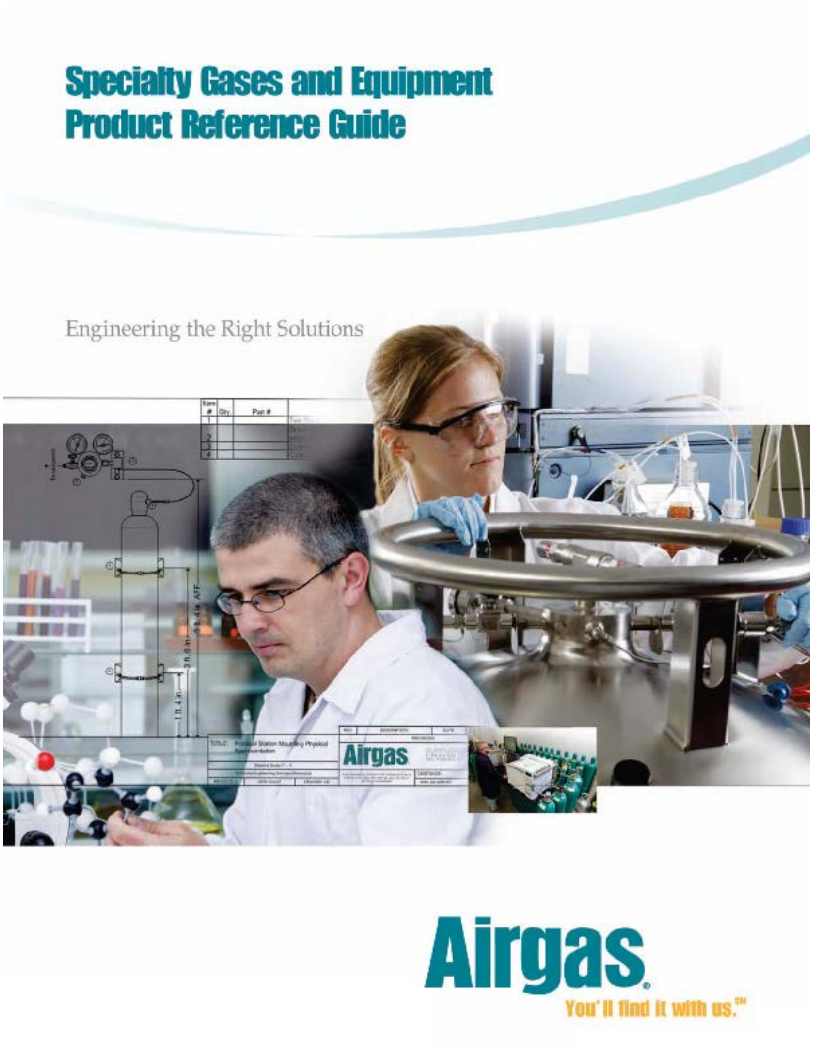
Gas Mixture Two Components



Contents

Two-Component Mixtures

Gas mixtures with greater accuracy, precision and consistency

Airgas offers the widest variety of gas and liquid mixtures, through the largest networks of national and regional specialty gas laboratories in the U.S. The following pages detail our most common two-component mixtures. Airgas also produces custom mixtures of multiple components to suit your requirements. See the Special Applications section for some of the most common gases for your industry's process, analytical or regulatory needs.

Airgas uses breakthrough technology like our patented AcuGrav™ computerized filling system developed by our own automation team. AcuGrav helps Airgas provide high-tolerance gas mixtures with greater accuracy, consistency and reliability.

Introduction

Selecting the right combination of blend tolerance, analytical tolerance and traceability is not a complex task. Airgas offers six grades, covering most specification requirements:

- EPA Protocol Gases
- Traceability Standards
- Primary Standards
- Precision Blends
- Certified Standards
- Batch Certified

The Mixture Specifications Table on the next page outlines these grades and their respective tolerances. If your requirements are different from those listed, simply call the Airgas Specialty Gas Technical Hotline (1-877-ASG-4-GAS) or your Airgas representative to fully review your needs. In addition, with the exception of the Batch Certified Mixtures, each calibration gas standard comes with a Certificate of Analysis at no extra charge. All mixtures are filled to 2000 psig at 70° F unless otherwise noted in the Technical Data sections.

Types of Grades Available

EPA Protocol Gases

EPA Protocol Gases are manufactured and analytically certified in strict accordance with the most recent EPA traceability guideline document entitled “EPA Traceability Protocol for Assay and Certification of Gaseous Standards”. 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 Standard Reference Materials (SRMs) or NIST Traceable Reference Materials (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

Traceability Standards are calibration mixtures, which are analytically certified directly against either NIST SRMs or NTRMs, within a comprehensive quality system. The analytical testing process is based upon the EPA Protocol document, 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, when supported by NIST.

Precision Blends

Precision Blends are developed to satisfy customer requirements for “zero blend tolerance” mixtures. These blends are manufactured by dynamically mixing the mixture components in real time while monitoring the composition using continuous analytical monitoring. Minor adjustments are made as needed during the blending process to assure the final mixture is statistically identical to the requested composition, as verified through careful analysis.

This process has several advantages:

- Gas mixtures are provided at the requested concentration
- Homogenous composition of all cylinders within a batch
- Consistency of mixtures from one order to the next

Many Precision Blend mixtures are available upon request as Traceability Standards, i.e. with ± 1% analytical traceability directly versus NIST Reference Materials.

Primary Standards

Primary Standards often referred to as NIST Traceable by Weight Mixtures, should be used when your application demands the highest mixture accuracy and reliability. Airgas produces Primary Standards gravimetrically on sophisticated high-load, high-sensitivity scales, with statistically measured precision and accuracy. These weighing systems are stringently calibrated with NIST traceable weights, in accordance with ISO procedures. Gravimetric blending offers the closest tolerance available, often better than available through laboratory testing. A dual verification of mixture accuracy is also performed by quality control analysis on instrumentation calibrated with Airgas Primary Standards, NIST SRMs, NTRMs, or GMIS.

Certified Standards

Certified Standards, sometimes referred to as working standards, are analyzed calibration mixtures used routinely in science and industry. For the majority of applications, the tolerance of a Certified Standard is acceptable. These standards are generally prepared either by partial pressure or gravimetrically. Certification of the standard is performed through quality control analysis on instrumentation calibrated with Airgas Primary Standards, NIST SRMs, NTRMs, or GMIS.

Batch Certified Mixtures

Prepared using the same techniques as Primary or Certified Standards. Composition is guaranteed to fall within the stated blend tolerance, with nominal concentrations reported.

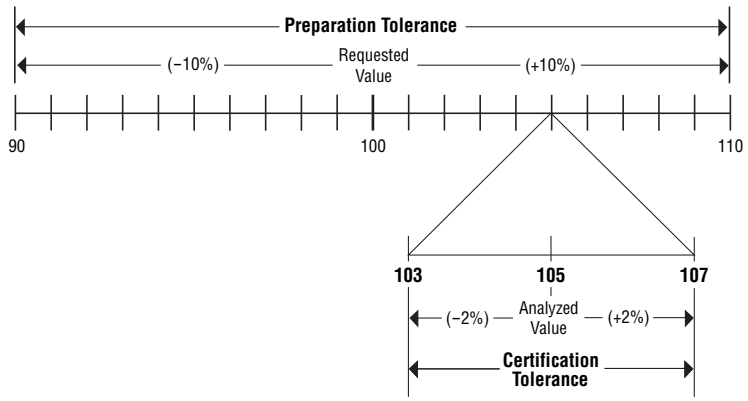
Explanation of the Tolerances

Airgas has two tolerances associated with all our mixture grades. First is the Blend or Preparation tolerance. This is the minimum acceptable uncertainty associated with the actual production of the blend. These uncertainties are accumulated during the manufacturing process because of equipment used in production, and due to the physical properties of the gases. Second is the Analytical or Certification tolerance, which is the minimum acceptable uncertainty, associated with the analysis of the blend. This uncertainty is accumulated throughout the analytical procedure and includes instrument and calibration uncertainties.

For most applications, the analytical tolerance is of greater importance than the blend tolerance because it represents the range in which the true or actual concentration may be

Mix Grade	Concentration	Blend tolerances	Analytical tolerances All values are ± relative
EPA Protocol	< 2ppm 2ppm - 10ppm > 10ppm	Inquire ± 1ppm ± 5%	≤ 1% ≤ 1% ≤ 1%
Traceability	< 2ppm 2ppm - 10ppm > 10ppm	Inquire ± 1ppm ± 5%	≤ 1% ≤ 1% ≤ 1%
Primary	< 50ppm 50ppm - < 1% 1% - < 2% ≥ 2%	Inquire 5% 1% 1%	Inquire ≤ 1% ≤ 1% ≤ 0.02% absolute
Precision Blend	All	"zero"	± 2%
Certified	< 5ppm 5 ppm - < 50 ppm 50 ppm - < 1% ≥ 1%	Inquire ± 20% ± 10% ± 5%	Inquire ≤ 5% ≤ 2% ≤ 2%
Batch Certified			

Note: Analytical tolerances for H_2S and NO_2 EPA Protocol mixtures ± 2% and Traceability Standard mixtures are ± 1% for all concentrations.



All of Airgas' six mixture grades have two tolerances—preparation and certification. This graph shows how the two interrelate. For example, a certified mix ordered at 100 ppm is prepared between 90 ppm and 110 ppm (the preparation tolerance). Assume the mix, when made, reads 105 ppm. When analyzed in the lab, it may actually be between 103 ppm and 107 ppm (the analytical tolerance).

in relation to the analytical concentration. For some applications, such as those that require an upper or lower range of concentration that cannot be exceeded, the preparation tolerance becomes equally if not more important.

Traceability in Calibration Gas Mixtures

Airgas offers calibration gas mixtures with established and defined traceability to NIST or to an equivalent national measurement institute. Each traceable mixture is accompanied by full documentation in the form of a Certificate of Analysis (COA), designed in compliance with applicable guidelines.

Traceability is defined as "the property of the result of measurement or the value of a standard whereby it can be related to stated references, usually national or international standards, through an unbroken chain of comparisons all having stated uncertainties." A requirement for ISO 9001 and ISO 17025 compliant programs, emissions monitoring and reportable environmental testing is that the instrument calibration process maintain traceability to a national primary reference material.

Calibration gas mixture compositional traceability is assured through one of two methods:

1) Analytical traceability using Reference Materials from a national measurement institute (usually NIST) to calibrate the measurement system through a rigorous process to determine the concentrations of mixture components of interest.

2) Process traceability to the international unit of mass (Kg) through comprehensive manufacturing and quality programs, using high precision, high sensitivity weighing systems for component additions. The resultant mixtures are analyzed versus Primary Standards of known composition and uncertainty.

Typically, the process-based traceability is used when Reference Materials are unavailable from NIST or other national measurement institutes for the component(s) or concentration(s) of interest. Blends produced gravimetrically, using scales extensively calibrated with NIST certified weights, are considered traceable and have known uncertainty in their composition.

The majority of traceable products supplied by Airgas are certified to an overall analytical or process uncertainty not to exceed ± 1%.

Ammonia (NH_3)

- **Other balance gases and cylinder sizes are available upon request.**
- **Concentrations over 1.8% in air and 4% in all other balance gases are provided at reduced pressure and volume.**

Ammonia in Air

Concentration	Cylinder Size	≈Contents ft³
2.5 ppm - <100 ppm	150A 80A 33A	146 84 29
100 ppm - < 1%	150A 80A 33A	146 84 29
1% - 1.8%	150A 80A 33A	148 86 30

Not available in Air over 9.4%
Standard Valve Outlet: CGA 705
Individual Certificate of Analysis or Certificate of Batch Analysis included.

Ammonia in Argon

Concentration	Cylinder Size	≈Contents ft³
2.5 ppm - <100 ppm	150A 80A 33A	153 82 35
100 ppm - < 1%	150A 80A 33A	153 82 35
1% - 10%	150A 80A 33A	156 83 36

Standard Valve Outlet: CGA 705
Individual Certificate of Analysis or Certificate of Batch Analysis included.

Ammonia in Helium

Concentration	Cylinder Size	≈Contents ft³
2.5 ppm - <100 ppm	150A 80A 33A	132 70 30
100 ppm - < 1%	150A 80A 33A	132 70 30
1% - 10%	150A 80A 33A	132 70 30

Standard Valve Outlet: CGA 705
Individual Certificate of Analysis or Certificate of Batch Analysis included.

Ammonia in Nitrogen

Concentration	Cylinder Size	≈Contents ft³
2.5 ppm - <100 ppm	150A 80A 33A	146 84 29
100 ppm - < 1%	150A 80A 33A	146 84 29
1% - 10%	150A 80A 33A	148 86 30

Standard Valve Outlet: CGA 705
Individual Certificate of Analysis or Certificate of Batch Analysis included.

Technical Data & Shipping Information

Cylinder Pressure	2000 psig
U.S. DOT Class:	
In Air, Ar, He, and N_2	2.2
In H_2	2.1
U.S. DOT Label:	
In Air, Ar, He, and N_2	Nonflammable Gas
In H_2	Flammable Gas
ID Number:	
In Air, Ar, He, and N_2	UN1956
In H_2	UN1954

Airgas offers a wide range of specialty gas equipment for gas mixtures, including regulators.

Pictured: Y12-C445

Equipment Recommendations are found on page 34

Argon (Ar)

• Other balance gases and cylinder sizes are available upon request.

Argon in Helium

Concentration	Cylinder Size	≈Contents ft³
0.5 ppm - <100 ppm	200 150A 80 35	196 132 77 30
100 ppm – <1000 ppm	200 150A 80 35	196 132 77 30
>0.1%	200 80 35	197 78 31

Primary Standards available for concentration ≥ 1 ppm
Standard Valve Outlet: CGA 580
Individual Certificate of Analysis or Certificate of Batch Analysis included.

Argon in Hydrogen

Concentration	Cylinder Size	≈Contents ft³
0.5 ppm - <100 ppm	200 150A 80 35	196 132 77 30
100 ppm – <1000 ppm	200 150A 80 35	196 132 77 30
>0.1%	200 80 35	200 79 31

Primary Standards available for concentration ≥ 1 ppm
Standard Valve Outlet: CGA 350
Individual Certificate of Analysis or Certificate of Batch Analysis included.

Argon in Nitrogen

Concentration	Cylinder Size	≈Contents ft³
100 ppm – <1000 ppm	200 150A 80 35	215 144 85 33
100 ppm – <1000 ppm	200 80 35	218 86 34
Mixtures below 100 ppm - inquire		

Primary Standards available for concentration ≥ 100 ppm
Standard Valve Outlet: CGA 580
Individual Certificate of Analysis or Certificate of Batch Analysis included.

Argon in Oxygen

Concentration	Cylinder Size	≈Contents ft³
3 ppm – <100 ppm	200 150A 80 35	230 154 91 36
100 ppm – <1000 ppm	200 150A 80 35	230 154 91 36
>0.1%	200 80 35	230 91 36

Primary Standards available for concentration ≥ 3 ppm
Standard Valve Outlet: CGA 296
Individual Certificate of Analysis or Certificate of Batch Analysis included.

Technical Data & Shipping Information

Cylinder Pressure	2000 psig
U.S. DOT Class:	
In H_2	2.1
All Others	2.2
U.S. DOT Label:	
In H_2	Flammable Gas
All Others	Nonflammable Gas
ID Number:	
In H_2	UN1954
All Others	UN1956

You'll find it with us—a wide range of specialty gas equipment for gas mixtures, including regulators.

Pictured: Y12-N145

Equipment Recommendations are found on page 34

Benzene (C_6H_6)

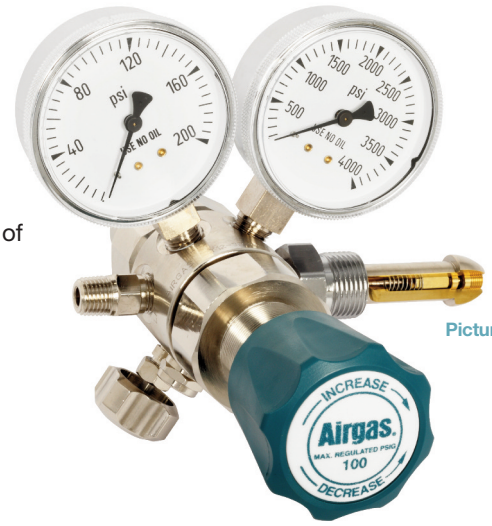
- **Other balance gases and cylinder sizes are available upon request.**
- **Concentrations over 250 ppm are provided at reduced pressure and volume.**

Benzene in Air			Benzene in Nitrogen		
Concentration	**Cylinder Size**	**≈Contents ft³**	**Concentration**	**Cylinder Size**	**≈Contents ft³**
0.09 ppm – < 50 ppm	150A 80A 33A	146 79 33	**0.09 ppm – < 50 ppm**	150A 80A 33A	146 79 33
50 – 250ppm	150A 80A 33A	146 79 33	**50 – 250ppm**	150A 80A 33A	146 79 33
Primary Standards available for concentrations greater than 1 ppm. Standard Valve Outlet: CGA 590 Individual Certificate of Analysis included.			Primary Standards available for concentrations greater than 1 ppm. Standard Valve Outlet: CGA 350 Certificate of Analysis included.		

Technical Data & Shipping Information	
Cylinder Pressure	2000 psig
U.S. DOT Class	2.2
U.S. DOT Label	Nonflammable Gas
ID Number	UN1956

Equipment Recommendations are found on page 34

Airgas offers a wide range of specialty gas equipment designed especially for specialty gas mixtures.



Pictured: Y12-244

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.

n-Butane (C_2H_{10})

- **Other balance gases and cylinder sizes are available up on request.**
- **Concentrations over 2750 ppm in air and 1% in all other gases are provided at reduced pressure and volume.**

n-Butane in Air

Concentration	Cylinder Size	≈Contents ft³
1 ppm – <100 ppm	200 150A 80 35	218 146 86 34
100 ppm – <1000 ppm	200 150A 80 35	218 146 86 34
1000 ppm – 2750 ppm	200 150A 50 35	218 146 86 34

Not available in Air over 1.2%
Primary Standards available in all concentrations
Standard Valve Outlet: CGA 590
Individual Certificate of Analysis or Certificate of Batch Analysis included.

n-Butane in Helium

Concentration	Cylinder Size	≈Contents ft³
1 ppm – <100 ppm	200 150A 80 35	196 132 77 30
100 ppm – <1000 ppm	200 150A 80 35	196 132 77 30
0.1% – 3.5%	200 80 35	196 77 30

Primary Standards available in all concentrations
Standard Valve Outlet: CGA 350
Individual Certificate of Analysis or Certificate of Batch Analysis included.

n-Butane in Nitrogen

Concentration	Cylinder Size	≈Contents ft³
1 ppm – <100 ppm	200 150A 80 35	215 144 85 33
100 ppm – <1000 ppm	200 150A 80 35	216 145 85 34
0.1% – 3.5%	200 80 35	216 85 34

Primary Standards available in all concentrations
Standard Valve Outlet: CGA 350
Individual Certificate of Analysis or Certificate of Batch Analysis included.

Rely on Airgas for all your specialty gas equipment needs, including regulators for gas mixtures.

Pictured: Y11-244

Technical Data & Shipping Information

Cylinder Pressure	2000 psig
U.S. DOT Class:	
$n\text{-}C_4H_{10}$ in Air, or ≤ 3.82% in He or ≤ 5.6% in N_2	2.2
All Others	2.1
U.S. DOT Label:	
$n\text{-}C_4H_{10}$ in Air, or ≤ 3.82% in He or ≤ 5.6% in N_2	Nonflammable Gas
All Others	Flammable Gas
ID Number:	
$n\text{-}C_4H_{10}$ in Air, or ≤ 3.82% in He or ≤ 5.6% in N_2	UN1956
All Others	UN1954

Equipment Recommendations are found on page 34

Carbon Dioxide (CO_2)

- **Other balance gases and cylinder sizes are available up on request.**
- **Concentrations over 28% are provided at reduced pressure and volume.**

Carbon Dioxide in Air

Concentration	Cylinder Size	≈Contents ft³
0.5 ppm – <100 ppm	150A 80A 35A	146 78 33
100 ppm – <1%	200 80 35	218 86 34
1% – 28%	200 80 35	232 92 36

Primary Standards available for concentrations greater than 1 ppm.
Standard Valve Outlet: CGA 590
Individual Certificate of Analysis or Certificate of Batch Analysis included.

Carbon Dioxide in Argon

Concentration	Cylinder Size	≈Contents ft³
0.5 ppm - <100 ppm	150A 80A 35A	153 82 35
100 ppm – <1%	200 80 35	228 90 35
1% – 28%	200 80 35	243 96 38

Primary Standards available for concentrations greater than 1 ppm.
Standard Valve Outlet: CGA 580
Individual Certificate of Analysis or Certificate of Batch Analysis included.

Carbon Dioxide in Helium

Concentration	Cylinder Size	≈Contents ft³
0.5 ppm - <100 ppm	150A 80A 35A	132 70 30
100 ppm - < 1%	200 80 35	196 77 30
1% - 28%	200 80 35	198 78 31

Primary Standards available for concentrations greater than 1 ppm.
Standard Valve Outlet: CGA 580
Individual Certificate of Analysis or Certificate of Batch Analysis included.

Carbon Dioxide in Hydrogen

Concentration	Cylinder Size	≈Contents ft³
0.5 ppm - <100 ppm	150A 80A 35A	132 70 30
100 ppm - <1%	200 80 35	197 78 31
1% - 28%	200 80 35	201 79 31

Primary Standards available for concentrations greater than 1 ppm.
Standard Valve Outlet: CGA 350
Individual Certificate of Analysis or Certificate of Batch Analysis included.

Equipment Recommendations are found on page 34

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.

Carbon Dioxide (CO_2) Cont.

- Other balance gases and cylinder sizes are available up on request.
- Concentrations over 28% are provided at reduced pressure and volume.

Carbon Dioxide in Nitrogen			Carbon Dioxide in Oxygen		
Concentration	**Cylinder Size**	**≈Contents ft³**	**Concentration**	**Cylinder Size**	**≈Contents ft³**
0.5 ppm – <100 ppm	150A 80A 33A	144 77 33	**0.5 ppm - <100 ppm**	150A 80A 33A	154 82 35
100 ppm – <1%	200 80 35	215 85 33	**100 ppm – <1%**	200 80 35	230 91 36
1% – 28%	200 80 35	228 90 35	**1% – 28%**	200 80 35	245 97 35
Primary Standards available for concentrations greater than 1 ppm. Standard Valve Outlet: CGA 580 Individual Certificate of Analysis or Certificate of Batch Analysis included.			Primary Standards available for concentrations greater than 1 ppm. Standard Valve Outlet: CGA 296 Individual Certificate of Analysis or Certificate of Batch Analysis included.		

Technical Data & Shipping Information	
Cylinder Pressure	2000 psig
U.S. DOT Class:	
In H_2	2.1
All Others	2.2
U.S. DOT Label:	
In H_2	Flammable Gas
All Others	Nonflammable Gas
ID Number:	
In H_2	UN1954
All Others	UN1956

Equipment Recommendations are found on page 34

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.

Carbon Monoxide (CO)

- **Other balance gases and cylinder sizes are available upon request.**
- **Concentration over 2.9% in Air are provided at reduced pressure and volume.**
- **Steel cylinders available at reduced pressure and volume.**

Carbon Monoxide in Air

Concentration	Cylinder Size	≈Contents ft³
0.5 ppm – <100 ppm	150A 80A 33A	148 78 33
100 ppm – <1%	200 80 35	218 86 34
1% – 2.9%	200 80 35	232 92 36

Not available in Air over 7.8%
Primary Standards available for concentrations greater than 1 ppm.
Standard Valve Outlet: CGA 590
Individual Certificate of Analysis or Certificate of Batch Analysis included.

Carbon Monoxide in Argon

Concentration	Cylinder Size	≈Contents ft³
0.5 ppm - <100 ppm	150A 80A 35A	153 82 35
100 ppm – <1%	200 80 35	228 90 35
≥ 1%	200 80 35	243 96 38

Primary Standards available for concentrations greater than 1 ppm.
Standard Valve Outlet: CGA 350
Individual Certificate of Analysis or Certificate of Batch Analysis included.

Carbon Monoxide in Helium

Concentration	Cylinder Size	≈Contents ft³
0.5 ppm - <100 ppm	150A 80A 35A	132 70 30
100 ppm - < 1%	200 80 35	196 77 30
1% - 28%	200 80 35	198 78 31

Primary Standards available for concentrations greater than 1 ppm.
Standard Valve Outlet: CGA 350
Individual Certificate of Analysis or Certificate of Batch Analysis included.

Carbon Monoxide in Hydrogen

Concentration	Cylinder Size	≈Contents ft³
0.5 ppm - <100 ppm	150A 80A 35A	132 70 30
100 ppm - <1%	200 80 35	197 78 31
1% - 28%	200 80 35	201 79 31

Primary Standards available for concentrations greater than 2 ppm.
Standard Valve Outlet: CGA 350
Individual Certificate of Analysis or Certificate of Batch Analysis included.

Carbon Monoxide in Nitrogen

Concentration	Cylinder Size	≈Contents ft³
0.5 ppm – <100 ppm	150A 80A 33A	146 78 33
100 ppm – <1%	150A 80A 33A	146 78 33
≥ 1%	150A 80A 33A	146 78 33

Primary Standards available for concentrations greater than 1 ppm.
Standard Valve Outlet: CGA 350
Individual Certificate of Analysis or Certificate of Batch Analysis included.

Equipment Recommendations are found on page 34

Carbon Monoxide (CO) Cont .

- **Other balance gases and cylinder sizes are available upon request.**
- **Concentration over 2.9% in Air are provided at reduced pressure and volume.**
- **Steel cylinders available at reduced pressure and volume.**

Technical Data & Shipping Information	
Cylinder Pressure:	
Aluminum	2000 psig
Steel	1650 psig
U.S. DOT Class:	
CO In Air, or ≤ 11.1% in He or ≤ 20% in N_2	2.2
In H_2 and All Others	2.1
U.S. DOT Label:	
CO In Air, or ≤ 11.1% in He or ≤ 20% in N_2	Nonflammable Gas
In H_2 and All Others	Flammable Gas
ID Number:	
CO In Air, or ≤ 11.1% in He or ≤ 20% in N_2	UN1956
In H_2 and All Others	UN1954

You'll find it with us—a wide range of specialty gas equipment designed especially for gas mixtures.

Pictured: Y12-N145

Equipment Recommendations are found on page 34

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.

Chlorine (Cl_2)

- Other balance gases and cylinder sizes are available upon request.
- Concentrations over 3% are provided at reduced pressure and volume.

Chlorine in Nitrogen		
Concentration	**Cylinder Size**	**≈Contents ft³**
5 ppm - <100 ppm	150A 80A 33A	144 77 33
100 ppm – <1000 ppm	150A 80A 33A	144 77 33
1000 ppm – 3%	200 80 35	217 76 35

Not available as a primary standard
Standard Valve Outlet: CGA 660
Individual Certificate of Analysis or Certificate of Batch Analysis included.

Technical Data & Shipping Information

Cylinder Pressure	2000 psig
U.S. DOT Class:	
$Cl_2 \geq 5.86\%$	2.3
All Others	2.2
U.S. DOT Label:	
$Cl_2 \geq 5.86\%$	Inhalation Hazard, Corrosive
All Others	Nonflammable Gas
ID Number:	
$Cl_2 \geq 5.86\%$	UN3304
All Others	UN1956

You'll find it with us—a wide range of specialty gas equipment designed especially for gas mixtures.

Pictured: Y11-C334

Equipment Recommendations are found on page 35

Ethane (C_2H_6)

- **Other balance gases and cylinder sizes are available up on request.**
- **Concentrations over 5300 ppm in Air and 20% in all other balance gases are provided at reduced pressure and volume.**

Ethane in Air

Concentration	Cylinder Size	≈Contents ft³
1 ppm – <100 ppm	200 150A 80 35	218 146 76 35
100 ppm - <1000 ppm	200 150A 80 35	218 146 76 35
1000 ppm – 5300 ppm	200 80 35	218 76 35

Cannot exceed 1.8% in Air.
Primary Standards available for concentrations greater than 5 ppm.
Standard Valve Outlet: CGA 590
Individual Certificate of Analysis or Certificate of Batch Analysis included.

Ethane in Helium

Concentration	Cylinder Size	≈Contents ft³
1 ppm – <100 ppm	200 150A 80 35	196 132 77 30
100 ppm – <1%	200 150A 80 35	196 132 77 30
1% – 20%	200 80 35	199 79 31

Standard Valve Outlet: CGA 350
Individual Certificate of Analysis or Certificate of Batch Analysis included.

Ethane in Hydrogen

Concentration	Cylinder Size	≈Contents ft³
1 ppm – <100 ppm	200 150A 80 35	196 132 77 30
100 ppm – <1%	200 150A 80 35	196 132 77 30
1% – 20%	200 80 35	199 79 31

Standard Valve Outlet: CGA 350
Individual Certificate of Analysis or Certificate of Batch Analysis included.

Ethane in Nitrogen

Concentration	Cylinder Size	≈Contents ft³
1 ppm – <100 ppm	200 150A 80 35	215 144 85 33
100 ppm – <1%	200 150A 80 35	215 144 85 33
1% – 20%	200 80 35	225 89 35

Standard Valve Outlet: CGA 350
Individual Certificate of Analysis or Certificate of Batch Analysis included.

Technical Data & Shipping Information

Cylinder Pressure	2000 psig
U.S. DOT Class:	
C_2H_6 In Air, or 8.37% in He, or ≤ 12.0% in N_2	2.2
In H_2 and All Others	2.1
U.S. DOT Label:	
C_2H_6 In Air, or 8.37% in He, or ≤ 12.0% in N_2	Nonflammable Gas
In H_2 and All Others	Flammable Gas
ID Number:	
C_2H_6 In Air, or 8.37% in He, or ≤ 12.0% in N_2	UN1956
In H_2 and All Others	UN1954

Equipment Recommendations are found on page 35

Ethylene Oxide (C_2H_4O)

- **Other balance gases and cylinder sizes are available upon request.**
- **Concentrations over 6100 ppm in Air and 1% in all other balance gases are provided at reduced pressure and volume.**

Ethylene Oxide in Air

Concentration	Cylinder Size	≈Contents ft³
1 ppm – < 100 ppm	150A 80A 33A	146 78 33
100 ppm – 6100 ppm	150A 80A 33A	103 55 23

Cannot exceed 1.8% in Air.
Standard Valve Outlet: CGA 590
Certificate of Analysis included.

Ethylene Oxide in Helium

Concentration	Cylinder Size	≈Contents ft³
1 ppm – < 100 ppm	150A 80A 33A	132 70 30
100 ppm – 1%	150A 80A 33A	132 70 30

Standard Valve Outlet: CGA 350
Certificate of Analysis included.

Ethylene Oxide in Nitrogen

Concentration	Cylinder Size	≈Contents ft³
1 ppm – < 100 ppm	150A 80A 33A	144 77 33
100 ppm – 1%	150A 80A 33A	144 77 33

Standard Valve Outlet: CGA 350
Certificate of Analysis included.

Airgas offers a wide range of specialty gas equipment designed especially for specialty gas mixtures.

Pictured: Y11-N245

Technical Data & Shipping Information

Cylinder Pressure	2000 psig
U.S. DOT Class:	
C_2H_4O in Air, or ≤ 2.5% He or ≤ 3.7% in N_2	2.2
All Others	2.1
U.S. DOT Label:	
C_2H_4O in Air, or ≤ 2.5% He or ≤ 3.7% in N_2	Nonflammable Gas
All Others	Flammable Gas
ID Number:	
C_2H_4O in Air, or ≤ 2.5% He or ≤ 3.7% in N_2	UN1956
All Others	UN1954

Equipment Recommendations are found on page 35

Fluorine Mixtures

See Laser Mixtures

Airgas has a complete laser offering, including fluorine mixtures and hydrogen chloride mixtures for excimer lasers. See the Special Applications Section, page SA13.

Helium (He)

• Other balance gases and cylinder sizes are available upon request.

Helium in Argon			Helium in Nitrogen		
Concentration	**Cylinder Size**	**≈Contents ft³**	**Concentration**	**Cylinder Size**	**≈Contents ft³**
5 ppm – <100 ppm	200 150A 80 35	228 153 90 35	**5 ppm – <100 ppm**	200 150A 80 35	215 144 85 33
100 ppm – < 1%	200 150A 80 35	228 153 90 35	**100 ppm – < 1%**	200 150A 80 35	215 144 85 33
> 1%	200 80 35	212 84 33	**> 1%**	200 80 35	205 81 32
Primary Standards available for concentrations greater than 10 ppm. Standard Valve Outlet: CGA 580 Individual Certificate of Analysis or Certificate of Batch Analysis included.			Primary Standards available for concentrations greater than 10 ppm. Standard Valve Outlet: CGA 580 Individual Certificate of Analysis or Certificate of Batch Analysis included.		

Technical Data & Shipping Information	
Cylinder Pressure	2000 psig
U.S. DOT Class	2.2
U.S. DOT Label	Nonflammable Gas
ID Number	UN1956

Equipment Recommendations are found on page 35

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.

n-Hexane (C_6H_{14})

- **Other balance gases and cylinder sizes are available upon request.**
- **Concentrations greater than 900 ppm available at reduced pressure and volume.**

n-Hexane in Air			n-Hexane in Nitrogen		
Concentration	**Cylinder Size**	**≈Contents ft³**	**Concentration**	**Cylinder Size**	**≈Contents ft³**
0.5 ppm – <100 ppm	150A 80A 33A	146 78 33	**0.5 ppm – <100 ppm**	150A 80A 33A	144 77 33
100 ppm – 1900 ppm	200 150A 80 35	217 146 86 34	**100 ppm – 2500 ppm**	200 150A 80 35	215 144 85 33
Cannot exceed 6900 ppm in Air. Primary Standards available for concentrations greater than 1 ppm. Standard Valve Outlet: CGA 590 Individual Certificate of Analysis or Certificate of Batch Analysis included.			Primary Standards available for concentrations greater than 1 ppm. Standard Valve Outlet: CGA 350 Individual Certificate of Analysis or Certificate of Batch Analysis included.		

Technical Data & Shipping Information	
Cylinder Pressure	2000 psig
U.S. DOT Class	2.2
U.S. DOT Label	Nonflammable Gas
ID Number	UN1956

Rely on Airgas for all your specialty gas equipment needs, including regulators for gas mixtures.

Pictured: Y12-244

Equipment Recommendations are found on page 35

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.

Hydrogen (H_2)

• Other balance gases and cylinder sizes are available upon request.

Hydrogen in Air

Concentration	Cylinder Size	≈Contents ft³
1 ppm – < 1000 ppm	200 150A 80 35	217 146 86 34
1000 ppm – 2.5%	200 150A 80 35	217 146 86 34

Cannot exceed 2.5% in Air.
Primary Standards available for concentrations greater than 2 ppm.
Standard Valve Outlet: CGA 590
Individual Certificate of Analysis or Certificate of Batch Analysis included.

Hydrogen in Argon

Concentration	Cylinder Size	≈Contents ft³
1 ppm - < 100 ppm	200 150A 80 35	217 152 90 32
100 ppm – <1%	200 150A 80 35	227 152 90 35
>1%	200 80 35	214 85 33

Primary Standards available for concentrations greater than 2 ppm.
Standard Valve Outlet: CGA 350
Individual Certificate of Analysis or Certificate of Batch Analysis included.

Hydrogen in Helium

Concentration	Cylinder Size	≈Contents ft³
1 ppm – < 100 ppm	200 150A 80 35	196 132 77 30
100 ppm – < 1%	200 150A 80 35	196 132 77 30
> 1%	200 80 35	196 77 30

Primary Standards available for concentrations greater than 2 ppm.
Standard Valve Outlet: CGA 350
Individual Certificate of Analysis or Certificate of Batch Analysis included.

Hydrogen in Nitrogen

Concentration	Cylinder Size	≈Contents ft³
1 ppm – < 100 ppm	200 150A 80 35	215 144 85 33
100 ppm – < 1%	200 150A 80 35	215 144 85 33
> 1%	200 80 35	224 89 35

Primary Standards available for concentrations greater than 2 ppm.
Standard Valve Outlet: CGA 350
Individual Certificate of Analysis or Certificate of Batch Analysis included.

Technical Data & Shipping Information

Cylinder Pressure	2000 psig
U.S. DOT Class:	
H_2 in Air, or ≤ 2.93% in Ar, or ≤ 3.9% in He, or ≤ 5.7 in N_2	2.2
All Others	2.1
U.S. DOT Label:	
H_2 in Air, or ≤ 2.93% in Ar, or ≤ 3.9% in He, or ≤ 5.7% in N_2	Nonflammable Gas
All Others	Flammable Gas
ID Number:	
H_2 in Air, or ≤ 2.93% in Ar, or ≤ 3.9% in He, or ≤ 5.7% in N_2	UN1956
All Others	UN1954

Equipment Recommendations are found on page 36

Hydrogen Chloride (HCl)

- Other balance gases and cylinder sizes are available upon request.
- Concentrations over 5% provided at reduced pressure and volume.

Hydrogen Chloride in Nitrogen

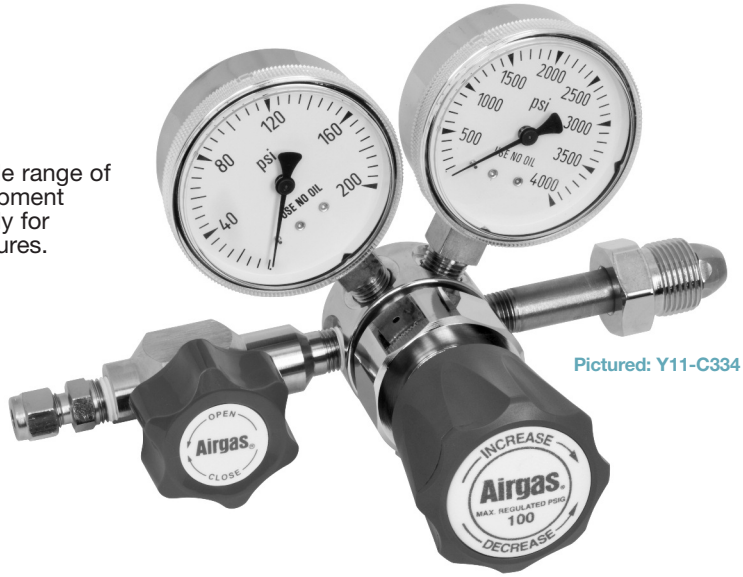
Concentration	Cylinder Size	≈Contents ft³
2 ppm – < 100 ppm	150A 80A 35A	144 77 33
100 ppm – < 1000 ppm	150A 80A 35A	144 77 33
1000 ppm – 5%	200* 80* 35*	157 62 24

*Note: Nickel Plated Steel cylinders.
Standard Valve Outlet: CGA 330
Individual Certificate of Analysis included.

Technical Data & Shipping Information

Cylinder Pressure	2000 psig
U.S. DOT Class	2.2
U.S. DOT Label	Nonflammable Gas
ID Number	UN1956

Airgas offers a wide range of specialty gas equipment designed especially for specialty gas mixtures.



Pictured: Y11-C334

Equipment Recommendations are found on page 36

Hydrogen Sulfide (H_2S)

- **Other balance gases and cylinder sizes are available upon request.**
- **Concentrations over 1.4% in air and 9% in other gases are provided at reduced pressure and volume.**

Hydrogen Sulfide in Air

Concentration	Cylinder Size	≈Contents ft³
0.25 ppm – < 100 ppm	150A 80A 33A	146 77 33
100 ppm – 1000 ppm	150A 80A 33A	146 77 33
1000 ppm – 1.4%	150A 80A 33A	147 78 30

Cannot exceed 2.7% in Air.
Primary Standards available for concentrations greater than 1 ppm.
Standard Valve Outlet: CGA 330
Individual Certificate of Analysis included.

Hydrogen Sulfide in Helium

Concentration	Cylinder Size	≈Contents ft³
0.25 ppm – < 100 ppm	150A 80A 33A	132 70 30
100 ppm - < 1%	150A 80A 33A	132 70 30
1% – 9%	200 150A 80 35	196 132 77 30

Primary Standards available for concentrations greater than 1 ppm.
Standard Valve Outlet: CGA 330
Individual Certificate of Analysis included.

Hydrogen Sulfide in Hydrogen

Concentration	Cylinder Size	≈Contents ft³
0.25 ppm – < 100 ppm	150A 80A 33A	132 70 30
100 ppm - < 1%	150A 80A 33A	132 70 30
1% – 9%	200 150A 80 35	196 132 77 30

Primary Standards available for concentrations greater than 1 ppm.
Standard Valve Outlet: CGA 330
Individual Certificate of Analysis included.

Hydrogen Sulfide in Methane

Concentration	Cylinder Size	≈Contents ft³
0.25 ppm – < 100 ppm	150A 80A 33A	160 85 36
100 ppm - < 1%	150A 80A 33A	160 85 36
1% – 9%	200 150A 80 35	241 162 95 37

Primary Standards available for concentrations greater than 1 ppm.
Standard Valve Outlet: CGA 330
Individual Certificate of Analysis included.

Hydrogen Sulfide in Nitrogen

Concentration	Cylinder Size	≈Contents ft³
0.25 ppm – < 100 ppm	150A 80A 33A	144 77 33
100 ppm – < 1%	150A 80A 33A	144 77 33
1% - 9%	200 150A 80 35	220 148 87 34

Primary Standards available for concentrations greater than 1 ppm.
Standard Valve Outlet: CGA 330
Individual Certificate of Analysis included.

Technical Data & Shipping Information

Cylinder Pressure	2000 psig
U.S. DOT Class:	
In CH_4	2.1
All Others	2.2
U.S. DOT Label:	
In CH_4	Flammable Gas
All Others	Nonflammable Gas
ID Number:	
In CH_4	UN1954
All Others	UN1956

Equipment Recommendations are found on page 36

Isobutane (iso-C_4H_{10})

- **Other balance gases and cylinder sizes are available upon request.**
- **Concentrations over 2900 ppm in Air and 1% in all other balance gases are provided at reduced pressure and volume.**

Isobutane in Air

Concentration	Cylinder Size	≈Contents ft³
1 ppm – < 100 ppm	200 150A 80 35	215 144 85 33
100 ppm – 2900 ppm	200 150A 80 35	215 144 85 33

Standard Valve Outlet: CGA 590
Individual Certificate of Analysis or Certificate of Batch Analysis included.

Isobutane in Helium

Concentration	Cylinder Size	≈Contents ft³
1 ppm – < 100 ppm	200 150A 80 35	198 133 78 31
100 ppm - < 1%	200 150A 80 35	195 131 77 30

Standard Valve Outlet: CGA 350
Individual Certificate of Analysis or Certificate of Batch Analysis included.

Isobutane in Nitrogen

Concentration	Cylinder Size	≈Contents ft³
1 ppm – < 100 ppm	200 150A 80 35	215 144 85 33
100 ppm – 1%	200 150A 80 35	215 145 85 33

Standard Valve Outlet: CGA 350
Individual Certificate of Analysis or Certificate of Batch Analysis included.

Rely on Airgas for all your specialty gas equipment needs, including regulators for gas mixtures.

Pictured: Y11-N145

You'll find it with us—a wide range of specialty gas equipment designed especially for gas mixtures.

Pictured: Y11-244

Technical Data & Shipping Information

Cylinder Pressure	2000 psig
U.S. DOT Class:	
C_4H_{10} in Air, or ≤ 3.8% in He or ≤ 5.5% in N_2	2.2
All Others	2.1
U.S. DOT Label:	
C_4H_{10} in Air, or ≤ 3.8% in He or ≤ 5.5% in N_2	Nonflammable Gas
All Others	Flammable Gas
ID Number:	
C_4H_{10} in Air, or ≤ 3.8% in He or ≤ 5.5% in N_2	UN1956
All Others	UN1954

Equipment Recommendations are found on page 36

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.

Methane (CH_4)

- **Other balance gases and cylinder sizes are available upon request.**
- **Concentrations over 9400 ppm in Air are provided at reduced pressure and volume.**

Methane in Air

Concentration	Cylinder Size	≈Contents ft³
0.5 ppm – < 100 ppm	200 150A 80 35	218 146 86 34
100 ppm – < 1000 ppm	200 150A 80 35	218 146 86 34
1000 ppm – 9400 ppm	200 80 35	218 86 34

Primary Standards for concentrations greater than 1 ppm.
Standard Valve Outlet: CGA 590
Individual Certificate of Analysis or Certificate of Batch Analysis included.

Methane in Helium

Concentration	Cylinder Size	≈Contents ft³
0.5 ppm – < 100 ppm	200 150A 80 35	196 132 77 30
100 ppm – <1%	200 150A 80 35	196 132 77 30
> 1%	200 80 35	199 79 31

Primary Standards for concentrations greater than 1 ppm.
Standard Valve Outlet: CGA 350
Individual Certificate of Analysis or Certificate of Batch Analysis included.

Methane in Nitrogen

Concentration	Cylinder Size	≈Contents ft³
0.5 ppm – < 100 ppm	200 150A 80 35	215 144 85 33
100 ppm – < 1%	200 150A 80 35	215 144 85 33
> 1%	200 80 35	219 87 34

Primary Standards for concentrations greater than 1 ppm.
Standard Valve Outlet: CGA 350
Individual Certificate of Analysis or Certificate of Batch Analysis included.

Airgas offers a wide range of specialty gas equipment designed especially for specialty gas mixtures.

Pictured: Y12-N145

Technical Data & Shipping Information

Cylinder Pressure	2000 psig
U.S. DOT Class:	
CH_4 in Air, or ≤ 7.7% in Ar*, or ≤ 10.1% in He or ≤ 14.3% in N_2	2.2
CH_4 in H_2 and All Others	2.1
U.S. DOT Label:	
CH_4 in Air, or ≤ 7.7% in Ar*, or ≤ 10.1% in He or ≤ 14.3% in N_2	Nonflammable Gas
CH_4 in H_2 and All Others	Flammable Gas
ID Number:	
CH_4 in Air, or ≤ 7.7% in Ar*, or ≤ 10.1% in He or ≤ 14.3% in N_2	UN1956
CH_4 in H_2 and All Others	UN1954

Additional Information:
Methane in Argon:
For information about ECD Qualified and Nuclear Counter P-5 (5% Methane/Argon) and P-10 (10% Methane/Argon), see the Special Applications section.

*A mixture of 10% methane in argon has been determined by testing to be nonflammable (Table 1: CGA P-23-2008)

Equipment Recommendations are found on page 36

Airgas
an Air Liquide company

Nitric Oxide (NO)

• Other balance gases and cylinder sizes are available upon request.

Nitric Oxide in Nitrogen		
Concentration	**Cylinder Size**	**≈Contents ft³**
0.1 ppm – < 100 ppm	150A 80A 33A	144 77 33
100 ppm – < 1%	150A 80A 33A	144 77 33
1% to 10%	200 150A 80 35	110 72 37 18

Above 1% concentration, top pressure is restricted to 1000 psig.
Primary Standards available for concentrations greater than 1 ppm.
Standard Valve Outlet: CGA 660
Individual Certificate of Analysis or Certificate of Batch Analysis included.

Technical Data & Shipping Information

Cylinder Pressure:	
NO < 1%	2000 psig
NO ≥ 1%	≤ 1000 psig
U.S. DOT Class:	
NO < 2.3%	2.2
NO ≥ 2.3%	2.3
U.S. DOT Label:	
NO < 2.3%	Nonflammable Gas
NO ≥ 2.3%	Inhalation Hazard
ID Number:	
NO < 2.3%	UN1956
NO ≥ 2.3%	UN1955

Additional Information:
For more information about EPA Protocol mixtures, refer to Environmental Compliance in Special Applications section.

Additional FTIR analysis for NO_2 concentration available upon request.

This product is not offered for use in inhalation therapy.

Equipment Recommendations are found on page 36

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.

Nitrogen (N_2)

• Other balance gases and cylinder sizes are available upon request.

Nitrogen in Argon

Concentration	Cylinder Size	≈Contents ft³
2 ppm – < 100 ppm	200 150A 80 35	228 153 90 35
100 ppm – < 1%	200 150A 80 35	228 153 90 35
> 1%	200 80 35	224 90 35

Primary Standards available for concentrations greater than 5 ppm.
Standard Valve Outlet: CGA 580
Individual Certificate of Analysis or Certificate of Batch Analysis included.

Nitrogen in Helium

Concentration	Cylinder Size	≈Contents ft³
1 ppm – < 100 ppm	200 150A 80 35	196 132 77 30
100 ppm – < 1%	200 150A 80 35	196 132 77 30
> 1%	200 80 35	198 78 31

Primary Standards available for concentrations greater than 2 ppm.
Standard Valve Outlet: CGA 580
Individual Certificate of Analysis or Certificate of Batch Analysis included.

Nitrogen in Hydrogen

Concentration	Cylinder Size	≈Contents ft³
1 ppm – < 100 ppm	200 150A 80 35	196 132 77 30
100 ppm – < 1%	200 150A 80 35	196 132 77 30
> 1%	200 80 35	198 78 31

Primary Standards available for concentrations greater than 2 ppm.
Standard Valve Outlet: CGA 350
Individual Certificate of Analysis or Certificate of Batch Analysis included.

Nitrogen in Oxygen

Concentration	Cylinder Size	≈Contents ft³
1 ppm – < 100 ppm	200 150A 80 35	230 154 91 36
100 ppm – < 1%	200 150A 80 35	230 154 91 36
> 1%	200 80 35	226 89 35

Primary Standards available for concentrations greater than 20 ppm.
Standard Valve Outlet: CGA 296
Individual Certificate of Analysis or Certificate of Batch Analysis included.

Technical Data & Shipping Information

Cylinder Pressure	2000 psig
U.S. DOT Class:	
In H_2	2.1
All Others	2.2
U.S. DOT Label:	
In H_2	Flammable Gas
All Others	Nonflammable Gas
ID Number:	
In H_2	UN1954
All Others	UN1956

Equipment Recommendations are found on page 37

Nitrogen Dioxide (NO_2)

- Other balance gases and cylinder sizes are available upon request.
- Concentration above 0.5% provided at reduced pressure and volume
- Mixtures of NO_2 below 1% must have an oxygen component for stability.

Nitrogen Dioxide in Air			Nitrogen Dioxide in Nitrogen		
Concentration	**Cylinder Size**	**≈Contents ft³**	**Concentration**	**Cylinder Size**	**≈Contents ft³**
1 ppm – < 100 ppm	150A 80A 33A	146 78 33	**1 ppm – < 100 ppm**	150A 80A 33A	144 77 33
100 ppm – < 1000 ppm	150A 80A 33A	146 78 33	**100 ppm – < 1000 ppm**	150A 80A 33A	144 77 33
1000 ppm – 5000 ppm	150A 80A 33A	146 78 33	**1000 ppm – 5000 ppm**	150A 80A 33A	144 77 33
Primary Standards available for concentrations greater than 2.5 ppm. Standard Valve Outlet: CGA 660 Individual Certificate of Analysis or Certificate of Batch Analysis included.			Primary Standards available for concentrations greater than 2.5 ppm. Standard Valve Outlet: CGA 660 Individual Certificate of Analysis or Certificate of Batch Analysis included.		

Technical Data & Shipping Information

Cylinder Pressure	2000 psig
U.S. DOT Class:	
NO_2 < 2.3%	2.2
NO_2 ≥ 2.3%	2.3
U.S. DOT Label:	
NO_2 < 2.3%	Nonflammable Gas
NO_2 ≥ 2.3%	Inhalation Hazard
ID Number:	
NO_2 < 2.3%	UN1956
NO_2 ≥ 2.3%	UN1955

Additional Information:

For more information about EPA Protocol mixtures, refer to Environmental Compliance in Special Application section.

You'll find it with us—a wide range of specialty gas equipment designed especially for gas mixtures.

Pictured: Y11-E444

Equipment Recommendations are found on page 37

Nitrous Oxide (N_2O)

- Other balance gases and cylinder sizes are available upon request.
- Concentrations over 28% are provided at reduced pressure and volume.

Nitrous Oxide in Air			Nitrous Oxide in Nitrogen		
Concentration	**Cylinder Size**	**≈Contents ft³**	**Concentration**	**Cylinder Size**	**≈Contents ft³**
0.1 ppm – < 100 ppm	150A 80A 33A	146 78 33	**0.1 ppm – < 100 ppm**	150A 80A 33A	144 77 33
100 ppm – < 1%	150A 80A 33A	146 78 33	**100 ppm – < 1%**	150A 80A 33A	144 77 33
1% – 28%	150A 80A 33A	165 97 38	**1% – 28%**	150A 80A 33A	162 86 37
Primary Standards available for concentrations greater than 0.3 ppm. Standard Valve Outlet: CGA 590 Individual Certificate of Analysis or Certificate of Batch Analysis included.			Primary Standards available for concentrations greater than 0.3 ppm. Standard Valve Outlet: CGA 590 Individual Certificate of Analysis or Certificate of Batch Analysis included.		

Technical Data & Shipping Information	
Cylinder Pressure	2000 psig
U.S. DOT Class	2.2
U.S. DOT Label	Nonflammable Gas
ID Number	UN1956

Additional Information:

For more information about EPA Protocol mixtures, refer to Environmental Compliance in Special Application section.

Equipment Recommendations are found on page 37

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.

Oxygen (O_2)

• Other balance gases and cylinder sizes are available upon request.

Oxygen in Argon

Concentration	Cylinder Size	≈Contents ft³
1 ppm – < 100 ppm	150A 80A 33A	153 80 34
100 ppm – < 1%	200 150A 80A 33A	228 153 80 34
> 1%	200 80 35	228 90 35

Primary Standards for concentrations greater than 3 ppm.
Standard Valve Outlet: <5% Oxygen – CGA 580; 5% - <23.5% Oxygen – CGA 590, ≥ 23.5% Oxygen – CGA 296
Individual Certificate of Analysis or Certificate of Batch Analysis included.

Oxygen in Helium

Concentration	Cylinder Size	≈Contents ft³
1 ppm – < 100 ppm	150A 80A 33A	132 70 30
100 ppm – < 1%	200 150A 80A 33A	196 132 70 30
> 1%	200 80 35	197 78 31

Primary Standards available for concentrations greater than 2 ppm.
Standard Valve Outlet: <5% Oxygen – CGA 580; 5% - <23.5% Oxygen – CGA 590; ≥ 23.5% Oxygen – CGA 296
Individual Certificate of Analysis or Certificate of Batch Analysis included.

Oxygen in Nitrogen

Concentration	Cylinder Size	≈Contents ft³
1 ppm – < 100 ppm	150A 80A 33A	144 77 33
100 ppm – <1%	200 150A 80A 33A	215 144 77 33
> 1%	200 80 35	218 86 33

Primary Standards for concentrations greater than 2 ppm.
Standard Valve Outlet: <5% Oxygen – CGA 580; 5% - <23.5% Oxygen – CGA 590, ≥ 23.5% Oxygen – CGA 296
Individual Certificate of Analysis or Certificate of Batch Analysis included.

Airgas offers a wide range of specialty gas equipment designed especially for specialty gas mixtures.

Pictured: Y12-244

Rely on Airgas for all your specialty gas equipment needs, including regulators for gas mixtures.

Pictured: Y12-N145

Technical Data & Shipping Information

Cylinder Pressure	2000 psig
U.S. DOT Class	2.2
U.S. DOT Label	Nonflammable Gas
ID Number	UN1956

Additional Information:
For more information about EPA Protocol mixtures, refer to Environmental Compliance in Special Application section.

Equipment Recommendations are found on page 37

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.

Propane (C_3H_8)

- **Other balance gases and cylinder sizes are available upon request.**
- **Concentrations over 3700 ppm in Air and 5% in all other balance gases are provided at reduced pressure and volume.**

Propane in Air			Propane in Nitrogen		
Concentration	**Cylinder Size**	**≈Contents ft³**	**Concentration**	**Cylinder Size**	**≈Contents ft³**
0.25 ppm - < 100 ppm	200 150A 80 35	218 146 86 34	**0.25 ppm - < 100 ppm**	200 150A 80 35	215 144 85 33
100 ppm – < 1000 ppm	200 150A 80 35	218 146 86 34	**100 ppm – < 1000 ppm**	200 150A 80 35	215 144 85 33
1000 ppm – 3700 ppm	200 80 35	218 86 34	**0.1% - 5%**	200 80 35	219 87 34
Primary Standards for concentrations greater than 1 ppm. Cannot exceed 1.35% in Air. Standard Valve Outlet: CGA 590 Individual Certificate of Analysis or Certificate of Batch Analysis included.			Primary Standards for concentrations greater than 1 ppm. Standard Valve Outlet: CGA 350 Individual Certificate of Analysis or Certificate of Batch Analysis included.		

Technical Data & Shipping Information

Cylinder Pressure	2000 psig
U.S. DOT Class:	
C_3H_8 in Air, or ≤ 4.45% in He or ≤ 6.5% in N_2	2.2
All Others	2.1
U.S. DOT Label:	
C_3H_8 in Air, or ≤ 4.45% in He or ≤ 6.5% in N_2	Nonflammable Gas
All Others	Flammable Gas
ID Number:	
C_3H_8 in Air, or ≤ 4.45% in He or ≤ 6.5% in N_2	UN1956
All Others	UN1954

Additional Information:
For more information about EPA Protocol mixtures, refer to Environmental Compliance in Special Application section.

Equipment Recommendations are found on page 37

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.

Propylene (C_3H_6)

- **Other balance gases and cylinder sizes are available upon request.**
- **Concentrations over 3800 ppm in Air and 5% in all other balance gases are provided at reduced pressure and volume.**

Propylene in Air			Propylene in Nitrogen		
Concentration	**Cylinder Size**	**≈Contents ft³**	**Concentration**	**Cylinder Size**	**≈Contents ft³**
0.25 ppm - < 100 ppm	200 150A 80 35	218 146 76 35	**0.25 ppm - < 100 ppm**	200 150A 80 35	215 144 75 35
100 ppm – < 1000 ppm	200 150A 80 35	218 146 76 35	**100 ppm – < 1000 ppm**	200 150A 80 35	215 144 75 35
1000 ppm – 3800 ppm	200 80 35	218 76 35	**0.1% - 5%**	200 80 35	221 77 36
Primary Standards for concentrations greater than 1 ppm. Cannot exceed 1.5% in Air. Standard Valve Outlet: CGA 590 Individual Certificate of Analysis or Certificate of Batch Analysis included.			Primary Standards for concentrations greater than 1 ppm. Standard Valve Outlet: CGA 350 Individual Certificate of Analysis or Certificate of Batch Analysis included.		

Technical Data & Shipping Information	
Cylinder Pressure	2000 psig
U.S. DOT Class:	
C_3H_6 in Air, or ≤ 2.9% in He or ≤ 5.6% in N_2	2.2
All Others	2.1
U.S. DOT Label:	
C_3H_6 in Air, or ≤ 2.9% in He or ≤ 5.6% in N_2	Nonflammable Gas
All Others	Flammable Gas
ID Number:	
C_3H_6 in Air, or ≤ 2.9% in He or ≤ 5.6% in N_2	UN1956
All Others	UN1954

Equipment Recommendations are found on page 37

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.

Silane (SiH_4)

- **Other concentrations, balance gases, and cylinder sizes are available upon request.**
- **Concentrations > 2% in Argon, Helium, Nitrogen, and > 1% in Hydrogen are gravimetrically certified.**

Silane in Argon

Concentration	Cylinder Size	≈Contents ft³
5 ppm - ≤ 2%	200 150A 80	229 154 80

Standard Valve outlet: CGA 350
Individual Certificate of Analysis or Certificate of Batch Analysis included.

Silane in Helium

Concentration	Cylinder Size	≈Contents ft³
5 ppm - ≤ 2%	200 150A 80	196 131 68

Standard Valve outlet: CGA 350
Individual Certificate of Analysis or Certificate of Batch Analysis included.

Silane in Hydrogen

Concentration	Cylinder Size	≈Contents ft³
5 ppm - ≤ 1%	200 150A 80	197 132 68

Standard Valve outlet: CGA 350
Individual Certificate of Analysis or Certificate of Batch Analysis included.

Silane in Nitrogen

Concentration	Cylinder Size	≈Contents ft³
5 ppm - ≤ 2%	200 150A 80	216 145 75

Standard Valve outlet: CGA 350
Individual Certificate of Analysis or Certificate of Batch Analysis included.

Technical Data & Shipping Information

Cylinder Pressure	2000 psig
U.S. DOT Class:	
SiH_4 in Ar, He, or N_2	2.2
SiH_4 in H_2	2.1
U.S. DOT Label:	
SiH_4 in Ar, He, or N_2	Nonflammable Gas
SiH_4 in H_2	Flammable Gas
ID Number:	
SiH_4 in Ar, He, or N_2	UN1956
SiH_4 in H2	UN1954

Equipment Recommendations are found on page 38

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.

Sulfur Dioxide (SO_2)

- **Other balance gases and cylinder sizes are available upon request.**
- **Concentrations over 1.7% are provided at reduced pressure and volume.**

Sulfur Dioxide in Air			Sulfur Dioxide in Nitrogen		
Concentration	**Cylinder Size**	**≈Contents ft³**	**Concentration**	**Cylinder Size**	**≈Contents ft³**
0.2 ppm – < 100 ppm	150A 80A 33A	146 78 33	**0.2 ppm – < 100 ppm**	150A 80A 33A	144 77 33
100 ppm – < 1000 ppm	150A 80A 33A	146 78 33	**100 ppm – < 1000 ppm**	150A 80A 33A	144 77 33
1000 ppm – 1.7%	150A 80A 33A	146 78 33	**1000 ppm – 1.7%**	150A 80A 33A	144 77 33
Primary Standards available for concentrations greater than 2 ppm. Standard Valve Outlet: CGA 660 Individual Certificate of Analysis or Certificate of Batch Analysis included.			Primary Standards available for concentrations greater than 2 ppm. Standard Valve Outlet: CGA 660 Individual Certificate of Analysis or Certificate of Batch Analysis included.		

Technical Data & Shipping Information	
Cylinder Pressure	2000 psig
U.S. DOT Class	2.2
U.S. DOT Label	Nonflammable Gas
ID Number	UN1956

Additional Information:
For more information about EPA Protocol mixtures, refer to Environmental Compliance in Special Application section.

Equipment Recommendations are found on page 38

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.

Sulfur Hexafluoride (SF_6)

- Other balance gases and cylinder sizes are available upon request.
- Concentrations over 10.5% are provided at reduced pressure and volume.

Sulfur Hexafluoride in Nitrogen		
Concentration	**Cylinder Size**	**≈Contents ft³**
0.5 ppm - < 100 ppm	200 150A 80 35	215 144 85 33
100 ppm - < 1%	200 150A 80 35	215 144 85 33
1% – 10.5%	200 150A 80 35	227 144 90 33

Primary Standards available for concentrations greater than 1 ppm.
Standard Valve Outlet: CGA 580
Individual Certificate of Analysis or Certificate of Batch Analysis included.

Technical Data & Shipping Information	
Cylinder Pressure	2000 psig
U.S. DOT Class	2.2
U.S. DOT Label	Nonflammable Gas
ID Number	UN1956

Equipment Recommendations are found on page 38

Toluene ($C_6H_5CH_3$)

- Other balance gases and cylinder sizes are available upon request.
- Concentrations over 150 ppm are provided at reduced pressure and volume.

Toluene in Nitrogen		
Concentration	**Cylinder Size**	**≈Contents ft³**
0.5 ppm – < 100 ppm	150A 80A 33A	146 79 33
100 ppm – 150 ppm	150A 80A 33A	146 79 33

Primary Standards available for concentrations greater than 20 ppm
Standard Valve Outlet: CGA 350
Individual Certificate of Analysis included.

Technical Data & Shipping Information	
Cylinder Pressure	2000 psig
U.S. DOT Class	2.2
U.S. DOT Label	Nonflammable Gas
ID Number	UN1956

Equipment Recommendations are found on page 38

Vinyl Chloride (CH_2CHCl)

- **Other balance gases and cylinder sizes are available upon request.**
- **Concentrations over 1.5% are provided at reduced pressure and volume.**

Vinyl Chloride in Nitrogen

Concentration	Cylinder Size	≈Contents ft^3
1 ppm – < 100 ppm	150A 80A 33A	144 77 33
100 ppm – 5000 ppm	150A 80A 33A	144 77 33

Primary Standards available for concentrations greater than 30 ppm.
Standard Valve Outlet: CGA 350
Certificate of Analysis included.

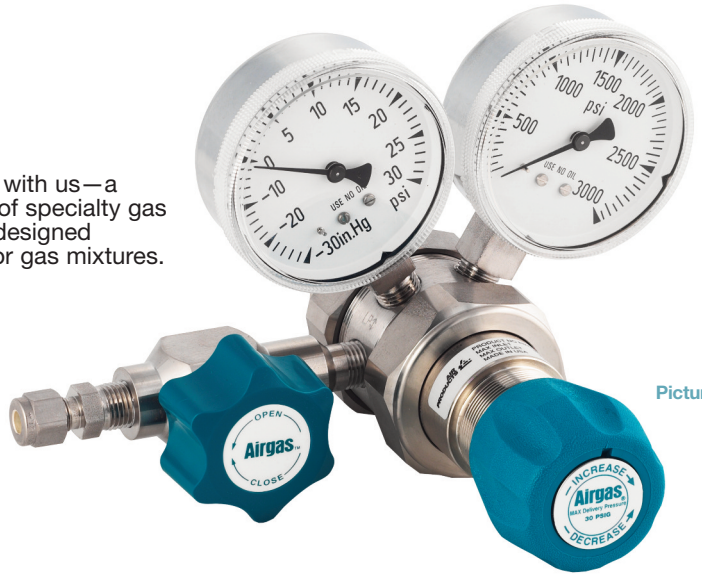
Technical Data & Shipping Information

Cylinder Pressure	2000 psig
U.S. DOT Class	2.2
U.S. DOT Label	Nonflammable Gas
ID Number	UN1956

Additional Information:
Concentrations up to 5,000 ppm can be certified as above. Higher concentrations are available as standard analyzed gas mixtures.

Vinyl Chloride Mixtures are certified in accordance with Environmental Protection Agency Regulations as cited in the Federal Register, Vol. 41, No. 205, Oct. 21, 1976, and Vol. 42, No. 109, June 7, 1977.

You'll find it with us—a wide range of specialty gas equipment designed especially for gas mixtures.



Pictured: Y11-N145

Equipment Recommendations are found on page 38

Equipment Recommendations

Page #	Gas Mixture	Recommended Regulator	Delivery Pressure Range (psig)	Equipment Page Number
M4	Ammonia in Air Ammonia in Argon Ammonia in Helium Ammonia in Nitrogen	**Two-Stage Regulator** Y12-C445 * 705 **Single-Stage** Y11-C444 * 705 **Cross Purge** Y99-CPA4705 **Tee Purge** Y99-TP4C705 * Insert Delivery Pressure	**A = 0 - 30** **B = 0 - 60** **D = 0 - 100** **F = 0 - 250**	**E28** **E27** **E50** **E51**
M5	Argon in Helium Argon in Hydrogen Argon in Nitrogen Argon in Oxygen	**Two-Stage Regulator** Y12-C445 * **Single-Stage** Y11-C444 * **Cross Purge** Y99-CPA4CGA **Tee Purge** Y99-TP4CCGA * Insert Delivery Pressure Range Code and proper CGA Connection	**A = 0 - 30** **B = 0 - 60** **D = 0 - 100** **F = 0 - 250** **G = 0 - 500**** ** Single Stage Only	**E28** **E27** **E50** **E51**
M6	Benzene in Air Benzene in Nitrogen	**Two-Stage Regulator** Y12-N245 * Y12-C445 * **Single-Stage** Y11-N245 * Y11-C444 * * Insert Delivery Pressure Range Code and proper CGA Connection	**A = 0 - 25, B = 0 - 50** **A = 0 - 30, B = 0 - 60** **A = 0 - 25, B = 0 - 50** **A = 0 - 30, B = 0 - 60**	**E21** **E28** **E20** **E27**
M7	n-Butane in Air n-Butane in Helium n-Butane in Nitrogen	**Two-Stage Regulator** Y12-N245* Y12-244* **Single-Stage** Y11-N245* Y11-244 * Insert Delivery Pressure Range Code and proper CGA Connection	**A = 0 - 25** **B = 0 - 50**	**E21** **E12** **E20** **E11**
M8-M9	Carbon Dioxide in Air Carbon Dioxide in Argon Carbon Dioxide in Helium Carbon Dioxide in Hydrogen Carbon Dioxide in Nitrogen Carbon Dioxide in Oxygen	**Two-Stage Regulator** Y12-N245* Y12-244* **Single-Stage** Y11-N245* Y11-244* * Insert Delivery Pressure Range Code and proper CGA Connection	**A = 0 - 25** **B = 0 - 50** **D = 0 - 100** ***E = 0 - 150** **F = 0 - 250** ***G = 0 - 500** * Only available for the N245 series	**E21** **E12** **E20** **E11**
M10-M11	Carbon Monoxide in Air Carbon Monoxide in Argon Carbon Monoxide in Helium Carbon Monoxide in Hydrogen Carbon Monoxide in Nitrogen	**Two-Stage Regulator** Y12-N245* Y12-244* **Single-Stage** Y11-N245* Y11-244 * Insert Delivery Pressure Range Code and proper CGA Connection	**A = 0 - 25** **B = 0 - 50** **D = 0 - 100** ***E = 0 - 150** **F = 0 - 250** ***G = 0 - 500** * Only available for the N245 series	**E21** **E12** **E20** **E11**

Equipment Recommendations

Page #	Gas Mixture	Recommended Regulator	Delivery Pressure Range (psig)	Equipment Page Number
M12	Chlorine in Air	**Two-Stage Regulator** Y12-E444* **Single-Stage** Y11-C334* **Cross Purge** Y99-CPA4* **Tee Purge** Y99-TP4C* * Insert Delivery Pressure Range Code and proper CGA Connection	**A = 0 - 30, B = 0 - 60, D = 0 - 100** **C = 0 - 50, E = 0 - 200**	**E29** **E49** **E50** **E51**
M13	Ethane in Air Ethane in Helium Ethane in Hydrogen Ethane in Nitrogen	**Two-Stage Regulator** Y12-N245* Y12-244* **Single-Stage** Y11-N245* Y11-244* * Insert Delivery Pressure Range Code and proper CGA Connection	**A = 0 - 25** **B = 0 - 50** **G = 0 - 500**	**E21** **E12** **E20** **E11**
M14	Ethylene in Air Ethylene in Helium Ethylene in Nitrogen	**Two-Stage Regulator** Y12-N245* Y12-244* **Single-Stage** Y11-N245* Y11-244* * Insert Delivery Pressure Range Code and proper CGA Connection	**A = 0 - 25** **B = 0 - 50** **D = 0 - 100** ***E = 0 - 150** **F = 0 - 250** ***G = 0 - 500** * Only available for the N245 series	**E21** **E12** **E20** **E11**
M15	Ethylene Oxide in Air Ethylene Oxide in Helium Ethylene Oxide in Nitrogen	**Two-Stage Regulator** Y12-N245* Y12-244* **Single-Stage** Y11-N245* Y11-244 * Insert Delivery Pressure Range Code and proper CGA Connection	**A = 0 - 25** **B = 0 - 50** ***G = 0 - 500** * Only available for the N245 series	**E21** **E12** **E20** **E11**
M16	Helium in Argon Helium in Nitrogen	**Two-Stage Regulator** Y12-N245* Y12-244* **Single-Stage** Y11-N245* Y11-244* * Insert Delivery Pressure Range Code and proper CGA Connection	**A = 0 - 25** **B = 0 - 50** **D = 0 - 100** ***E = 0 - 150** **F = 0 - 250** ***G = 0 - 500** * Only available for the N245 series	**E21** **E12** **E20** **E11**
M17	n-Hexane in Air n-Hexane in Nitrogen	**Two-Stage Regulator** Y12-N245* Y12-244* **Single-Stage** Y11-N245* Y11-244 * Insert Delivery Pressure Range Code and proper CGA Connection	**A = 0 - 25** **B = 0 - 50** **D = 0 - 100** ***E = 0 - 150** **F = 0 - 250** ***G = 0 - 500** * Only available for the N245 series	**E21** **E12** **E20** **E11**

Equipment Recommendations

Page #	Gas Mixture	Recommended Regulator	Delivery Pressure Range (psig)	Equipment Page Number
M18	Hydrogen in Air Hydrogen in Argon Hydrogen in Helium Hydrogen in Nitrogen	**Two-Stage Regulator** Y12-N245* Y12-244* **Single-Stage** Y11-N245* Y11-244* * Insert Delivery Pressure Range Code and proper CGA Connection	**A = 0 - 25** **B = 0 - 50** **D = 0 - 100** ***E = 0 - 150** **F = 0 - 250** ***G = 0 - 500** * Only available for the N245 series	**E21** **E12** **E20** **E11**
M19	Hydrogen Chloride in Nitrogen	**Two-Stage Regulator** Y12-E444 * **Single-Stage** Y11-E444* Y11-C334* **Cross Purge** Y99-CPA4330 **Tee Purge** Y99-TP4C330 * Insert Delivery Pressure Range Code and proper CGA Connection	**A = 0 - 30, B = 0 - 60, D = 0 - 100** **A = 0 - 30, B = 0 - 60, C = 0 - 100, D = 0 - 150** **C = 0 - 50, E = 0 - 200**	**E29** **E29** **E49** **E50** **E51**
M20	Hydrogen Sulfide in Air Hydrogen Sulfide in Helium Hydrogen Sulfide in Hydrogen Hydrogen Sulfide in Methane Hydrogen Sulfide in Nitrogen	**Two-Stage Regulator** Y12-E444 * **Single-Stage** Y11-E444* **Cross Purge** Y99-CPA4330 **Tee Purge** Y99-TP4C330 * Insert Delivery Pressure Range Code and proper CGA Connection	**A = 0 - 30, B = 0 - 60, D = 0 - 100** **A = 0 - 30, B = 0 - 60, C = 0 - 100, D = 0 - 150**	**E29** **E29** **E50** **E51**
M21	Isobutane in Air Isobutane in Helium Isobutane in Nitrogen	**Two-Stage Regulator** Y12-N245* Y12-244* **Single-Stage** Y11-N245* Y11-244 * Insert Delivery Pressure Range Code and proper CGA Connection	**A = 0 - 25** **B = 0 - 50** ***G = 0 – 500** * Only available for the N245 series	**E21** **E12** **E20** **E11**
M22	Methane in Air Methane in Helium Methane in Nitrogen	**Two-Stage Regulator** Y12-N245* Y12-244* **Single-Stage** Y11-N245* Y11-244* * Insert Delivery Pressure Range Code and proper CGA Connection	**A = 0 - 25** **B = 0 - 50** **D = 0 – 100** ***E = 0 - 150** **F = 0 – 250** ***G = 0 – 500** * Only available for the N245 series	**E21** **E12** **E20** **E11**
M23	Nitric Oxide in Nitrogen	**Two-Stage Regulator** Y12-E444 * **Single-Stage** Y11-E444* **Cross Purge** Y99-CPA4330 **Tee Purge** Y99-TP4C330 * Insert Delivery Pressure Range Code and proper CGA Connection	**A = 0 - 30, B = 0 - 60, D = 0 - 100** **A = 0 - 30, B = 0 - 60, C = 0 - 100, D = 0 - 150**	**E29** **E29** **E50** **E51**

Equipment Recommendations

Page #	Gas Mixture	Recommended Regulator	Delivery Pressure Range (psig)	Equipment Page Number
M24	Nitrogen in Argon Nitrogen in Helium Nitrogen in Hydrogen Nitrogen in Oxygen	**Two-Stage Regulator** Y12-N245* Y12-244* **Single-Stage** Y11-N245* Y11-244* * Insert Delivery Pressure Range Code and proper CGA Connection	**A = 0 - 25** **B = 0 - 50** **D = 0 - 100** ***E = 0 - 150** **F = 0 - 250** ***G = 0 - 500** * Only available for the N245 series	**E21** **E12** **E20** **E11**
M25	Nitrogen Dioxide in Air Nitrogen Dioxide in Nitrogen	**Two-Stage Regulator** Y12-E444 * **Single-Stage** Y11-E444* **Cross Purge** Y99-CPA4660 **Tee Purge** Y99-TP4C660 * Insert Delivery Pressure Range Code and proper CGA Connection	**A = 0 - 30, B = 0 - 60, D = 0 - 100** **A = 0 - 30, B = 0 - 60, C = 0 - 100, D = 0 - 150**	**E29** **E29** **E50** **E51**
M26	Nitrous Oxide in Air Nitrous Oxide in Nitrogen	**Two-Stage Regulator** Y12-C445 * **Single-Stage** Y11-C444* * Insert Delivery Pressure Range Code and proper CGA Connection	**A = 0 - 30** **B = 0 - 60** **D = 0 - 100**	**E28** **E27**
M27	Oxygen in Argon Oxygen in Helium Oxygen in Nitrogen	**Two-Stage Regulator** Y12-N245* Y12-244* **Single-Stage** Y11-N245* Y11-244 * Insert Delivery Pressure Range Code and proper CGA Connection	**A = 0 - 25** **B = 0 - 50** **D = 0 - 100** ***E = 0 - 150** **F = 0 - 250** * Only available for the N245 series	**E21** **E12** **E20** **E11**
M28	Propane in Air Propane in Nitrogen	**Two-Stage Regulator** Y12-N245* Y12-244* **Single-Stage** Y11-N245* Y11-244* * Insert Delivery Pressure Range Code and proper CGA Connection	**A = 0 - 25** **B = 0 - 50** **D = 0 - 100** ***E = 0 - 150** **F = 0 - 250** * Only available for the N245 series	**E21** **E12** **E20** **E11**
M29	Propylene in Air Propylene in Nitrogen	**Two-Stage Regulator** Y12-N245* Y12-244* **Single-Stage** Y11-N245* Y11-244* * Insert Delivery Pressure Range Code and proper CGA Connection	**A = 0 - 25** **B = 0 - 50** **D = 0 - 100** ***E = 0 - 150** **F = 0 - 250** * Only available for the N245 series	**E21** **E12** **E20** **E11**

Equipment Recommendations

Page #	Gas Mixture	Recommended Regulator	Delivery Pressure Range (psig)	Equipment Page Number
M30	Silane in Argon Silane in Helium Silane in Hydrogen Silane in Nitrogen	**Two-Stage Regulator** Y12-N245* Y12-244* **Single-Stage** Y11-N245* Y11-244* * Insert Delivery Pressure Range Code and proper CGA Connection	**A = 0 - 25** **B = 0 - 50** **D = 0 - 100** ***E = 0 - 150** **F = 0 - 250** * Only available for the N245 series	**E21** **E12** **E20** **E11**
M31	Sulfur Dioxide in Air Sulfur Dioxide in Nitrogen	**Two-Stage Regulator** Y12-E444 * **Single-Stage** Y11-E444* **Cross Purge** Y99-CPA4660 **Tee Purge** Y99-TP4C660 * Insert Delivery Pressure Range Code and proper CGA Connection	**A = 0 - 30, B = 0 - 60, D = 0 - 100** **A = 0 - 30, B = 0 - 60, C = 0 - 100, D = 0 - 150**	**E29** **E29** **E50** **E51**
M32	Sulfur Hexafluoride in Nitrogen	**Two-Stage Regulator** Y12-215 * **Single-Stage** Y11-215* * Insert Delivery Pressure Range Code and proper CGA Connection	**A = 0 - 25** **B = 0 - 50** **D = 0 - 100** **F = 0 - 250**	**E9** **E8**
M32	Toluene in Nitrogen	**Two-Stage Regulator** Y12-N245* Y12-244* **Single-Stage** Y11-N245* Y11-244 * Insert Delivery Pressure Range Code and proper CGA Connection	**A = 0 - 25** **B = 0 - 50** **D = 0 - 100** ***E = 0 - 150** * Only available for the N245 series	**E21** **E12** **E20** **E11**
M33	Vinyl Chloride in Nitrogen	**Two-Stage Regulator** Y12-N245* Y12-244* **Single-Stage** Y11-N245* Y11-244* * Insert Delivery Pressure Range Code and proper CGA Connection	**A = 0 - 25** **B = 0 - 50** **D = 0 - 100**	**E21** **E12** **E20** **E11**

Airgas

Contents

Two-Component Mixtures

Gas mixtures with greater accuracy, precision and consistency

Airgas offers the widest variety of gas and liquid mixtures, through the largest networks of national and regional specialty gas laboratories in the U.S. The following pages detail our most common two-component mixtures. Airgas also produces custom mixtures of multiple components to suit your requirements. See the Special Applications section for some of the most common gases for your industry's process, analytical or regulatory needs.

Airgas uses breakthrough technology like our patented AcuGrav™ computerized filling system developed by our own automation team. AcuGrav helps Airgas provide high-tolerance gas mixtures with greater accuracy, consistency and reliability.

Introduction

Selecting the right combination of blend tolerance, analytical tolerance and traceability is not a complex task. Airgas offers six grades, covering most specification requirements:

- EPA Protocol Gases
- Traceability Standards
- Primary Standards
- Precision Blends
- Certified Standards
- Batch Certified

The Mixture Specifications Table on the next page outlines these grades and their respective tolerances. If your requirements are different from those listed, simply call the Airgas Specialty Gas Technical Hotline (1-877-ASG-4-GAS) or your Airgas representative to fully review your needs. In addition, with the exception of the Batch Certified Mixtures, each calibration gas standard comes with a Certificate of Analysis at no extra charge. All mixtures are filled to 2000 psig at 70° F unless otherwise noted in the Technical Data sections.

Types of Grades Available

EPA Protocol Gases

EPA Protocol Gases are manufactured and analytically certified in strict accordance with the most recent EPA traceability guideline document entitled “EPA Traceability Protocol for Assay and Certification of Gaseous Standards”. 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 Standard Reference Materials (SRMs) or NIST Traceable Reference Materials (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

Traceability Standards are calibration mixtures, which are analytically certified directly against either NIST SRMs or NTRMs, within a comprehensive quality system. The analytical testing process is based upon the EPA Protocol document, 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, when supported by NIST.

Precision Blends

Precision Blends are developed to satisfy customer requirements for “zero blend tolerance” mixtures. These blends are manufactured by dynamically mixing the mixture components in real time while monitoring the composition using continuous analytical monitoring. Minor adjustments are made as needed during the blending process to assure the final mixture is statistically identical to the requested composition, as verified through careful analysis.

This process has several advantages:

- Gas mixtures are provided at the requested concentration
- Homogenous composition of all cylinders within a batch
- Consistency of mixtures from one order to the next

Many Precision Blend mixtures are available upon request as Traceability Standards, i.e. with ± 1% analytical traceability directly versus NIST Reference Materials.

Primary Standards

Primary Standards often referred to as NIST Traceable by Weight Mixtures, should be used when your application demands the highest mixture accuracy and reliability. Airgas produces Primary Standards gravimetrically on sophisticated high-load, high-sensitivity scales, with statistically measured precision and accuracy. These weighing systems are stringently calibrated with NIST traceable weights, in accordance with ISO procedures. Gravimetric blending offers the closest tolerance available, often better than available through laboratory testing. A dual verification of mixture accuracy is also performed by quality control analysis on instrumentation calibrated with Airgas Primary Standards, NIST SRMs, NTRMs, or GMIS.

Certified Standards

Certified Standards, sometimes referred to as working standards, are analyzed calibration mixtures used routinely in science and industry. For the majority of applications, the tolerance of a Certified Standard is acceptable. These standards are generally prepared either by partial pressure or gravimetrically. Certification of the standard is performed through quality control analysis on instrumentation calibrated with Airgas Primary Standards, NIST SRMs, NTRMs, or GMIS.

Batch Certified Mixtures

Prepared using the same techniques as Primary or Certified Standards. Composition is guaranteed to fall within the stated blend tolerance, with nominal concentrations reported.

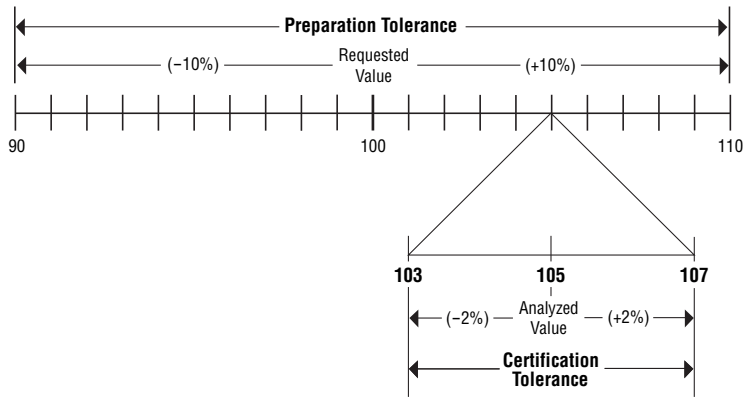
Explanation of the Tolerances

Airgas has two tolerances associated with all our mixture grades. First is the Blend or Preparation tolerance. This is the minimum acceptable uncertainty associated with the actual production of the blend. These uncertainties are accumulated during the manufacturing process because of equipment used in production, and due to the physical properties of the gases. Second is the Analytical or Certification tolerance, which is the minimum acceptable uncertainty, associated with the analysis of the blend. This uncertainty is accumulated throughout the analytical procedure and includes instrument and calibration uncertainties.

For most applications, the analytical tolerance is of greater importance than the blend tolerance because it represents the range in which the true or actual concentration may be

Mix Grade	Concentration	Blend tolerances	Analytical tolerances All values are ± relative
EPA Protocol	< 2ppm 2ppm - 10ppm > 10ppm	Inquire ± 1ppm ± 5%	≤ 1% ≤ 1% ≤ 1%
Traceability	< 2ppm 2ppm - 10ppm > 10ppm	Inquire ± 1ppm ± 5%	≤ 1% ≤ 1% ≤ 1%
Primary	< 50ppm 50ppm - < 1% 1% - < 2% ≥ 2%	Inquire 5% 1% 1%	Inquire ≤ 1% ≤ 1% ≤ 0.02% absolute
Precision Blend	All	"zero"	± 2%
Certified	< 5ppm 5 ppm - < 50 ppm 50 ppm - < 1% ≥ 1%	Inquire ± 20% ± 10% ± 5%	Inquire ≤ 5% ≤ 2% ≤ 2%
Batch Certified			

Note: Analytical tolerances for H_2S and NO_2 EPA Protocol mixtures ± 2% and Traceability Standard mixtures are ± 1% for all concentrations.



All of Airgas' six mixture grades have two tolerances—preparation and certification. This graph shows how the two interrelate. For example, a certified mix ordered at 100 ppm is prepared between 90 ppm and 110 ppm (the preparation tolerance). Assume the mix, when made, reads 105 ppm. When analyzed in the lab, it may actually be between 103 ppm and 107 ppm (the analytical tolerance).

in relation to the analytical concentration. For some applications, such as those that require an upper or lower range of concentration that cannot be exceeded, the preparation tolerance becomes equally if not more important.

Traceability in Calibration Gas Mixtures

Airgas offers calibration gas mixtures with established and defined traceability to NIST or to an equivalent national measurement institute. Each traceable mixture is accompanied by full documentation in the form of a Certificate of Analysis (COA), designed in compliance with applicable guidelines.

Traceability is defined as "the property of the result of measurement or the value of a standard whereby it can be related to stated references, usually national or international standards, through an unbroken chain of comparisons all having stated uncertainties." A requirement for ISO 9001 and ISO 17025 compliant programs, emissions monitoring and reportable environmental testing is that the instrument calibration process maintain traceability to a national primary reference material.

Calibration gas mixture compositional traceability is assured through one of two methods:

1) Analytical traceability using Reference Materials from a national measurement institute (usually NIST) to calibrate the measurement system through a rigorous process to determine the concentrations of mixture components of interest.

2) Process traceability to the international unit of mass (Kg) through comprehensive manufacturing and quality programs, using high precision, high sensitivity weighing systems for component additions. The resultant mixtures are analyzed versus Primary Standards of known composition and uncertainty.

Typically, the process-based traceability is used when Reference Materials are unavailable from NIST or other national measurement institutes for the component(s) or concentration(s) of interest. Blends produced gravimetrically, using scales extensively calibrated with NIST certified weights, are considered traceable and have known uncertainty in their composition.

The majority of traceable products supplied by Airgas are certified to an overall analytical or process uncertainty not to exceed ± 1%.

Ammonia (NH_3)

- **Other balance gases and cylinder sizes are available upon request.**
- **Concentrations over 1.8% in air and 4% in all other balance gases are provided at reduced pressure and volume.**

Ammonia in Air

Concentration	Cylinder Size	≈Contents ft³
2.5 ppm - <100 ppm	150A 80A 33A	146 84 29
100 ppm - < 1%	150A 80A 33A	146 84 29
1% - 1.8%	150A 80A 33A	148 86 30

Not available in Air over 9.4%
Standard Valve Outlet: CGA 705
Individual Certificate of Analysis or Certificate of Batch Analysis included.

Ammonia in Argon

Concentration	Cylinder Size	≈Contents ft³
2.5 ppm - <100 ppm	150A 80A 33A	153 82 35
100 ppm - < 1%	150A 80A 33A	153 82 35
1% - 10%	150A 80A 33A	156 83 36

Standard Valve Outlet: CGA 705
Individual Certificate of Analysis or Certificate of Batch Analysis included.

Ammonia in Helium

Concentration	Cylinder Size	≈Contents ft³
2.5 ppm - <100 ppm	150A 80A 33A	132 70 30
100 ppm - < 1%	150A 80A 33A	132 70 30
1% - 10%	150A 80A 33A	132 70 30

Standard Valve Outlet: CGA 705
Individual Certificate of Analysis or Certificate of Batch Analysis included.

Ammonia in Nitrogen

Concentration	Cylinder Size	≈Contents ft³
2.5 ppm - <100 ppm	150A 80A 33A	146 84 29
100 ppm - < 1%	150A 80A 33A	146 84 29
1% - 10%	150A 80A 33A	148 86 30

Standard Valve Outlet: CGA 705
Individual Certificate of Analysis or Certificate of Batch Analysis included.

Technical Data & Shipping Information

Cylinder Pressure	2000 psig
U.S. DOT Class:	
In Air, Ar, He, and N_2	2.2
In H_2	2.1
U.S. DOT Label:	
In Air, Ar, He, and N_2	Nonflammable Gas
In H_2	Flammable Gas
ID Number:	
In Air, Ar, He, and N_2	UN1956
In H_2	UN1954

Airgas offers a wide range of specialty gas equipment for gas mixtures, including regulators.

Pictured: Y12-C445

Equipment Recommendations are found on page 34

Argon (Ar)

• Other balance gases and cylinder sizes are available upon request.

Argon in Helium

Concentration	Cylinder Size	≈Contents ft³
0.5 ppm - <100 ppm	200 150A 80 35	196 132 77 30
100 ppm – <1000 ppm	200 150A 80 35	196 132 77 30
>0.1%	200 80 35	197 78 31

Primary Standards available for concentration ≥ 1 ppm
Standard Valve Outlet: CGA 580
Individual Certificate of Analysis or Certificate of Batch Analysis included.

Argon in Hydrogen

Concentration	Cylinder Size	≈Contents ft³
0.5 ppm - <100 ppm	200 150A 80 35	196 132 77 30
100 ppm – <1000 ppm	200 150A 80 35	196 132 77 30
>0.1%	200 80 35	200 79 31

Primary Standards available for concentration ≥ 1 ppm
Standard Valve Outlet: CGA 350
Individual Certificate of Analysis or Certificate of Batch Analysis included.

Argon in Nitrogen

Concentration	Cylinder Size	≈Contents ft³
100 ppm – <1000 ppm	200 150A 80 35	215 144 85 33
100 ppm – <1000 ppm	200 80 35	218 86 34
Mixtures below 100 ppm - inquire		

Primary Standards available for concentration ≥ 100 ppm
Standard Valve Outlet: CGA 580
Individual Certificate of Analysis or Certificate of Batch Analysis included.

Argon in Oxygen

Concentration	Cylinder Size	≈Contents ft³
3 ppm – <100 ppm	200 150A 80 35	230 154 91 36
100 ppm – <1000 ppm	200 150A 80 35	230 154 91 36
>0.1%	200 80 35	230 91 36

Primary Standards available for concentration ≥ 3 ppm
Standard Valve Outlet: CGA 296
Individual Certificate of Analysis or Certificate of Batch Analysis included.

Technical Data & Shipping Information

Cylinder Pressure	2000 psig
U.S. DOT Class:	
In H_2	2.1
All Others	2.2
U.S. DOT Label:	
In H_2	Flammable Gas
All Others	Nonflammable Gas
ID Number:	
In H_2	UN1954
All Others	UN1956

You'll find it with us—a wide range of specialty gas equipment for gas mixtures, including regulators.

Pictured: Y12-N145

Equipment Recommendations are found on page 34

Benzene (C_6H_6)

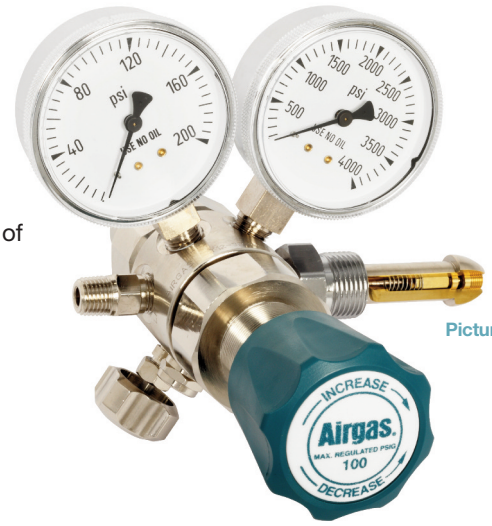
- **Other balance gases and cylinder sizes are available upon request.**
- **Concentrations over 250 ppm are provided at reduced pressure and volume.**

Benzene in Air			Benzene in Nitrogen		
Concentration	**Cylinder Size**	**≈Contents ft³**	**Concentration**	**Cylinder Size**	**≈Contents ft³**
0.09 ppm – < 50 ppm	150A 80A 33A	146 79 33	**0.09 ppm – < 50 ppm**	150A 80A 33A	146 79 33
50 – 250ppm	150A 80A 33A	146 79 33	**50 – 250ppm**	150A 80A 33A	146 79 33
Primary Standards available for concentrations greater than 1 ppm. Standard Valve Outlet: CGA 590 Individual Certificate of Analysis included.			Primary Standards available for concentrations greater than 1 ppm. Standard Valve Outlet: CGA 350 Certificate of Analysis included.		

Technical Data & Shipping Information	
Cylinder Pressure	2000 psig
U.S. DOT Class	2.2
U.S. DOT Label	Nonflammable Gas
ID Number	UN1956

Equipment Recommendations are found on page 34

Airgas offers a wide range of specialty gas equipment designed especially for specialty gas mixtures.



Pictured: Y12-244

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.

n-Butane (C_2H_{10})

- **Other balance gases and cylinder sizes are available up on request.**
- **Concentrations over 2750 ppm in air and 1% in all other gases are provided at reduced pressure and volume.**

n-Butane in Air

Concentration	Cylinder Size	≈Contents ft³
1 ppm – <100 ppm	200 150A 80 35	218 146 86 34
100 ppm – <1000 ppm	200 150A 80 35	218 146 86 34
1000 ppm – 2750 ppm	200 150A 50 35	218 146 86 34

Not available in Air over 1.2%
Primary Standards available in all concentrations
Standard Valve Outlet: CGA 590
Individual Certificate of Analysis or Certificate of Batch Analysis included.

n-Butane in Helium

Concentration	Cylinder Size	≈Contents ft³
1 ppm – <100 ppm	200 150A 80 35	196 132 77 30
100 ppm – <1000 ppm	200 150A 80 35	196 132 77 30
0.1% – 3.5%	200 80 35	196 77 30

Primary Standards available in all concentrations
Standard Valve Outlet: CGA 350
Individual Certificate of Analysis or Certificate of Batch Analysis included.

n-Butane in Nitrogen

Concentration	Cylinder Size	≈Contents ft³
1 ppm – <100 ppm	200 150A 80 35	215 144 85 33
100 ppm – <1000 ppm	200 150A 80 35	216 145 85 34
0.1% – 3.5%	200 80 35	216 85 34

Primary Standards available in all concentrations
Standard Valve Outlet: CGA 350
Individual Certificate of Analysis or Certificate of Batch Analysis included.

Rely on Airgas for all your specialty gas equipment needs, including regulators for gas mixtures.

Pictured: Y11-244

Technical Data & Shipping Information

Cylinder Pressure	2000 psig
U.S. DOT Class:	
$n\text{-}C_4H_{10}$ in Air, or ≤ 3.82% in He or ≤ 5.6% in N_2	2.2
All Others	2.1
U.S. DOT Label:	
$n\text{-}C_4H_{10}$ in Air, or ≤ 3.82% in He or ≤ 5.6% in N_2	Nonflammable Gas
All Others	Flammable Gas
ID Number:	
$n\text{-}C_4H_{10}$ in Air, or ≤ 3.82% in He or ≤ 5.6% in N_2	UN1956
All Others	UN1954

Equipment Recommendations are found on page 34

Carbon Dioxide (CO_2)

- **Other balance gases and cylinder sizes are available up on request.**
- **Concentrations over 28% are provided at reduced pressure and volume.**

Carbon Dioxide in Air

Concentration	Cylinder Size	≈Contents ft³
0.5 ppm – <100 ppm	150A 80A 35A	146 78 33
100 ppm – <1%	200 80 35	218 86 34
1% – 28%	200 80 35	232 92 36

Primary Standards available for concentrations greater than 1 ppm.
Standard Valve Outlet: CGA 590
Individual Certificate of Analysis or Certificate of Batch Analysis included.

Carbon Dioxide in Argon

Concentration	Cylinder Size	≈Contents ft³
0.5 ppm - <100 ppm	150A 80A 35A	153 82 35
100 ppm – <1%	200 80 35	228 90 35
1% – 28%	200 80 35	243 96 38

Primary Standards available for concentrations greater than 1 ppm.
Standard Valve Outlet: CGA 580
Individual Certificate of Analysis or Certificate of Batch Analysis included.

Carbon Dioxide in Helium

Concentration	Cylinder Size	≈Contents ft³
0.5 ppm - <100 ppm	150A 80A 35A	132 70 30
100 ppm - < 1%	200 80 35	196 77 30
1% - 28%	200 80 35	198 78 31

Primary Standards available for concentrations greater than 1 ppm.
Standard Valve Outlet: CGA 580
Individual Certificate of Analysis or Certificate of Batch Analysis included.

Carbon Dioxide in Hydrogen

Concentration	Cylinder Size	≈Contents ft³
0.5 ppm - <100 ppm	150A 80A 35A	132 70 30
100 ppm - <1%	200 80 35	197 78 31
1% - 28%	200 80 35	201 79 31

Primary Standards available for concentrations greater than 1 ppm.
Standard Valve Outlet: CGA 350
Individual Certificate of Analysis or Certificate of Batch Analysis included.

Equipment Recommendations are found on page 34

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.

Carbon Dioxide (CO_2) Cont.

- Other balance gases and cylinder sizes are available up on request.
- Concentrations over 28% are provided at reduced pressure and volume.

Carbon Dioxide in Nitrogen			Carbon Dioxide in Oxygen		
Concentration	**Cylinder Size**	**≈Contents ft³**	**Concentration**	**Cylinder Size**	**≈Contents ft³**
0.5 ppm – <100 ppm	150A 80A 33A	144 77 33	**0.5 ppm - <100 ppm**	150A 80A 33A	154 82 35
100 ppm – <1%	200 80 35	215 85 33	**100 ppm – <1%**	200 80 35	230 91 36
1% – 28%	200 80 35	228 90 35	**1% – 28%**	200 80 35	245 97 35
Primary Standards available for concentrations greater than 1 ppm. Standard Valve Outlet: CGA 580 Individual Certificate of Analysis or Certificate of Batch Analysis included.			Primary Standards available for concentrations greater than 1 ppm. Standard Valve Outlet: CGA 296 Individual Certificate of Analysis or Certificate of Batch Analysis included.		

Technical Data & Shipping Information	
Cylinder Pressure	2000 psig
U.S. DOT Class:	
In H_2	2.1
All Others	2.2
U.S. DOT Label:	
In H_2	Flammable Gas
All Others	Nonflammable Gas
ID Number:	
In H_2	UN1954
All Others	UN1956

Equipment Recommendations are found on page 34

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.

Carbon Monoxide (CO)

- **Other balance gases and cylinder sizes are available upon request.**
- **Concentration over 2.9% in Air are provided at reduced pressure and volume.**
- **Steel cylinders available at reduced pressure and volume.**

Carbon Monoxide in Air

Concentration	Cylinder Size	≈Contents ft³
0.5 ppm – <100 ppm	150A 80A 33A	148 78 33
100 ppm – <1%	200 80 35	218 86 34
1% – 2.9%	200 80 35	232 92 36

Not available in Air over 7.8%
Primary Standards available for concentrations greater than 1 ppm.
Standard Valve Outlet: CGA 590
Individual Certificate of Analysis or Certificate of Batch Analysis included.

Carbon Monoxide in Argon

Concentration	Cylinder Size	≈Contents ft³
0.5 ppm - <100 ppm	150A 80A 35A	153 82 35
100 ppm – <1%	200 80 35	228 90 35
≥ 1%	200 80 35	243 96 38

Primary Standards available for concentrations greater than 1 ppm.
Standard Valve Outlet: CGA 350
Individual Certificate of Analysis or Certificate of Batch Analysis included.

Carbon Monoxide in Helium

Concentration	Cylinder Size	≈Contents ft³
0.5 ppm - <100 ppm	150A 80A 35A	132 70 30
100 ppm - < 1%	200 80 35	196 77 30
1% - 28%	200 80 35	198 78 31

Primary Standards available for concentrations greater than 1 ppm.
Standard Valve Outlet: CGA 350
Individual Certificate of Analysis or Certificate of Batch Analysis included.

Carbon Monoxide in Hydrogen

Concentration	Cylinder Size	≈Contents ft³
0.5 ppm - <100 ppm	150A 80A 35A	132 70 30
100 ppm - <1%	200 80 35	197 78 31
1% - 28%	200 80 35	201 79 31

Primary Standards available for concentrations greater than 2 ppm.
Standard Valve Outlet: CGA 350
Individual Certificate of Analysis or Certificate of Batch Analysis included.

Carbon Monoxide in Nitrogen

Concentration	Cylinder Size	≈Contents ft³
0.5 ppm – <100 ppm	150A 80A 33A	146 78 33
100 ppm – <1%	150A 80A 33A	146 78 33
≥ 1%	150A 80A 33A	146 78 33

Primary Standards available for concentrations greater than 1 ppm.
Standard Valve Outlet: CGA 350
Individual Certificate of Analysis or Certificate of Batch Analysis included.

Equipment Recommendations are found on page 34

Carbon Monoxide (CO) Cont .

- **Other balance gases and cylinder sizes are available upon request.**
- **Concentration over 2.9% in Air are provided at reduced pressure and volume.**
- **Steel cylinders available at reduced pressure and volume.**

Technical Data & Shipping Information	
Cylinder Pressure:	
Aluminum	2000 psig
Steel	1650 psig
U.S. DOT Class:	
CO In Air, or ≤ 11.1% in He or ≤ 20% in N_2	2.2
In H_2 and All Others	2.1
U.S. DOT Label:	
CO In Air, or ≤ 11.1% in He or ≤ 20% in N_2	Nonflammable Gas
In H_2 and All Others	Flammable Gas
ID Number:	
CO In Air, or ≤ 11.1% in He or ≤ 20% in N_2	UN1956
In H_2 and All Others	UN1954

You'll find it with us—a wide range of specialty gas equipment designed especially for gas mixtures.

Pictured: Y12-N145

Equipment Recommendations are found on page 34

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.

Chlorine (Cl_2)

- Other balance gases and cylinder sizes are available upon request.
- Concentrations over 3% are provided at reduced pressure and volume.

Chlorine in Nitrogen		
Concentration	**Cylinder Size**	**≈Contents ft³**
5 ppm - <100 ppm	150A 80A 33A	144 77 33
100 ppm – <1000 ppm	150A 80A 33A	144 77 33
1000 ppm – 3%	200 80 35	217 76 35

Not available as a primary standard
Standard Valve Outlet: CGA 660
Individual Certificate of Analysis or Certificate of Batch Analysis included.

Technical Data & Shipping Information

Cylinder Pressure	2000 psig
U.S. DOT Class:	
$Cl_2 \geq 5.86\%$	2.3
All Others	2.2
U.S. DOT Label:	
$Cl_2 \geq 5.86\%$	Inhalation Hazard, Corrosive
All Others	Nonflammable Gas
ID Number:	
$Cl_2 \geq 5.86\%$	UN3304
All Others	UN1956

You'll find it with us—a wide range of specialty gas equipment designed especially for gas mixtures.

Pictured: Y11-C334

Equipment Recommendations are found on page 35

Ethane (C_2H_6)

- **Other balance gases and cylinder sizes are available up on request.**
- **Concentrations over 5300 ppm in Air and 20% in all other balance gases are provided at reduced pressure and volume.**

Ethane in Air

Concentration	Cylinder Size	≈Contents ft³
1 ppm – <100 ppm	200 150A 80 35	218 146 76 35
100 ppm - <1000 ppm	200 150A 80 35	218 146 76 35
1000 ppm – 5300 ppm	200 80 35	218 76 35

Cannot exceed 1.8% in Air.
Primary Standards available for concentrations greater than 5 ppm.
Standard Valve Outlet: CGA 590
Individual Certificate of Analysis or Certificate of Batch Analysis included.

Ethane in Helium

Concentration	Cylinder Size	≈Contents ft³
1 ppm – <100 ppm	200 150A 80 35	196 132 77 30
100 ppm – <1%	200 150A 80 35	196 132 77 30
1% – 20%	200 80 35	199 79 31

Standard Valve Outlet: CGA 350
Individual Certificate of Analysis or Certificate of Batch Analysis included.

Ethane in Hydrogen

Concentration	Cylinder Size	≈Contents ft³
1 ppm – <100 ppm	200 150A 80 35	196 132 77 30
100 ppm – <1%	200 150A 80 35	196 132 77 30
1% – 20%	200 80 35	199 79 31

Standard Valve Outlet: CGA 350
Individual Certificate of Analysis or Certificate of Batch Analysis included.

Ethane in Nitrogen

Concentration	Cylinder Size	≈Contents ft³
1 ppm – <100 ppm	200 150A 80 35	215 144 85 33
100 ppm – <1%	200 150A 80 35	215 144 85 33
1% – 20%	200 80 35	225 89 35

Standard Valve Outlet: CGA 350
Individual Certificate of Analysis or Certificate of Batch Analysis included.

Technical Data & Shipping Information

Cylinder Pressure	2000 psig
U.S. DOT Class:	
C_2H_6 In Air, or 8.37% in He, or ≤ 12.0% in N_2	2.2
In H_2 and All Others	2.1
U.S. DOT Label:	
C_2H_6 In Air, or 8.37% in He, or ≤ 12.0% in N_2	Nonflammable Gas
In H_2 and All Others	Flammable Gas
ID Number:	
C_2H_6 In Air, or 8.37% in He, or ≤ 12.0% in N_2	UN1956
In H_2 and All Others	UN1954

Equipment Recommendations are found on page 35

Ethylene Oxide (C_2H_4O)

- **Other balance gases and cylinder sizes are available upon request.**
- **Concentrations over 6100 ppm in Air and 1% in all other balance gases are provided at reduced pressure and volume.**

Ethylene Oxide in Air

Concentration	Cylinder Size	≈Contents ft³
1 ppm – < 100 ppm	150A 80A 33A	146 78 33
100 ppm – 6100 ppm	150A 80A 33A	103 55 23

Cannot exceed 1.8% in Air.
Standard Valve Outlet: CGA 590
Certificate of Analysis included.

Ethylene Oxide in Helium

Concentration	Cylinder Size	≈Contents ft³
1 ppm – < 100 ppm	150A 80A 33A	132 70 30
100 ppm – 1%	150A 80A 33A	132 70 30

Standard Valve Outlet: CGA 350
Certificate of Analysis included.

Ethylene Oxide in Nitrogen

Concentration	Cylinder Size	≈Contents ft³
1 ppm – < 100 ppm	150A 80A 33A	144 77 33
100 ppm – 1%	150A 80A 33A	144 77 33

Standard Valve Outlet: CGA 350
Certificate of Analysis included.

Airgas offers a wide range of specialty gas equipment designed especially for specialty gas mixtures.

Pictured: Y11-N245

Technical Data & Shipping Information

Cylinder Pressure	2000 psig
U.S. DOT Class:	
C_2H_4O in Air, or ≤ 2.5% He or ≤ 3.7% in N_2	2.2
All Others	2.1
U.S. DOT Label:	
C_2H_4O in Air, or ≤ 2.5% He or ≤ 3.7% in N_2	Nonflammable Gas
All Others	Flammable Gas
ID Number:	
C_2H_4O in Air, or ≤ 2.5% He or ≤ 3.7% in N_2	UN1956
All Others	UN1954

Equipment Recommendations are found on page 35

Fluorine Mixtures

See Laser Mixtures

Airgas has a complete laser offering, including fluorine mixtures and hydrogen chloride mixtures for excimer lasers. See the Special Applications Section, page SA13.

Helium (He)

• Other balance gases and cylinder sizes are available upon request.

Helium in Argon			Helium in Nitrogen		
Concentration	**Cylinder Size**	**≈Contents ft³**	**Concentration**	**Cylinder Size**	**≈Contents ft³**
5 ppm – <100 ppm	200 150A 80 35	228 153 90 35	**5 ppm – <100 ppm**	200 150A 80 35	215 144 85 33
100 ppm – < 1%	200 150A 80 35	228 153 90 35	**100 ppm – < 1%**	200 150A 80 35	215 144 85 33
> 1%	200 80 35	212 84 33	**> 1%**	200 80 35	205 81 32
Primary Standards available for concentrations greater than 10 ppm. Standard Valve Outlet: CGA 580 Individual Certificate of Analysis or Certificate of Batch Analysis included.			Primary Standards available for concentrations greater than 10 ppm. Standard Valve Outlet: CGA 580 Individual Certificate of Analysis or Certificate of Batch Analysis included.		

Technical Data & Shipping Information	
Cylinder Pressure	2000 psig
U.S. DOT Class	2.2
U.S. DOT Label	Nonflammable Gas
ID Number	UN1956

Equipment Recommendations are found on page 35

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.

n-Hexane (C_6H_{14})

- **Other balance gases and cylinder sizes are available upon request.**
- **Concentrations greater than 900 ppm available at reduced pressure and volume.**

n-Hexane in Air			n-Hexane in Nitrogen		
Concentration	**Cylinder Size**	**≈Contents ft³**	**Concentration**	**Cylinder Size**	**≈Contents ft³**
0.5 ppm – <100 ppm	150A 80A 33A	146 78 33	**0.5 ppm – <100 ppm**	150A 80A 33A	144 77 33
100 ppm – 1900 ppm	200 150A 80 35	217 146 86 34	**100 ppm – 2500 ppm**	200 150A 80 35	215 144 85 33
Cannot exceed 6900 ppm in Air. Primary Standards available for concentrations greater than 1 ppm. Standard Valve Outlet: CGA 590 Individual Certificate of Analysis or Certificate of Batch Analysis included.			Primary Standards available for concentrations greater than 1 ppm. Standard Valve Outlet: CGA 350 Individual Certificate of Analysis or Certificate of Batch Analysis included.		

Technical Data & Shipping Information	
Cylinder Pressure	2000 psig
U.S. DOT Class	2.2
U.S. DOT Label	Nonflammable Gas
ID Number	UN1956

Rely on Airgas for all your specialty gas equipment needs, including regulators for gas mixtures.

Pictured: Y12-244

Equipment Recommendations are found on page 35

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.

Hydrogen (H_2)

• Other balance gases and cylinder sizes are available upon request.

Hydrogen in Air

Concentration	Cylinder Size	≈Contents ft³
1 ppm – < 1000 ppm	200 150A 80 35	217 146 86 34
1000 ppm – 2.5%	200 150A 80 35	217 146 86 34

Cannot exceed 2.5% in Air.
Primary Standards available for concentrations greater than 2 ppm.
Standard Valve Outlet: CGA 590
Individual Certificate of Analysis or Certificate of Batch Analysis included.

Hydrogen in Argon

Concentration	Cylinder Size	≈Contents ft³
1 ppm - < 100 ppm	200 150A 80 35	217 152 90 32
100 ppm – <1%	200 150A 80 35	227 152 90 35
>1%	200 80 35	214 85 33

Primary Standards available for concentrations greater than 2 ppm.
Standard Valve Outlet: CGA 350
Individual Certificate of Analysis or Certificate of Batch Analysis included.

Hydrogen in Helium

Concentration	Cylinder Size	≈Contents ft³
1 ppm – < 100 ppm	200 150A 80 35	196 132 77 30
100 ppm – < 1%	200 150A 80 35	196 132 77 30
> 1%	200 80 35	196 77 30

Primary Standards available for concentrations greater than 2 ppm.
Standard Valve Outlet: CGA 350
Individual Certificate of Analysis or Certificate of Batch Analysis included.

Hydrogen in Nitrogen

Concentration	Cylinder Size	≈Contents ft³
1 ppm – < 100 ppm	200 150A 80 35	215 144 85 33
100 ppm – < 1%	200 150A 80 35	215 144 85 33
> 1%	200 80 35	224 89 35

Primary Standards available for concentrations greater than 2 ppm.
Standard Valve Outlet: CGA 350
Individual Certificate of Analysis or Certificate of Batch Analysis included.

Technical Data & Shipping Information

Cylinder Pressure	2000 psig
U.S. DOT Class:	
H_2 in Air, or ≤ 2.93% in Ar, or ≤ 3.9% in He, or ≤ 5.7 in N_2	2.2
All Others	2.1
U.S. DOT Label:	
H_2 in Air, or ≤ 2.93% in Ar, or ≤ 3.9% in He, or ≤ 5.7% in N_2	Nonflammable Gas
All Others	Flammable Gas
ID Number:	
H_2 in Air, or ≤ 2.93% in Ar, or ≤ 3.9% in He, or ≤ 5.7% in N_2	UN1956
All Others	UN1954

Equipment Recommendations are found on page 36

Hydrogen Chloride (HCl)

- Other balance gases and cylinder sizes are available upon request.
- Concentrations over 5% provided at reduced pressure and volume.

Hydrogen Chloride in Nitrogen

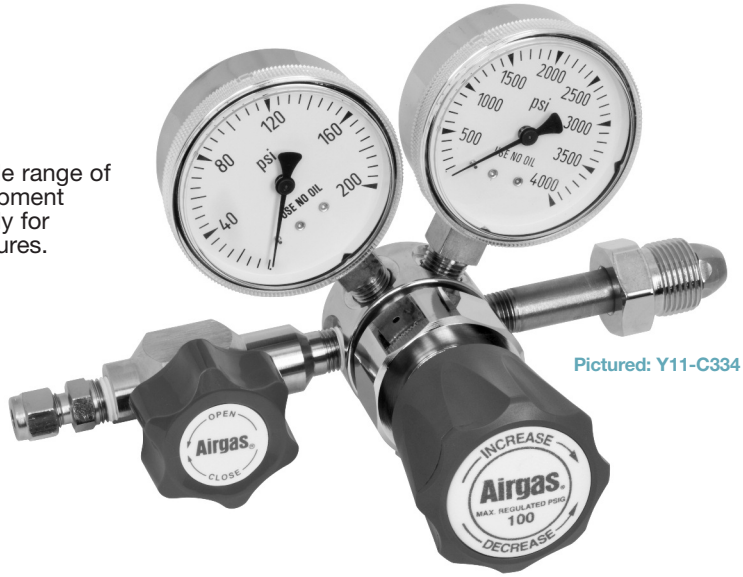
Concentration	Cylinder Size	≈Contents ft³
2 ppm – < 100 ppm	150A 80A 35A	144 77 33
100 ppm – < 1000 ppm	150A 80A 35A	144 77 33
1000 ppm – 5%	200* 80* 35*	157 62 24

*Note: Nickel Plated Steel cylinders.
Standard Valve Outlet: CGA 330
Individual Certificate of Analysis included.

Technical Data & Shipping Information

Cylinder Pressure	2000 psig
U.S. DOT Class	2.2
U.S. DOT Label	Nonflammable Gas
ID Number	UN1956

Airgas offers a wide range of specialty gas equipment designed especially for specialty gas mixtures.



Pictured: Y11-C334

Equipment Recommendations are found on page 36

Hydrogen Sulfide (H_2S)

- **Other balance gases and cylinder sizes are available upon request.**
- **Concentrations over 1.4% in air and 9% in other gases are provided at reduced pressure and volume.**

Hydrogen Sulfide in Air

Concentration	Cylinder Size	≈Contents ft³
0.25 ppm – < 100 ppm	150A 80A 33A	146 77 33
100 ppm – 1000 ppm	150A 80A 33A	146 77 33
1000 ppm – 1.4%	150A 80A 33A	147 78 30

Cannot exceed 2.7% in Air.
Primary Standards available for concentrations greater than 1 ppm.
Standard Valve Outlet: CGA 330
Individual Certificate of Analysis included.

Hydrogen Sulfide in Helium

Concentration	Cylinder Size	≈Contents ft³
0.25 ppm – < 100 ppm	150A 80A 33A	132 70 30
100 ppm - < 1%	150A 80A 33A	132 70 30
1% – 9%	200 150A 80 35	196 132 77 30

Primary Standards available for concentrations greater than 1 ppm.
Standard Valve Outlet: CGA 330
Individual Certificate of Analysis included.

Hydrogen Sulfide in Hydrogen

Concentration	Cylinder Size	≈Contents ft³
0.25 ppm – < 100 ppm	150A 80A 33A	132 70 30
100 ppm - < 1%	150A 80A 33A	132 70 30
1% – 9%	200 150A 80 35	196 132 77 30

Primary Standards available for concentrations greater than 1 ppm.
Standard Valve Outlet: CGA 330
Individual Certificate of Analysis included.

Hydrogen Sulfide in Methane

Concentration	Cylinder Size	≈Contents ft³
0.25 ppm – < 100 ppm	150A 80A 33A	160 85 36
100 ppm - < 1%	150A 80A 33A	160 85 36
1% – 9%	200 150A 80 35	241 162 95 37

Primary Standards available for concentrations greater than 1 ppm.
Standard Valve Outlet: CGA 330
Individual Certificate of Analysis included.

Hydrogen Sulfide in Nitrogen

Concentration	Cylinder Size	≈Contents ft³
0.25 ppm – < 100 ppm	150A 80A 33A	144 77 33
100 ppm – < 1%	150A 80A 33A	144 77 33
1% - 9%	200 150A 80 35	220 148 87 34

Primary Standards available for concentrations greater than 1 ppm.
Standard Valve Outlet: CGA 330
Individual Certificate of Analysis included.

Technical Data & Shipping Information

Cylinder Pressure	2000 psig
U.S. DOT Class:	
In CH_4	2.1
All Others	2.2
U.S. DOT Label:	
In CH_4	Flammable Gas
All Others	Nonflammable Gas
ID Number:	
In CH_4	UN1954
All Others	UN1956

Equipment Recommendations are found on page 36

Isobutane (iso-C_4H_{10})

- **Other balance gases and cylinder sizes are available upon request.**
- **Concentrations over 2900 ppm in Air and 1% in all other balance gases are provided at reduced pressure and volume.**

Isobutane in Air

Concentration	Cylinder Size	≈Contents ft³
1 ppm – < 100 ppm	200 150A 80 35	215 144 85 33
100 ppm – 2900 ppm	200 150A 80 35	215 144 85 33

Standard Valve Outlet: CGA 590
Individual Certificate of Analysis or Certificate of Batch Analysis included.

Isobutane in Helium

Concentration	Cylinder Size	≈Contents ft³
1 ppm – < 100 ppm	200 150A 80 35	198 133 78 31
100 ppm - < 1%	200 150A 80 35	195 131 77 30

Standard Valve Outlet: CGA 350
Individual Certificate of Analysis or Certificate of Batch Analysis included.

Isobutane in Nitrogen

Concentration	Cylinder Size	≈Contents ft³
1 ppm – < 100 ppm	200 150A 80 35	215 144 85 33
100 ppm – 1%	200 150A 80 35	215 145 85 33

Standard Valve Outlet: CGA 350
Individual Certificate of Analysis or Certificate of Batch Analysis included.

Rely on Airgas for all your specialty gas equipment needs, including regulators for gas mixtures.

Pictured: Y11-N145

You'll find it with us—a wide range of specialty gas equipment designed especially for gas mixtures.

Pictured: Y11-244

Technical Data & Shipping Information

Cylinder Pressure	2000 psig
U.S. DOT Class:	
C_4H_{10} in Air, or ≤ 3.8% in He or ≤ 5.5% in N_2	2.2
All Others	2.1
U.S. DOT Label:	
C_4H_{10} in Air, or ≤ 3.8% in He or ≤ 5.5% in N_2	Nonflammable Gas
All Others	Flammable Gas
ID Number:	
C_4H_{10} in Air, or ≤ 3.8% in He or ≤ 5.5% in N_2	UN1956
All Others	UN1954

Equipment Recommendations are found on page 36

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.

Methane (CH_4)

- **Other balance gases and cylinder sizes are available upon request.**
- **Concentrations over 9400 ppm in Air are provided at reduced pressure and volume.**

Methane in Air

Concentration	Cylinder Size	≈Contents ft³
0.5 ppm – < 100 ppm	200 150A 80 35	218 146 86 34
100 ppm – < 1000 ppm	200 150A 80 35	218 146 86 34
1000 ppm – 9400 ppm	200 80 35	218 86 34

Primary Standards for concentrations greater than 1 ppm.
Standard Valve Outlet: CGA 590
Individual Certificate of Analysis or Certificate of Batch Analysis included.

Methane in Helium

Concentration	Cylinder Size	≈Contents ft³
0.5 ppm – < 100 ppm	200 150A 80 35	196 132 77 30
100 ppm – <1%	200 150A 80 35	196 132 77 30
> 1%	200 80 35	199 79 31

Primary Standards for concentrations greater than 1 ppm.
Standard Valve Outlet: CGA 350
Individual Certificate of Analysis or Certificate of Batch Analysis included.

Methane in Nitrogen

Concentration	Cylinder Size	≈Contents ft³
0.5 ppm – < 100 ppm	200 150A 80 35	215 144 85 33
100 ppm – < 1%	200 150A 80 35	215 144 85 33
> 1%	200 80 35	219 87 34

Primary Standards for concentrations greater than 1 ppm.
Standard Valve Outlet: CGA 350
Individual Certificate of Analysis or Certificate of Batch Analysis included.

Airgas offers a wide range of specialty gas equipment designed especially for specialty gas mixtures.

Pictured: Y12-N145

Technical Data & Shipping Information

Cylinder Pressure	2000 psig
U.S. DOT Class:	
CH_4 in Air, or ≤ 7.7% in Ar*, or ≤ 10.1% in He or ≤ 14.3% in N_2	2.2
CH_4 in H_2 and All Others	2.1
U.S. DOT Label:	
CH_4 in Air, or ≤ 7.7% in Ar*, or ≤ 10.1% in He or ≤ 14.3% in N_2	Nonflammable Gas
CH_4 in H_2 and All Others	Flammable Gas
ID Number:	
CH_4 in Air, or ≤ 7.7% in Ar*, or ≤ 10.1% in He or ≤ 14.3% in N_2	UN1956
CH_4 in H_2 and All Others	UN1954

Additional Information:
Methane in Argon:
For information about ECD Qualified and Nuclear Counter P-5 (5% Methane/Argon) and P-10 (10% Methane/Argon), see the Special Applications section.

*A mixture of 10% methane in argon has been determined by testing to be nonflammable (Table 1: CGA P-23-2008)

Equipment Recommendations are found on page 36

Airgas
an Air Liquide company

Nitric Oxide (NO)

• Other balance gases and cylinder sizes are available upon request.

Nitric Oxide in Nitrogen		
Concentration	**Cylinder Size**	**≈Contents ft³**
0.1 ppm – < 100 ppm	150A 80A 33A	144 77 33
100 ppm – < 1%	150A 80A 33A	144 77 33
1% to 10%	200 150A 80 35	110 72 37 18

Above 1% concentration, top pressure is restricted to 1000 psig.
Primary Standards available for concentrations greater than 1 ppm.
Standard Valve Outlet: CGA 660
Individual Certificate of Analysis or Certificate of Batch Analysis included.

Technical Data & Shipping Information

Cylinder Pressure:	
NO < 1%	2000 psig
NO ≥ 1%	≤ 1000 psig
U.S. DOT Class:	
NO < 2.3%	2.2
NO ≥ 2.3%	2.3
U.S. DOT Label:	
NO < 2.3%	Nonflammable Gas
NO ≥ 2.3%	Inhalation Hazard
ID Number:	
NO < 2.3%	UN1956
NO ≥ 2.3%	UN1955

Additional Information:
For more information about EPA Protocol mixtures, refer to Environmental Compliance in Special Applications section.

Additional FTIR analysis for NO_2 concentration available upon request.

This product is not offered for use in inhalation therapy.

Equipment Recommendations are found on page 36

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.

Nitrogen (N_2)

• Other balance gases and cylinder sizes are available upon request.

Nitrogen in Argon

Concentration	Cylinder Size	≈Contents ft³
2 ppm – < 100 ppm	200 150A 80 35	228 153 90 35
100 ppm – < 1%	200 150A 80 35	228 153 90 35
> 1%	200 80 35	224 90 35

Primary Standards available for concentrations greater than 5 ppm.
Standard Valve Outlet: CGA 580
Individual Certificate of Analysis or Certificate of Batch Analysis included.

Nitrogen in Helium

Concentration	Cylinder Size	≈Contents ft³
1 ppm – < 100 ppm	200 150A 80 35	196 132 77 30
100 ppm – < 1%	200 150A 80 35	196 132 77 30
> 1%	200 80 35	198 78 31

Primary Standards available for concentrations greater than 2 ppm.
Standard Valve Outlet: CGA 580
Individual Certificate of Analysis or Certificate of Batch Analysis included.

Nitrogen in Hydrogen

Concentration	Cylinder Size	≈Contents ft³
1 ppm – < 100 ppm	200 150A 80 35	196 132 77 30
100 ppm – < 1%	200 150A 80 35	196 132 77 30
> 1%	200 80 35	198 78 31

Primary Standards available for concentrations greater than 2 ppm.
Standard Valve Outlet: CGA 350
Individual Certificate of Analysis or Certificate of Batch Analysis included.

Nitrogen in Oxygen

Concentration	Cylinder Size	≈Contents ft³
1 ppm – < 100 ppm	200 150A 80 35	230 154 91 36
100 ppm – < 1%	200 150A 80 35	230 154 91 36
> 1%	200 80 35	226 89 35

Primary Standards available for concentrations greater than 20 ppm.
Standard Valve Outlet: CGA 296
Individual Certificate of Analysis or Certificate of Batch Analysis included.

Technical Data & Shipping Information

Cylinder Pressure	2000 psig
U.S. DOT Class:	
In H_2	2.1
All Others	2.2
U.S. DOT Label:	
In H_2	Flammable Gas
All Others	Nonflammable Gas
ID Number:	
In H_2	UN1954
All Others	UN1956

Equipment Recommendations are found on page 37

Nitrogen Dioxide (NO_2)

- Other balance gases and cylinder sizes are available upon request.
- Concentration above 0.5% provided at reduced pressure and volume
- Mixtures of NO_2 below 1% must have an oxygen component for stability.

Nitrogen Dioxide in Air			Nitrogen Dioxide in Nitrogen		
Concentration	**Cylinder Size**	**≈Contents ft³**	**Concentration**	**Cylinder Size**	**≈Contents ft³**
1 ppm – < 100 ppm	150A 80A 33A	146 78 33	**1 ppm – < 100 ppm**	150A 80A 33A	144 77 33
100 ppm – < 1000 ppm	150A 80A 33A	146 78 33	**100 ppm – < 1000 ppm**	150A 80A 33A	144 77 33
1000 ppm – 5000 ppm	150A 80A 33A	146 78 33	**1000 ppm – 5000 ppm**	150A 80A 33A	144 77 33
Primary Standards available for concentrations greater than 2.5 ppm. Standard Valve Outlet: CGA 660 Individual Certificate of Analysis or Certificate of Batch Analysis included.			Primary Standards available for concentrations greater than 2.5 ppm. Standard Valve Outlet: CGA 660 Individual Certificate of Analysis or Certificate of Batch Analysis included.		

Technical Data & Shipping Information

Cylinder Pressure	2000 psig
U.S. DOT Class:	
NO_2 < 2.3%	2.2
NO_2 ≥ 2.3%	2.3
U.S. DOT Label:	
NO_2 < 2.3%	Nonflammable Gas
NO_2 ≥ 2.3%	Inhalation Hazard
ID Number:	
NO_2 < 2.3%	UN1956
NO_2 ≥ 2.3%	UN1955

Additional Information:

For more information about EPA Protocol mixtures, refer to Environmental Compliance in Special Application section.

You'll find it with us—a wide range of specialty gas equipment designed especially for gas mixtures.

Pictured: Y11-E444

Equipment Recommendations are found on page 37

Nitrous Oxide (N_2O)

- Other balance gases and cylinder sizes are available upon request.
- Concentrations over 28% are provided at reduced pressure and volume.

Nitrous Oxide in Air			Nitrous Oxide in Nitrogen		
Concentration	**Cylinder Size**	**≈Contents ft³**	**Concentration**	**Cylinder Size**	**≈Contents ft³**
0.1 ppm – < 100 ppm	150A 80A 33A	146 78 33	**0.1 ppm – < 100 ppm**	150A 80A 33A	144 77 33
100 ppm – < 1%	150A 80A 33A	146 78 33	**100 ppm – < 1%**	150A 80A 33A	144 77 33
1% – 28%	150A 80A 33A	165 97 38	**1% – 28%**	150A 80A 33A	162 86 37
Primary Standards available for concentrations greater than 0.3 ppm. Standard Valve Outlet: CGA 590 Individual Certificate of Analysis or Certificate of Batch Analysis included.			Primary Standards available for concentrations greater than 0.3 ppm. Standard Valve Outlet: CGA 590 Individual Certificate of Analysis or Certificate of Batch Analysis included.		

Technical Data & Shipping Information	
Cylinder Pressure	2000 psig
U.S. DOT Class	2.2
U.S. DOT Label	Nonflammable Gas
ID Number	UN1956

Additional Information:

For more information about EPA Protocol mixtures, refer to Environmental Compliance in Special Application section.

Equipment Recommendations are found on page 37

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.

Oxygen (O_2)

• Other balance gases and cylinder sizes are available upon request.

Oxygen in Argon

Concentration	Cylinder Size	≈Contents ft³
1 ppm – < 100 ppm	150A 80A 33A	153 80 34
100 ppm – < 1%	200 150A 80A 33A	228 153 80 34
> 1%	200 80 35	228 90 35

Primary Standards for concentrations greater than 3 ppm.
Standard Valve Outlet: <5% Oxygen – CGA 580; 5% - <23.5% Oxygen – CGA 590, ≥ 23.5% Oxygen – CGA 296
Individual Certificate of Analysis or Certificate of Batch Analysis included.

Oxygen in Helium

Concentration	Cylinder Size	≈Contents ft³
1 ppm – < 100 ppm	150A 80A 33A	132 70 30
100 ppm – < 1%	200 150A 80A 33A	196 132 70 30
> 1%	200 80 35	197 78 31

Primary Standards available for concentrations greater than 2 ppm.
Standard Valve Outlet: <5% Oxygen – CGA 580; 5% - <23.5% Oxygen – CGA 590; ≥ 23.5% Oxygen – CGA 296
Individual Certificate of Analysis or Certificate of Batch Analysis included.

Oxygen in Nitrogen

Concentration	Cylinder Size	≈Contents ft³
1 ppm – < 100 ppm	150A 80A 33A	144 77 33
100 ppm – <1%	200 150A 80A 33A	215 144 77 33
> 1%	200 80 35	218 86 33

Primary Standards for concentrations greater than 2 ppm.
Standard Valve Outlet: <5% Oxygen – CGA 580; 5% - <23.5% Oxygen – CGA 590, ≥ 23.5% Oxygen – CGA 296
Individual Certificate of Analysis or Certificate of Batch Analysis included.

Airgas offers a wide range of specialty gas equipment designed especially for specialty gas mixtures.

Pictured: Y12-244

Rely on Airgas for all your specialty gas equipment needs, including regulators for gas mixtures.

Pictured: Y12-N145

Technical Data & Shipping Information

Cylinder Pressure	2000 psig
U.S. DOT Class	2.2
U.S. DOT Label	Nonflammable Gas
ID Number	UN1956

Additional Information:
For more information about EPA Protocol mixtures, refer to Environmental Compliance in Special Application section.

Equipment Recommendations are found on page 37

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.

Propane (C_3H_8)

- **Other balance gases and cylinder sizes are available upon request.**
- **Concentrations over 3700 ppm in Air and 5% in all other balance gases are provided at reduced pressure and volume.**

Propane in Air			Propane in Nitrogen		
Concentration	**Cylinder Size**	**≈Contents ft³**	**Concentration**	**Cylinder Size**	**≈Contents ft³**
0.25 ppm - < 100 ppm	200 150A 80 35	218 146 86 34	**0.25 ppm - < 100 ppm**	200 150A 80 35	215 144 85 33
100 ppm – < 1000 ppm	200 150A 80 35	218 146 86 34	**100 ppm – < 1000 ppm**	200 150A 80 35	215 144 85 33
1000 ppm – 3700 ppm	200 80 35	218 86 34	**0.1% - 5%**	200 80 35	219 87 34
Primary Standards for concentrations greater than 1 ppm. Cannot exceed 1.35% in Air. Standard Valve Outlet: CGA 590 Individual Certificate of Analysis or Certificate of Batch Analysis included.			Primary Standards for concentrations greater than 1 ppm. Standard Valve Outlet: CGA 350 Individual Certificate of Analysis or Certificate of Batch Analysis included.		

Technical Data & Shipping Information

Cylinder Pressure	2000 psig
U.S. DOT Class:	
C_3H_8 in Air, or ≤ 4.45% in He or ≤ 6.5% in N_2	2.2
All Others	2.1
U.S. DOT Label:	
C_3H_8 in Air, or ≤ 4.45% in He or ≤ 6.5% in N_2	Nonflammable Gas
All Others	Flammable Gas
ID Number:	
C_3H_8 in Air, or ≤ 4.45% in He or ≤ 6.5% in N_2	UN1956
All Others	UN1954

Additional Information:
For more information about EPA Protocol mixtures, refer to Environmental Compliance in Special Application section.

Equipment Recommendations are found on page 37

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.

Propylene (C_3H_6)

- **Other balance gases and cylinder sizes are available upon request.**
- **Concentrations over 3800 ppm in Air and 5% in all other balance gases are provided at reduced pressure and volume.**

Propylene in Air			Propylene in Nitrogen		
Concentration	**Cylinder Size**	**≈Contents ft³**	**Concentration**	**Cylinder Size**	**≈Contents ft³**
0.25 ppm - < 100 ppm	200 150A 80 35	218 146 76 35	**0.25 ppm - < 100 ppm**	200 150A 80 35	215 144 75 35
100 ppm – < 1000 ppm	200 150A 80 35	218 146 76 35	**100 ppm – < 1000 ppm**	200 150A 80 35	215 144 75 35
1000 ppm – 3800 ppm	200 80 35	218 76 35	**0.1% - 5%**	200 80 35	221 77 36
Primary Standards for concentrations greater than 1 ppm. Cannot exceed 1.5% in Air. Standard Valve Outlet: CGA 590 Individual Certificate of Analysis or Certificate of Batch Analysis included.			Primary Standards for concentrations greater than 1 ppm. Standard Valve Outlet: CGA 350 Individual Certificate of Analysis or Certificate of Batch Analysis included.		

Technical Data & Shipping Information	
Cylinder Pressure	2000 psig
U.S. DOT Class:	
C_3H_6 in Air, or ≤ 2.9% in He or ≤ 5.6% in N_2	2.2
All Others	2.1
U.S. DOT Label:	
C_3H_6 in Air, or ≤ 2.9% in He or ≤ 5.6% in N_2	Nonflammable Gas
All Others	Flammable Gas
ID Number:	
C_3H_6 in Air, or ≤ 2.9% in He or ≤ 5.6% in N_2	UN1956
All Others	UN1954

Equipment Recommendations are found on page 37

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.

Silane (SiH_4)

- **Other concentrations, balance gases, and cylinder sizes are available upon request.**
- **Concentrations > 2% in Argon, Helium, Nitrogen, and > 1% in Hydrogen are gravimetrically certified.**

Silane in Argon

Concentration	Cylinder Size	≈Contents ft³
5 ppm - ≤ 2%	200 150A 80	229 154 80

Standard Valve outlet: CGA 350
Individual Certificate of Analysis or Certificate of Batch Analysis included.

Silane in Helium

Concentration	Cylinder Size	≈Contents ft³
5 ppm - ≤ 2%	200 150A 80	196 131 68

Standard Valve outlet: CGA 350
Individual Certificate of Analysis or Certificate of Batch Analysis included.

Silane in Hydrogen

Concentration	Cylinder Size	≈Contents ft³
5 ppm - ≤ 1%	200 150A 80	197 132 68

Standard Valve outlet: CGA 350
Individual Certificate of Analysis or Certificate of Batch Analysis included.

Silane in Nitrogen

Concentration	Cylinder Size	≈Contents ft³
5 ppm - ≤ 2%	200 150A 80	216 145 75

Standard Valve outlet: CGA 350
Individual Certificate of Analysis or Certificate of Batch Analysis included.

Technical Data & Shipping Information

Cylinder Pressure	2000 psig
U.S. DOT Class:	
SiH_4 in Ar, He, or N_2	2.2
SiH_4 in H_2	2.1
U.S. DOT Label:	
SiH_4 in Ar, He, or N_2	Nonflammable Gas
SiH_4 in H_2	Flammable Gas
ID Number:	
SiH_4 in Ar, He, or N_2	UN1956
SiH_4 in H2	UN1954

Equipment Recommendations are found on page 38

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.

Sulfur Dioxide (SO_2)

- **Other balance gases and cylinder sizes are available upon request.**
- **Concentrations over 1.7% are provided at reduced pressure and volume.**

Sulfur Dioxide in Air			Sulfur Dioxide in Nitrogen		
Concentration	**Cylinder Size**	**≈Contents ft³**	**Concentration**	**Cylinder Size**	**≈Contents ft³**
0.2 ppm – < 100 ppm	150A 80A 33A	146 78 33	**0.2 ppm – < 100 ppm**	150A 80A 33A	144 77 33
100 ppm – < 1000 ppm	150A 80A 33A	146 78 33	**100 ppm – < 1000 ppm**	150A 80A 33A	144 77 33
1000 ppm – 1.7%	150A 80A 33A	146 78 33	**1000 ppm – 1.7%**	150A 80A 33A	144 77 33
Primary Standards available for concentrations greater than 2 ppm. Standard Valve Outlet: CGA 660 Individual Certificate of Analysis or Certificate of Batch Analysis included.			Primary Standards available for concentrations greater than 2 ppm. Standard Valve Outlet: CGA 660 Individual Certificate of Analysis or Certificate of Batch Analysis included.		

Technical Data & Shipping Information	
Cylinder Pressure	2000 psig
U.S. DOT Class	2.2
U.S. DOT Label	Nonflammable Gas
ID Number	UN1956

Additional Information:
For more information about EPA Protocol mixtures, refer to Environmental Compliance in Special Application section.

Equipment Recommendations are found on page 38

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.

Sulfur Hexafluoride (SF_6)

- Other balance gases and cylinder sizes are available upon request.
- Concentrations over 10.5% are provided at reduced pressure and volume.

Sulfur Hexafluoride in Nitrogen		
Concentration	**Cylinder Size**	**≈Contents ft³**
0.5 ppm - < 100 ppm	200 150A 80 35	215 144 85 33
100 ppm - < 1%	200 150A 80 35	215 144 85 33
1% – 10.5%	200 150A 80 35	227 144 90 33

Primary Standards available for concentrations greater than 1 ppm.
Standard Valve Outlet: CGA 580
Individual Certificate of Analysis or Certificate of Batch Analysis included.

Technical Data & Shipping Information	
Cylinder Pressure	2000 psig
U.S. DOT Class	2.2
U.S. DOT Label	Nonflammable Gas
ID Number	UN1956

Equipment Recommendations are found on page 38

Toluene ($C_6H_5CH_3$)

- Other balance gases and cylinder sizes are available upon request.
- Concentrations over 150 ppm are provided at reduced pressure and volume.

Toluene in Nitrogen		
Concentration	**Cylinder Size**	**≈Contents ft³**
0.5 ppm – < 100 ppm	150A 80A 33A	146 79 33
100 ppm – 150 ppm	150A 80A 33A	146 79 33

Primary Standards available for concentrations greater than 20 ppm
Standard Valve Outlet: CGA 350
Individual Certificate of Analysis included.

Technical Data & Shipping Information	
Cylinder Pressure	2000 psig
U.S. DOT Class	2.2
U.S. DOT Label	Nonflammable Gas
ID Number	UN1956

Equipment Recommendations are found on page 38

Vinyl Chloride (CH_2CHCl)

- **Other balance gases and cylinder sizes are available upon request.**
- **Concentrations over 1.5% are provided at reduced pressure and volume.**

Vinyl Chloride in Nitrogen

Concentration	Cylinder Size	≈Contents ft^3
1 ppm – < 100 ppm	150A 80A 33A	144 77 33
100 ppm – 5000 ppm	150A 80A 33A	144 77 33

Primary Standards available for concentrations greater than 30 ppm.
Standard Valve Outlet: CGA 350
Certificate of Analysis included.

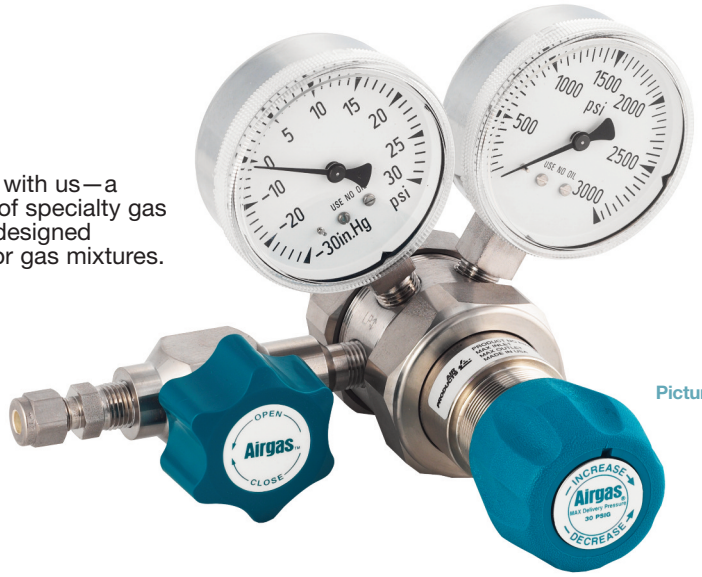
Technical Data & Shipping Information

Cylinder Pressure	2000 psig
U.S. DOT Class	2.2
U.S. DOT Label	Nonflammable Gas
ID Number	UN1956

Additional Information:
Concentrations up to 5,000 ppm can be certified as above. Higher concentrations are available as standard analyzed gas mixtures.

Vinyl Chloride Mixtures are certified in accordance with Environmental Protection Agency Regulations as cited in the Federal Register, Vol. 41, No. 205, Oct. 21, 1976, and Vol. 42, No. 109, June 7, 1977.

You'll find it with us—a wide range of specialty gas equipment designed especially for gas mixtures.



Pictured: Y11-N145

Equipment Recommendations are found on page 38

Equipment Recommendations

Page #	Gas Mixture	Recommended Regulator	Delivery Pressure Range (psig)	Equipment Page Number
M4	Ammonia in Air Ammonia in Argon Ammonia in Helium Ammonia in Nitrogen	**Two-Stage Regulator** Y12-C445 * 705 **Single-Stage** Y11-C444 * 705 **Cross Purge** Y99-CPA4705 **Tee Purge** Y99-TP4C705 * Insert Delivery Pressure	**A = 0 - 30** **B = 0 - 60** **D = 0 - 100** **F = 0 - 250**	**E28** **E27** **E50** **E51**
M5	Argon in Helium Argon in Hydrogen Argon in Nitrogen Argon in Oxygen	**Two-Stage Regulator** Y12-C445 * **Single-Stage** Y11-C444 * **Cross Purge** Y99-CPA4CGA **Tee Purge** Y99-TP4CCGA * Insert Delivery Pressure Range Code and proper CGA Connection	**A = 0 - 30** **B = 0 - 60** **D = 0 - 100** **F = 0 - 250** **G = 0 - 500**** ** Single Stage Only	**E28** **E27** **E50** **E51**
M6	Benzene in Air Benzene in Nitrogen	**Two-Stage Regulator** Y12-N245 * Y12-C445 * **Single-Stage** Y11-N245 * Y11-C444 * * Insert Delivery Pressure Range Code and proper CGA Connection	**A = 0 - 25, B = 0 - 50** **A = 0 - 30, B = 0 - 60** **A = 0 - 25, B = 0 - 50** **A = 0 - 30, B = 0 - 60**	**E21** **E28** **E20** **E27**
M7	n-Butane in Air n-Butane in Helium n-Butane in Nitrogen	**Two-Stage Regulator** Y12-N245* Y12-244* **Single-Stage** Y11-N245* Y11-244 * Insert Delivery Pressure Range Code and proper CGA Connection	**A = 0 - 25** **B = 0 - 50**	**E21** **E12** **E20** **E11**
M8-M9	Carbon Dioxide in Air Carbon Dioxide in Argon Carbon Dioxide in Helium Carbon Dioxide in Hydrogen Carbon Dioxide in Nitrogen Carbon Dioxide in Oxygen	**Two-Stage Regulator** Y12-N245* Y12-244* **Single-Stage** Y11-N245* Y11-244* * Insert Delivery Pressure Range Code and proper CGA Connection	**A = 0 - 25** **B = 0 - 50** **D = 0 - 100** ***E = 0 - 150** **F = 0 - 250** ***G = 0 - 500** * Only available for the N245 series	**E21** **E12** **E20** **E11**
M10-M11	Carbon Monoxide in Air Carbon Monoxide in Argon Carbon Monoxide in Helium Carbon Monoxide in Hydrogen Carbon Monoxide in Nitrogen	**Two-Stage Regulator** Y12-N245* Y12-244* **Single-Stage** Y11-N245* Y11-244 * Insert Delivery Pressure Range Code and proper CGA Connection	**A = 0 - 25** **B = 0 - 50** **D = 0 - 100** ***E = 0 - 150** **F = 0 - 250** ***G = 0 - 500** * Only available for the N245 series	**E21** **E12** **E20** **E11**

Equipment Recommendations

Page #	Gas Mixture	Recommended Regulator	Delivery Pressure Range (psig)	Equipment Page Number
M12	Chlorine in Air	**Two-Stage Regulator** Y12-E444* **Single-Stage** Y11-C334* **Cross Purge** Y99-CPA4* **Tee Purge** Y99-TP4C* * Insert Delivery Pressure Range Code and proper CGA Connection	**A = 0 - 30, B = 0 - 60, D = 0 - 100** **C = 0 - 50, E = 0 - 200**	**E29** **E49** **E50** **E51**
M13	Ethane in Air Ethane in Helium Ethane in Hydrogen Ethane in Nitrogen	**Two-Stage Regulator** Y12-N245* Y12-244* **Single-Stage** Y11-N245* Y11-244* * Insert Delivery Pressure Range Code and proper CGA Connection	**A = 0 - 25** **B = 0 - 50** **G = 0 - 500**	**E21** **E12** **E20** **E11**
M14	Ethylene in Air Ethylene in Helium Ethylene in Nitrogen	**Two-Stage Regulator** Y12-N245* Y12-244* **Single-Stage** Y11-N245* Y11-244* * Insert Delivery Pressure Range Code and proper CGA Connection	**A = 0 - 25** **B = 0 - 50** **D = 0 - 100** ***E = 0 - 150** **F = 0 - 250** ***G = 0 - 500** * Only available for the N245 series	**E21** **E12** **E20** **E11**
M15	Ethylene Oxide in Air Ethylene Oxide in Helium Ethylene Oxide in Nitrogen	**Two-Stage Regulator** Y12-N245* Y12-244* **Single-Stage** Y11-N245* Y11-244 * Insert Delivery Pressure Range Code and proper CGA Connection	**A = 0 - 25** **B = 0 - 50** ***G = 0 - 500** * Only available for the N245 series	**E21** **E12** **E20** **E11**
M16	Helium in Argon Helium in Nitrogen	**Two-Stage Regulator** Y12-N245* Y12-244* **Single-Stage** Y11-N245* Y11-244* * Insert Delivery Pressure Range Code and proper CGA Connection	**A = 0 - 25** **B = 0 - 50** **D = 0 - 100** ***E = 0 - 150** **F = 0 - 250** ***G = 0 - 500** * Only available for the N245 series	**E21** **E12** **E20** **E11**
M17	n-Hexane in Air n-Hexane in Nitrogen	**Two-Stage Regulator** Y12-N245* Y12-244* **Single-Stage** Y11-N245* Y11-244 * Insert Delivery Pressure Range Code and proper CGA Connection	**A = 0 - 25** **B = 0 - 50** **D = 0 - 100** ***E = 0 - 150** **F = 0 - 250** ***G = 0 - 500** * Only available for the N245 series	**E21** **E12** **E20** **E11**

Equipment Recommendations

Page #	Gas Mixture	Recommended Regulator	Delivery Pressure Range (psig)	Equipment Page Number
M18	Hydrogen in Air Hydrogen in Argon Hydrogen in Helium Hydrogen in Nitrogen	**Two-Stage Regulator** Y12-N245* Y12-244* **Single-Stage** Y11-N245* Y11-244* * Insert Delivery Pressure Range Code and proper CGA Connection	**A = 0 - 25** **B = 0 - 50** **D = 0 - 100** ***E = 0 - 150** **F = 0 - 250** ***G = 0 - 500** * Only available for the N245 series	**E21** **E12** **E20** **E11**
M19	Hydrogen Chloride in Nitrogen	**Two-Stage Regulator** Y12-E444 * **Single-Stage** Y11-E444* Y11-C334* **Cross Purge** Y99-CPA4330 **Tee Purge** Y99-TP4C330 * Insert Delivery Pressure Range Code and proper CGA Connection	**A = 0 - 30, B = 0 - 60, D = 0 - 100** **A = 0 - 30, B = 0 - 60, C = 0 - 100, D = 0 - 150** **C = 0 - 50, E = 0 - 200**	**E29** **E29** **E49** **E50** **E51**
M20	Hydrogen Sulfide in Air Hydrogen Sulfide in Helium Hydrogen Sulfide in Hydrogen Hydrogen Sulfide in Methane Hydrogen Sulfide in Nitrogen	**Two-Stage Regulator** Y12-E444 * **Single-Stage** Y11-E444* **Cross Purge** Y99-CPA4330 **Tee Purge** Y99-TP4C330 * Insert Delivery Pressure Range Code and proper CGA Connection	**A = 0 - 30, B = 0 - 60, D = 0 - 100** **A = 0 - 30, B = 0 - 60, C = 0 - 100, D = 0 - 150**	**E29** **E29** **E50** **E51**
M21	Isobutane in Air Isobutane in Helium Isobutane in Nitrogen	**Two-Stage Regulator** Y12-N245* Y12-244* **Single-Stage** Y11-N245* Y11-244 * Insert Delivery Pressure Range Code and proper CGA Connection	**A = 0 - 25** **B = 0 - 50** ***G = 0 – 500** * Only available for the N245 series	**E21** **E12** **E20** **E11**
M22	Methane in Air Methane in Helium Methane in Nitrogen	**Two-Stage Regulator** Y12-N245* Y12-244* **Single-Stage** Y11-N245* Y11-244* * Insert Delivery Pressure Range Code and proper CGA Connection	**A = 0 - 25** **B = 0 - 50** **D = 0 – 100** ***E = 0 - 150** **F = 0 – 250** ***G = 0 – 500** * Only available for the N245 series	**E21** **E12** **E20** **E11**
M23	Nitric Oxide in Nitrogen	**Two-Stage Regulator** Y12-E444 * **Single-Stage** Y11-E444* **Cross Purge** Y99-CPA4330 **Tee Purge** Y99-TP4C330 * Insert Delivery Pressure Range Code and proper CGA Connection	**A = 0 - 30, B = 0 - 60, D = 0 - 100** **A = 0 - 30, B = 0 - 60, C = 0 - 100, D = 0 - 150**	**E29** **E29** **E50** **E51**

Equipment Recommendations

Page #	Gas Mixture	Recommended Regulator	Delivery Pressure Range (psig)	Equipment Page Number
M24	Nitrogen in Argon Nitrogen in Helium Nitrogen in Hydrogen Nitrogen in Oxygen	**Two-Stage Regulator** Y12-N245* Y12-244* **Single-Stage** Y11-N245* Y11-244* * Insert Delivery Pressure Range Code and proper CGA Connection	**A = 0 - 25** **B = 0 - 50** **D = 0 - 100** ***E = 0 - 150** **F = 0 - 250** ***G = 0 - 500** * Only available for the N245 series	**E21** **E12** **E20** **E11**
M25	Nitrogen Dioxide in Air Nitrogen Dioxide in Nitrogen	**Two-Stage Regulator** Y12-E444 * **Single-Stage** Y11-E444* **Cross Purge** Y99-CPA4660 **Tee Purge** Y99-TP4C660 * Insert Delivery Pressure Range Code and proper CGA Connection	**A = 0 - 30, B = 0 - 60, D = 0 - 100** **A = 0 - 30, B = 0 - 60, C = 0 - 100, D = 0 - 150**	**E29** **E29** **E50** **E51**
M26	Nitrous Oxide in Air Nitrous Oxide in Nitrogen	**Two-Stage Regulator** Y12-C445 * **Single-Stage** Y11-C444* * Insert Delivery Pressure Range Code and proper CGA Connection	**A = 0 - 30** **B = 0 - 60** **D = 0 - 100**	**E28** **E27**
M27	Oxygen in Argon Oxygen in Helium Oxygen in Nitrogen	**Two-Stage Regulator** Y12-N245* Y12-244* **Single-Stage** Y11-N245* Y11-244 * Insert Delivery Pressure Range Code and proper CGA Connection	**A = 0 - 25** **B = 0 - 50** **D = 0 - 100** ***E = 0 - 150** **F = 0 - 250** * Only available for the N245 series	**E21** **E12** **E20** **E11**
M28	Propane in Air Propane in Nitrogen	**Two-Stage Regulator** Y12-N245* Y12-244* **Single-Stage** Y11-N245* Y11-244* * Insert Delivery Pressure Range Code and proper CGA Connection	**A = 0 - 25** **B = 0 - 50** **D = 0 - 100** ***E = 0 - 150** **F = 0 - 250** * Only available for the N245 series	**E21** **E12** **E20** **E11**
M29	Propylene in Air Propylene in Nitrogen	**Two-Stage Regulator** Y12-N245* Y12-244* **Single-Stage** Y11-N245* Y11-244* * Insert Delivery Pressure Range Code and proper CGA Connection	**A = 0 - 25** **B = 0 - 50** **D = 0 - 100** ***E = 0 - 150** **F = 0 - 250** * Only available for the N245 series	**E21** **E12** **E20** **E11**

Equipment Recommendations

Page #	Gas Mixture	Recommended Regulator	Delivery Pressure Range (psig)	Equipment Page Number
M30	Silane in Argon Silane in Helium Silane in Hydrogen Silane in Nitrogen	**Two-Stage Regulator** Y12-N245* Y12-244* **Single-Stage** Y11-N245* Y11-244* * Insert Delivery Pressure Range Code and proper CGA Connection	**A = 0 - 25** **B = 0 - 50** **D = 0 - 100** ***E = 0 - 150** **F = 0 - 250** * Only available for the N245 series	**E21** **E12** **E20** **E11**
M31	Sulfur Dioxide in Air Sulfur Dioxide in Nitrogen	**Two-Stage Regulator** Y12-E444 * **Single-Stage** Y11-E444* **Cross Purge** Y99-CPA4660 **Tee Purge** Y99-TP4C660 * Insert Delivery Pressure Range Code and proper CGA Connection	**A = 0 - 30, B = 0 - 60, D = 0 - 100** **A = 0 - 30, B = 0 - 60, C = 0 - 100, D = 0 - 150**	**E29** **E29** **E50** **E51**
M32	Sulfur Hexafluoride in Nitrogen	**Two-Stage Regulator** Y12-215 * **Single-Stage** Y11-215* * Insert Delivery Pressure Range Code and proper CGA Connection	**A = 0 - 25** **B = 0 - 50** **D = 0 - 100** **F = 0 - 250**	**E9** **E8**
M32	Toluene in Nitrogen	**Two-Stage Regulator** Y12-N245* Y12-244* **Single-Stage** Y11-N245* Y11-244 * Insert Delivery Pressure Range Code and proper CGA Connection	**A = 0 - 25** **B = 0 - 50** **D = 0 - 100** ***E = 0 - 150** * Only available for the N245 series	**E21** **E12** **E20** **E11**
M33	Vinyl Chloride in Nitrogen	**Two-Stage Regulator** Y12-N245* Y12-244* **Single-Stage** Y11-N245* Y11-244* * Insert Delivery Pressure Range Code and proper CGA Connection	**A = 0 - 25** **B = 0 - 50** **D = 0 - 100**	**E21** **E12** **E20** **E11**