,2-Tetrafluoroethane	25, 100
156	**R-407B**	Difluoromethane, Pentafluoroethane, 1,1,1,2-Tetrafluoroethane	25, 100
471	**R-407C**	Difluoromethane, Pentafluoroethane, 1,1,1,2-Tetrafluoroethane	25, 115, 1550
507	**R-410A**	Pentafluoroethane, Difluoromethane	25, 100, 850, 1350, 1450
354	**R-417A**	1,1,1,2-Tetrafluoroethane Pentafluoroethane	25, 110, 950
128	**R-422A**	1,1,1,2-Tetrafluoroethane Pentafluoroethane	24, 100
375	**R-422D**	1,1,1,2-Tetrafluoroethane Pentafluoroethane	25, 110
292	**R-423A**	Tetrafluoroethane, Heptafluoropropane	125, 1800
3405	**R-427A**	1,1,1,2-Tetrafluoroethane, Pentafluoroethane	25, 100
2727	**R-438A**	Difluoromethane, Pentafluoroethane, 1, 1, 1, 2-Tetrafluoroethane, n-Butane, Isopentane	25, 100
326	**R-507**	Pentafluoroethane, Trifluoroethane	25, 100, 800, 840, 1400
none	**R-508A**	Trifluoromethane, Hexafluoroethane	4.4, 10, 82
302	**R-508B**	Trifluoromethane, Hexafluoroethane	10, 20, 70

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PROCESS CHEMICALS

Precise Packaging. Unrivaled Experience.

The chemicals you need. Packaged for your process. Delivered with safety and precision. You'll find it all at Airgas.

Airgas has long been recognized as the leading U.S. distributor of industrial, medical and specialty gases, welding goods and safety products. Our best-kept secret is our comprehensive Process Chemical product offering. This is increasingly important because of recent changes in the way chemical users purchase and store these reactive products. Key factors that have led to supply chain changes include more stringent environmental regulations and storage restrictions required by the Department of Homeland Security. Airgas' broad product and package offering, distribution capabilities and supply chain programs translate into unmatched versatility in delivering exactly the chemical you need, in the quantities needed, where and when you need them. In addition, our technical expertise and dedication to safety provide customers with the right risk management solution.

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The right expertise to meet ever-changing needs.

Airgas has been meeting the process chemicals needs of industry for nearly 20 years with the widest range of process chemicals packaging available and an extensive nationwide distribution system. Our supply chain management expertise will help you comply with the latest risk management regulations unique to your industry or facility.

The right process chemicals — where and how you need them.

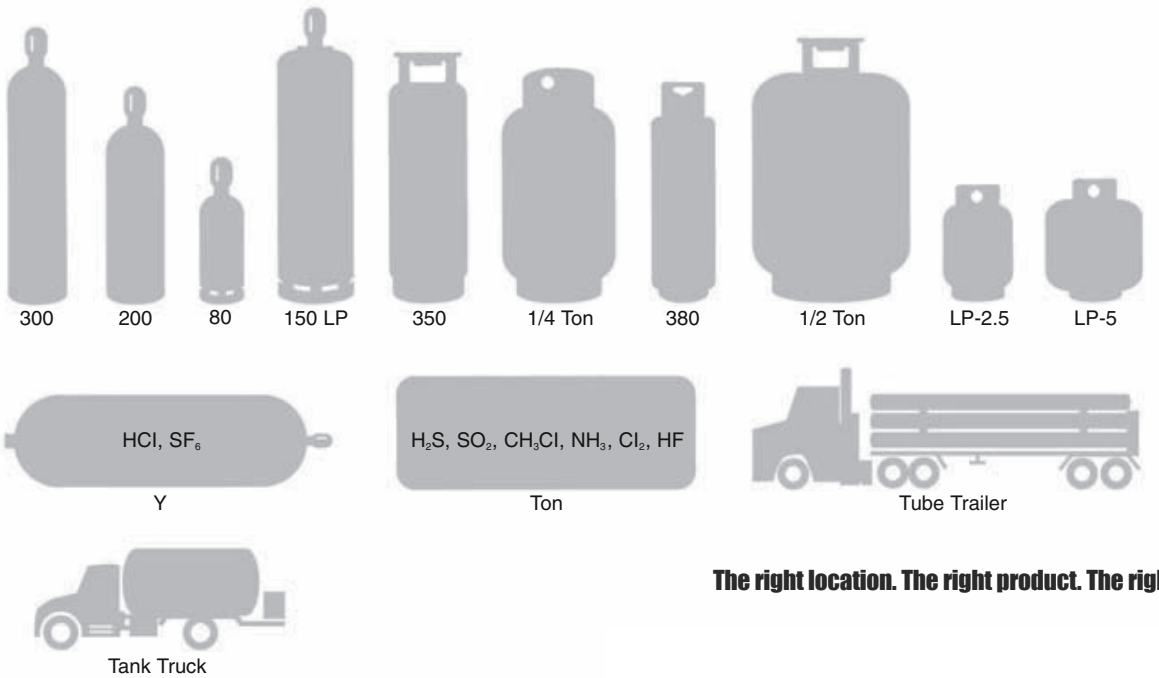
For companies requiring less-than-railcar quantities, Airgas provides a broad range of top-quality process chemicals. With more than two dozen package sizes and the ability to provide custom packaging, we can meet virtually any need. And with Airgas' supply chain management capabilities, there's no need to store large quantities of chemicals on site. You get exactly what you need, in the package size you need, delivered right where you need it.

Airgas offers more than 30 process chemicals, including:

- *Ammonia (NH_3)*
- *Chlorine (Cl_2)*
- *Chlorine Dioxide (ClO_2)*
- *Ethyl Chloride (C_2H_5Cl)*
- *Fluorine (F_2) and derivatives*
- *Hydrocarbons (a wide variety)*
- *Hydrocarbon Refrigerants (a wide variety)*
- *Hydrogen Bromide (HBr)*
- *Hydrogen Chloride (HCl)*
- *Hydrogen Fluoride (HF)*
- *Hydrogen Sulfide (H_2S)*
- *Methylamines (MMA, DMA, TMA)*
- *Methyl Chloride (CH_3Cl)*
- *Sulfur Dioxide (SO_2)*
- *Sulfur Hexafluoride (SF_6)*

Airgas' nationwide Emergency Response infrastructure is the largest response organization in our industry providing support anywhere in the country. Our Engineered Solutions engineering group can design and install partial or turn-key product supply systems with enhanced safety features.

Process Chemicals Package Sizes and Capacities



The right location. The right product. The right expertise.

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Hydrocarbon Processing Gases

Airgas® is a leading supplier of hydrocarbon calibration standards for use in the calibration of laboratory, emission monitoring, and process control instrumentation. Airgas' calibration standards are available as both liquid and gaseous mixtures in minor component ranges from low part-per-million (ppm) to percentage.

Liquid and Gaseous Blends

We can provide liquid or gaseous mixtures in both aluminum and steel cylinders. Gaseous blends, containing condensable components, are normally filled to a pressure which is 75% dewpoint pressure at 70° F unless physical or stability problems dictate a lower percentage. This is designed to prevent condensation problems which may occur as a result of lower temperature conditions. Liquid blends are normally filled by weight and will not exceed the fill density regulations set forth by the DOT(§173.304 (d)). All liquid blends will also be delivered with a 200 psig helium head pressure as standard unless requested by the customer.

Packages

Hydrocarbon calibration blends are available in a variety of steel and aluminum cylinders that are prepared specific to each mixture. We offer specially prepared packages for low concentration or reactive gas mixtures to ensure mixture stability. We also can provide mixtures in a constant-pressure piston cylinder for liquid mixtures that may fractionate.

We provide our gas blend cylinders with a standard diaphragm valve and a CGA outlet recommended by CGA Pamphlet V-7. All liquid cylinders come with a dip tube and a helium head pressure to allow for efficient liquid withdrawal.

Standard Low Pressure Cylinder with Single-Port Valve and Dip Tube

These mixtures are usually blended gravimetrically. The headspace is then pressurized with an inert gas, normally helium. Liquid is then drawn from the bottom of the cylinder through the dip tube. This type of cylinder/valve combination is recommended for mixtures containing components having low volatility.

Standard Low Pressure Cylinder with Dual-Port Valve

A dual-port valve allows the cylinder to be pressurized at your site. The valve contains an inlet valve that allows a helium or nitrogen supply to be connected. The advantage of the dual-port valve is that the head space pressure can be maintained as the liquid is drawn off. This prevents the more volatile components from moving to the head space, and provides a constant delivery pressure. It is recommended for mixtures where the components all have low volatility.

Piston Cylinder

Mixtures are prepared gravimetrically. Pressure is maintained by pressurizing one side of the piston with an inert gas, normally helium. The floating piston effectively separates the inert gas from the liquid mixture. The constant pressure on the piston prevents the lighter components from volatilizing, thus providing the most accurate and consistent liquid standards.

Airgas offers hydrocarbon standards in piston cylinders to assure consistent component concentrations.

HYDROCARBON PROCESSING GASES

Liquid and Gaseous Hydrocarbon Standards

1-Butanol
1-Butene
1-Butyl Alchohol
1-Chloro-2-Propanol
1-Chloro-2,2-Difluoroethylene
1-Chloro-2,2,2-Trifluoroethane
1-Chloropropane
1-Chloropropylene
1-Chlorobutane
1-Decene
1-Dodecene
1-Hexene
1-Methoxy-2-Propanol
1-Methoxy-2-Propyl Acetate
1-Methyethylbenzene
1-Methylpropylbenzene
1-Nonene
1-Octene
1-Pentene
1-Propanol
1-Propoxy-2-Propanol
1,1-Dichloroethane
1,1-Dichloroethylene
1,1-Difluoroethane
1,1-Difluoroethylene
1,1,1-Trichloroethane
1,1,1,2-Tetrachloroethane
1,1,1,2,3,3,3-Heptafluoropropane
1,1,1,3,3-Pentafluoropropane
1,1,2-Trichloroethane
1,1,2-Trichloroethylene
1,1,2,2-Tetrachloroethane
1,2-Butadiene
1,2-Dibromoethane
1,2-Dichloropropane
1,2-Dichlorobenzene
1,2-Dichloroethane
1,2-Ethanedithiol
1,2-Propadiene
1,2,2,2-Tetrachloroethane
1,2,3-Trichloropropane
1,2,4-Trichlorobenzene
1,2,4-Trimethylbenzene
1,3-Butadiene
1,3-Cyclopentadiene
1,3-Dichlorobenzene
1,3,5-Trimethylbenzene
1,4-Butanediol
1,4-Dichlorobenzene
1,4-Diethylbenzene
1,4-Dioxane
1,4-Pentadiene
1H-indene
1-Nonene
2-Butanol
2-Chloro-1,3-Butadiene
2-Chloroethylvinylether
2-Chloropropane
2-Ethyl-1-Butene
2-Fluoropropane
2-Hexene
2-Methyl-1-Butene
2-Methyl-1-Pentene
2-Methyl-2-Butene
2-Methyl-2-Pentene
2-Methyl-2-Propanethiol
2-Methylpentane
2-Methylbutane
2-Methylhexane
2-Propanol
2-Propyl Mercaptan
2,2-Dichloroethanol
2,2-Dimethylpentane
2,2-Dimethylbutane
2,2-Dimethylpropane
2,2,3-Trimethylbutane
2,2,3-Trimethylpentane
2,2,4-Trimethylpentane
2,3-Dimethylbutane
2,3-Dimethylpentane
2,3-Dimethylbutane
2,3,3-Trimethylpentane
2,3,4-Trimethylpentane
2,4-Dimethylpentane
2,4-Pentanedione
3-Chloropropylene
3-Methyl-1-Butene
3-Methyl-cis-2-Pentene
3-Methyl-trans-2-Pentene
3-Methylpentene
3-Methylhexane
3-Methylpentane
3-Methylthiophene
3,3-Dimethylpentane
4-Bromofluorobenzene
4-Methyl-cis-2-Pentene
4-Methyl-trans-2-Pentene
4-Vinyl-1-Cyclohexene
5-Ethylidene-2-Norbornene
5-Vinyl-2-Norbornene
Acetaldehyde
Acetic Acid
Acetone
Acetonitrile
Acetylene
Acrolein
Acrylic Acid
Acrylonitrile
Allene
Allyl Alchohol
Allyl Chloride
alpha-Methylstyrene
Ammonia
Amylmethyl Ether
Argon
Arsine
Benzaldehyde
Benzene
Benzylchloride
Biphenyl
Bromobenzene
Bromodichloromethane
Bromochloromethane
Bromoethane
Bromoform
Bromomethane
Bromotrifluoromethane
Butylacetate
Butylacrylate
Butylaldehyde
Butylbenzene
Butylglycol
Butylmercaptan
Carbon Dioxide
Carbon Disulfide
Carbon Monoxide
Carbon Tetrachloride
Carbonyl Fluoride
Carbonyl Sulfide
Chlorbenzene
Chlorodibromomethane
Chlorodifluoroethane
Chlorodifluoromethane
Chloroethane
Chloroethylene
Chloroform
Chloromethane
Chloromethyl Methyl Ether
Chloropentafluoroethane
Chloropentafluoromethane
cis-1,2-Dichloroethylene
cis-1,3-Dichloropropene
cis-1,3-Pentadiene
cis-2-Butene
cis-2-Hexene
cis-2-Octene
cis-2-Pentene
cis-3-Hexene
Crotonaldehyde
Cumene
Cyanogen
Cyanogen Chloride
Cyclobutene
Cyclohexane
Cyclohexanone
Cyclopentane
Cyclopentene
Decafluorobutane
Deuterium
Dibromochloromethane
Dibutyl Sulfide
Dichlorodifluoromethane
Dichlorofluoromethane
Dichloromethane
Dichlorotetrafluoroethane
Dichlorotrifluoroethane
Dicyclopentadiene
Diethyl Disulfide
Diethyl Ether
Diethyl Sulfide
Diethyleneglycolethyl Ether
Diethyl Ketone
Difluoromethane
Diisobutylene
Diisopropyl Ether
Diisopropylamine
Dimethylacetylene
Dimethyl Disulfide
Dimethyl Ether
Dimethylformamide
Dimethyl Sulfide
Dimethylacetamide
Docosane
Dodecane
Ethane
Ethanol
Ethylacetate
Ethylacetylene
Ethylacrylate
Ethylalchohol
Ethylbenzene
Ethylbromide
Ethylchloride
Ethylcyclopentane
Ethyl Disulfide
Ethylisobutyl Ketone
Ethylmercaptan
Ethylmethyl Sulfide
Ethyltertbutyl Ether
Ethylbenzene
Ethylene
Ethylene Dichloride
Ethylene Oxide
Ethylene Sulfide
Formaldehyde
Furan
Helium
Heptane
Hexachloro-1,3-Butadiene
Hexafluoro-1,3-Butadiene
Hexafluoroethane
Hexamethyldisiloxane
Hexane
Hexylaldehyde
Hydrogen
Hydrogen Bromide
Hydrogen Chloride
Hydrogen Cyanide
Hydrogen Sulfide
Isobutane
Isobutene
Isobutylene
Isobutyraldehyde
Isooctane
Isopentane
Isoprene
Isopropanol
Isopropyl Alchohol
Isopropyl Ether
Isopropyl Mercaptan
Isopropylnitrate
Isopropylacetate
Krypton
m-Xylene
Methacrolein
Methane
Methanthiol
Methanol

Liquid and Gaseous Hydrocarbon Standards

HYDROCARBON PROCESSING GASES

Methylacetate
Methylacetylene
Methylacrylate
Methyl Alchohol
Methylbromide
Methylbutylketone
Methylchloride
Methylcyclohexane
Methylcyclopentane
Methylethylketone
Methylformate
Methyliodide
Methylisobutyl Ketone
Methylmercaptan
Methylmethacrylate
Methylpentyl Ketone
Methylphenyl Ketone
Methylpropyl Ketone
Methylpyrollidine
Methylsalicylate
Methyltertbutyl Ether
Methyltrichlorosilane
Methylvinyl Ether
Methylvinyl Ketone
Methylcyclopentane
Methylenebromide
Methylenechloride
Methylformate
n-Butane
n-Butanol
n-Butylbenzene
n-Decane
n-Heptane
n-Nonane
n-Octane
n-Pentane
n-Propanol
n-Propylbenzene
n-Propylmercaptan
N,N-Dimethylaniline
neo-Hexane
Neon
neo-Pentane
Nitric Oxide
Nitrogen
Nitrogen Dioxide
Nitrogen Trifluoride
Nitrous Oxide
Nonane
o-Xylene
Octafluorocyclobutane
Octafluoropropane
Octane
Oxygen
Oxygen Difluoride
p-Isopropyltoluene
p-Xylene
Pentadecane
Pentafluoroethane
Perchloroethylene
Perfluoropropane
Propadiene
Propane
Propionaldehyde
Propylacetate
Propylmercaptan
Propylbenzene
Propylene
Propylene Oxide
Silicon Tetrafluoride
Styrene
Sulfur Dioxide
Sulfur Hexafluoride
Sulfur Tetrafluoride
tert-Butylalchohol
tert-Butylbenzene
tert-Butylchloride
tert-Butylmercaptan
Tetrabromomethane
Tetrachloroethane
Tetrachloroethylene
Tetradecane
Tetrafluoroethane
Tetrafluoromethane
Tetrahydrofuran
Tetrahydrothiophene
Thiophane
Thiophene
Toluene
trans-1,2-Dichloroethylene
trans-1,3-Dichloropropene
trans-2-Butene
trans-2-Hexene
trans-2-Octene
trans-2-Pentene
trans-3-Hexene
Trichloroethylene
Trichlorofluoromethane
Trichloromethane
Tridecane
Triethylamine
Trifluoromethane
Tungsten Hexafluoride
Undecane
Vinyl Acetate
Vinyl Acetylene
Vinyl Chloride
Vinyl Cyclohexane
Vinyl Cyclohexene
Vinyl Trimethoxysilane
Water
Xenon

Natural Gas Standards

HYDROCARBON PROCESSING GASES

Typical Natural Gas Mixtures

Component Concentration (MOL %)	GPA Gas Reference	High Helium Reference	High Ethane Reference	Low BTU Reference	Daniel Reference
Helium	0.5	0.2 – 2.0			
Hydrogen				14.0	
Argon				1.0	
Nitrogen	5.0	1.6	2.5	Balance	2.5
Carbon Monoxide				12.0	
Carbon Dioxide	1.0	0.3	3.0	5.0	1.0
Methane	Balance	Balance	Balance	0.5	Balance
Ethane	9.0	3.0	3.5		5.0
Acetylene				1.0	
Propane	6.0	1.8	1.0		1.0
Isobutane	3.0	1.0	0.4		0.3
n-Butane	3.0	1.0	0.4		0.3
Isopentane	1.0	0.3	0.15		0.1
n-Pentane	1.0	0.3	0.15		0.1
Neopentane			0.1		0.1
n-Hexane			0.05		0.03
n-Heptane			0.02		
Nominal BTU	1298	1080	1028	114	1051

The following is a list of the more common components used in natural gas standards. While certain mixtures are standard throughout the industry, Airgas prides itself in providing the highest quality, multi-component custom standards to meet the needs and specifications of the individual customer.

We are sorry but this product has been discontinued effective 10/20/2014

ANALYTICAL GASES — Flame Ionization Detector (FID) Fuel Gases

Used with FIDs in gas chromatography and continuous stream hydrocarbon analyzers.

Concentration	Cylinder Size	≈Contents ft³	Product Number	Equipment Recommendations	Page Number
40% Hydrogen Balance Helium THC ≤ 0.5 ppm	300 200 80	298 200 76	X02HE60A3003005 X02HE60A2003005 X02HE60A803005	**Two-Stage Regulators** Y12-N145D350 Y12-244D350	**E21 E12**
40% Hydrogen Balance Nitrogen THC ≤ 0.5 ppm	300 200 80	298 200 76	X02NI60A3003006 X02NI60A2003006 X02NI60A803006		
***39-41% Hydrogen Balance Helium THC ≤ 0.05 ppm**	300 200 80	298 200 76	X02HE60A300C3K1 X02HE60A200C146 X02HE60A80C558		

Individual Certificate of Analysis or Certificate of Batch Analysis available upon request.
Minimum of Ultra Zero Air recommended for optimal analytical results.
Standard valve outlet: 350
*Product meets 40 CFR PART 1065— Engine Testing Procedure requirements.

Technical Data

Cylinder Pressure:	
Size 300	2400 psig
All Other Sizes	2000 psig
DOT Class	2.1
DOT Label	Flammable Gas
ID No.	UN1954

ANALYTICAL GASES — Electron Capture Detector (ECD) Gases

A minimum of UHP grade gases are recommended for optimal analytical results.

Concentration	Cylinder Size	≈Contents ft³	Product Number	Equipment Recommendations	Page Number
Ultra ECD Grade P-5 5% UHP Methane Balance UHP Argon	300 200 80	302 223 85	X02AR95J3001826 X02AR95J2000286 X02AR95J800995	**Two-Stage Regulators** Y12-N245D350 Y12-244D350	**E21 E12**
Ultra ECD Grade P-10 10% UHP Methane Balance UHP Argon	300 200 80	302 223 85	X02AR90J3000339 X02AR90J2000288 X02AR90J804972		

Individual Certificate of Analysis or Certificate of Batch Analysis available upon request.
Standard valve outlet: 350
Performance qualified to confirm <1 ppb SF6 equivalent ECD response.

* Insert Delivery Pressure Range Code

Technical Data

Cylinder Pressure	2000 psig
DOT Class	2.2
DOT Label	Nonflammable Gas
ID No.	UN1956

Leak Detection Gases | ANALYTICAL GASES

Gas mixtures containing helium allow for more sensitive and accurate leak detection than a simple pressure test.

Concentration	Cylinder Size	≈Contents ft³	Product Number	Equipment Recommendations	Page Number
0.5 - 10% Helium Balance Nitrogen	300 200 80	278 208 82	Inquire Inquire Inquire	**Two-Stage Regulators** Y12-N145D580 Y12-244D580	**E21** **E12**

Individual Certificate of Analysis or Certificate of Batch Analysis available upon request.
Standard valve outlet: 580

Technical Data

Cylinder Pressure	2000 psig
DOT Class	2.2
DOT Label	Nonflammable Gas
ID No.	UN1956

Nuclear Counter Gases | ANALYTICAL GASES

Formulated for instrumentation measuring radioactivity and ionization.

Concentration	Cylinder Size	≈Contents ft³	Product Number	Equipment Recommendations	Page Number
P-10 **10% Methane** **Balance Argon**	300 200 80	302 223 85	X02AR90D3000979 X02AR90D2000291 X02AR90D804302	**Two-Stage Regulators** Y12-N245D350 Y12-244D350	**E21** **E12**
P-5 **5% Methane** **Balance Argon**	300 200 80	302 223 85	X02AR95D3002178 X02AR95D2000994 X02AR95D800995		
Quench Gas **1.3% n-Butane** **Balance Helium**	200	163	X02HE98D2005171		
Geiger Flow Gas **0.95% Isobutane** **Balance Helium**	200	196	X02HE99D200R767		

Individual Certificate of Analysis or Certificate of Batch Analysis available upon request.
Standard valve outlet: 350

Technical Data

Cylinder Pressure	
Size 300	2400 psig
Quench Gas	1650 psig
All Other Sizes	2000 psig
DOT Class	2.2
DOT Label	Nonflammable Gas
ID No.	UN1956

Airgas
an Air Liquide company

EPA Protocol Gases

As the largest producer of EPA Protocol gases with six locations throughout the U.S., Airgas® has the EPA Protocol gases that customers need.

- Airgas has six laboratories with ISO 17025 accreditation through A2LA covering all EPA Protocol gases and Traceability Standards, including three laboratories with over 10 years ongoing accreditation.
- Produces and owns more NTRMs than any other gas vendor.
- The exclusive producer of EPA Protocols via the AcuGrav®, AutoFTIR™, and Automated LabPack™ technologies.
- Exclusive SRM provider to NIST.
- Able to provide both online certifications and online cylinder expiration notifications.
- One of only two producers of elemental mercury calibration gases.
- Provides accurate HCl calibration gases.
- The leading supplier of ammonia calibration gases for both ammonia slip and health and safety monitoring with ±1% analytical traceability to Primary Reference Materials, with traceability down to 2.5ppm.
- NO down to 0.4 ppm, NO_2 down to 2.5 ppm and N_2O down to 0.3 ppm concentrations.
- Proven accuracy of EPA Protocols has saved utilities millions of dollars by optimizing emissions credits (allowances) for SO_2 and NOx.
- Member of PGVP audit program, which Airgas helped to author.

Airgas EPA Protocols are prepared and analyzed in strict accordance with the EPA's most current guideline entitled "EPA Traceability Protocol Assay and Certification of Gaseous Calibration Standards." The guideline specifies methods for traceability to National Institute of Standards and Technology (NIST) SRMs or other NIST-approved reference materials, which include Airgas produced and NIST certified NTRMs.

The majority of EPA Protocol mixtures from Airgas are certified to a ≤1% overall uncertainty guarantee, except where limited by the higher uncertainty of the NIST SRMs or NTRMs. All analytical certifications are performed under completely interference-free conditions. Maximum allowable shelf life is guaranteed. Documentation fully conforms to the requirements of the EPA Protocol program, in compliance with the Clean Air Act.

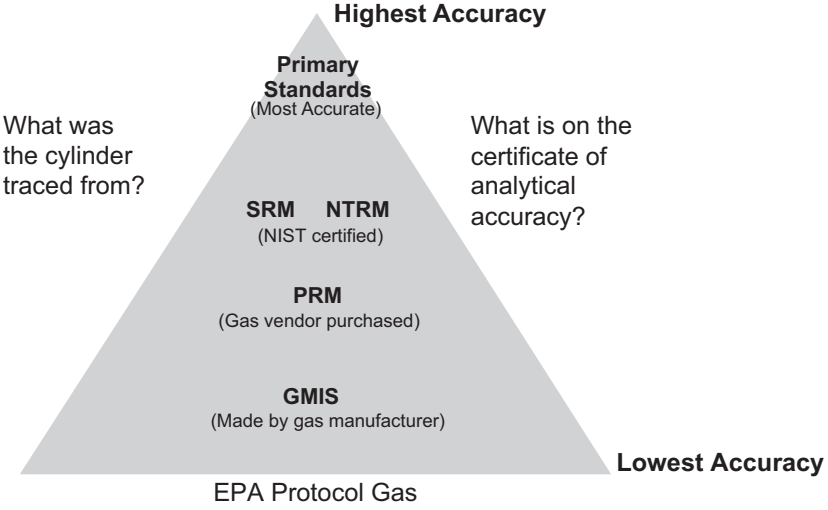
Traceability Standards

To meet customer and regulatory requirements for analytically NIST Traceable calibration mixtures, Airgas offers Traceability Standards, which are analytically certified directly against either NIST SRMs or NTRMs, within a comprehensive quality system. The analytical testing process is based upon EPA Protocol production processes, including triad analysis, comprehensive instrumentation characterization, and statistical data analysis. This results in a ± 1% overall uncertainty (accuracy) with direct traceability to NIST Reference Materials. Traceability Standards are primarily used for the calibration of continuous emissions monitoring systems and engine emissions analyzers.

Combined with Airgas' Precision Blend dynamic processes, Airgas will upon request offer Traceability Standard gas mixtures with blend tolerances equal to the accuracy of the analytical system monitoring the filling operations. The analytical value of each gas mixture is validated against a NIST SRM or NTRM. Every cylinder is certified accurate within ± 1% of NIST reference material.

Airgas' line of Traceability Standards assures ongoing compliance with the calibration requirements imposed by federal, state and local authorities. Traceability Standards offer precise concentrations, homogenous composition of all cylinders within a lot, and consistency of mixtures from order to order.

Upon request, Airgas can produce Traceability Standards at one of several Airgas specialty gas laboratories accredited to the ISO 17025 standard by the American Association of Laboratory Accreditation (A2LA). ISO 17025 is the international standard for calibration and testing laboratories and recognized in many industries, including the automotive and aerospace industries. In these cases, Airgas can include the accreditation body's logo and ISO 17025 notation on the accompanying Certificate of Analysis.



EPA Instrumental Test Methods as Defined by 40 CFR Part 60

# EPA Method	Test Method Determines	Components Tested	Zero Gas*
3A*	O_2% & CO_2%	O_2% &/or CO_2% in N_2 or mixtures of SO_2 ppm &/or NO_2 ppm + O_2% &/or CO_2% in N_2	Defined by CFR 40 72.2
3 & 3B	O_2% & CO_2% using an ORSAT	O_2% &/or CO_2% in N_2 for Audit	
3C	CO_2%, O_2%, N_2% & CH_4 ppm using a thermal conductivity detector (TCD) gas chromatograph	CO_2, CH_4, N_2, O_2, and other gas components	Carrier Gas. Helium, high-purity
6C*	SO_2 ppm from stationary sources	SO_2 ppm in Air or N_2 SO_2 ppm &/or O_2% &/or CO_2% in N_2	Defined by CFR 40 72.2
7E*	NO_x ppm from stationary sources	NO_x ppm in N_2 other mixtures may be used if no interference is caused. NO_2 for Converter Efficiency	Defined by CFR 40 72.2
10*	CO ppm from stationary sources	CO ppm in N_2 other mixtures may be used if no interference is caused	Defined by CFR 40 72.2
10A	CO ppm CEM at petroleum refinery	CO ppm in N_2	Defined by CFR 40 72.2
10B	CO ppm from stationary sources	CO ppm in N_2 & CH_2 in air	(Helium zero/Hydrogen zero)
15	TRS Emissions from sulfur recovery plants in petroleum refinery	H_2S in N_2 & COS in N_2 & CS_2 in N_2 traceable	<0.5 ppm TRS with <10 ppm H_2O & (Oxygen Zero/Zero Nitrogen)
15A	TRS Emissions from sulfur recovery plants in petroleum refinery	COS in N_2	<50 ppb TRS with <10 ppm Hydrocarbons
16	TRS Emissions from Kraft Pulp Mills	H_2S in N_2 & MeSH in N_2 & DMS in N_2 & DMDS in N_2 traceable	<50 ppb TRS with <10 ppm Hydrocarbons
16A	TRS Emissions from Kraft Pulp Mills	H_2S in N_2	<50 ppb TRS with <10 ppm Hydrocarbons
16B	TRS Emissions from Kraft Pulp Mills	SO_2 in N_2 & H_2S in N_2	<50 ppb TRS with <10 ppm Hydrocarbons
18	Gaseous Organic Compound Emissions by Gas Chromatography	VOC ppm in N_2 <1-2% or NIST traceable	Defined by CFR 51 Appendix M Method 205
21	Volatile Organic Compound Leaks	VOC ppm in N_2 or Air <2%	<10 ppm VOC
25	Total Gaseous Nonmethane Organic Emissions (TGNMO) as Carbon	CO, CH_4, C_3H_8, CO_2, hexane, toluene, and methanol each in air <1%	He, Air & O_2 <1ppm HC & CO_2 <1ppm & <0.1ppm HC
25A	Total Gaseous Organic Emissions using FID	C_2H_6, C_3H_8, C_4H_{10} or appropriate in N_2 or Air <2%	Defined by CFR 51 Appendix M Method 205
25B	Total Gaseous Organic Emissions using NDIR	C_2H_6, C_3H_8, C_4H_{10} or appropriate in N_2 or Air <2%	Defined by CFR 51 Appendix M Method 205
25C	Non Methane Organic Compounds (NMOC) in MSW landfill gases	CO, CH_4, C_3H_8, CO_2, hexane, toluene, and methanol each in air <1%	<10 ppm VOC
25D	Volatile Organic Concentration of Waste Samples	% propane and % 1,1-dichloroethylene in N_2	N_2, Air & O_2 <1ppm C
25E	Phase Organic Concentration in Waste Samples	% propane in N_2 or Air NIST traceable	N_2, Air & O_2 zero grade <ppm C
30A	Hg^0 µg/m³ from stationary sources	Hg^0 & $HgCl_2$ µg/m³ in N_2 or Air NIST traceable	No measurable Hg
30B	Hg^0 µg/m³ from stationary sources	Hg^0 & $HgCl_2$ µg/m³ in N_2 or Air NIST traceable	No measurable Hg

*These test methods were revised in August 2006 and advise using Zero Air / Zero Nitrogen that fits the definition of CFR 40 72.2 as the low point, oppose to a low level concentration pollutant.

EPA PS#	CEM Performance Specification for	Components (recommended but need not be certified)	Zero Gas (need not be certified)
PS 2	SO_2 ppm &/or NO_2 ppm	SO_2 ppm &/or NO_2 ppm in N_2	
PS 3	O_2% &/or CO_2%	O_2% &/or CO_2% in N_2 for Audit	
PS 4	CO ppm	1000 CO ppm on N_2	
PS 4A	CO ppm	<200 CO ppm on N_2	
PS 5	TRS ppm	H_2S ppm or other TRS in N_2	
PS 7	TRS ppm	H_2S ppm or other TRS in N_2	
PS 8	VOC ppm	CH_4, C_2H_6, C_3H_8, C_4H_{10}ppm or appropriate in N_2 or Air	
PS 9	Specific VOC ppm by GC	Specific VOC ppm in N_2 or Air <2%	Defined by CFR 40 72.2
PS 12	Hg	Hg in N_2	
PS 12A	Hg	Hg in N_2	
PPS 011 ETV Verification	NH_3 ppm	NH_3 in N_2 NIST or N_{mi} <3%	
PS-18	HCl ppm	HCl in N_2	Defined by CFR 40 72.2

Proposed Method 322 - HCl Emissions from Portland Cement Kilns by GFCIR 3/11/98 (WordPerfect version).
Proposed Method 323 - Measurement of Formaldehyde Emissions from Natural Gas-Fired Stationary Sources - Acetyl Acetone Derivitization Method (FR Vol. 68, No. 9, Tuesday, Jan. 14, 2003 Pgs. 1925-1929).

ENVIRONMENTAL MONITORING

EPA Protocols and Traceability Standards

EPA Protocol Gas Mixtures — Equipment Recommendations

	Concentration Range	CGA Connection	Cylinder Size*	Contents ft³**	Recommended Two-Stage Regulator
Carbon Dioxide in Air	300 ppm - < 1% 1% - 30%	590	150A	143	Y12-T265D590 **E23**
Carbon Dioxide in Nitrogen	300 ppm - < 1% 1% - 30%	580	150A	140	Y12-T265D580 **E23**
Carbon Monoxide in Air	2 ppm - <100 ppm 100 ppm - <1% 1% - 6.25%	590	150A	143	Y12-T265D590 **E23**
Carbon Monoxide in Nitrogen	2 ppm - <100 ppm 100 ppm - <1% 1% - 13%	350	150A	140	Y12-T265D350 **E23**
Hydrogen Sulfide in Nitrogen	2 ppm - <100 ppm 100 ppm - 1000 ppm	330	150A	140	Y12-C445D330 **E28**
Methane in Air	0.5 ppm - <100 ppm 100 ppm - 1000 ppm	590	150A	143	Y12-N245D590 **E21**
Nitric Oxide in Nitrogen	0.4 ppm - <100 ppm 100 ppm - 5000 ppm	660	150A	140	Y12-C445D660 **E28**
Oxygen in Nitrogen	1000 ppm - <1% 1% - 30%	<5% CGA 580 ≥5% - 23.5% CGA 590 >23.5% CGA 296	150A	140	Y12-N245D (CGA) **E21**
Propane in Air	0.25 ppm - <100 ppm 100 ppm - <0.1% 0.1% - 1%	590	150A	143	Y12-N245D590 **E21**
Propane in Nitrogen	0.25 ppm - <100 ppm 100 ppm - <0.1% 0.1% - 1%	350	150A	140	Y12-N245D350 **E21**
Sulfur Dioxide in Air	2 ppm - <100 ppm 100 ppm - <1000 ppm 1000 ppm - 5000 ppm	660	150A	143	Y12-C445D660 **E28**
Sulfur Dioxide in Nitrogen	2 ppm - <100 ppm 100 ppm - <1000 ppm 1000 ppm - 5000 ppm	660	150A	140	Y12-C445D660 **E28**
Sulfur Dioxide, Nitric Oxide in Nitrogen	2 ppm - 5000 ppm 0.4 ppm - 5000 ppm	660	150A	143	Y12-C445D660 **E28**
Sulfur Dioxide, Oxygen in Nitrogen	2 ppm - 5000 ppm 0.1% - 30%	660	150A	143	Y12-C445D660 **E28**
Carbon Dioxide, Oxygen in Nitrogen	300 ppm - 30% 0.1% - 30%	<5% CGA 580 ≥5% - 23.5% CGA 590 >23.5% CGA 296	150A	143	Y12-N245D (CGA) **E21**
Sulfur Dioxide, Nitric Oxide, Carbon Dioxide in Nitrogen	2 ppm - 5000 ppm 2 ppm - 5000 ppm 300 ppm - 30%	660	150A	143	Y12-C445D660 **E28**
Sulfur Dioxide, Nitric Oxide, Carbon Monoxide in Nitrogen	2 ppm - 5000 ppm 2 ppm - 5000 ppm 2 ppm - 13%	660	150A	143	Y12-C445D660 **E28**
Sulfur Dioxide, Nitric Oxide, Carbon Dioxide, Carbon Monoxide in Nitrogen	2 ppm - 5000 ppm 2 ppm - 5000 ppm 300 ppm - 30% 2 ppm - 13%	660	150A	143	Y12-C445D660 **E28**

* Airgas® EPA Protocol gases are supplied in aluminum cylinders, sizes 150A, 80A, and 33A.
** Contents represent approximations; actual volumes are determined by the concentrations of the minor components.

Where EPA Protocol Standards are not required, Continuous Emissions Monitoring (CEM) Daily Calibration Standards are blended to the same exacting standards, are NIST Traceable, and have an analytical accuracy of ± 2%. In addition to those components and combinations of components listed as EPA Protocol Standards, the following mixtures are available as daily calibration standards:

CEM Daily Calibration Gases					Equipment Recommendations
Daily Calibration Standards	**Concentration Range**	**CGA Connection**	**Cylinder Size**	**Contents ft³**	**Recommended Two-Stage Regulator**
Ammonia in Nitrogen	5 ppm - <100 ppm 100 ppm - <1% 1% - 4%	705	150A	140	Y12-T265D705 **E23**
Carbon Dioxide in Air	300 ppm - <1% 1% - 30%	590	150A	143	Y12-T265D590 **E23**
Carbon Dioxide in Nitrogen	300 ppm - <1% 1% - 30%	580	150A	140	Y12-T265D580 **E23**
Carbon Monoxide in Air	2 ppm - <100 ppm 100 ppm - <1% 1% - 6.25%	580	150A	143	Y12-T265D590 **E23**
Carbon Monoxide in Nitrogen	2 ppm - <100 ppm 100 ppm - <1% 1% - 20%	350	150A	140	Y12-T265D350 **E23**
Hydrogen Chloride in Nitrogen	2 ppm - <100 ppm 100 ppm - 1000 ppm	330	150A	140	Y12-T265D330 **E23**
Hydrogen Sulfide in Nitrogen	2 ppm - <100 ppm 100 ppm - 1000 ppm	330	150A	140	Y12-T265D330 **E23** **E23**
Nitric Oxide in Nitrogen	2 ppm - <100 ppm 100 ppm - <1% 1% - 6.25%	660	150A	140	Y12-T265D660 **E23**
Oxygen in Nitrogen	100 ppm - <1% 1% - 30%	<5% CGA 580 ≥5% -23.5% CGA 590 >23.5% CGA 296	150A	140	Y12-T265D590/296 **E23**
Propane in Air	1 ppm - <100 ppm 100 ppm - <1000 ppm 1000 ppm - 1%	590	150A	143	Y12-T265D590 **E23**
Propane in Nitrogen	1 ppm - <100 ppm 100 ppm - <1000 ppm 1000 ppm - 2%	350	150A	140	Y12-T265D350 **E23**
Sulfur Dioxide in Air	5 ppm - <100 ppm 100 ppm - <1000 ppm 1000 ppm - 2%	660	150A	143	Y12-T265D660 **E23**
Sulfur Dioxide in Nitrogen	5 ppm - <100 ppm 100 ppm - <1000 ppm 1000 ppm - 2%	660	150A	140	Y12-T265D660 **E23**

CEM Zero Gases					Equipment Recommendations
Gas	**Purity Specifications**	**CGA Connection**	**Cylinder Size**	**Contents ft³**	**Recommended Two-Stage Regulator**
CEM Zero Air*	O_2 20% - 21% CO ≤ 0.5 ppm CO_2 ≤ 1 ppm NO_x ≤ 0.1 ppm SO_2 ≤ 0.1 ppm THC ≤ 0.1 ppm	80A	150A 76	144 **E23**	Y12-T265D590
CEM Zero Nitrogen*	CO ≤ 0.5 ppm CO_2 ≤ 1 ppm NO_x ≤ 0.1 ppm SO_2 ≤ 0.1 ppm THC ≤ 0.1 ppm	580	150A 80A	140 76	Y12-T265D580 **E23**

Follows CFR Specifications for zero ambient air material.
Batch Certificates of Analysis included with each cylinder.
*Meets the requirements of CFR 72.2

ENVIRONMENTAL MONITORING | Non EPA Protocol Calibration Gases

Elemental Mercury Gas Specifications

- Concentrations range from 1 µg/M³ to 60 µg/M³ (100ppT to 6ppB)
- Balance Air or Nitrogen
- Pressure (depending on cylinder size) 300A's = 2000 PSIG (5500 Usable Liters) 150A's = 1800 PSIG (3600 Usable Liters)
- Directly traceable to NIST certified Vendor Prime Mercury Generator
- Analytical Accuracy ±5% (currently)
- 6 month stability

How will elemental mercury calibration gas cylinders be used

- Traceability Protocol for Elemental Mercury Gas Generators routine audit test.
- Instrumental Test method 30b (spiking)
- Substitute for mercury gas generators (broken, failures, etc.)
- Overall independent spot check for systems.

Ammonia Calibration Standards

Accurate to keep you compliant and safe

- Comply with your Title V monitoring requirements.
- Traceable to VSL (Dutch National Laboratory) and NIST
- Non Traceable available
- Meets the requirements of EPA tests for stationary source monitoring such as:
  Preliminary Performance Specification 001 (PPS-001) Ammonia CEMS
  http://www.epa.gov/ttn/emc/prelim.html
  Molybdenum vs. Stainless Steel differential converter test Method 7E – NOx – Instrumental
  http://www.epa.gov/ttn/emc/promgate.html
- OSHA monitoring test gas for:
  OSHA permissible exposure limit (PEL) of 50 parts per million (ppm)
  The OSHA (former) standard of 35 ppm (as a 15 minute Short Term Exposure Limit (STEL))
  http://www.ufcw.org/your_industry/manufacturing/safety_health_news_and_facts/ammonia_hazards.cfm

FEATURES:

- Ranges from 5 ppm to 1,000 ppm
- 12 month stability
- Traceable to VSL and NIST
- Available in Air and Nitrogen

ZERO GAS

EPA requires the use of Zero gas that meets the requirements of 40 CFR 72.2 in EPA CFR 40 part 60 EPA test methods, and EPA CFR 40 Part 75.

Airgas® Standard Operating Procedures assure that we provide a certification verifying that the contents meet CFR 40 72.2 that the calibration gas does not contain concentrations of SO_2, NOx, or total hydrocarbons above 0.1 parts per million (ppm), a concentration of CO above 1 ppm, or a concentration of CO_2 above 400 ppm.

Hydrogen Chloride (HCl)

Airgas has performed extensive stability studies and has documented the stability of HCl mixtures supporting the 12 month certification period. Airgas provided HCl mixtures pass the stringent PADEP requirements for HCl used for calibration of CEMS as well as many applications including incineration, waste to energy facilities, and industrial hygiene.

HCl mixture specifications:

Cylinder size: 150A
300A

Concentrations: 2 ppm–1000 ppm

Shelf Life: 6 months for PADEP HCl (or other states requiring 6 months)
12 months elsewhere

Meets the requirements of US EPA HCl Performance Specification PS-18

Certification Periods for EPA Protocol gases in accordance with the May 2012 "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards"

Certified Component	Balance Gas	Applicable range	Certification period (months)
Ammonia	Nitrogen	≥5 ppm	12
Carbon dioxide	Air	≥360 ppm	96
Carbon Dioxide	Nitrogen	≥100 ppm	96
Carbon monoxide	Nitrogen or Air	≥2 ppm	96
Hydrogen Sulfide	Nitrogen	≥2 ppm	36
Methane	Nitrogen or Air	≥1 ppm	96
Nitric Oxide	Nitrogen (O_2-free)	0.5 to 50 ppm	36
Nitric Oxide	Nitrogen (O_2-free)	≥50 ppm	96
Nitrous Oxide	Air	≥0.3 ppm	96
Oxides of Nitrogen (NO_2)	Air	≥3 ppm	36
Oxides of Nitrogen (NO_2)	Nitrogen (O_2 doped)	≥3 ppm	36
Oxygen	Nitrogen	≥0.2%	96
Propane	Air	>0.25 ppm	96
Propane	Nitrogen	>0.25 ppm	96
Sulfur Dioxide	Nitrogen or Air	1 to 50 ppm	48
Sulfur Dioxide	Nitrogen or Air	≥50 ppm	96
Mixtures with lower concentrations are certified for 6 months.			

An EPA Protocol mixture can be recertified if the residual pressure after analysis is >100psig
EPA Protocol mixtures are certified down to a minimum use pressure of 100psig
O_2-free Nitrogen contains <100ppB of oxygen

Check your Certificates of Analysis (COA):

The contents of the Certification of Analysis and sidewall label that are provided with each EPA Protocol gas cylinder are extremely important. These are frequently reviewed by local, state and EPA air quality enforcement personnel to ensure they meet mandatory requirements. A quick check of your COA can save you fines and aggravation. The following are the minimum requirements for information on an EPA Protocol gases COA:

1. Cylinder identification number (e.g. stamped cylinder number)
2. The certified concentrations for the assayed components of the Protocol gas, with values provided to at least 3 significant figures, and the balance gas
3. The calculated estimate of 95% uncertainty for each named component
4. Cylinder pressure at certification and statement that the Protocol gas cannot be used below 100psig, i.e. 0.7 megapascals
5. Dates of the assays and certification. The certification date is the date of the last assay
6. Certification expiration date
7. Information about each reference standard used in the assay:
   a. For an NTRM, RGM or PRM: standard type, cylinder number, certified concentration, expanded uncertainty, certification expiration date
   b. For a GMIS: cylinder number, certified concentration, expanded uncertainty, expiration date – plus information (7.a.) about the reference material used in certifying the GMIS
8. Statement that the assay/certification was performed according to EPA Protocol document EPA 600/R-12/531 – plus the Procedure used: G1 or G2
9. The analytical method(s) used in the assays and date of the most recent multipoint calibration for each instrument used in the assays
10. Identification of the specialty gas producer: Company, laboratory name, city and state, PGVP vendor ID
11. Chronological record of all certifications for the standard

* As required by "EPA Traceability Protocol Assay and Certification of Gaseous Calibration Standard (EPA 600/R-12/531 May 2012) Documentation"
** In some cases the states and local air agencies can ask for more information on a Certificate of Analysis.

ENVIRONMENTAL MONITORING | Air Toxics Monitoring

EPA TO-14 Calibration Standard - 42 Components, 100 ppb or 1 ppm each in Nitrogen

Benzene	Dichlorodifluoromethane	4-Ethyltoluene	Trichloroethylene
1,3-Butadiene	1,1-Dichloroethane	Ethyl Chloride	Trichlorofluoromethane
Carbon Tetrachloride	1,2-Dichloroethane	Hexachloro-1,3-butadiene	1,1,2-Trichloro-1,2,2-trifluoroethane
Chlorobenzene	1,1-Vinylidene Chloride	Methyl Bromide	1,2,4-Trimethylbenzene
Chloroform	cis-1,2-Dichloroethylene	Styrene	1,3,5-Trimethylbenzene
Chloromethane	Dichloromethane	1,1,2,2-Tetrachloroethane	Vinyl Chloride
3-Chloropropylene	1,2-Dichloropropane	Tetrachloroethylene	m-Xylene
1,2-Dibromoethane	cis-1,3-Dichloropropene	Toluene	o-Xylene
1,2-Dichlorobenzene	trans-1,3-Dichloropropene	1,2,4-Trichlorobenzene	p-Xylene
1,3-Dichlorobenzene	1,2-Dichloro-1,1,2,2-tetrafluoroethane	1,1,1-Trichloroethane	
1,4-Dichlorobenzene	Ethylbenzene	1,1,2-Trichloroethane	

EPA TO-14 Chlorinated Hydrocarbon Mixture (16 Components, 100 ppb or 1 ppm each in Nitrogen)

Carbon Tetrachloride	Chloromethane	1,2-Dichloroethane	cis-1,2-Dichloroethylene
1,2-Dichloropropane	Hexachloro-1,3-butadiene	Tetrachloroethylene	Trichloroethylene
Chloroform	1,1-Dichloroethane	1,1-Dichloroethylene	Dichloromethane
cis-1,3-Dichloropropene	1,1,2,2-Tetrachloroethane	1,1,2-Trichloroethane	Vinyl Chloride

EPA TO-14 Aromatics Mixture (14 Components, 100 ppb or 1 ppm each in Nitrogen)

Benzene	1,2-Dichlorobenzene	1,4-Dichlorobenzene	Styrene
Toluene	1,2,4-Trimethylbenzene	m-Xylene	p-Xylene
Chlorobenzene	1,3-Dichlorobenzene	Ethylbenzene	
1,2,4-Trichlorobenzene	1,3,5-Trimethylbenzene	o-Xylene	

EPA TO-14 CFC/HCFC Mixture (4 Components, 100 ppb or 1 ppm each in Nitrogen)

Halocarbon 11	Halocarbon 113
Halocarbon 12	Halocarbon 114

EPA TO-14 GC/MS Internal Standard (3 Components, 100 ppb or 1 ppm each in Nitrogen)

Bromochloromethane	Chlorbenzene - D5	1,4-Difluorobenzene

EPA TO-14 Internal/Tuning Standard (3 Components, 100 ppb or 1 ppm each in Nitrogen)

Bromochloromethane	Chlorbenzene - D5	Bromofluorobenzene

BTEX Mixture (6 Components, 100 ppb or 1 ppm each in Nitrogen)

Benzene	m-Xylene
Ethylbenzene	o-Xylene
Toluene	p-Xylene

Special Applications

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Mobile Emissions Monitoring | ENVIRONMENTAL MONITORING

Airgas® provides a complete range of certified California BAR (Bureau of Automotive Repair) blends for emissions certification, state vehicle inspection and IM testing, and independent testing laboratories. Products include both standard and enhanced emission monitoring gases, multiple component gases for test equipment calibration, and Vehicle Emission Zero Air used prior to every vehicle test. Gases are produced in California BAR-certified facilities using a dynamic blending process that ensures repeatable calibration accuracy.

Bar-97 Calibration Gases

State auto emissions programs using either 2-speed idle testing or loaded mode testing

Calibration & Audit Gases	Concentrations	
Low-Range BAR-97 with Nitric Oxide (NO) Blend Code 32	200 ppm 0.50% 6.0% 300 ppm Balance:	Propane (HC) Carbon Monoxide (CO) Carbon Dioxide (CO_2) Nitric Oxide (NO) (< 3 ppm NO_2) Oxygen-free Nitrogen (N_2)
High-Range BAR-97 with Nitric Oxide (NO) Blend Code 35	3200 ppm 8.00% 12.0% 3000 ppm Balance:	Propane (HC) Carbon Monoxide (CO) Carbon Dioxide (CO_2) Nitric Oxide (NO) (< 3 ppm NO_2) Oxygen-free Nitrogen (N_2)
BAR-97 Vehicle Emission Zero Air Blend Code 37	<1 ppm <1 ppm <400 ppm <1 ppm 20.9% Balance:	Total Hydrocarbons (THC) Carbon Monoxide (CO) Carbon Dioxide (CO_2) Nitric Oxide (NO) Oxygen (O_2) Oxygen-free Nitrogen (N_2)
High-Range BAR-97 Blend Code 34	3200 ppm 8.00% 12.0% Balance:	Propane (HC) Carbon Monoxide (CO) Carbon Dioxide (CO_2) Oxygen-free Nitrogen (N_2)

Bar-90ET & Earlier Calibration Gases

Used for auto emissions inspection and IM programs using 2-speed idle testing

Calibration & Audit Gases	Concentrations	
Low-Range BAR-90ET Blend Code 11	300 ppm 1.00% 6.0% Balance:	Propane (HC) Carbon Monoxide (CO) Carbon Dioxide (CO_2) Nitrogen (N_2)
Mid-Range BAR-90ET Blend Code 12	1200 ppm 4.00% 12.0% Balance:	Propane (HC) Carbon Monoxide (CO) Carbon Dioxide (CO_2) Nitrogen (N_2)
Low-Range BAR-84 Blend Code 13	600 ppm 1.60% 11.0% Balance:	Propane (HC) Carbon Monoxide (CO) Carbon Dioxide (CO_2) Nitrogen (N_2)

Note: For a complete listing of blends and audit standards contact your local Airgas® representative.

IM240 NOx Converter Efficiency Test Mix

A mixture of 200 ppm Nitrogen Dioxide (NO_2) in Air, which is used for the weekly check of the NOx converter in a Chemiluminescent analyzer.

Blend tolerance: +/– 100 ppm absolute
Analytical tolerance: +/– 2%
Expiration date: 12 months

IM240 FID CHECK GAS

The mixture is 50 ppm Methane in Air used for the monthly check of the response of the Hydrocarbon analyzer.

Blend tolerance: +/– 5% relative
Analytical tolerance: +/– 2% relative
Expiration date: 36 months

IM240 SPAN GAS*

Components	Balance Gas	Accuracy	Expiration
Carbon Monoxide	Air or Nitrogen	+/– 2%	36 months
Carbon Dioxide	Air or Nitrogen	+/– 2%	36 months
Propane	Air only	+/– 2%	36 months
Nitric Oxide	Nitrogen only	+/– 2%	24 months

Analytical results are directly traceable to NIST.
Blend tolerance shall be no more than +/– 5% relative.

IM240 Audit Gas IM240 Calibration Gas*

These products can be single or multicomponent gases with the following limitations:

Components	Balance Gas	Accuracy	Expiration
Carbon Monoxide	Air or Nitrogen	+/– 1%	36 months
Carbon Dioxide	Air or Nitrogen	+/– 1%	36 months
Propane	Air only	+/– 1%	36 months
Nitric Oxide	Nitrogen only	+/– 1%	24 months

Analytical results are directly traceable to NIST.
Blend tolerance shall be no more than +/– 5% relative.

IM240 FID OXIDIZER

A mixture of 18-21% Oxygen in Nitrogen or Argon, used as the oxidant gas for the Hydrocarbon analyzer.

THC < 1 ppm

IM240 FID FUEL GAS

A mixture of 40% Hydrogen in Helium used as the fuel gas for the Hydrocarbon analyzer. Blend tolerance: +/– 2% absolute

THC < 1 ppm

*IM240 Calibration and Span gases will be supplied with a Certificate of Analysis.

Special Applications

Special Applications

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AIRGAS® LASER*PLUS*™ GASES | Pure Laser Gases

Airgas® offers a complete line of Airgas® Laser*PLUS*™ gases. To meet the precise and consistent purity specifications needed for optimal laser performance, we produce our Airgas® Laser*PLUS*™ gases under the strictest quality control. Our manufacturing facilities incorporate the highest standards to help ensure that each cylinder meets or exceeds required purity and tolerance levels.

Purity Specifications	Minimum Purity	O_2	H_2O	THC
Airgas® Laser*PLUS*™ Helium	99.998%	-	<5	<1
Airgas® Laser*PLUS*™ Nitrogen	99.998%	-	<5	<1
Airgas® Laser*PLUS*™ Carbon Dioxide	99.995%	-	<5	<5
Airgas® Laser*PLUS*™ Helium Ultra	99.999%	<1	<2	<0.5
Airgas® Laser*PLUS*™ Nitrogen Ultra	99.999%	<1	<2	<0.5
Airgas® Laser*PLUS*™ Carbon Dioxide Ultra	99.996%	<10	<5	<1
Airgas® Laser*PLUS*™ Argon	99.998%	-	<5	<1
Airgas® Laser*PLUS*™ Oxygen	99.98%	-	<5	<1

PRODUCT	Ordering Information			
	Cylinder Size	Volume ft³	Cylinder Pressure at 70°F (psig)	Product Number
Airgas® Laser*PLUS*™ Helium	300	291	2,640	Inquire
	Individual or batch Certificate of Analysis is available upon request. Standard value outlet: CGA 580			
Airgas® Laser*PLUS*™ Nitrogen	300	304	2,640	Inquire
	Individual or batch Certificate of Analysis is available upon request. Standard value outlet: CGA 580			
Airgas® Laser*PLUS*™ Carbon Dioxide	200	60 lb	838	Inquire
	Individual or batch Certificate of Analysis is available upon request. Standard value outlet: CGA 320			
Airgas® Laser*PLUS*™ Helium Ultra	300	291	2640	Inquire
	Individual or batch Certificate of Analysis is available upon request. Standard value outlet: CGA 580			
Airgas® Laser*PLUS*™ Nitrogen Ultra	300	304	2640	Inquire
	Individual or batch Certificate of Analysis is available upon request. Standard value outlet: CGA 580			
Airgas® Laser*PLUS*™ Carbon Dioxide Ultra	200	60 lb	2640	Inquire
	Individual or batch Certificate of Analysis is available upon request. Standard value outlet: CGA 320			
Airgas® Laser*PLUS*™ Argon	300	336	2640	Inquire
	Individual or batch Certificate of Analysis is available upon request. Standard value outlet: CGA 580			
Airgas® Laser*PLUS*™ Oxygen	300	337	2640	Inquire
	Individual or batch Certificate of Analysis is available upon request. Standard value outlet: CGA 540			

Technical Data & Shipping Information	
DOT Class	2.2
DOT Label	Nonflammable Gas
ID No.	Helium: UN1046 Nitrogen: UN1066 Carbon Dioxide: UN1013 Argon: UN 1006 Oxygen: UN 1072

Special Applications

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Laser Gas Mixtures | AIRGAS® LASER*PLUS*™ GASES

Product Name	CO_2 (%)	N_2 (%)	He (%)	CO (%)	H_2 (%)	O_2 (%)	Xe (%)
Airgas® Laser*PLUS*™ 201		90				10	
Airgas® Laser*PLUS*™ 302	1.7	23.4	74.9				
Airgas® Laser*PLUS*™ 320	4.5	13.5	82				
Airgas® Laser*PLUS*™ 321	5	55	40				
Airgas® Laser*PLUS*™ 323	6	20	74				
Airgas® Laser*PLUS*™ 324	3.4	15.6	81				
Airgas® Laser*PLUS*™ 327	6	18	76				
Airgas® Laser*PLUS*™ 328	12	12	76				
Airgas® Laser*PLUS*™ 331	5	35	60				
Airgas® Laser*PLUS*™ 471	15	2	79		4		
Airgas® Laser*PLUS*™ 472	8	16	74	2			
Airgas® Laser*PLUS*™ 475	8	8	82	2			
Airgas® Laser*PLUS*™ 477	8	16	72	4			
Airgas® Laser*PLUS*™ 483	8	60	28	4			
Airgas® Laser*PLUS*™485	10	23.7	65.1		1.2		
Airgas® Laser*PLUS*™ 579	9	18	68.7	4	0.3		
Airgas® Laser*PLUS*™ 581	7.5	15	74.25	3	0.25		
Airgas® Laser*PLUS*™ 584	8	16	71.6	4	0.4		
Airgas® Laser*PLUS*™ 690	4	19	65	6		3	3

PRODUCT	Ordering Information			
	Cylinder Size	Volume* ft^3	Connection	Product Number
Airgas® Laser*PLUS*™ 201	300 200	304 216	590 590	Inquire Inquire
Airgas® Laser*PLUS*™ 302	300 200	258 196	580 580	Inquire Inquire
Airgas® Laser*PLUS*™ 320	300 200	259 196	580 580	Inquire Inquire
Airgas® Laser*PLUS*™ 321	300 200	268 203	580 580	Inquire Inquire
Airgas® Laser*PLUS*™ 323	300 200	259 196	580 580	Inquire Inquire
Airgas® Laser*PLUS*™ 324	300 200	259 196	580 580	Inquire Inquire
Airgas® Laser*PLUS*™ 327	300 200	260 197	580 580	Inquire Inquire
Airgas® Laser*PLUS*™ 328	300 200	262 198	580 580	Inquire Inquire
Airgas® Laser*PLUS*™ 331	300 200	262 199	580 580	Inquire Inquire
Airgas® Laser*PLUS*™ 471	300 200	262 200	350 350	Inquire Inquire
Airgas® Laser*PLUS*™ 472	150A	133	350	Inquire
Airgas® Laser*PLUS*™ 475	150A	132	350	Inquire
Airgas® Laser*PLUS*™ 477	150A	133	350	Inquire
Airgas® Laser*PLUS*™ 483	150A	140	350	Inquire
Airgas® Laser*PLUS*™ 485	300 200	261 197	350 350	Inquire Inquire
Airgas® Laser*PLUS*™ 579	150A	133	350	Inquire
Airgas® Laser*PLUS*™ 581	150A	132	350	Inquire
Airgas® Laser*PLUS*™ 584	150A	133	350	Inquire
Airgas® Laser*PLUS*™ 690	650RAL	285 (liters)	350	Inquire

*Actual volume may vary depending on fill pressure

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Think Airgas for Refrigerants

Refrigerant Gases

Free next day delivery

Airgas Refrigerants, Inc., is the leading, nationwide, refrigerant supplier, offering the widest selection of refrigerants available from coast-to-coast. We provide free next day delivery to anywhere in the contiguous United States. Whether you're looking for out-of-production CFC's such as R-12, R-11 or R-113 or one of the new alternative refrigerants such as R-407A, R-407C, R-407F, R-422D or R-438A, Airgas has what you need.

Call us today and join the thousands of refrigerant buyers across the country who have discovered Airgas for all their refrigerant supply needs.

Used Refrigerant Return Programs

Highest buy-back prices offered

Airgas Refrigerants is an EPA Certified Refrigerant Reclaimer operating multiple state-of-the-art reclamation facilities. We offer the most competitive buy-back prices in the industry, flexible used refrigerant return programs, refrigerant banking plans, refrigerant process and exchange, disposal, analytical testing, cylinder recertification and refurbishing, and much more. Whether you're working on a one time retrofit or maintenance project or you need a program for repeated returns of used refrigerants, Airgas has what you need.

Call us today and discover how easy returning your used refrigerant can be.

Refrigerant On-Site Services

Certified Airgas field technicians

Airgas Refrigerants has the capability to reclaim refrigerant to AHRI-700 standards on site. Our patented technologies of our transportable recovery reclamation units RPS and MPS, can return your refrigerant to AHRI-700 purity standards on site at speeds of up to 2,700 pounds per hour. Airgas also provides dehydration and flushing services designed to remove moisture from any refrigerant system regardless of size. Most importantly Airgas Refrigerants' on-site services are run by certified Airgas field technicians who work safely and conscientiously on-site throughout the entire process.

Call us today and partner with Airgas for your refrigerant service requirements.

Contact an Airgas Representative

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Refrigerant Listing

COLOR PMS #	TYPE	CHEMICAL NAME OR COMPONENTS	CONTAINER SIZES (lbs.)
CFC	**EPA Technician Certification required to purchase CFC refrigerants**		
021	**R-11**	Trichlorofluoromethane	30, 100, 200, 650, 1000, 2200
White	**R-12**	Dichlorodiflouromethane	15, 30, 50, 145, 1000, 2000
2975	**R-13**	Chlorotrifluoromethane	5, 9, 23, 70, 80
177	**R-13B1**	Bromotrifluoromethane	10, 50, 150, custom
124	**R-14**	Tetrafluoromethane	15, 70
266	**R-113**	Trichlorotrifluoroethane	100, 200, 690
302	**R-114**	1,2-Dichloro-1,1,2,2-Tetrafluoroethane	30, 150, 2200
103	**R-500**	Dichlorodifluoromethane, Difluoroethane	15, 30, 50, 125, 1000, 1750
251	**R-502**	Chlorodifluoromethane, Chloropentafluoroethane	15, 30, 50, 125, 1000, 1750
3268	**R-503**	Chlorotrifluoromethane, Trifluoromethane	5, 9, 20, 70, 80, 1200
HCFC	**EPA Technician Certification required to purchase HCFC refrigerants**		
352	**R-22**	Chlorodifluoromethane	15, 30, 50, 125, 1000, 1750
428	**R-123**	Dichlorotrifluoroethane	100, 200, 630, 2200
335	**R-124**	1-Chloro-1,2,2,2-Tetrafluoroethane	30, 150, 1750, 2000
177	**R-401A**	Chlorodifluoromethane, Chlorotetrafluoroethane	30, 125, 1700
124	**R-401B**	Chlorodifluoromethane, Chlorotetrafluoroethane	30, 125, 1700
461	**R-402A**	Chlorodifluoromethane, Pentafluoroethane	27, 110
385	**R-402B**	Chlorodifluoromethane, Pentafluoroethane	13
248	**R-408A**	Trifluoroethane, Chlorodifluoromethane	24, 100
465	**R-409A**	Chlorodifluoromethane, Chlorotetrafluoroethane	30, 125
none	**R-412A**	Chlorodifluoromethane, 1-Chloro-1,1-Difluoroethane and Octafluoropropane	4.4
4545	**R-414B**	Chlorodifluoromethane, Chlorodifluoroethane, Chlorotetrafluoroethane	25
381	**R-416A**	1-Chloro-1,2,2,2-tetrafluoroethane, 1,1,1,2-Tetrafluoroethane	25, 125
HFC	**No EPA Technician Certification needed to purchase HFC refrigerants**		
428	**R-23**	Trifluoromethane	9, 20, 70
424	**R-116**	Hexafluoroethane	26, 90, 95
2975	**R-134a**	1,1,1,2-Tetrafluoroethane	30, 125, 1000, 1750
021	**R-404A**	Pentafluoroethane, 1,1,1,2-Tetrafluoroethane, Trifluoroethane	24, 100, 800, 870, 1300
368	**R-407A**	Difluoromethane, Pentafluoroethane, 1,1,1,2-Tetrafluoroethane	25, 100
156	**R-407B**	Difluoromethane, Pentafluoroethane, 1,1,1,2-Tetrafluoroethane	25, 100
471	**R-407C**	Difluoromethane, Pentafluoroethane, 1,1,1,2-Tetrafluoroethane	25, 115, 1550
507	**R-410A**	Pentafluoroethane, Difluoromethane	25, 100, 850, 1350, 1450
354	**R-417A**	1,1,1,2-Tetrafluoroethane Pentafluoroethane	25, 110, 950
128	**R-422A**	1,1,1,2-Tetrafluoroethane Pentafluoroethane	24, 100
375	**R-422D**	1,1,1,2-Tetrafluoroethane Pentafluoroethane	25, 110
292	**R-423A**	Tetrafluoroethane, Heptafluoropropane	125, 1800
3405	**R-427A**	1,1,1,2-Tetrafluoroethane, Pentafluoroethane	25, 100
2727	**R-438A**	Difluoromethane, Pentafluoroethane, 1, 1, 1, 2-Tetrafluoroethane, n-Butane, Isopentane	25, 100
326	**R-507**	Pentafluoroethane, Trifluoroethane	25, 100, 800, 840, 1400
none	**R-508A**	Trifluoromethane, Hexafluoroethane	4.4, 10, 82
302	**R-508B**	Trifluoromethane, Hexafluoroethane	10, 20, 70

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PROCESS CHEMICALS

Precise Packaging. Unrivaled Experience.

The chemicals you need. Packaged for your process. Delivered with safety and precision. You'll find it all at Airgas.

Airgas has long been recognized as the leading U.S. distributor of industrial, medical and specialty gases, welding goods and safety products. Our best-kept secret is our comprehensive Process Chemical product offering. This is increasingly important because of recent changes in the way chemical users purchase and store these reactive products. Key factors that have led to supply chain changes include more stringent environmental regulations and storage restrictions required by the Department of Homeland Security. Airgas' broad product and package offering, distribution capabilities and supply chain programs translate into unmatched versatility in delivering exactly the chemical you need, in the quantities needed, where and when you need them. In addition, our technical expertise and dedication to safety provide customers with the right risk management solution.

Airgas
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The right expertise to meet ever-changing needs.

Airgas has been meeting the process chemicals needs of industry for nearly 20 years with the widest range of process chemicals packaging available and an extensive nationwide distribution system. Our supply chain management expertise will help you comply with the latest risk management regulations unique to your industry or facility.

The right process chemicals — where and how you need them.

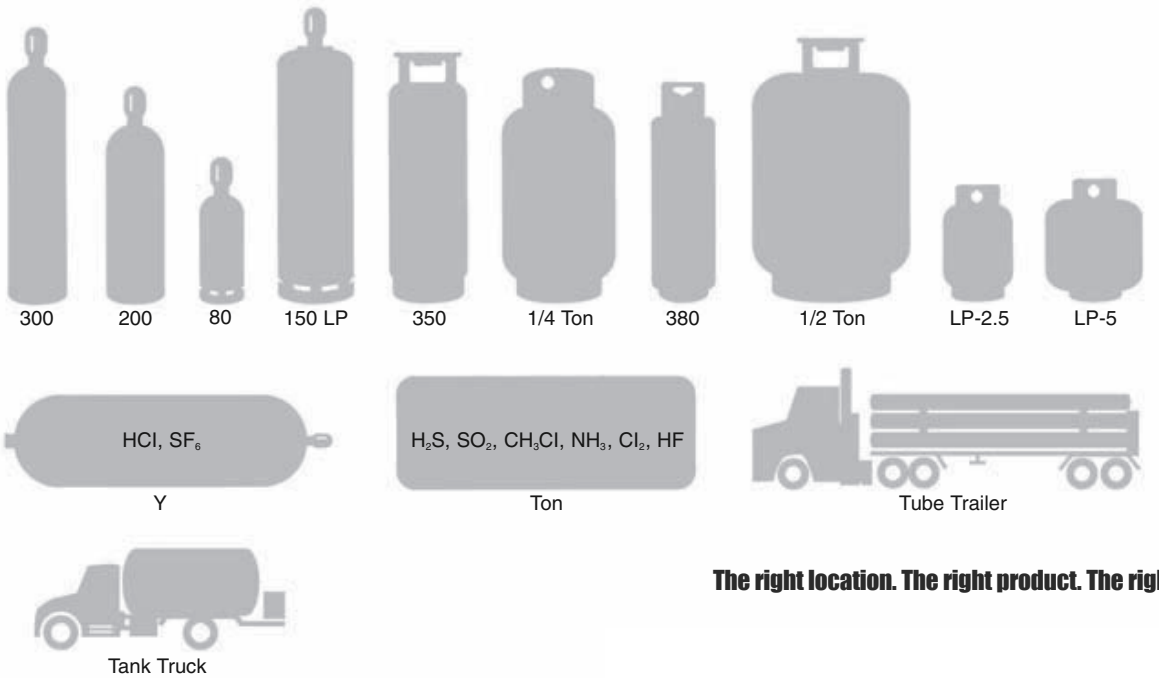
For companies requiring less-than-railcar quantities, Airgas provides a broad range of top-quality process chemicals. With more than two dozen package sizes and the ability to provide custom packaging, we can meet virtually any need. And with Airgas' supply chain management capabilities, there's no need to store large quantities of chemicals on site. You get exactly what you need, in the package size you need, delivered right where you need it.

Airgas offers more than 30 process chemicals, including:

- *Ammonia (NH_3)*
- *Chlorine (Cl_2)*
- *Chlorine Dioxide (ClO_2)*
- *Ethyl Chloride (C_2H_5Cl)*
- *Fluorine (F_2) and derivatives*
- *Hydrocarbons (a wide variety)*
- *Hydrocarbon Refrigerants (a wide variety)*
- *Hydrogen Bromide (HBr)*
- *Hydrogen Chloride (HCl)*
- *Hydrogen Fluoride (HF)*
- *Hydrogen Sulfide (H_2S)*
- *Methylamines (MMA, DMA, TMA)*
- *Methyl Chloride (CH_3Cl)*
- *Sulfur Dioxide (SO_2)*
- *Sulfur Hexafluoride (SF_6)*

Airgas' nationwide Emergency Response infrastructure is the largest response organization in our industry providing support anywhere in the country. Our Engineered Solutions engineering group can design and install partial or turn-key product supply systems with enhanced safety features.

Process Chemicals Package Sizes and Capacities



The right location. The right product. The right expertise.

Airgas
an Air Liquide company

Hydrocarbon Processing Gases

Airgas® is a leading supplier of hydrocarbon calibration standards for use in the calibration of laboratory, emission monitoring, and process control instrumentation. Airgas' calibration standards are available as both liquid and gaseous mixtures in minor component ranges from low part-per-million (ppm) to percentage.

Liquid and Gaseous Blends

We can provide liquid or gaseous mixtures in both aluminum and steel cylinders. Gaseous blends, containing condensable components, are normally filled to a pressure which is 75% dewpoint pressure at 70° F unless physical or stability problems dictate a lower percentage. This is designed to prevent condensation problems which may occur as a result of lower temperature conditions. Liquid blends are normally filled by weight and will not exceed the fill density regulations set forth by the DOT(§173.304 (d)). All liquid blends will also be delivered with a 200 psig helium head pressure as standard unless requested by the customer.

Packages

Hydrocarbon calibration blends are available in a variety of steel and aluminum cylinders that are prepared specific to each mixture. We offer specially prepared packages for low concentration or reactive gas mixtures to ensure mixture stability. We also can provide mixtures in a constant-pressure piston cylinder for liquid mixtures that may fractionate.

We provide our gas blend cylinders with a standard diaphragm valve and a CGA outlet recommended by CGA Pamphlet V-7. All liquid cylinders come with a dip tube and a helium head pressure to allow for efficient liquid withdrawal.

Standard Low Pressure Cylinder with Single-Port Valve and Dip Tube

These mixtures are usually blended gravimetrically. The headspace is then pressurized with an inert gas, normally helium. Liquid is then drawn from the bottom of the cylinder through the dip tube. This type of cylinder/valve combination is recommended for mixtures containing components having low volatility.

Standard Low Pressure Cylinder with Dual-Port Valve

A dual-port valve allows the cylinder to be pressurized at your site. The valve contains an inlet valve that allows a helium or nitrogen supply to be connected. The advantage of the dual-port valve is that the head space pressure can be maintained as the liquid is drawn off. This prevents the more volatile components from moving to the head space, and provides a constant delivery pressure. It is recommended for mixtures where the components all have low volatility.

Piston Cylinder

Mixtures are prepared gravimetrically. Pressure is maintained by pressurizing one side of the piston with an inert gas, normally helium. The floating piston effectively separates the inert gas from the liquid mixture. The constant pressure on the piston prevents the lighter components from volatilizing, thus providing the most accurate and consistent liquid standards.

Airgas offers hydrocarbon standards in piston cylinders to assure consistent component concentrations.

HYDROCARBON PROCESSING GASES

Liquid and Gaseous Hydrocarbon Standards

1-Butanol
1-Butene
1-Butyl Alchohol
1-Chloro-2-Propanol
1-Chloro-2,2-Difluoroethylene
1-Chloro-2,2,2-Trifluoroethane
1-Chloropropane
1-Chloropropylene
1-Chlorobutane
1-Decene
1-Dodecene
1-Hexene
1-Methoxy-2-Propanol
1-Methoxy-2-Propyl Acetate
1-Methyethylbenzene
1-Methylpropylbenzene
1-Nonene
1-Octene
1-Pentene
1-Propanol
1-Propoxy-2-Propanol
1,1-Dichloroethane
1,1-Dichloroethylene
1,1-Difluoroethane
1,1-Difluoroethylene
1,1,1-Trichloroethane
1,1,1,2-Tetrachloroethane
1,1,1,2,3,3,3-Heptafluoropropane
1,1,1,3,3-Pentafluoropropane
1,1,2-Trichloroethane
1,1,2-Trichloroethylene
1,1,2,2-Tetrachloroethane
1,2-Butadiene
1,2-Dibromoethane
1,2-Dichloropropane
1,2-Dichlorobenzene
1,2-Dichloroethane
1,2-Ethanedithiol
1,2-Propadiene
1,2,2,2-Tetrachloroethane
1,2,3-Trichloropropane
1,2,4-Trichlorobenzene
1,2,4-Trimethylbenzene
1,3-Butadiene
1,3-Cyclopentadiene
1,3-Dichlorobenzene
1,3,5-Trimethylbenzene
1,4-Butanediol
1,4-Dichlorobenzene
1,4-Diethylbenzene
1,4-Dioxane
1,4-Pentadiene
1H-indene
1-Nonene
2-Butanol
2-Chloro-1,3-Butadiene
2-Chloroethylvinylether
2-Chloropropane
2-Ethyl-1-Butene
2-Fluoropropane
2-Hexene
2-Methyl-1-Butene
2-Methyl-1-Pentene
2-Methyl-2-Butene
2-Methyl-2-Pentene
2-Methyl-2-Propanethiol
2-Methylpentane
2-Methylbutane
2-Methylhexane
2-Propanol
2-Propyl Mercaptan
2,2-Dichloroethanol
2,2-Dimethylpentane
2,2-Dimethylbutane
2,2-Dimethylpropane
2,2,3-Trimethylbutane
2,2,3-Trimethylpentane
2,2,4-Trimethylpentane
2,3-Dimethylbutane
2,3-Dimethylpentane
2,3-Dimethylbutane
2,3,3-Trimethylpentane
2,3,4-Trimethylpentane
2,4-Dimethylpentane
2,4-Pentanedione
3-Chloropropylene
3-Methyl-1-Butene
3-Methyl-cis-2-Pentene
3-Methyl-trans-2-Pentene
3-Methylpentene
3-Methylhexane
3-Methylpentane
3-Methylthiophene
3,3-Dimethylpentane
4-Bromofluorobenzene
4-Methyl-cis-2-Pentene
4-Methyl-trans-2-Pentene
4-Vinyl-1-Cyclohexene
5-Ethylidene-2-Norbornene
5-Vinyl-2-Norbornene
Acetaldehyde
Acetic Acid
Acetone
Acetonitrile
Acetylene
Acrolein
Acrylic Acid
Acrylonitrile
Allene
Allyl Alchohol
Allyl Chloride
alpha-Methylstyrene
Ammonia
Amylmethyl Ether
Argon
Arsine
Benzaldehyde
Benzene
Benzylchloride
Biphenyl
Bromobenzene
Bromodichloromethane
Bromochloromethane
Bromoethane
Bromoform
Bromomethane
Bromotrifluoromethane
Butylacetate
Butylacrylate
Butylaldehyde
Butylbenzene
Butylglycol
Butylmercaptan
Carbon Dioxide
Carbon Disulfide
Carbon Monoxide
Carbon Tetrachloride
Carbonyl Fluoride
Carbonyl Sulfide
Chlorbenzene
Chlorodibromomethane
Chlorodifluoroethane
Chlorodifluoromethane
Chloroethane
Chloroethylene
Chloroform
Chloromethane
Chloromethyl Methyl Ether
Chloropentafluoroethane
Chloropentafluoromethane
cis-1,2-Dichloroethylene
cis-1,3-Dichloropropene
cis-1,3-Pentadiene
cis-2-Butene
cis-2-Hexene
cis-2-Octene
cis-2-Pentene
cis-3-Hexene
Crotonaldehyde
Cumene
Cyanogen
Cyanogen Chloride
Cyclobutene
Cyclohexane
Cyclohexanone
Cyclopentane
Cyclopentene
Decafluorobutane
Deuterium
Dibromochloromethane
Dibutyl Sulfide
Dichlorodifluoromethane
Dichlorofluoromethane
Dichloromethane
Dichlorotetrafluoroethane
Dichlorotrifluoroethane
Dicyclopentadiene
Diethyl Disulfide
Diethyl Ether
Diethyl Sulfide
Diethyleneglycolethyl Ether
Diethyl Ketone
Difluoromethane
Diisobutylene
Diisopropyl Ether
Diisopropylamine
Dimethylacetylene
Dimethyl Disulfide
Dimethyl Ether
Dimethylformamide
Dimethyl Sulfide
Dimethylacetamide
Docosane
Dodecane
Ethane
Ethanol
Ethylacetate
Ethylacetylene
Ethylacrylate
Ethylalchohol
Ethylbenzene
Ethylbromide
Ethylchloride
Ethylcyclopentane
Ethyl Disulfide
Ethylisobutyl Ketone
Ethylmercaptan
Ethylmethyl Sulfide
Ethyltertbutyl Ether
Ethylbenzene
Ethylene
Ethylene Dichloride
Ethylene Oxide
Ethylene Sulfide
Formaldehyde
Furan
Helium
Heptane
Hexachloro-1,3-Butadiene
Hexafluoro-1,3-Butadiene
Hexafluoroethane
Hexamethyldisiloxane
Hexane
Hexylaldehyde
Hydrogen
Hydrogen Bromide
Hydrogen Chloride
Hydrogen Cyanide
Hydrogen Sulfide
Isobutane
Isobutene
Isobutylene
Isobutyraldehyde
Isooctane
Isopentane
Isoprene
Isopropanol
Isopropyl Alchohol
Isopropyl Ether
Isopropyl Mercaptan
Isopropylnitrate
Isopropylacetate
Krypton
m-Xylene
Methacrolein
Methane
Methanthiol
Methanol

Liquid and Gaseous Hydrocarbon Standards

HYDROCARBON PROCESSING GASES

Methylacetate
Methylacetylene
Methylacrylate
Methyl Alchohol
Methylbromide
Methylbutylketone
Methylchloride
Methylcyclohexane
Methylcyclopentane
Methylethylketone
Methylformate
Methyliodide
Methylisobutyl Ketone
Methylmercaptan
Methylmethacrylate
Methylpentyl Ketone
Methylphenyl Ketone
Methylpropyl Ketone
Methylpyrollidine
Methylsalicylate
Methyltertbutyl Ether
Methyltrichlorosilane
Methylvinyl Ether
Methylvinyl Ketone
Methylcyclopentane
Methylenebromide
Methylenechloride
Methylformate
n-Butane
n-Butanol
n-Butylbenzene
n-Decane
n-Heptane
n-Nonane
n-Octane
n-Pentane
n-Propanol
n-Propylbenzene
n-Propylmercaptan
N,N-Dimethylaniline
neo-Hexane
Neon
neo-Pentane
Nitric Oxide
Nitrogen
Nitrogen Dioxide
Nitrogen Trifluoride
Nitrous Oxide
Nonane
o-Xylene
Octafluorocyclobutane
Octafluoropropane
Octane
Oxygen
Oxygen Difluoride
p-Isopropyltoluene
p-Xylene
Pentadecane
Pentafluoroethane
Perchloroethylene
Perfluoropropane
Propadiene
Propane
Propionaldehyde
Propylacetate
Propylmercaptan
Propylbenzene
Propylene
Propylene Oxide
Silicon Tetrafluoride
Styrene
Sulfur Dioxide
Sulfur Hexafluoride
Sulfur Tetrafluoride
tert-Butylalchohol
tert-Butylbenzene
tert-Butylchloride
tert-Butylmercaptan
Tetrabromomethane
Tetrachloroethane
Tetrachloroethylene
Tetradecane
Tetrafluoroethane
Tetrafluoromethane
Tetrahydrofuran
Tetrahydrothiophene
Thiophane
Thiophene
Toluene
trans-1,2-Dichloroethylene
trans-1,3-Dichloropropene
trans-2-Butene
trans-2-Hexene
trans-2-Octene
trans-2-Pentene
trans-3-Hexene
Trichloroethylene
Trichlorofluoromethane
Trichloromethane
Tridecane
Triethylamine
Trifluoromethane
Tungsten Hexafluoride
Undecane
Vinyl Acetate
Vinyl Acetylene
Vinyl Chloride
Vinyl Cyclohexane
Vinyl Cyclohexene
Vinyl Trimethoxysilane
Water
Xenon

Natural Gas Standards

HYDROCARBON PROCESSING GASES

Typical Natural Gas Mixtures

Component Concentration (MOL %)	GPA Gas Reference	High Helium Reference	High Ethane Reference	Low BTU Reference	Daniel Reference
Helium	0.5	0.2 – 2.0			
Hydrogen				14.0	
Argon				1.0	
Nitrogen	5.0	1.6	2.5	Balance	2.5
Carbon Monoxide				12.0	
Carbon Dioxide	1.0	0.3	3.0	5.0	1.0
Methane	Balance	Balance	Balance	0.5	Balance
Ethane	9.0	3.0	3.5		5.0
Acetylene				1.0	
Propane	6.0	1.8	1.0		1.0
Isobutane	3.0	1.0	0.4		0.3
n-Butane	3.0	1.0	0.4		0.3
Isopentane	1.0	0.3	0.15		0.1
n-Pentane	1.0	0.3	0.15		0.1
Neopentane			0.1		0.1
n-Hexane			0.05		0.03
n-Heptane			0.02		
Nominal BTU	1298	1080	1028	114	1051

The following is a list of the more common components used in natural gas standards. While certain mixtures are standard throughout the industry, Airgas prides itself in providing the highest quality, multi-component custom standards to meet the needs and specifications of the individual customer.

We are sorry but this product has been discontinued effective 10/20/2014