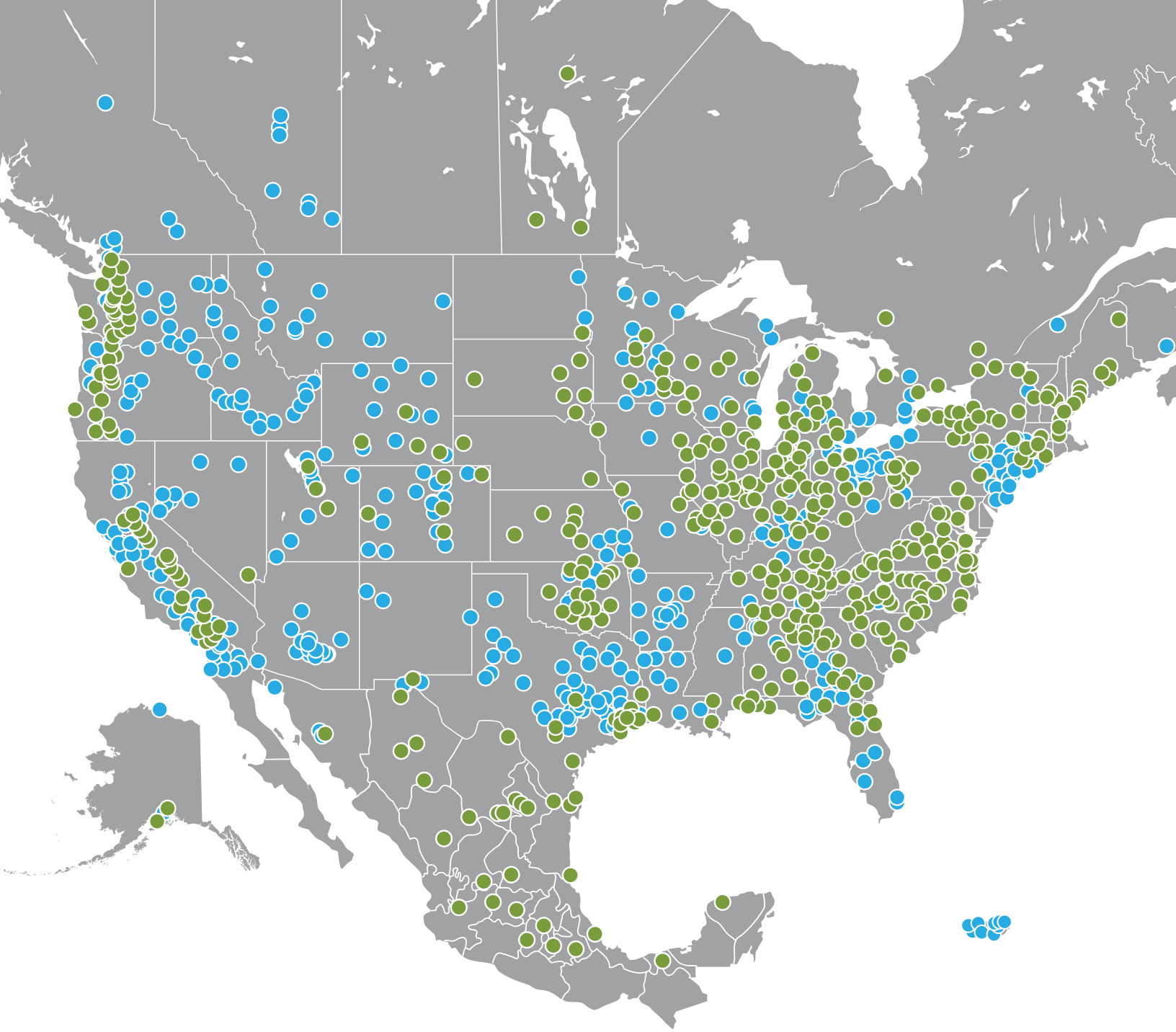
PurityPlus®

SPECIALTY GAS. THERE WHEN YOU NEED IT.

SPECIALTY GASES & EQUIPMENT CATALOG

THIRD EDITION



PURITYPLUS DISTRIBUTION CENTERS LOCATED THROUGHOUT NORTH AMERICA

PurityPlus is supplied through a network of Independent Distributor Members known as the IWDC – a 60 year old North American cooperative of producers and distributors of specialty gases.

With over 140 members and more than 800 locations, no matter where you are throughout the U.S., Canada, and Mexico, a local PurityPlus distribution center will be ready to provide quick and dedicated service. Corporations with operations in multiple locations can rely on the exclusive network of PurityPlus producers to ensure that each of their facilities receive the same high quality gases and gas mixtures, with the same stringent specifications, wherever they are.

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PurityPlus® SPECIALTY GASES

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How to Use This Catalog

Section 1 – Pure Gases

Pure gases are listed in alphabetical order. Additional products are available upon request. If you do not see your requirement listed, please contact the nearest PurityPlus sales office.

Many Specialty Gas products are available in bulk quantities. If you need special size cylinders, manifolded cylinder banks, ton containers, tube trailers or cryogenic trailers, please contact the nearest PurityPlus sales office.

Section 2 – Mixed gases

Two Component Mixtures are listed alphabetically by MINOR component. Standard balance gases are listed. Additional balance gases may be available. Please check with our technical staff.

Three Component Mixtures – Common components and balance gases listed.

Section 3 – Special Application Mixtures

These common mixtures are listed by use.

Section 4 – Equipment

Specialty Gas Handling Equipment is listed by type of product, i.e. regulators, flowmeters, etc. There is an index at the beginning of the section.

Equipment recommendations for each gas can also be found on the product pages with a reference to the proper catalog page.

Section 5 – Technical Information

Material Compatibility Chart
Unit Conversion Tables

Section 6 – Glossary

Introduction

PurityPlus Specialty Gases and Gas Handling Equipment are offered by the Independent Welding Distributor Cooperative (IWDC) to their customers in North America. Over 150 Independent Distributors in North America are proud to offer this quality brand of Specialty Gases. The quality of PurityPlus Specialty Gases combined with the service and dependability of our Independent Distributors are unequaled by anyone. Most of our family owned businesses have been servicing their customers for the better part of a century.

The map on page vi shows the distribution points available to the IWDC. Many products are already stock items for our customers. Please check with the nearest sales office to see if they can stock products for your requirements.

We have over twenty producing laboratories in North America. The combined technical experience of our laboratory personnel and our state-of-the-art facilities allow us to provide you with the best product for your application.

Quality Assurance: To ensure that you receive only the highest quality products, our producing laboratories exercise strict QA inspection standards for incoming material and maintain the most stringent quality control throughout the entire production process.

Availability and Service: With over 150 Independent Distributors with over 600 locations throughout North America, IWDC has one of the largest networks to supply your specialty gas and equipment requirements. Many of the hundreds of products that we offer are stocked locally for our customers. Please contact your local sales office if you have a need to stock additional products or package sizes. We pride themselves on our ability to service our customers. We can meet many special delivery needs. Please contact us if you have any special requirements.

Nonstandard Containers and Products: Many of the products listed are available in special non-standard containers. Many products are also available in bulk and mini-bulk quantities. This includes tube trailers, liquid trailers, liquid cylinders, manifolded cylinder skids, ton containers and more. Additionally, non-standard and special order specialty gases may also be available. This is especially true for gas mixtures. We are able to supply many different non-standard liquid and gas components with various balance gases, taking physical or safety limitations into consideration. Please contact the nearest sales office for availability and pricing.

Gas Handling Equipment: We carry only the highest quality gas handling equipment from regulators to filters to cylinder gas manifolds. Please refer to the recommended equipment for each gas that you need. Please contact us if you have any questions as to have to safely handle the products you are using.

Product Safety

The gases available through this catalog are hazardous. Some of the gases are flammable, toxic, or corrosive. As with any chemical or compressed gas improper use can cause serious injury or even death. Please be sure to review all available safety precautions when handling these gases, including the applicable Material Safety Data Sheet which is provided with each gas product. If you have any questions regarding the safe handling or use of any product we supply, please contact the nearest PurityPlus Sales Office.

Additional safety information is available from the Compressed Gas Association, DOT regulations, and applicable OSHA guidelines. Many other industry associated references are available to review the safety requirements for the handling and storage of industrial and specialty gases.

Terms and Conditions

The PurityPlus producers have the following terms and conditions for the sales of the products in this catalog. All sales of the products listed in this catalog shall be governed by these terms and conditions.

1. **Terms of sale.** Gas prices are FOB stocking point unless otherwise noted. All freight, handling, and additional related charges relating to the shipment of these products will be at the account of the Purchaser. Purchaser will pay the sales, use or excise tax imposed on the sales or delivery of these products. Terms of payment will be net 15 days from date of invoice. Seller reserves the right to increase or decrease prices from time to time. Seller's price in effect at time of shipment will apply to all orders. There is a minimum charge of $50.00 per invoice (excluding cylinder rent or demurrage).

2. **Warranty.** Gases - Seller warrants that the products will meet the specifications listed in this catalog. Gas products will be adequately packaged and labeled in accordance with all appropriate regulations and industry standards. Equipment will be free from defects in material and workmanship. Purchaser shall inspect and examine each shipment upon receipt, and, unless a written claim is delivered to Seller within 10 days thereafter, all claims with respect to said shipment or the products contained therein shall be conclusively deemed waived and Purchaser shall be conclusively deemed to have accepted delivery of such product and that Seller is in full compliance with all of the obligations to Purchaser with respect to such product. No claim against the seller shall be made, whether or not based on negligence or warranty, shall exceed the purchase price of the product. THERE ARE NO EXPRESS WARRANTIES OTHER THAN THOSE SPECIFIED IN THIS PARAGRAPH. SELLER MAKES NO OTHER WARRANTY OF ANY KIND, EITHER EXPRESSED OR IMPLIED, IN FACT OR BY LAW, INCLUDING, BUT NOT LIMITED TO ANY WARRANTY OF MERCHANTABILITY OR WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE.

3. **WARNING!** SELLER WARNS PURCHASER THAT THERE ARE HAZARDS ASSOCIATED WITH THE USE OF THE PRODUCTS LISTED IN THIS CATALOG. PURCHASER ACKNOWLEDGES THAT THERE ARE HAZARDS ASSOCIATED WITH THE USE AND STORAGE OF THESE PRODUCTS OR EQUIPMENT, THAT IT UNDERSTANDS SUCH HAZARDS, AND THAT IT IS THE RESPONSIBILITY OF THE PURCHASER TO WARN AND PROTECT ITS EMPLOYEES AND OTHERS EXPOSED TO SUCH HAZARDS THROUGH THE STORAGE AND USE OF THESE PRODUCTS OR EQUIPMENT. PURCHASER ASSUMES ALL RISK AND LIABILITY FOR LOSS, DAMAGES OR INJURY TO PERSONS OR TO PROPERTY ARISING FROM THE PRESENCE OR USE OR THESE PRODUCTS OR EQUIPMENT. SELLER SHALL NOT BE LIABLE FOR ANY INDIRECT, INCIDENTAL, OR CONSEQUENTIAL DAMAGES ASSOCIATED WITH THE USE OR MISUSE OF THESE PRODUCTS OR EQUIPMENT. Determination of the suitability of the products purchased and the results of using product alone or in combination with other articles or substances and in any manufacturing, medical, or other process or procedure is the sole responsibility of Purchaser. Seller shall have no responsibility in connection therewith.

4. **Contingencies.** Neither the seller nor purchaser will be liable to the other for default or delay in the performance of any of their obligations to each other in connection with the purchase, sale, shipment or delivery of the products due to an Act of God, accident, fire, flood, storm, riot, war, sabotage, explosion, strike or other labor disturbance, national defense requirement, governmental law, ordinance, rule or regulation, inability to obtain electricity, or other type of energy, raw material, labor, equipment or transportation, or any other contingency beyond their reasonable control.

5. **Cylinders.** Most gas products will be supplied in Seller owned, returnable cylinders. There may be a charge for the use of these cylinders. Purchaser will return these cylinders to the Seller in a non-contaminated condition with all valves tightly closed. If dust plugs or dust caps have been provided, these must be reinstalled and securely tightened to the cylinder valve outlet. Cylinder caps must be in place and securely tightened. All returnable cylinders will remain the property of the seller at all times. Purchaser will pay seller for any damage beyond normal wear and tear while in the possession of the Purchaser. This does not apply to any non-returnable or disposable container. ALL CYLINDERS MUST BE RETURNED FREIGHT PREPAID. Purchaser will be charged current replacement cost for any lost cylinders.

CYLINDER DATA AND CROSS REFERENCE CHART

	PurityPlus	DOT Number	Size (inches)	Tare Weight (pounds)	Water Volume (cu. ft.)	Airgas	BOC/ Linde	Air Products	Praxair	Scott	Matheson	Air Liquide	
STEEL	300	3AA2400	9x60	143	1.73	300	300	A	T	K	IL	49	STEEL
	200	3AA2015	9x56	133	1.54	200	200	B	K	A	IA	44	
	80	3AA2015	8.5x31	65	0.52	80	80	C	Q	B	2	16	
	30	3AA2015	6x24	29	0.26	35	30	D1	G	C	3	7	
	10	3AA2015	4x20	10	0.11	10	12	D	F	D	4	3	
	LB	3E1800	2x16	4	0.015	LB	2	LB	LB	LB	LB	LB	
	ELB	3E1800	2x16	4	0.015	LX	7X	LG	ELB		7X		
	E	3AA2015	4.5x31	13	0.17	E	E	Med.E	ANE	ER		MEDE	
	AA380	8AL	12x8	195	N/A	380	5	A	Lab380	XF	IB	380	
	LP300	4BW240	15x48	75	3.83	350		A1	FX	XL	1F	350	
	LP150	4AA480	15x52	151	4.46	150	150	AA	FA	XG	1K	150	
	LP60	4BA300	10x53	55	1.97	65		A3	FC	XP	IJ	65	
	6000	3AA-6000	10x51	303	1.5	3HP	485		6K		1U	44H	
	3500	3AA-3600	9.25x51	189	1.54	2HP			3K		1H		
ALUMINUM	AL150	3AL2015	8x53	48	1.04	150A	150A	B(AL)	ALS	Al	1R	30AL	ALUMINUM
	AL80	3AL2015	7x38	30	0.55	80A	80A	C(AL)	ALQ	BL	2R	22AL	
	AL30	3AL2015	7x21	9	0.14	33A	30A	DL(AL)	ALH	CL	3R	7AL	

Compressed Gas Cylinders

Low Pressure Cylinders

LOW PRESSURE LIQUID CYLINDERS

Specifications

MODEL SIZE		160L	160L	180L	180L	200L	200L	230L	230L	265L	265L
	Pressure	MP	HP	MP	HP	MP	HP	MP	HP	MP	HP
LCCM	Part Number	10508748	10508756	10508764	10496433	10508772	10496417	10496468	10496492	10510039	10512561
MCR	Part Number	10783424	10783467	10783491	10783539	10783598	10783619	10783635	10783651	10783678	10783694
CAPACITY											
Liquid (Gross)	(liters)	176	176	196	196	209	209	240	240	276	276
Liquid (Net)	(liters)	165	165	185	185	196	196	230	230	265	265
Gas (N_2)*	ft^3 / Nm^3	3685 / 97	3464 / 91	4099 / 108	3864 / 102	4375 / 115	4072 / 108	5024 / 132	4734 / 124	5769 / 152	5438 / 143
Gas (O_2)*	ft^3 / Nm^3	4577 / 120	4348 / 114	5096 / 134	4843 / 127	5435 / 143	5048 / 133	6244 / 164	5930 / 156	7186 / 189	681 1 / 179
Gas (Ar)*	ft^3 / Nm^3	4448 / 117	4226 / 111	4961 / 130	4709 / 124	5290 / 139	4932 / 130	6073 / 160	5763 / 151	6982 / 183	6634 / 174
Gas (CO_2)*	ft^3 / Nm^3	--	3382 / 89	--	3766 / 99	--	4011 / 105	--	4614 / 121	--	5305 / 139
Gas (N_2O)*	ft^3 / Nm^3	--	3207 / 84	--	3574 / 94	--	3810 / 100	--	4378 / 115	--	5034 / 132
PERFORMANCE											
NER (N_2)	% per day	2	2	1.9	1.9	1.85	1.85	1.8	1.8	2	2
NER (O_2 - Ar)	% per day	1.4	1.4	1.3	1.3	1.2	1.2	1.2	1.2	1.4	1.4
NER (CO_2 - N_2O)	% per day	--	0.5	--	0.5	--	0.5	--	0.5	--	0.5
Gas Flow (N_2, O_2, Ar)	ft^3/hr / Nm^3/hr	350 / 9.2	350 / 9.2	350 / 9.2	350 / 9.2	400 / 10.5	400 / 10.5	400 / 10.5	400 / 10.5	400 / 10.5	400 / 10.5
Gas Flow (CO_2, N_2O)	ft^3/hr / Nm^3/hr	--	110 / 2.9	--	110 / 2.9	--	110 / 2.9	--	110 / 2.9	--	110 / 2.9
DIMENSIONS & PRESSURE RATINGS											
Relief Valve Setting	psig / barg	230 / 16	350 / 24	230 / 16	350 / 24	230 / 16	350 / 24	230 / 16	350 / 24	230 / 16	350 / 24
DOT/CTC Rating		4L200	4L292	4L200	4L292	4L200	4L292	4L200	4L292	4L200	4L292
Diameter	in / *cm*	20/50.8	20/50.8	20/50.8	20/50.8	20/50.8	20/50.8	26/66.0	26/66.0	26/66.0	26/66.0
Height	in / *cm*	59.6 / 151.3	59.6 / 151.3	63.5 / 161.3	63.5 / 161.3	65.8 / 167.1	65.8 / 167.1	52.9 / 131.9	52.9 / 131.9	57.8 / 146.8	57.8 / 146.8
Empty Weight	lb / *kg*	250 / 113.4	280 / 126.9	260 / 117.9	300 / 136.1	280 / 126.9	320 / 145.1	300 / 136.1	340 / 154.2	340 / 154.2	360 / 163.6
Full Weight (N_2)	lb / *kg*	517 / 234	531 / 241	557 / 253	580 / 263	597 / 271	618 / 280	664 / 301	683 / 310	758 / 344	754 / 343
(O_2)	lb / *kg*	629 / 285	640 / 290	682 / 309	701/ 318	730 / 331	747 /339	817 / 370	831 / 377	935 / 424	924 / 420
(Ar)	lb / *kg*	710 / 322	717 / 325	773 / 351	787 / 357	827 / 375	839 / 380	928 / 421	936 / 424	1062 / 481	1046 / 475
(CO_2)	lb / *kg*	--	667 / 303	--	731 / 331	--	779 / 353	--	868 / 393	--	967 / 439

**At relief valve settings*

PurityPlus Distribution Centers Located Throughout North America

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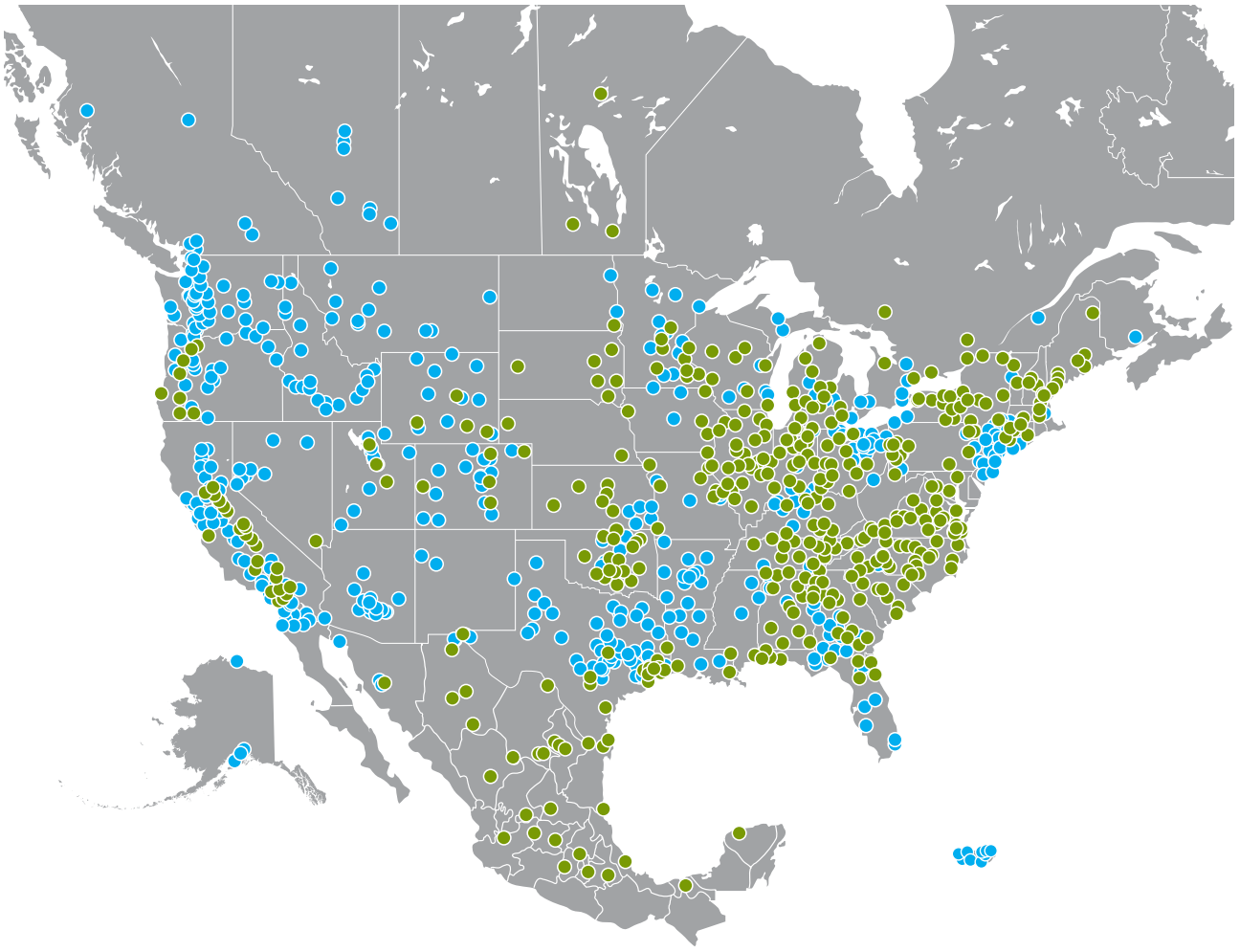

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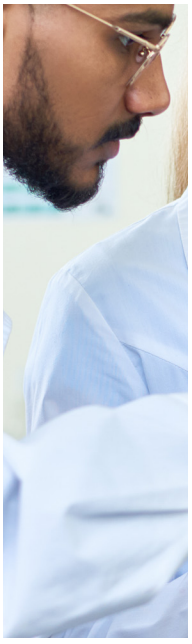


PURE GASES

PurityPlus®
SPECIALTY GASES

PurityPlus® SPECIALTY GASES

Section 1 - Pure Gases

Pure Gas Suggested Part Number Format

[GAS CODE]-[GRADE]-[CYLINDER SIZE]

Pure Gas Part Numbers are built like this: Gas Code – Grade – Cylinder Size

Example: HEL-70-XX

Helium (Pure Gas)
Suggested Part Number: HEL-70-XX

- HEL = Helium
- 70 = PurityPlus 7.0
- XX = Cylinder size

- HEL-70-20 or HEL-70-R
- HEL-70-80 or HEL-70-Q
- HEL-70-300 or HEL-70-T

PurityPlus® SPECIALTY GASES

A colorless, highly flammable gas.

Acetylene

Technical Information:	
Chemical Symbol:	C_2H_2
Molecular Weight:	26.04
Specific Volume	14.7 ft^3/lb (0.91 m^3/kg)
CAS Registry Number:	74-86-2

Shipping Information:	
DOT Proper Name:	Acetylene, dissolved
Hazard Class:	2.1
I.D. Number:	UN 1001
Labels:	Flammable Gas

Grade	Purity	Impurity	Specification
PurityPlus Purified 2.6 (For Atomic Absorption)	99.6%	Oxygen plus CH_4 PH_3	< 4000 ppm < 20 ppm

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Standard Cylinder Sizes *	Contents ft^3/m^3	Cylinder Pressure PSIG	CGA Valve Connection
380	330	250	510
140	130	250	510

*Nonstandard cylinder sizes available upon request

PurityPlus® SPECIALTY GASES

Air

A colorless, odorless, nonflammable gas.

Technical Information:	
Chemical Symbol:	N/A
Molecular Weight:	28.96
Specific Volume	13.3 ft^3/lb (0.83 m^3/kg)
CAS Registry Number:	132259-10-0

Shipping Information:	
DOT Proper Name:	Air, Compressed
Hazard Class:	2.2
I.D. Number:	UN 1002
Labels:	Nonflammable Gas

Grade	Purity	Impurity	Specification	Equipment Recommended
PurityPlus Ultra Zero		Total Hydrocarbons Moisture Oxygen Carbon Dioxide Carbon Monoxide	< 0.1 ppm < 3 ppm 19.5% to 23.5% < 1 ppm < 1 ppm	Regulator with brass bar stock body, SS diaphragm
PurityPlus Zero		Total Hydrocarbons Oxygen	<1 ppm 19.5% to 23.5%	Regulator with brass bar stock body, SS diaphragm
PurityPlus Extra Dry		Moisture Oxygen	< 8 ppm 19.5% to 23.5%	Regulator with brass bar stock body, SS diaphragm

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Standard Cylinder Sizes *	Contents ft^3/m^3	Cylinder Pressure PSIG	CGA Valve Connection
300	311	2640	590
200	233	2200	590
80	88	2200	590

*Nonstandard cylinder sizes available upon request

PurityPlus® SPECIALTY GASES

A colorless, pungent, toxic gas.

Ammonia

Technical Information:	
Chemical Symbol:	NH_3
Molecular Weight:	17.03
Specific Volume	22.6 ft^3/lb (1.41 m^3/kg)
CAS Registry Number:	7664-41-7

Shipping Information:	
DOT Proper Name:	Ammonia, Anhydrous
Hazard Class:	2.2
I.D. Number:	UN 1005
Labels:	Non-Flammable Gas

Grade	Purity	Impurity	Specification
PurityPlus VLSI 4.5 (Liquid Phase)	99.995%	Oil Moisture	< 0.5 ppm < 3 ppm
PurityPlus 2.5 (Liquid Phase)	> 99.5%	Total Impurities	< 0.5%

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Standard Cylinder Sizes *	Contents lbs.	Cylinder Pressure PSIG	CGA Valve Connection
400	150	114	660/240
150A	30	114	660/705
80A	15	114	660/705
33A	7	114	660/705

*Nonstandard cylinder sizes available upon request

PurityPlus® SPECIALTY GASES

Argon

A chemically inert, colorless, odorless, nontoxic gas.

Technical Information:	
Chemical Symbol:	Ar
Molecular Weight:	39.948
Specific Volume	9.7 ft^3/lb (0.606 m^3/kg)
CAS Registry Number:	7440-37-1

Shipping Information:	
DOT Proper Name:	Argon, Compressed
Hazard Class:	2.2
I.D. Number:	UN 1006
Labels:	Nonflammable Gas

Grade	Purity	Impurity	Specification	Equipment Recommended
PurityPlus 6.0 (Research)	99.9999%	Oxygen Moisture Nitrogen Total Hydrocarbons Carbon Monoxide Carbon Dioxide	< 0.2 ppm < 0.2 ppm < 0.4 ppm < 0.1 ppm < 0.1 ppm < 0.1 ppm	Regulator with stainless steel bar stock body, SS diaphragm
PurityPlus 5.5 (Chromatograph)	99.9995%	Oxygen Moisture Nitrogen Total Hydrocarbons	< 1 ppm < 1 ppm < 3 ppm < 0.1 ppm	Regulator with brass bar stock body, SS diaphragm
PurityPlus N_2 Free 5.0	99.999%	Oxygen Moisture Nitrogen Total Hydrocarbons	< 2 ppm < 2 ppm < 4 ppm < 0.5 ppm	Regulator with brass bar stock body, SS diaphragm
PurityPlus 5.0 (Ultra High Purity)	99.999%	Oxygen Moisture Total Hydrocarbons	< 1 ppm < 1 ppm < 0.5 ppm	Regulator with brass bar stock body, SS diaphragm
PurityPlus 4.8 (Prepurified)	99.998%	Oxygen Moisture Total Hydrocarbons	< 5 ppm < 5 ppm < 2 ppm	Regulator with brass bar stock body, SS diaphragm
PurityPlus Zero 4.8	99.998%	Total Hydrocarbons	< 0.5 ppm	Regulator with brass bar stock body, SS diaphragm

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Standard Cylinder Sizes *	Contents ft^3/m^3	Cylinder Pressure PSIG	CGA Valve Connection
300	337 / 9.37	2640	580
200	250 / 6.79	2200	580
80	83 / 2.3	2200	580

*Nonstandard cylinder sizes available upon request

PurityPlus® SPECIALTY GASES

A colorless, toxic, corrosive gas shipped as a liquid under its own vapor pressure.

Boron Trichloride

Technical Information:	
Chemical Symbol:	BCl_3
Molecular Weight:	117.17
Specific Volume	3.3 ft^3/lb (0.202 m^3/kg)
CAS Registry Number:	10294-34-5

Shipping Information:	
DOT Proper Name:	Boron Trichloride
Hazard Class:	2.3
I.D. Number:	UN1741
Labels:	Poison Gas, Corrosive

Grade	Purity	Impurity	Specification
PurityPlus 5.0 (Research)	> 99.999%	Total Impurities	< 10 ppm
PurityPlus 3.0 (Electronic)	> 99.9%	Total Impurities	< 1000 ppm
PurityPlus 2.5 (Chemically Pure)	> 99.5%	Total Impurities	< 0.5%
Higher grades available upon request.			

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Standard Cylinder Sizes *	Contents lbs.	Cylinder Pressure PSIG	CGA Valve Connection
200	100	4.4	660
35	14	4.4	660
LB	1	4.4	660

*Nonstandard cylinder sizes available upon request

PurityPlus® SPECIALTY GASES

Boron Trifluoride

A nonflammable, toxic and corrosive gas.

Technical Information:	
Chemical Symbol:	BF_3
Molecular Weight:	67.781
Specific Volume	5.6 ft^3/lb (0.350 m^3/kg)
CAS Registry Number:	7637-07-2

Shipping Information:	
DOT Proper Name:	Boron Trifluoride, Compressed
Hazard Class:	2.3
I.D. Number:	UN1008
Labels:	Poison Gas

Grade	Purity	Impurity	Specification
PurityPlus 2.5 (Chemically Pure)	> 99.5%	Total Impurities	< 0.5%

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Standard Cylinder Sizes *	Contents lbs.	Cylinder Pressure PSIG	CGA Valve Connection
200	60	1800	330
35	10	1800	330
LB	0.375	1800	180

*Nonstandard cylinder sizes available upon request

PurityPlus® SPECIALTY GASES

A colorless, flammable gas shipped as a liquid under its own vapor pressure.

1,3-Butadiene

Technical Information:	
Chemical Symbol:	C_4H_6
Molecular Weight:	54.09
Specific Volume	6.9 ft^3/lb (0.431 m^3/kg)
CAS Registry Number:	106-99-0

Shipping Information:	
DOT Proper Name:	Butadienes, Inhibited
Hazard Class:	2.1
I.D. Number:	UN1010
Labels:	Flammable Gas

Grade	Purity	Impurity	Specification
PurityPlus 2.0 (Chemically Pure)	> 99.0% Liquid Phase	Total Impurities	< 1 %

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Standard Cylinder Sizes *	Contents lbs.	Cylinder Pressure	CGA Valve Connection
454, 400	570	21	510
350, 400	135	21	510
33	7	21	510
LB	0.375	21	170

*Nonstandard cylinder sizes available upon request

PurityPlus® SPECIALTY GASES

n-Butane

A colorless, flammable gas shipped as a liquid under its own vapor pressure.

Technical Information:	
Chemical Symbol:	C_4H_{10}
Molecular Weight:	58.12
Specific Volume	6.34 ft^3/lb (0.396 m^3/kg)
CAS Registry Number:	106-97-8

Shipping Information:	
DOT Proper Name:	Butane
Hazard Class:	2.1
I.D. Number:	UN1011
Labels:	Flammable Gas

Grade	Purity	Impurity	Specification
PurityPlus 4.0 (Research)	> 99.99%	Total Impurities	< 100 ppm
PurityPlus 2.5 (Instrument)	> 99.5%	Total Impurities	< 0.5%
PurityPlus 2.0 (Chemically Pure)	> 99.0%	Total Impurities	< 1%

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Standard Cylinder Sizes *	Contents ft^3/m^3	Cylinder Pressure	CGA Valve Connection
454	540	16.3	510
350	120	16.3	510
200	40	16.3	510
80	6	16.3	510
LB	0.375	16.3	170

*Nonstandard cylinder sizes available upon request

PurityPlus® SPECIALTY GASES

A colorless, flammable gas shipped as a liquid under its own vapor pressure.

1-Butene

Technical Information:	
Chemical Symbol:	C_4H_8
Molecular Weight:	56.11
Specific Volume	6.55 ft^3/lb (0.409 m^3/kg)
CAS Registry Number:	106-98-9

Shipping Information:	
DOT Proper Name:	Liquid Petroleum Gas (Butene)
Hazard Class:	2.1
I.D. Number:	UN 1012
Labels:	Flammable Gas

Grade	Purity	Impurity	Specification
PurityPlus 4.0 (Polymer Grade)	> 99.99 % Liquid Phase	Moisture Total Sulfur Total Impurities: 1,3 Butadiene, Methane, Ethane, trans-2-Butene, cis-2-Butene, Propane, Other C-4's, Moisture, Sulfur	< 5 ppm < 0.5 ppm < 100 ppm
PurityPlus 3.0 (Research)	> 99.9 % Liquid Phase	Total Impurities	< 1000 ppm
PurityPlus 2.5 (Instrument)	> 99.5 % Gas Phase	Total Impurities	< 0.5 %
PurityPlus 2.0 (Chemically Pure)	> 99.0 % Liquid Phase	Total Impurities	< 1 %

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Standard Cylinder Sizes *	Contents lbs.	Cylinder Pressure	CGA Valve Connection
454	540	23	510
350	128	23	510
80	17	23	510
LB	0.375	23	170

*Nonstandard cylinder sizes available upon request

PurityPlus® SPECIALTY GASES

CIS-2-Butene

A colorless, flammable, liquefied gas having a slight aromatic odor.

Technical Information:	
Chemical Symbol:	C_4H_8
Molecular Weight:	56.11
Specific Volume	6.7 ft^3/lb (0.42 m^3/kg)
CAS Registry Number:	590-18-1

Shipping Information:	
DOT Proper Name:	Butylene
Hazard Class:	2.1
I.D. Number:	UN1012
Labels:	Flammable Gas

Grade	Purity	Impurity	Specification
PurityPlus 2.0 (Chemically Pure)	> 99.0% Liquid Phase	Other Hydrocarbons Sulfur Moisture Total impurities	< 1% < 1 ppm < 5 ppm < 1%
PurityPlus 1.5 (Technical)	> 95.0% Liquid Phase	Total impurities	< 5%

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Standard Cylinder Sizes *	Contents lbs	Cylinder Pressure	CGA Valve Connection
½ Ton	570.0	13	510
LP30	136.0	13	510
LP15	81.0	13	510
LP05	27.0	13	510
LP01	6.0	13	510
350	135.0	13	510
300	55.0	13	510
200	50.0	13	510
80	18.0	13	510
30	8.0	13	510
LB	0.375	13	170

*Nonstandard cylinder sizes available upon request

PurityPlus® SPECIALTY GASES

A colorless, odorless, nonflammable slightly acidic gas.

Carbon Dioxide

Technical Information:	
Chemical Symbol:	CO_2
Molecular Weight:	44.04
Specific Volume	8.76 ft^3/lb (0.55 m^3/kg)
CAS Registry Number:	124-38-9

Shipping Information:	
DOT Proper Name:	Carbon Dioxide
Hazard Class:	2.2
I.D. Number:	UN 1013
Labels:	Nonflammable Gas

Grade	Purity	Impurity	Specification	Equipment Recommended
PurityPlus 5.0 (Research)	99.999%	Oxygen Nitrogen Carbon Monoxide Methane Moisture Carbon Dioxide	< 1 ppm < 1 ppm < 0.1 ppm < 0.5 ppm < 2 ppm 99.999%	Regulator with brass bar stock body, SS diaphragm
PurityPlus 4.8 (Scientific)	99.998%	Argon + Oxygen Moisture Carbon Monoxide THC (as methane) Carbon Dioxide	< 2 ppm < 3 ppm < 1 ppm < 2 ppm 99.998%	Regulator with brass bar stock body, SS diaphragm
PurityPlus Laser 4.5	99.995%	Moisture Oxygen Total Hydrocarbons Carbon Dioxide	< 5 ppm < 5 ppm < 1 ppm 99.995%	Regulator with forged brass body, SS diaphragm
PurityPlus Coleman 4.0 (Instrument)	99.99%	Moisture Oxygen Nitrogen Carbon Dioxide	< 10 ppm < 20 ppm < 50 ppm 99.99%	Regulator with forged brass body, SS diaphragm
PurityPlus 3.0 Refrigerant R-744	99.9% wt.	Moisture	< 10 ppm wt.	Regulator with forged brass body, SS diaphragm
PurityPlus Anaerobic 3.0	99.9%	Oxygen Carbon Dioxide	< 20 ppm 99.9%	Regulator with forged brass body, SS diaphragm
PurityPlus 2.8 (Bone Dry)	99.8%	Moisture Carbon Dioxide	< 20 ppm 99.8%	Regulator with forged brass body, SS diaphragm

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Standard Cylinder Sizes *	Contents lb	Cylinder Pressure PSIG	CGA Valve Connection
200	50	838	320
80	20	838	320

*Nonstandard cylinder sizes available upon request

PurityPlus® SPECIALTY GASES

Carbon Monoxide

A colorless, odorless, toxic, flammable gas.

Technical Information:	
Chemical Symbol:	CO
Molecular Weight:	28.01
Specific Volume	13.8 ft^3/lb (0.86 m^3/kg)
CAS Registry Number:	630-08-0

Shipping Information:	
DOT Proper Name:	Carbon Monoxide, Compressed
Hazard Class:	2.3
I.D. Number:	UN 1016
Labels:	Poison Gas, Flammable Gas

Grade	Purity	Impurity	Specification
PurityPlus 4.0	99.99%	Nitrogen Oxygen Carbon Dioxide Hydrogen Total Hydrocarbons Moisture	< 10 ppm < 2 ppm < 20 ppm < 10 ppm < 5 ppm < 5 ppm
PurityPlus 2.5 (Chemically Pure)	> 99.5%	Total Impurities	< 0.5%
PurityPlus 2.0 (Technical)	99.0%	Total Impurities	< 1.0%

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Standard Cylinder Sizes *	Contents ft^3/m^3	Cylinder Pressure PSIG	CGA Valve Connection
300	236	2000	350
200	175	1660	350
150A	148	2000	350
80A	78	2000	350
33A	34	2000	350

*Nonstandard cylinder sizes available upon request

PurityPlus® SPECIALTY GASES

A colorless gas with an unpleasant smell.

Carbonyl Sulfide

Technical Information:	
Chemical Symbol:	COS
Molecular Weight:	60.7
Specific Volume	2.1 ft^3/lb
CAS Registry Number:	463-58-1

Shipping Information:	
DOT Proper Name:	Carbonyl Sulfide
Hazard Class:	2.3
I.D. Number:	UN 2204
Labels:	Flammable Gas

Grade	Purity	Impurity	Specification
PurityPlus 3.0	99.9%	Oxygen Nitrogen Moisture Carbon Dioxide Hydrogen Sulfide	< 0.01% < 0.03% < 0.01% < 0.03% < 0.01%

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Standard Cylinder Sizes *	Contents lbs	Cylinder Pressure PSIG	CGA Valve Connection
200	44	174.7	330
80	16	174.7	330
33	7	174.7	330

*Nonstandard cylinder sizes available upon request

PurityPlus® SPECIALTY GASES

Chlorine

A greenish-yellow, toxic, corrosive gas with an extremely disagreeable odor.

Technical Information:	
Chemical Symbol:	Cl_2
Molecular Weight:	70.91
Specific Volume	5.4 ft^3/lb (0.33 m^3/kg)
CAS Registry Number:	7782-50-5

Shipping Information:	
DOT Proper Name:	Chlorine
Hazard Class:	2.3
I.D. Number:	UN 1017
Labels:	Poison Gas, Corrosive

Grade	Purity	Impurity	Specification
PurityPlus 3.0 (High Purity)	> 99.9%	Total Impurities	< 1000 ppm
PurityPlus 2.5 (Chemically Pure)	> 99.5%	Total Impurities	< 0.5%

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Standard Cylinder Sizes *	Contents lbs	Cylinder Pressure PSIG	CGA Valve Connection
400	150	85	660
200	100	85	660
80	40	85	660
30	15	85	660

*Nonstandard cylinder sizes available upon request

PurityPlus® SPECIALTY GASES

A colorless, odorless, flammable, stable isotope of hydrogen.

Deuterium

Technical Information:	
Chemical Symbol:	D_2
Molecular Weight:	4.03
Specific Volume	95.9 ft^3/lb (5.95 m^3/kg)
CAS Registry Number:	7782-39-0

Shipping Information:	
DOT Proper Name:	Deuterium
Hazard Class:	2.1
I.D. Number:	UN 1957
Labels:	Flammable Gas

Grade	Purity	Impurity	Specification
PurityPlus 5.0	99.999%	Hydrogen Oxygen Nitrogen Moisture Deuterium Hydride Total Hydrocarbons Carbon Monoxide Carbon Dioxide	< 100 ppm < 1 ppm < 1 ppm < 1 ppm < 3000 ppm < 1 ppm < 1 ppm < 1 ppm
PurityPlus 4.0	> 99.99%	Total Impurities	< 100 ppm
PurityPlus 2.7	> 99.7%	Total Impurities	< 0.3%

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Standard Cylinder Sizes *	Contents liters	Cylinder Pressure	CGA Valve Connection
200	5000	1760	350
80	1000	890	350
30	500	1090	350

*Nonstandard cylinder sizes available upon request

PurityPlus® SPECIALTY GASES

Dimethyl Ether (DME)

A colorless, flammable gas shipped as a liquid under its own vapor pressure.

Technical Information:	
Chemical Symbol:	$(CH_3)_2O$
Molecular Weight:	46.07
Specific Volume	8.4 ft^3/lb (0.524 m^3/kg)
CAS Registry Number:	115-10-6

Shipping Information:	
DOT Proper Name:	Dimethyl Ether
Hazard Class:	2.1
I.D. Number:	UN1033
Labels:	Flammable Gas

Grade	Purity	Impurity	Specification
PurityPlus 2.8 (Chemically Pure)	Min. 99.8 wt% Liquid Phase	Other Volatiles Sulfur Compounds Moisture Non-Volatile Residue	Max 0.2 wt% Max 500 ppmw Max 100 ppmw Max 50g/100 ml
PurityPlus 2.5 (Technical)	> 99.5% Liquid Phase	Total Impurities	< 0.5%

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Standard Cylinder Sizes *	Contents lbs.	Cylinder Pressure	CGA Valve Connection
350	100	62.3	510
30	16	62.3	510
LB	0.5	62.3	170

*Nonstandard cylinder sizes available upon request

PurityPlus® SPECIALTY GASES

A colorless, odorless, flammable gas.

Ethane

Technical Information:	
Chemical Symbol:	C_2H_6
Molecular Weight:	30.07
Specific Volume	12.80 ft^3/lb (0.79 m^3/kg)
CAS Registry Number:	74-84-0

Shipping Information:	
DOT Proper Name:	Ethane, Compressed
Hazard Class:	2.1
I.D. Number:	UN 1035
Labels:	Flammable Gas

Grade	Purity	Impurity	Specification
PurityPlus 2.5 (Instrument)	> 99.5%	Total Impurities	< 5000 ppm
PurityPlus 2.0 (Chemically Pure)	> 99.0%	Total Impurities	< 1.0%

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Standard Cylinder Sizes *	Contents lbs	Cylinder Pressure PSIG	CGA Valve Connection
200	34	544	350
80	11	544	350
30	4	544	350

*Nonstandard cylinder sizes available upon request

PurityPlus® SPECIALTY GASES

Ethylene

A colorless, flammable gas with a sweet odor.

Technical Information:	
Chemical Symbol:	C_2H_4
Molecular Weight:	28.05
Specific Volume	13.70 ft^3/lb (0.86 m^3/kg)
CAS Registry Number:	74-85-1

Shipping Information:	
DOT Proper Name:	Ethylene, Compressed
Hazard Class:	2.1
I.D. Number:	UN 1962
Labels:	Flammable Gas

Grade	Purity	Impurity	Specification
PurityPlus 4.0	99.99%	Ethane Total Impurities	< 100 ppm < 100 ppm
PurityPlus 3.0 (Polymer Grade)	99.9%	Ethane Total Impurities	< 0.1% < 0.1%
PurityPlus 2.5 (Chemically Pure)	99.5%	Ethane Total Impurities	< 0.5% < 0.5%

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Standard Cylinder Sizes *	Contents lbs	Cylinder Pressure PSIG	CGA Valve Connection
300	37	1600	350
200	30	1200	350
80	10	1200	350

*Nonstandard cylinder sizes available upon request

PurityPlus® SPECIALTY GASES

A colorless, odorless, tasteless, inert gas.

Helium

Technical Information:	
Chemical Symbol:	He
Molecular Weight:	4.003
Specific Volume	96.7 ft³/lb (6.0 m³/kg)
CAS Registry Number:	7440-59-7

Shipping Information:	
DOT Proper Name:	Helium, Compressed
Hazard Class:	2.2
I.D. Number:	UN 1046
Labels:	Nonflammable Gas

Grade	Purity	Impurity	Specification	Equipment Recommended
PurityPlus 6.0 (Research)	99.9999%	Oxygen Moisture Nitrogen Total Hydrocarbons Carbon Monoxide Carbon Dioxide Total of all impurities	< 0.2 ppm < 0.2 ppm < 0.4 ppm < 0.1 ppm < 0.1 ppm < 0.1 ppm < 1 ppm	
PurityPlus 5.5 (Chromatograph)	99.9995%	Oxygen Nitrogen Moisture Total Hydrocarbons	< 1 ppm < 3 ppm < 1 ppm < 0.5 ppm	Regulator with stainless steel bar stock body, SS diaphragm
PurityPlus 5.0 N2 Free	99.999%	Oxygen Moisture Total Hydrocarbons Nitrogen	< 1 ppm < 1 ppm < 0.5 ppm < 5 ppm	Regulator with brass bar stock body, SS diaphragm
PurityPlus 5.0 (Ultra High Purity)	99.999%	Oxygen Moisture Total Hydrocarbons	< 1 ppm < 1 ppm < 0.5 ppm	
PurityPlus Zero 4.8	99.998%	Total Hydrocarbons	< 0.5 ppm	
PurityPlus 4.7 (Prepurified)	99.997%	Oxygen Moisture	< 5 ppm < 5 ppm	

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Standard Cylinder Sizes *	Contents ft³/m³	Cylinder Pressure PSIG	CGA Valve Connection
300	291	2640	580
200	217	2200	580
80	73	2200	580

*Nonstandard cylinder sizes available upon request

PurityPlus® SPECIALTY GASES

Hexafluoroethane (R116)

A colorless, non-corosive, non-flammable liquefied gas.

Technical Information:	
Chemical Symbol:	C_2F_6
Molecular Weight:	138.01
Specific Volume	2.8 ft^3/lb
CAS Registry Number:	75-16-4

Shipping Information:	
DOT Proper Name:	Hexafluoroethane
Hazard Class:	2.2
I.D. Number:	UN 2193
Labels:	Nonflammable Gas

Grade	Purity	Impurity	Specification
PurityPlus 5.0	99.999% Liquid Phase	Oxygen	< 2 ppm
		Nitrogen	< 8 ppm
		Moisture	< 1.5 ppm
		Carbon Monoxide	< 0.5 ppm
		Carbon Dioxide	< 0.5 ppm
		Other Organics	< 0.5 ppm
		Acidity	< 0.1 ppmw
		Total Impurities	10 ppm

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Standard Cylinder Sizes *	Contents lbs.	Cylinder Pressure	CGA Valve Connection
200	95.0	23.5	660/320
80	43.0	23.5	660/320
30	15.0	23.5	660/320

*Nonstandard cylinder sizes available upon request

PurityPlus® SPECIALTY GASES

A colorless, odorless, nonflammable gas.

Hexafluoropropylene

Technical Information:	
Chemical Symbol:	C_3F_6
Molecular Weight:	150.03
Specific Volume	2.58 ft^3/lb (0.161 m^3/kg)
CAS Registry Number:	116-15-4

Shipping Information:	
DOT Proper Name:	Hexafluoropropylene, Compressed
Hazard Class:	2.2
I.D. Number:	UN 1858
Labels:	Nonflammable Gas

Grade	Purity	Impurity	Specification
PurityPlus 3.0	99.9%	Saturated Hydrocarbons Unsaturated Hydrocarbons Oxygen Acidity	< 0.2 ppm < 0.3 ppm < 50 ppm < 0.0001%

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Standard Cylinder Sizes *	Contents lbs.	Cylinder Pressure	CGA Valve Connection
LP300	125	85	660
LP150	30	85	660
LP60	14	85	660

*Nonstandard cylinder sizes available upon request

PurityPlus® SPECIALTY GASES

Hydrogen

A colorless, odorless, flammable gas.

Technical Information:	
Chemical Symbol:	H_2
Molecular Weight:	2.02
Specific Volume	192 ft³/lb (11.9 m³/kg)
CAS Registry Number:	1333-74-0

Shipping Information:	
DOT Proper Name:	Hydrogen, Compressed
Hazard Class:	2.1
I.D. Number:	UN 1049
Labels:	Flammable Gas

Grade	Purity	Impurity	Specification	Equipment Recommended
PurityPlus 6.0 (Research)	99.9996%	Oxygen Moisture Nitrogen THC CO/CO_2	< 0.2 ppm < 0.5 ppm < 0.3 ppm < 0.1 ppm < 0.1 ppm	Regulator with stainless steel bar stock body, SS diaphragm
PurityPlus 5.5 (Chromatograph)	99.9995%	Oxygen Moisture Nitrogen Methane Carbon Dioxide Carbon Monoxide	< 0.5 ppm < 2 ppm < 2 ppm < 0.2 ppm < 0.1 ppm < 0.2 ppm	Regulator with brass bar stock body, SS diaphragm
PurityPlus 5.0 (Ultra High Purity)	99.999%	Oxygen Moisture Nitrogen Total Hydrocarbons	< 1 ppm < 2 ppm < 5 ppm < 0.5 ppm	Regulator with brass bar stock body, SS diaphragm
PurityPlus Zero 4.5	99.995%	Total Hydrocarbons	< 0.5 ppm	Regulator with brass bar stock body, SS diaphragm
PurityPlus 4.0 (Prepurified)	99.99%	Moisture Oxygen	< 10 ppm < 20 ppm	Regulator with brass bar stock body, SS diaphragm
PurityPlus 3.7 (Fuel Cell)	99.97%	Moisture Oxygen Helium N2/Ar Carbon Dioxide Carbon Monoxide Ammonia Total Sulfurs Formaldehyde Formic Acid Total Hydrocarbons (Non-Methane)	< 5 ppm < 5 ppm < 300 ppm < 100 ppm < 2 ppm < 0.2 ppm < 0.1 ppm < 0.004 ppm < 0.01 ppm < 0.2 ppm < 2 ppm	Regulator with brass bar stock body, SS diaphragm

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Standard Cylinder Sizes *	Contents ft³/m³	Cylinder Pressure PSIG	CGA Valve Connection
300	261	2400	350
200	195	2000	350
80	71	2000	350

*Nonstandard cylinder sizes available upon request

PurityPlus® SPECIALTY GASES

A colorless, corrosive, irritating, toxic gas shipped as a liquid under its own vapor pressure.

Hydrogen Bromide

Technical Information:	
Chemical Symbol:	HBr
Molecular Weight:	80.91
Specific Volume	4.76 ft^3/lb (0.297 m^3/kg)
CAS Registry Number:	10035-10-6

Shipping Information:	
DOT Proper Name:	Hydrogen Bromide, Anhydrous
Hazard Class:	2.3
I.D. Number:	UN1048
Labels:	Inhalation Hazard, Corrosive

Grade	Purity	Impurity	Specification
PurityPlus 2.8 (Chemically Pure)	> 99.8% Liquid Phase	Total Impurities	< 2000 ppm

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Standard Cylinder Sizes *	Contents lbs.	Cylinder Pressure	CGA Valve Connection
80	30	320	330
30	10	320	330
LB	1	320	180

*Nonstandard cylinder sizes available upon request

PurityPlus® SPECIALTY GASES

Hydrogen Chloride

A colorless, corrosive, irritating, toxic gas.

Technical Information:	
Chemical Symbol:	HCl
Molecular Weight:	36.46
Specific Volume	10.6 ft^3/lb (0.68 m^3/kg)
CAS Registry Number:	7647-01-0

Shipping Information:	
DOT Proper Name:	Hydrogen Chloride, Anhydrous
Hazard Class:	2.3
I.D. Number:	UN 1050
Labels:	Poison Gas, Corrosive

Grade	Purity	Impurity	Specification
PurityPlus 5.0 (Research)	99.999%	Total Impurities (Nitrogen, Oxygen, CO, CO_2, Total Hydrocarbons)	< 10 ppm
PurityPlus 4.5	99.995%	Total Impurities (Nitrogen, Oxygen, CO, CO_2, Total Hydrocarbons)	< 50 ppm
PurityPlus 4.0	> 99.99%	Total Impurities	< 100 ppm
PurityPlus 2.0 (Technical)	> 99%	Total Impurities	< 100 ppm

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Standard Cylinder Sizes *	Contents lbs	Cylinder Pressure PSIG	CGA Valve Connection
200	60	613	330
80	20	613	330
30	8	613	330

*Nonstandard cylinder sizes available upon request

PurityPlus® SPECIALTY GASES

A colorless, flammable, toxic gas with the odor of rotten eggs.

Hydrogen Sulfide

Technical Information:	
Chemical Symbol:	H_2S
Molecular Weight:	34.08
Specific Volume	11.2 ft^3/lb (0.69 m^3/kg)
CAS Registry Number:	7783-06-4

Shipping Information:	
DOT Proper Name:	Hydrogen Sulfide, Liquefied
Hazard Class:	2.3
I.D. Number:	UN 1053
Labels:	Poison Gas, Flammable Gas

Grade	Purity	Impurity	Specification
PurityPlus 2.5 (Chemically Pure)	> 99.5%	Total Impurities	< 0.5%

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Standard Cylinder Sizes *	Contents lbs.	Cylinder Pressure	CGA Valve Connection
400	170	252	330
200	60	252	330
80	20	252	330

*Nonstandard cylinder sizes available upon request

PurityPlus® SPECIALTY GASES

Isobutane

A colorless, flammable gas.

Technical Information:	
Chemical Symbol:	C_4H_{10}
Molecular Weight:	58.12
Specific Volume	6.5 ft^3/lb (0.40 m^3/kg)
CAS Registry Number:	75-28-5

Shipping Information:	
DOT Proper Name:	Isobutane
Hazard Class:	2.1
I.D. Number:	UN 1969
Labels:	Flammable Gas

Grade	Purity	Impurity	Specification
PurityPlus 4.0 (Research)	> 99.99%	Total Impurities	< 100 ppm
PurityPlus 2.5 (Instrument)	> 99.5%	Total Impurities	< 0.5%
PurityPlus 2.0 (Chemically Pure)	> 99%	Total Impurities	< 1.0%
PurityPlus R600a (Liquid Phase Withdrawal)		UL Certified	

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Standard Cylinder Sizes *	Contents lbs	Cylinder Pressure PSIG	CGA Valve Connection
350	116	31	510
LP20	20	31	510

*Nonstandard cylinder sizes available upon request

PurityPlus® SPECIALTY GASES

A colorless, flammable, liquefied gas, having a coal gas odor.

Isobutylene

Technical Information:	
Chemical Symbol:	C_4H_8
Molecular Weight:	56.11
Specific Volume	6.7 ft^3/lb
CAS Registry Number:	115-11-7

Shipping Information:	
DOT Proper Name:	Isobutylene
Hazard Class:	2.1
I.D. Number:	UN 1055
Labels:	Flammable Gas

Grade	Purity	Impurity	Specification
PurityPlus 3.0	99.9% Gas Phase	Other Hydrocarbons Sulfur Moisture Total impurities	< 0.1% < 1 ppm < 5 ppm < 0.1%
PurityPlus 2.5	99.5% Gas Phase	Other Hydrocarbons Sulfur Moisture Total impurities	< 0.5% < 1 ppm < 5 ppm < 0.5%
PurityPlus 2.0	99% Gas Phase	Other Hydrocarbons Sulfur Moisture Total impurities	< 1% < 1 ppm < 10 ppm < 0.5%

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Standard Cylinder Sizes *	Contents lbs.	Cylinder Pressure	CGA Valve Connection
½ Ton	530.0	24.3	510
LP30	125.0	24.3	510
LP15	75.0	24.3	510
LP05	25.0	24.3	510
LP01	6.0	24.3	510
300	56.0	24.3	510
200	50.0	24.3	510
80	18.0	24.3	510
30	8.0	24.3	510

*Nonstandard cylinder sizes available upon request

PurityPlus® SPECIALTY GASES

Isopentane

A colorless, flammable liquid having a mild gasoline odor.

Technical Information:	
Chemical Symbol:	C_5H_{12}
Molecular Weight:	72.15
Specific Volume	Not Applicable
CAS Registry Number:	78-78-4

Shipping Information:	
DOT Proper Name:	Pentanes
Hazard Class:	3
I.D. Number:	UN 1265
Labels:	Flammable Liquid

Grade	Purity	Impurity	Specification
PurityPlus 2.5	99.5% Gas Phase	Other Hydrocarbons Sulfur Moisture Total impurities	< 0.5% < 1 ppm < 5 ppm < 0.5%
PurityPlus 2.0	99% Gas Phase	Other Hydrocarbons Sulfur Moisture Total impurities	< 1% < 1 ppm < 5 ppm < 1%

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Standard Cylinder Sizes *	Contents lbs	Cylinder Pressure PSIG	CGA Valve Connection
½ Ton	570.0	11.57	510
LP30	136.0	11.57	510
LP15	80.0	11.57	510
LP05	27.0	11.57	510
LP01	7.0	11.57	510
300	60.0	11.57	510
200	50.0	11.57	510
80	19.0	11.57	510
30	8.0	11.57	510

*Nonstandard cylinder sizes available upon request

PurityPlus® SPECIALTY GASES

A colorless, odorless, nonflammable, inert, rare gas.

Krypton

Technical Information:	
Chemical Symbol:	Kr
Molecular Weight:	83.80
Specific Volume	4.6 ft^3/lb (0.29 m^3/kg)
CAS Registry Number:	7439-90-9

Shipping Information:	
DOT Proper Name:	Krypton, Compressed
Hazard Class:	2.2
I.D. Number:	UN 1056
Labels:	Nonflammable Gas

Grade	Purity	Impurity	Specification
PurityPlus 5.0	99.999%	Nitrogen Oxygen Hydrogen CO/CO_2 Tetrafluoromethane Total Hydrocarbons Moisture Xenon Total Impurities	 < 10 ppm
PurityPlus 4.5	99.995%	Nitrogen Oxygen Hydrogen CO/CO_2 Tetrafluoromethane Total Hydrocarbons Moisture Xenon	< 10 ppm < 2 ppm < 1 ppm < 1 ppm < 1 ppm < 1 ppm < 1 ppm < 20 ppm
PurityPlus 2.0	> 99%	Total Impurities	< 1.0%

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Standard Cylinder Sizes *	Contents liters	Cylinder Pressure PSIG	CGA Valve Connection
300	10,000	2100	580
200	5000	1400	580
80	2500	1700	580
LB	100	760	580/110

*Nonstandard cylinder sizes available upon request

PurityPlus® SPECIALTY GASES

Methane

A colorless, odorless, tasteless, flammable gas.

Technical Information:	
Chemical Symbol:	CH_4
Molecular Weight:	16.04
Specific Volume	23.7 ft^3/lb (1.47 m^3/kg)
CAS Registry Number:	74-82-8

Shipping Information:	
DOT Proper Name:	Methane, Compressed
Hazard Class:	2.1
I.D. Number:	UN 1971
Labels:	Flammable Gas

Grade	Purity	Impurity	Specification
PurityPlus 5.0 (Research)	> 99.999%	Total Impurities	< 10 ppm
PurityPlus 4.0 (Ultra High Purity)	> 99.99%	Total Impurities	< 100 ppm
PurityPlus 2.0 (Chemically Pure)	> 99%	Total Impurities	< 1.0%
PurityPlus 1.3 (Commercial)	> 93%	Total Impurities	< 7.0 %

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Standard Cylinder Sizes *	Contents ft^3/m^3	Cylinder Pressure PSIG	CGA Valve Connection
300	356	2400	350
200	260	2000	350
80	88	2000	350

*Nonstandard cylinder sizes available upon request

PurityPlus® SPECIALTY GASES

A colorless, flammable, potentially harmful, liquefied gas.

Methyl Chloride

Technical Information:	
Chemical Symbol:	CH_3Cl
Molecular Weight:	50.49
Specific Volume	7.5 ft^3/lb (0.47 m^3/kg)
CAS Registry Number:	74-87-3

Shipping Information:	
DOT Proper Name:	Methyl Chloride
Hazard Class:	2.1
I.D. Number:	UN1063
Labels:	Flammable Gas

Grade	Purity	Impurity	Specification
PurityPlus 2.5 (Chemically Pure)	> 99.5% Liquid Phase	Total Impurities	< 0.5%

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Standard Cylinder Sizes *	Contents lbs.	Cylinder Pressure	CGA Valve Connection
454	800	59	510
350	100	59	510
80	25	59	510
LB	0.5	59	180

*Nonstandard cylinder sizes available upon request

PurityPlus® SPECIALTY GASES

Methyl Fluoride

A colorless, flammable, liquefied gas.

Technical Information:	
Chemical Symbol:	CH_3F
Molecular Weight:	34.03
Specific Volume	11.36 ft^3/lb (0.709 m^3/kg)
CAS Registry Number:	593-53-3

Shipping Information:	
DOT Proper Name:	Methyl Fluoride
Hazard Class:	2.1
I.D. Number:	UN2454
Labels:	Flammable Gas

Grade	Purity	Impurity	Specification
PurityPlus 2.0 (Chemically Pure)	> 99.0%	Total Impurities	< 1%

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Standard Cylinder Sizes *	Contents lbs.	Cylinder Pressure	CGA Valve Connection
10	0.25	538	350

*Nonstandard cylinder sizes available upon request

PurityPlus® SPECIALTY GASES

A colorless, flammable, potentially harmful, liquefied gas.

Methyl Mercaptan

Technical Information:	
Chemical Symbol:	CH_3SH
Molecular Weight:	48.1
Specific Volume	8.0 ft^3/lb (0.499 m^3/kg)
CAS Registry Number:	74-93-1

Shipping Information:	
DOT Proper Name:	Methyl Mercaptan
Hazard Class:	2.3
I.D. Number:	UN1064
Labels:	Flammable Gas

Grade	Purity	Impurity	Specification
PurityPlus 2.5 (Chemically Pure)	> 99.5%	Total Impurities	< 0.5%

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Standard Cylinder Sizes *	Contents lbs.	Cylinder Pressure	CGA Valve Connection
LB	0.5	15	110

*Nonstandard cylinder sizes available upon request

PurityPlus® SPECIALTY GASES

Monomethylamine (MMA)

A colorless, toxic, flammable, alkaline, liquefied gas.

Technical Information:	
Chemical Symbol:	CH_3NH_2
Molecular Weight:	31.06
Specific Volume	12.1 ft^3/lb (0.755 m^3/kg)
CAS Registry Number:	74-89-5

Shipping Information:	
DOT Proper Name:	Methylamine, Anhydrous
Hazard Class:	2.1
I.D. Number:	UN1061
Labels:	Flammable Gas

Grade	Purity	Impurity	Specification
PurityPlus 2.5 (Chemically Pure)	> 99.5% Liquid Phase	Total Impurities	< 0.5%

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Standard Cylinder Sizes *	Contents lbs.	Cylinder Pressure	CGA Valve Connection
350	125	29	705
LB	0.375	29	180

*Nonstandard cylinder sizes available upon request

PurityPlus® SPECIALTY GASES

A colorless, odorless, nonflammable, inert gas.

Neon

Technical Information:	
Chemical Symbol:	Ne
Molecular Weight:	20.18
Specific Volume	19.2 ft^3/lb (1.19 m^3/kg)
CAS Registry Number:	7440-01-9

Shipping Information:	
DOT Proper Name:	Neon, Compressed
Hazard Class:	2.2
I.D. Number:	UN 1065
Labels:	Nonflammable Gas

Grade	Purity	Impurity	Specification
PurityPlus 5.0 (Ultra High Purity)	99.999%	Helium Nitrogen Oxygen Moisture Hydrogen Total Hydrocarbons	< 8 ppm < 4 ppm < 1 ppm < 1 ppm < 1 ppm < 0.5 ppm

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Standard Cylinder Sizes *	Contents liters	Cylinder Pressure PSIG	CGA Valve Connection
300	7500	2400	580
200	6000	2200	580
80	2000	1775	580
LB	100	770	580/110

*Nonstandard cylinder sizes available upon request

PurityPlus® SPECIALTY GASES

Neopentane (Dimethylpropane)

A colorless, flammable, liquefied gas.

Technical Information:	
Chemical Symbol:	C_5H_{12}
Molecular Weight:	72.15
Specific Volume	5.30 ft^3/lb (0.330 m^3/kg)
CAS Registry Number:	463-82-1

Shipping Information:	
DOT Proper Name:	2,2-Dimethylpropane
Hazard Class:	2.1
I.D. Number:	UN2044
Labels:	Flammable Gas

Grade	Purity	Impurity	Specification
PurityPlus 2.0 (Chemically Pure)	> 99.0%	Total Impurities	< 1%

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Standard Cylinder Sizes *	Contents lbs.	Cylinder Pressure	CGA Valve Connection
LPS	5	7 psig	510

*Nonstandard cylinder sizes available upon request

PurityPlus® SPECIALTY GASES

A colorless, nonflammable, toxic, oxidizing gas with an irritating odor.

Nitric Oxide

Technical Information:	
Chemical Symbol:	NO
Molecular Weight:	30.01
Specific Volume	12.9 ft^3/lb (0.80 m^3/kg)
CAS Registry Number:	10102-43-9

Shipping Information:	
DOT Proper Name:	Nitric Oxide, Compressed
Hazard Class:	2.3
I.D. Number:	UN 1660
Labels:	Poison Gas, Oxidizer, Corrosive

Grade	Purity	Impurity	Specification
PurityPlus 3.0	> 99.9%	Total Impurities	< 1000 ppm
PurityPlus 2.0 (Chemically Pure)	> 99.0%	Total Impurities	< 1.0%

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Standard Cylinder Sizes *	Contents ft^3/m^3	Cylinder Pressure PSIG	CGA Valve Connection
200	53	500	660
80	19	500	660

*Nonstandard cylinder sizes available upon request

PurityPlus® SPECIALTY GASES

Nitrogen

A colorless, odorless, chemically inert gas.

Technical Information:	
Chemical Symbol:	N_2
Molecular Weight:	28.01
Specific Volume	13.8 ft^3/lb (0.86 m^3/kg)
CAS Registry Number:	7727-37-9

Shipping Information:	
DOT Proper Name:	Nitrogen, Compressed
Hazard Class:	2.2
I.D. Number:	UN 1066
Labels:	Nonflammable Gas

Grade	Purity	Impurity	Specification	Equipment Recommended
PurityPlus 6.0 (Research)	99.9999%	Oxygen Moisture Total Hydrocarbons Carbon Monoxide Carbon Dioxide	< 0.2 ppm < 0.2 ppm < 0.1 ppm < 0.1 ppm < 0.1 ppm	Regulator with stainless steel bar stock body, SS diaphragm
PurityPlus 5.5 (Chromatograph)	99.9995%	Oxygen Moisture Total Hydrocarbons Carbon Monoxide Carbon Dioxide	<1 ppm < 1 ppm < 0.1 ppm < 1 ppm < 1 ppm	Regulator with brass bar stock body, SS diaphragm
PurityPlus 5.0 (Ultra High Purity)	99.999%	Oxygen Moisture Total Hydrocarbons	< 1 ppm < 1 ppm < 0.5 ppm	Regulator with brass bar stock body, SS diaphragm
PurityPlus CEM	99.999%	Oxygen Moisture THC CO2 CO SO2 NOx	< 1.0 ppm < 2.0 ppm < 0.1 ppm < 1.0 ppm < 0.5 ppm < 0.1 ppm < 0.1 ppm	Regulator with brass bar stock body, SS diaphragm
PurityPlus 4.8 (Prepurified)	99.998%	Oxygen Moisture	< 5 ppm < 5 ppm	Regulator with brass bar stock body, SS diaphragm
PurityPlus Zero 4.8	99.998%	Total Hydrocarbons	< 0.5 ppm	Regulator with brass bar stock body, SS diaphragm
PurityPlus O_2 Free 4.8	99.998%	Oxygen	< 0.5 ppm	Regulator with brass bar stock body, SS diaphragm

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Standard Cylinder Sizes *	Contents ft^3/m^3	Cylinder Pressure PSIG	CGA Valve Connection
300	304	2640	580
200	228	2200	580
80	76	2200	580

*Nonstandard cylinder sizes available upon request

PurityPlus® SPECIALTY GASES

A brownish, toxic, corrosive, liquefied gas.

Nitrogen Dioxide (Dinitrogen Tetroxide)

Technical Information:	
Chemical Symbol:	NO_2
Molecular Weight:	46.01
Specific Volume	4.7 ft^3/lb (0.29 m^3/kg)
CAS Registry Number:	10102-44-0

Shipping Information:	
DOT Proper Name:	Nitrogen Dioxide, Liquefied
Hazard Class:	2.3
I.D. Number:	UN 1067
Labels:	Poison Gas, Oxidizer, Corrosive

Grade	Purity	Impurity	Specification
PurityPlus 2.5 (liquid phase)	99.5%	Moisture Particle (Metal Residue)	< 0.15% < 10 mg/L

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Standard Cylinder Sizes *	Contents lbs.	Cylinder Pressure	CGA Valve Connection
200	120	15	660
35	10	15	660

*Nonstandard cylinder sizes available upon request

PurityPlus® SPECIALTY GASES

Nitrogen Trifluoride

A toxic, colorless, odorless, nonflammable gas.

Technical Information:	
Chemical Symbol:	NF_3
Molecular Weight:	71.00
Specific Volume	5.043 ft^3/lb (0.337 m^3/kg)
CAS Registry Number:	7783-54-2

Shipping Information:	
DOT Proper Name:	Nitrogen Trifluoride, Compressed
Hazard Class:	2.2
I.D. Number:	UN 2451
Labels:	Nonflammable Gas, Oxidizer

Grade	Purity	Impurity	Specification
PurityPlus 4.0	99.99%	Oxygen/Argon	< 5 ppm
		Nitrogen	< 5 ppm
		Tetrafluoromethane	< 40 ppm
		Carbon Dioxide	< 3 ppm
		Nitrous Oxide	< 3 ppm
		Sulfur Hexafluoride	< 5 ppm
		Moisture	< 1 ppm
		Hydrogen Fluoride	< 1 ppm
		Carbon Monoxide	< 1 ppm
		Methane	< 1 ppm

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Standard Cylinder Sizes *	Contents lbs	Cylinder Pressure PSIG	CGA Valve Connection
200	44	1450	330

*Nonstandard cylinder sizes available upon request

PurityPlus® SPECIALTY GASES

A colorless, sweet-tasting, oxidizing gas.

Nitrous Oxide

Technical Information:	
Chemical Symbol:	N_2O
Molecular Weight:	44.01
Specific Volume	8.7 ft^3/lb (0.54 m^3/kg)
CAS Registry Number:	10024-97-2

Shipping Information:	
DOT Proper Name:	Nitrous Oxide, Compressed
Hazard Class:	2.2
I.D. Number:	UN 1070
Labels:	Nonflammable Gas, Oxidizer

Grade	Purity	Impurity	Specification
PurityPlus VLSI 5.0	99.999%	Nitrogen Oxygen Carbon Dioxide Total Hydrocarbons Moisture Carbon Monoxide Ammonia Nitric Oxide Nitrogen Dioxide Halogens	< 5 ppm < 2 ppm < 2 ppm < 1 ppm < 3 ppm < 1 ppm < 5 ppm < 0.5 ppm < 0.5 ppm < 0.5 ppm
PurityPlus 4.5	99.995%	Oxygen Moisture Nitrogen Total Hydrocarbons CO/CO_2	< 5 ppm < 5 ppm < 20 ppm < 5 ppm < 5 ppm
PurityPlus 3.0	99.9%	Nitrogen Oxygen Carbon Dioxide Total Hydrocarbons Moisture Carbon Monoxide	< 400 ppm < 100 ppm < 250 ppm < 30 ppm < 50 ppm < 50 ppm
PurityPlus AA 2.6	99.6%	Moisture O_2/N_2	< 30 ppm < 2000 ppm

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Standard Cylinder Sizes *	Contents lb	Cylinder Pressure PSIG	CGA Valve Connection
200	60	745	326

*Nonstandard cylinder sizes available upon request

PurityPlus® SPECIALTY GASES

Octafluorocyclobutane (R318)

A colorless, odorless, non-flammable liquefied gas.

Technical Information:	
Chemical Symbol:	C_4F_8
Molecular Weight:	200.03
Specific Volume	1.85 ft^3/lb
CAS Registry Number:	115-25-3

Shipping Information:	
DOT Proper Name:	Octafluorocyclobutane
Hazard Class:	2.2
I.D. Number:	UN 1976
Labels:	Nonflammable Gas

Grade	Purity	Impurity	Specification
PurityPlus 5.0	99.999% Liquid Phase	Oxygen Nitrogen Moisture Other Fluorocarbons Acidity Total Impurities	< 1 ppmw < 3 ppmw < 1 ppmw < 4 ppmw < 0.1 ppmw 10 ppm
PurityPlus 3.8	99.98% Liquid Phase	Oxygen Nitrogen Moisture Tetrafluoromethane Acidity Total Impurities	< 20 ppmv < 80 ppmv < 10 ppmv < 50 ppmv < 0.1 ppmw 200 ppm
PurityPlus 3.0	99.9% Liquid Phase	Air (N2, O2, CO, CO2) Moisture Other Organics Total Impurities	< 300 ppmv < 10 ppmv < 1000 ppmv < 1000 ppmv

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Standard Cylinder Sizes *	Contents lbs	Cylinder Pressure PSIG	CGA Valve Connection
200	100.0	23.5	660/DISS 716
80	35.0	23.5	660/DISS 716
30	15.0	23.5	660/DISS 716

*Nonstandard cylinder sizes available upon request

PurityPlus® SPECIALTY GASES

A colorless, relatively non-reactive gas.

Octafluoropropane (HC-218)

Technical Information:	
Chemical Symbol:	C_3F_8
Molecular Weight:	188.0
Specific Volume	2.02 ft^3/lb (0.126 m^3/kg)
CAS Registry Number:	76-19-7

Shipping Information:	
DOT Proper Name:	Octafluoropropane
Hazard Class:	2.2
I.D. Number:	UN 2424
Labels:	Nonflammable Gas

Grade	Purity	Impurity	Specification
PurityPlus 5.0	99.999%	Organic Impurities Moisture Carbon Monoxide Carbon Dioxide Nitrogen/Oxygen Acidity (as HF)	< 10 ppm
PurityPlus 3.0	> 99.9%	Total Impurities	< 1000 ppm

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Standard Cylinder Sizes *	Contents lbs	Cylinder Pressure PSIG	CGA Valve Connection
200	95	25	660
80	20	25	660

*Nonstandard cylinder sizes available upon request

PurityPlus® SPECIALTY GASES

Oxygen

A colorless, odorless, tasteless, highly oxidizing gas.

Technical Information:	
Chemical Symbol:	O_2
Molecular Weight:	32
Specific Volume	12.1 ft^3/lb (0.76 m^3/kg)
CAS Registry Number:	7782-44-7

Shipping Information:	
DOT Proper Name:	Oxygen, Compressed
Hazard Class:	2.2
I.D. Number:	UN 1072
Labels:	Nonflammable Gas, Oxidizer

Grade	Purity	Impurity	Specification	Equipment Recommended
PurityPlus 5.0 (Research)	99.999%	Moisture Nitrogen Total Hydrocarbons CO/CO_2 Argon	< 1 ppm < 5 ppm < 0.5 ppm < 1 ppm < 5 ppm	Regulator with brass bar stock body, SS diaphragm
PurityPlus 4.3 (Ultra High Purity)	99.993%	Moisture Nitrogen Total Hydrocarbons	< 3 ppm < 10 ppm < 0.5 ppm	Regulator with forged brass body, SS diaphragm
PurityPlus Zero 2.8	99.8%	Total Hydrocarbons	< 0.5 ppm	Regulator with forged brass body, SS diaphragm
PurityPlus Extra Dry 2.6	99.6%	Moisture	< 10 ppm	Regulator with forged brass body, SS diaphragm

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Standard Cylinder Sizes *	Contents ft^3/m^3	Cylinder Pressure PSIG	CGA Valve Connection
300	337	2640	540
200	249	2200	540
80	83	2200	540

*Nonstandard cylinder sizes available upon request

PurityPlus® SPECIALTY GASES

A colorless, flammable, liquefied, hydrocarbon gas.

Propane

Technical Information:	
Chemical Symbol:	C_3H_8
Molecular Weight:	44.096
Specific Volume	8.8 ft^3/lb
CAS Registry Number:	74-98-6

Shipping Information:	
DOT Proper Name:	Propane
Hazard Class:	2.1
I.D. Number:	UN1978
Labels:	Flammable Gas

Grade	Purity	Impurity	Specification
PurityPlus 5.0 (Research)	> 99.999%	Total Impurities	< 10 ppm
PurityPlus 4.0 (Ultra High Purity)	> 99.99%	Total Impurities	< 100 ppm
PurityPlus 2.5 (Instrument)	> 99.5%	Total Impurities	< 0.5%
PurityPlus 2.0 (Chemically Pure)	> 99.0%	Total Impurities	< 1.0%
PurityPlus R290 (Liquid Phase Withdrawal)		UL Certified	

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Standard Cylinder Sizes *	Contents lbs	Cylinder Pressure PSIG	CGA Valve Connection
350	105	109	510
200	35	109	510
80	13	109	510
LB	0.3	109	170

*Nonstandard cylinder sizes available upon request

PurityPlus® SPECIALTY GASES

Propylene

A colorless, flammable, liquefied, hydrocarbon gas.

Technical Information:	
Chemical Symbol:	C_3H_6
Molecular Weight:	42.08
Specific Volume	8.88 ft^3/lb (0.554 m^3/kg)
CAS Registry Number:	115-07-1

Shipping Information:	
DOT Proper Name:	Propylene
Hazard Class:	2.1
I.D. Number:	UN1077
Labels:	Flammable Gas

Grade	Purity	Impurity	Specification
PurityPlus 5.0 (Electronic)	> 99.999%	Total Impurities	< 10 ppm
PurityPlus 4.5 (Research)	> 99.995%	Total Impurities	< 50 ppm
PurityPlus 4.0	> 99.99%	Total Impurities	< 100 ppm
PurityPlus 3.0	> 99.9%	Total Impurities	< 1000 ppm
PurityPlus 2.5 (Polymer)	> 99.5%	Total Impurities	< 0.5%
PurityPlus 2.0 (Chemically Pure)	> 99.0%	Total Impurities	< 1.0%

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Standard Cylinder Sizes *	Contents lbs.	Cylinder Pressure	CGA Valve Connection
350	105	137	510
200	35	137	510
80	13	137	510
LB	0.3	137	170

*Nonstandard cylinder sizes available upon request

PurityPlus® SPECIALTY GASES

A colorless, irritating, nonflammable, toxic, liquefied gas.

Sulfur Dioxide

Technical Information:	
Chemical Symbol:	SO_2
Molecular Weight:	64.06
Specific Volume	5.99 ft^3/lb (0.374 m^3/kg)
CAS Registry Number:	7446-09-5

Shipping Information:	
DOT Proper Name:	Sulfur Dioxide, Liquefied
Hazard Class:	2.2
I.D. Number:	UN 1079
Labels:	Nonflammable Gas

Grade	Purity	Impurity	Specification
PurityPlus 3.8 (Anhydrous)	> 99.98%	Moisture Residue Sulfuric Acid	< 20 ppm < 50 ppm < 20 ppm

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Standard Cylinder Sizes *	Contents lbs.	Cylinder Pressure	CGA Valve Connection
761	2000	34	660
400	150	34	660
40	40	34	660
LB	1	34	180

*Nonstandard cylinder sizes available upon request

PurityPlus® SPECIALTY GASES

Sulfur Hexafluoride

A colorless, odorless, liquefied gas.

Technical Information:	
Chemical Symbol:	SF_6
Molecular Weight:	146.05
Specific Volume	2.50 ft^3/lb (0.16 m^3/kg)
CAS Registry Number:	2551-62-4

Shipping Information:	
DOT Proper Name:	Sulfur Hexafluoride
Hazard Class:	2.2
I.D. Number:	UN 1080
Labels:	Nonflammable Gas

Grade	Purity	Impurity	Specification
PurityPlus 5.0	99.999%	Air Tetrafluoromethane Moisture	< 6 ppm < 2 ppm < 2 ppm
PurityPlus 4.0	99.99%	Air Tetrafluoromethane Moisture Oil Acidity (as HF)	< 50 ppm < 40 ppm < 5 ppm < 2 ppm < 0.3 ppm
PurityPlus 3.0	99.9%	Air Tetrafluoromethane Moisture Oil Acidity (as HF)	< 300 ppm < 300 ppm < 8 ppm < 5 ppm < 0.3 ppm

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Standard Cylinder Sizes *	Contents lbs	Cylinder Pressure PSIG	CGA Valve Connection
200	115	320	590
80	35	320	590
30	10	320	590

*Nonstandard cylinder sizes available upon request

PurityPlus® SPECIALTY GASES

A colorless, odorless, nonflammable gas.

Tetrafluoromethane (HC-14)

Technical Information:	
Chemical Symbol:	CF_4
Molecular Weight:	88.005
Specific Volume	4.40 ft^3/lb (0.027 m^3/kg)
CAS Registry Number:	75-73-0

Shipping Information:	
DOT Proper Name:	Compressed Gas NOS Tetrafluoromethane
Hazard Class:	2.2
I.D. Number:	UN 1982
Labels:	Nonflammable Gas

Grade	Purity	Impurity	Specification
PurityPlus 5.0	99.999%	Oxygen/Argon Nitrogen CO/CO_2 Other Halocarbons Sulfur Hexafluoride Moisture Acidity (as HF)	< 1 ppm < 4 ppm < 1 ppm < 2 ppm < 1 ppm < 1 ppm < 0.1 ppmw
PurityPlus 4.0	99.99%	Oxygen/Argon Nitrogen CO/CO_2 Other Halocarbons Sulfur Hexafluoride Moisture Acidity (as HF)	< 5 ppm < 20 ppm < 10 ppm < 5 ppm < 5 ppm < 3 ppm < 0.01 ppmw

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Standard Cylinder Sizes *	Contents lbs	Cylinder Pressure PSIG	CGA Valve Connection
200	70	2000	320
80	20	2000	320
LB	0.1	500	320/180

*Nonstandard cylinder sizes available upon request

PurityPlus® SPECIALTY GASES

Trans-2-Butene

A colorless, flammable, liquefied gas having a slight aromatic odor.

Technical Information:	
Chemical Symbol:	C_4H_8
Molecular Weight:	56.11
Specific Volume	7.6 ft^3/lb
CAS Registry Number:	624-64-6

Shipping Information:	
DOT Proper Name:	Butylene
Hazard Class:	2.1
I.D. Number:	UN 1012
Labels:	Flammable Gas

Grade	Purity	Impurity	Specification
PurityPlus 2.0	99% Liquid Phase	Other Hydrocarbons Sulfur Moisture Total impurities	< 1% < 1 ppm < 5 ppm < 1%

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Standard Cylinder Sizes *	Contents lbs	Cylinder Pressure PSIG	CGA Valve Connection
½ Ton	540.0	15	510
LP30	128.0	15	510
LP15	77.0	15	510
LP05	25.0	15	510
LP01	6.0	15	510
300	55.0	15	510
200	50.0	15	510
80	18.0	15	510
30	8.0	15	510

*Nonstandard cylinder sizes available upon request

PurityPlus® SPECIALTY GASES

A colorless, non-toxic, non-flammable gas with slightly ethereal odor

Trifluoromethane (R23)

Technical Information:	
Chemical Symbol:	CHF_3
Molecular Weight:	70.01
Specific Volume	5.5 ft^3/lb
CAS Registry Number:	75-46-7

Shipping Information:	
DOT Proper Name:	Trifluoromethane
Hazard Class:	2.2
I.D. Number:	UN 1984
Labels:	Nonflammable Gas

Grade	Purity	Impurity	Specification
PurityPlus 5.0	99.999% Liquid Phase	Air (N2, O2, CO, CO2) Carbon Dioxide Moisture Other Organics Acidity Total Impurities	< 10 ppm < 10 ppm < 5 ppm < 10 ppm < 0.1 ppmw 10 ppm
PurityPlus 4.5	99.995% Liquid Phase	Air (N2, O2, CO, CO2) Carbon Dioxide Methane Moisture Other Organics Acidity Total Impurities	< 15 ppm < 2 ppm < 1 ppm < 4 ppm < 10 ppm < 0.1 ppmw 50 ppm
PurityPlus 3.0	99.9% Liquid Phase	Air (N2, O2, CO, CO2) Moisture Other Organics Acidity Total Impurities	< 500 ppm < 10 ppm < 1000 ppm < 0.1 ppmw < 1000 ppm

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Standard Cylinder Sizes *	Contents lbs	Cylinder Pressure PSIG	CGA Valve Connection
200	70.0	23.5	660/DISS 716
80	25.0	23.5	660/DISS 716
30	11.0	23.5	660/DISS 716

*Nonstandard cylinder sizes available upon request

PurityPlus® SPECIALTY GASES

Trimethylamine (TMA)

A colorless, toxic, flammable gas.

Technical Information:	
Chemical Symbol:	$(CH_3)_3N$
Molecular Weight:	59.11
Specific Volume	6.4 ft^3/lb (0.4 m^3/kg)
CAS Registry Number:	75-50-3

Shipping Information:	
DOT Proper Name:	Trimethylamine, Anhydrous
Hazard Class:	2.1
I.D. Number:	UN1083
Labels:	Flammable Gas

Grade	Purity	Impurity	Specification
PurityPlus 2.5 (Chemically Pure)	> 99.5%	Total Impurities	< 0.5%

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Standard Cylinder Sizes *	Contents lbs.	Cylinder Pressure	CGA Valve Connection
350	125	13	510
LB	0.375	13	180

*Nonstandard cylinder sizes available upon request

PurityPlus® SPECIALTY GASES

A colorless, odorless, nontoxic, inert gas.

Xenon

Technical Information:	
Chemical Symbol:	Xe
Molecular Weight:	131.3
Specific Volume	2.90 ft^3/lb (0.18 m^3/kg)
CAS Registry Number:	7440-63-3

Shipping Information:	
DOT Proper Name:	Xenon
Hazard Class:	2.2
I.D. Number:	UN 2036
Labels:	Nonflammable Gas

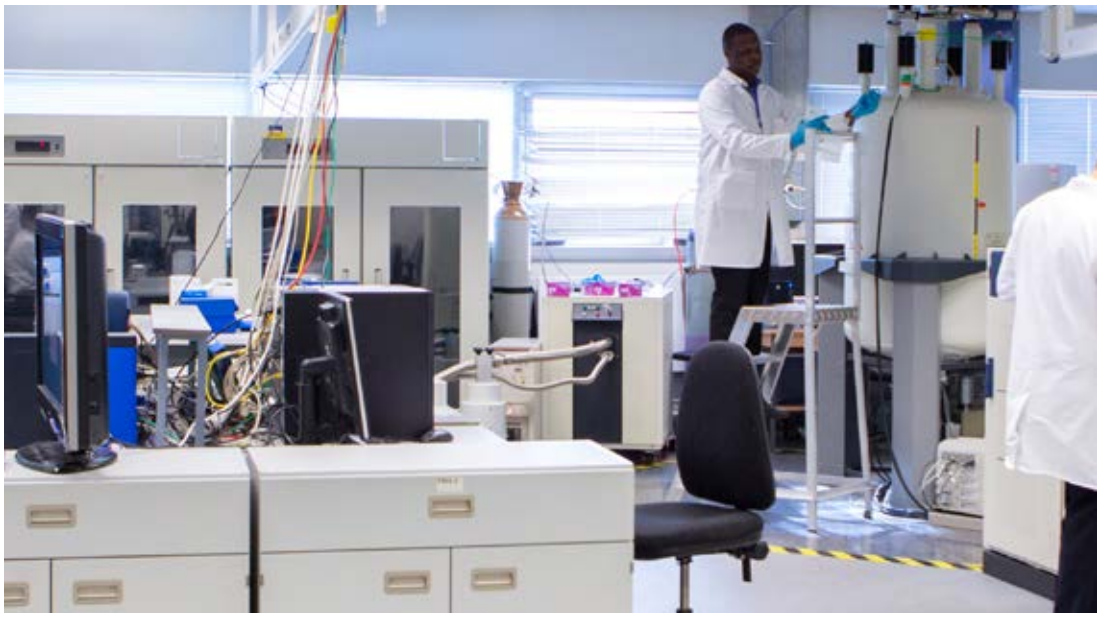
Grade	Purity	Impurity	Specification
PurityPlus 5.0 (Research)	99.999%	Krypton Moisture Hydrogen Oxygen Nitrogen Nitrous Oxide Total Hydrocarbons Tetrafluoromethane Carbon Dioxide Hexafluoroethane Total Impurities	< 10 ppm

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Standard Cylinder Sizes *	Contents liters	Cylinder Pressure PSIG	CGA Valve Connection
200	5000	900	580
80	2500	930	580
35	500	680	580

*Nonstandard cylinder sizes available upon request

Notes:



MIXED GASES

PurityPlus®
SPECIALTY GASES

Section 2 - Mixed Gases

Mixed Gases

Our independently audited and certified laboratories use high accuracy scales combined with the state-of-the-art cylinder preparation techniques to ensure the most accurate and stable mixtures in the industry.

Our laboratories also employ the most sensitive instrumentation and certified reference gases to accurately analyze all of the raw materials used in the manufacture of our mixed gases. This allows for the correction of any cross contamination and ensures that our customers receive the most accurate mixtures possible. This is especially important in hydrocarbon mixtures where impurities can alter the final composition of a mixture.

We offer several grades of mixtures:

PRIMARY STANDARD GRADE - precisely blended mixtures using the most advanced gravimetric techniques, resulting in the highest accuracy of gas mixtures available. NIST traceable weights are used to calibrate the high precision scales.

CERTIFIED STANDARD – calibration gases prepared with high-accuracy gas blending systems, using gravimetric or partial pressure methods. They are then analyzed against Primary Reference Standards, the results of which are reported on the Certificate of Analysis (COA).

CUSTOM MIXTURES – process gas standards that are prepared in the same fashion, and to the same specifications as the Certified Standards, but the analysis is not reported. The requested composition is reported on the label.

ENVIRONMENTAL MIXTURES – high accuracy reference gas mixtures used for the calibration of emission monitoring equipment. These mixtures are manufactured to stringent EPA specifications and procedures to maximize stability and shelf life. NIST traceable Reference Materials are used to certify these mixtures.

Dynamic blending and batch analyses are also available for multiple cylinder batches. Please contact us for more details.

AVAILABLE ANALYSES

Component Analysis – the determination of the concentration of each minor component in the requested mixture. - Results reported on the COA.

Specific Impurity Analysis – determination of the concentration of a specific impurity of concern. - Results reported on the COA.

We can prepare a wide variety and quantity of gases, such as 15 component hydrocarbon mixtures. There may be restrictions in the preparation of some mixtures. For example:

- Components that chemically react, even under limited conditions, will not be mixed together. Mixtures of fuels and oxidizers are given special consideration. Limits are determined by the fuel's lower explosive limit in an oxidizer, as well as the potential energy contained in the mixture.

- If a requested mixture contains a liquefied gas, such as propane, the final pressure of the mixture may be limited to prevent condensation of the component in the cylinder. Condensation of a component would result in separation of the component and the mixture would not be stable.

If there are any questions or concerns, our technical staff is available to assist you in selecting a mixture or series of mixtures to meet your needs. Please contact your nearest PurityPlus sales office with any issue that you may have.

MIXTURE SPECIFICATIONS:

There are two considerations used to determine the mixture grade required, the Mixture Preparation Tolerance and the Analytical Certification Tolerance.

Mixture Preparation Tolerance is the variation of a component from the requested concentration. Tighter tolerance requirements such as in the Aerospace or Electronics industries require Primary Standard grade mixtures. Other requirements, such as process monitoring operations can use the Custom Grade gas mixtures, where only the requested concentration is reported on the label. Whatever your gas requirements may be, you can be assured that our technicians will use the proper care and techniques in the manufacture of your mixture.

Mixture Preparation Tolerance			
Requested concentration	**Primary Standard**	**Certified Standard**	**Custom Mixture**
0.1-50%	**± 1% of requested concentration**	**± 2% of requested concentration**	**Custom Mixtures are manufactured to the same Mixture Preparation Tolerances as our Certified Standard. However, the analysis is not reported and the mixture is labeled with the requested value.**
10-999 PPM	**± 5% of requested concentration**	**± 10% of requested concentration**	
1-10 PPM	**± 10% or requested concentration**	**± 20% of requested concentration**	

Analytical Certification Tolerance, is the term used to indicate the level of certainty of an analysis. Any analytical measurement has a small amount of acceptable variation in the results. The higher accuracy methods of analysis have less variation. The Primary Standard Grade has the highest accuracy and the certainty is within ± 200 PPM for components greater than 2.0%. Please contact us if you have any questions as to which is the right mixture for your requirement.

Analytical Certification Tolerance			
Requested concentration	**Primary Standard**	**Certified Standard**	**Custom Mixture**
0.1-50%	**± 1% of reported concentration or 0.02% absolute, whichever is smaller**	**± 2% of reported concentration**	**Custom Mixtures are manufactured to the same Mixture Preparation Tolerances as our Certified Standard. However, the analysis is not reported and the mixture is labeled with the requested value.**
10-999 PPM	**± 1% of reported concentration**	**± 5% of reported concentration**	
1-10 PPM	**± 0.1 PPM of reported concentration**	**± 10% of reported concentration**	

Ammonia

Ammonia, in Air					
Grade	**Concentration**	**Cylinder Size**	**Contents cu.ft.**	**Pressure psig @ 70° F**	**CGA Valve Connection**
Primary	0.1-4%	200	214	2000	705
		150AL	144	2000	
Certified	10-99ppm	150AL	144	2000	705
		35AL	29	2000	
	100-999ppm	150AL	144	2000	
		35AL	29	2000	
	0.1-4%	200	214	2000	
		150AL	144	2000	
		35AL	29	2000	

Ammonia, in Nitrogen					
Grade	**Concentration**	**Cylinder Size**	**Contents cu.ft.**	**Pressure psig @ 70° F**	**CGA Valve Connection**
Primary	0.1-4%	200	208	2000	705
		150AL	140	2000	
Certified	10-99ppm	150AL	140	2000	705
		35AL	28	2000	
	100-999ppm	150AL	140	2000	
		35AL	28	2000	
	0.1-4%	200	208	2000	
		150AL	140	2000	
		35AL	28	2000	

DN - Description number assigned by manufacturing location.

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Shipping Information:	
DOT/TC Proper Name:	Compressed Gas, N.O.S.
Hazard Class:	2.2
I.D. Number:	UN 1956
Labels:	Non-flammable Gas

Ammonia in other balance gases are available upon request.

Argon

Argon, in Helium					
Grade	**Concentration**	**Cylinder Size**	**Contents cu.ft.**	**Pressure psig @ 70° F**	**CGA Valve Connection**
Primary	100 ppm-50%	200	200	2000	580
Certified	1-49ppm	200	200	2000	580
		80	73	2000	
	50-999 ppm	35	32	2000	
		200	200	2000	
	0.1-50%	80	73	2000	
		35	32	2000	
		200	200	2000	
		80	73	2000	
		35	32	2000	
Custom	50-999 ppm	200	200	2000	580
		80	73	2000	
		35	32	2000	
	0.1-50%	200	200	2000	
		80	73	2000	
		35	32	2000	

DN - Description number assigned by manufacturing location.

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Shipping Information:	
DOT/TC Proper Name:	Compressed gas, n.o.s.
Hazard Class:	2.2
I.D. Number:	UN 1956
Labels:	Non-flammable Gas

Argon in other balance gases are available upon request.

Argon (cont.)

Argon, in Hydrogen					
Grade	**Concentration**	**Cylinder Size**	**Contents cu.ft.**	**Pressure psig @ 70° F**	**CGA Valve Connection**
Primary	100 ppm-50%	200	197	2000	350
Certified	1-49ppm	200	197	2000	350
		80	72	2000	
	50-999 ppm	35	31	2000	
		200	197	2000	
	0.1-50%	80	72	2000	
		35	31	2000	
		200	197	2000	
		80	72	2000	
		35	31	2000	
Custom	50-999 ppm	200	197	2000	350
		80	72	2000	
		35	31	2000	
	0.1-50%	200	197	2000	
		80	72	2000	
		35	31	2000	

DN - Description number assigned by manufacturing location.

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Shipping Information:	
DOT/TC Proper Name:	Compressed Gas, Flammable N.O.S.
Hazard Class:	2.3
I.D. Number:	UN 1954
Labels:	Flammable Gas

Argon in other balance gases are available upon request.

Argon (cont.)

Argon, in Nitrogen					
Grade	**Concentration**	**Cylinder Size**	**Contents cu.ft.**	**Pressure psig @ 70° F**	**CGA Valve Connection**
Primary	100 ppm-50%	200	208	2000	580
Certified	1-49ppm	200	208	2000	580
		80	76	2000	
	50-999 ppm	35	32	2000	
		200	108	2000	
	0.1-50%	80	76	2000	
		35	32	2000	
		200	208	2000	
		80	76	2000	
		35	32	2000	
Custom	50-999 ppm	200	208	2000	580
		80	76	2000	
		35	32	2000	
	0.1-50%	200	208	2000	
		80	76	2000	
		35	32	2000	

DN - Description number assigned by manufacturing location.

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Shipping Information:	
DOT/TC Proper Name:	Compressed gas, n.o.s.
Hazard Class:	2.2
I.D. Number:	UN 1956
Labels:	Non-flammable Gas

Argon in other balance gases are available upon request.

Argon (cont.)

Argon, in Oxygen					
Grade	**Concentration**	**Cylinder Size**	**Contents cu.ft.**	**Pressure psig @ 70° F**	**CGA Valve Connection**
Primary	100 ppm-50%	200	226	2000	296
Certified	1-49ppm	200	226	2000	296
		80	83	2000	
	50-999 ppm	35	35	2000	
		200	226	2000	
	0.1-50%	80	83	2000	
		35	35	2000	
		200	226	2000	
		80	83	2000	
		35	35	2000	
Custom	50-999 ppm	200	226	2000	296
		80	83	2000	
		35	35	2000	
	0.1-50%	200	226	2000	
		80	83	2000	
		35	35	2000	

DN - Description number assigned by manufacturing location.

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Shipping Information:	
DOT/TC Proper Name:	Compressed Gas Oxidizing N.O.S.
Hazard Class:	2.2
I.D. Number:	UN 3156
Labels:	Non-flammable Gas and Oxidizer

Argon in other balance gases are available upon request.

n-Butane

n-Butane in Air					
Grade	**Concentration**	**Cylinder Size**	**Contents cu.ft.**	**Pressure psig @ 70° F**	**CGA Valve Connection**
Primary	50ppm-0.9%	200	214	2000	590
Certified	100-999 ppb	150AL	144	2000	590
		35AL	29	2000	
	1-49 ppm	200	214	2000	
		80	78	2000	
		35	33	2000	
	50-999 ppm	200	214	2000	
		80	78	2000	
		35	33	2000	
	0.1-0.9%	200	214	2000	
		80	78	2000	
		35	33	2000	
Custom	50-999 ppm	200	214	2000	590
		80	78	2000	
		35	33	2000	
	0.1-0.9%	200	214	2000	
		80	78	2000	
		35	33	2000	

DN - Description number assigned by manufacturing location.

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Shipping Information:	
DOT/TC Proper Name:	Compressed Gas, N.O.S.
Hazard Class:	2.2
I.D. Number:	UN 1956
Labels:	Non-flammable Gas

n-Butane in other balance gases are available upon request.

n-Butane (cont.)

n-Butane in Helium					
Grade	**Concentration**	**Cylinder Size**	**Contents cu.ft.**	**Pressure psig @ 70° F**	**CGA Valve Connection**
Primary	50ppm-0.9%	200	200	2000	350
Certified	100-999 ppb	150AL	135	2000	350
		35AL	27	2000	
	1-49 ppm	200	200	2000	
		80	73	2000	
		35	32	2000	
	50-999 ppm	200	200	2000	
		80	73	2000	
		35	32	2000	
	0.1-0.9%	200	200	2000	
		80	73	2000	
		35	32	2000	
Custom	50-999 ppm	200	200	2000	350
		80	73	2000	
		35	32	2000	
	0.1-0.9%	200	200	2000	
		80	73	2000	
		35	32	2000	

DN - Description number assigned by manufacturing location.

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Shipping Information:	
DOT/TC Proper Name:	Compressed Gas, N.O.S.
Hazard Class:	2.2
I.D. Number:	UN 1956
Labels:	Non-flammable Gas

n-Butane in other balance gases are available upon request.

n-Butane (cont.)

n-Butane in Nitrogen					
Grade	**Concentration**	**Cylinder Size**	**Contents cu.ft.**	**Pressure psig @ 70° F**	**CGA Valve Connection**
Primary	50ppm-0.9%	200	208	2000	350
Certified	100-999 ppb	150AL	140	2000	350
		35AL	28	2000	
	1-49 ppm	200	208	2000	
		80	76	2000	
		35	32	2000	
	50-999 ppm	200	208	2000	
		80	76	2000	
		35	32	2000	
	0.1-0.9%	200	208	2000	
		80	76	2000	
		35	32	2000	
Custom	50-999 ppm	200	208	2000	350
		80	76	2000	
		35	32	2000	
	0.1-0.9%	200	208	2000	
		80	76	2000	
		35	32	2000	

DN - Description number assigned by manufacturing location.

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Shipping Information:	
DOT/TC Proper Name:	Compressed Gas, N.O.S.
Hazard Class:	2.2
I.D. Number:	UN 1956
Labels:	Non-flammable Gas

n-Butane in other balance gases are available upon request.

Carbon Dioxide

Carbon Dioxide in Air					
Grade	**Concentration**	**Cylinder Size**	**Contents cu.ft.**	**Pressure psig @ 70° F**	**CGA Valve Connection**
Primary	50ppm-30%	200	214	2000	590
Certified	1-99 ppm	200	214	2000	590
		150AL	144	2000	
		80	78	2000	
		35	33	2000	
		35AL	29	2000	
	100-999 ppm	200	214	2000	
		80	78	2000	
		35	33	2000	
	0.1-30%	200	214	2000	
		80	78	2000	
		35	33	2000	
Custom	100-999 ppm	200	214	2000	590
		80	78	2000	
		35	33	2000	
	0.1-30%	200	214	2000	
		80	78	2000	
		35	33	2000	

DN - Description number assigned by manufacturing location.

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Shipping Information:	
DOT/TC Proper Name:	Compressed Gas, N.O.S.
Hazard Class:	2.2
I.D. Number:	UN 1956
Labels:	Non-flammable Gas

Carbon Dioxide in other balance gases are available upon request.

Carbon Dioxide (cont.)

Carbon Dioxide in Helium					
Grade	**Concentration**	**Cylinder Size**	**Contents cu.ft.**	**Pressure psig @ 70° F**	**CGA Valve Connection**
Primary	50ppm-30%	200	200	2000	580
Certified	1-99 ppm	200	200	2000	580
		150AL	135	2000	
		80	73	2000	
		35	32	2000	
		35AL	27	2000	
	100-999 ppm	200	200	2000	
		80	73	2000	
		35	32	2000	
	0.1-30%	200	200	2000	
		80	73	2000	
		35	32	2000	
Custom	100-999 ppm	200	200	2000	580
		80	73	2000	
		35	32	2000	
	0.1-30%	200	200	2000	
		80	73	2000	
		35	32	2000	

DN - Description number assigned by manufacturing location.

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Shipping Information:	
DOT/TC Proper Name:	Compressed Gas, N.O.S.
Hazard Class:	2.2
I.D. Number:	UN 1956
Labels:	Non-flammable Gas

Carbon Dioxide in other balance gases are available upon request.

Carbon Dioxide (cont.)

Carbon Dioxide in Nitrogen					
Grade	**Concentration**	**Cylinder Size**	**Contents cu.ft.**	**Pressure psig @ 70° F**	**CGA Valve Connection**
Primary	50ppm-30%	200	208	2000	580
Certified	1-99 ppm	200	208	2000	580
		150AL	140	2000	
		80	76	2000	
		35	32	2000	
		35AL	28	2000	
	100-999 ppm	200	208	2000	
		80	76	2000	
		35	32	2000	
	0.1-30%	200	208	2000	
		80	76	2000	
		35	32	2000	
Custom	100-999 ppm	200	208	2000	580
		80	76	2000	
		35	32	2000	
	0.1-30%	200	208	2000	
		80	76	2000	
		35	32	2000	

DN - Description number assigned by manufacturing location.

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Shipping Information:	
DOT/TC Proper Name:	Compressed Gas, N.O.S.
Hazard Class:	2.2
I.D. Number:	UN 1956
Labels:	Non-flammable Gas

Carbon Dioxide in other balance gases are available upon request.

Carbon Dioxide (cont.)

Carbon Dioxide in Oxygen					
Grade	**Concentration**	**Cylinder Size**	**Contents cu.ft.**	**Pressure psig @ 70° F**	**CGA Valve Connection**
Primary	50ppm-30%	200	226	2000	296
Certified	1-99 ppm	200	226	2000	296
		150AL	152	2000	
		80	83	2000	
		35	35	2000	
		35AL	30	2000	
	100-999 ppm	200	226	2000	
		80	83	2000	
		35	35	2000	
	0.1-30%	200	226	2000	
		80	83	2000	
		35	35	2000	
Custom	100-999 ppm	200	226	2000	296
		80	83	2000	
		35	35	2000	
	0.1-30%	200	226	2000	
		80	83	2000	
		35	35	2000	

DN - Description number assigned by manufacturing location.

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Shipping Information:	
DOT/TC Proper Name:	Compressed gas, oxidizing, n.o.s.
Hazard Class:	2.2
I.D. Number:	UN 3156
Labels:	Non-flammable Gas / Oxidizer

Carbon Dioxide in other balance gases are available upon request.

Carbon Monoxide

Carbon Monoxide in Air					
Grade	**Concentration**	**Cylinder Size**	**Contents cu.ft.**	**Pressure psig @ 70° F**	**CGA Valve Connection**
Primary	1-9 ppm	150AL	144	2000	590
	10-999ppm	150AL	144	2000	
	0.1-4%	200	177	1650	
Certified	0.5-9.9 ppm	150AL	144	2000	590
		35AL	29	2000	
	10-999ppm	150AL	144	2000	
		35AL	29	2000	
	0.1-4%	200	177	1650	
		80	64	1650	
		35	28	1650	
Custom	0.1-4%	200	177	1650	590
		80	64	1650	
		35	28	1650	

DN - Description number assigned by manufacturing location.

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Shipping Information:	
% of Carbon Monoxide:	< 20.0%
DOT/TC Proper Name:	Compressed Gas, N.O.S.
Hazard Class:	2.2
I.D. Number:	UN 1956
Labels:	Non-flammable Gas

Carbon Monoxide in other balance gases are available upon request.

Carbon Monoxide (cont.)

Carbon Monoxide in Nitrogen					
Grade	**Concentration**	**Cylinder Size**	**Contents cu.ft.**	**Pressure psig @ 70° F**	**CGA Valve Connection**
Primary	1-9 ppm	150AL	140	2000	350
	10-999ppm	150AL	140	2000	
	0.1-4%	200	173	1650	
Certified	0.5-9.9 ppm	150AL	140	2000	350
		35AL	28	2000	
	10-999ppm	150AL	140	2000	
		35AL	28	2000	
	0.1-9.9%	200	173	1650	
		80	64	1650	
		35	28	1650	
	10-50%	200	173	1650	
		80	64	1650	
		35	28	1650	
Custom	0.1-9.9%	200	173	1650	350
		80	64	1650	
		35	28	1650	
	10-50%	200	173	1650	
		80	64	1650	
		35	28	1650	

DN - Description number assigned by manufacturing location.

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Shipping Information:	
% of Carbon Monoxide:	> 20.0%
DOT/TC Proper Name:	Compressed Gas, Flammable, N.O.S.
Hazard Class:	2.1
I.D. Number:	UN 1954
Labels:	Flammable Gas

Carbon Monoxide in other balance gases are available upon request.

Ethane

Ethane in Air					
Grade	**Concentration**	**Cylinder Size**	**Contents cu.ft.**	**Pressure psig @ 70° F**	**CGA Valve Connection**
Primary	50ppm-1.5%	200	214	2000	350
Certified	100-999 ppb	150AL	144	2000	350
		35AL	29	2000	
	1-49 ppm	200	214	2000	
		80	78	2000	
		35	33	2000	
	50-999 ppm	200	214	2000	
		80	78	2000	
		35	33	2000	
	0.1-1.5%	200	214	2000	
		80	78	2000	
		35	33	2000	
Custom	50-999 ppm	200	214	2000	350
		80	78	2000	
		35	33	2000	
	0.1-1.5%	200	214	2000	
		80	78	2000	
		35	33	2000	

DN - Description number assigned by manufacturing location.

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Shipping Information:		
% of Ethane:	< 12.0%	> 12.0%
DOT/TC Proper Name:	Compressed Gas, N.O.S.	Compressed Gas, Flammable, N.O.S.
Hazard Class:	2.2	2.1
I.D. Number:	UN 1956	UN 1954
Labels:	Non-flammable Gas	Flammable Gas

Ethane in other balance gases are available upon request.

Ethane (cont.)

Ethane in Nitrogen					
Grade	**Concentration**	**Cylinder Size**	**Contents cu.ft.**	**Pressure psig @ 70° F**	**CGA Valve Connection**
Primary	50ppm-1.5%	200	208	2000	590
Certified	100-999 ppb	150AL	140	2000	590
		35AL	28	2000	
	1-49 ppm	200	208	2000	
		80	76	2000	
		35	32	2000	
	50-999 ppm	200	208	2000	
		80	76	2000	
		35	32	2000	
	0.1-20%	200	208	2000	
		80	76	2000	
		35	32	2000	
Custom	50-999 ppm	200	208	2000	590
		80	76	2000	
		35	32	2000	
	0.1-20%	200	208	2000	
		80	76	2000	
		35	32	2000	

DN - Description number assigned by manufacturing location.

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Shipping Information:		
% of Ethane:	< 12.0%	> 12.0%
DOT/TC Proper Name:	Compressed Gas, N.O.S.	Compressed Gas, Flammable, N.O.S.
Hazard Class:	2.2	2.1
I.D. Number:	UN 1956	UN 1954
Labels:	Non-flammable Gas	Flammable Gas

Ethane in other balance gases are available upon request.

Ethylene

Ethylene in Air					
Grade	**Concentration**	**Cylinder Size**	**Contents cu.ft.**	**Pressure psig @ 70° F**	**CGA Valve Connection**
Primary	10-49 ppm	200	214	2000	590
	50 ppm-1.55%	200	214	2000	
Certified	100-999 ppb	150AL	144	2000	590
		35AL	29	2000	
	1-49ppm	200	214	2000	
		80	78	2000	
		35	33	2000	
	50-999 ppm	200	214	2000	
		80	78	2000	
		35	33	2000	
	0.1-1.55%	200	214	2000	
		80	78	2000	
		35	33	2000	
Custom	50-999 ppm	200	214	2000	590
		80	78	2000	
		35	33	2000	
	0.1-1.55%	200	214	2000	
		80	78	2000	
		35	33	2000	

DN - Description number assigned by manufacturing location.

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Shipping Information:		
% of Ethylene:	< 6.0%	> 6.0%
DOT/TC Proper Name:	Compressed Gas, N.O.S.	Compressed Gas, Flammable, N.O.S.
Hazard Class:	2.2	2.1
I.D. Number:	UN 1956	UN 1954
Labels:	Non-flammable Gas	Flammable Gas

Ethylene in other balance gases are available upon request.

Ethylene (cont.)

Ethylene in Nitrogen					
Grade	**Concentration**	**Cylinder Size**	**Contents cu.ft.**	**Pressure psig @ 70° F**	**CGA Valve Connection**
Primary	10-49 ppm	200	214	2000	350
	50 ppm-50%	200	214	2000	
Certified	100-999 ppb	150AL	144	2000	350
		35AL	29	2000	
	1-49ppm	200	214	2000	
		80	78	2000	
		35	33	2000	
	50-999 ppm	200	214	2000	
		80	78	2000	
		35	33	2000	
	0.1-50%	200	214	2000	
		80	78	2000	
		35	33	2000	
Custom	50-999 ppm	200	214	2000	350
		80	78	2000	
		35	33	2000	
	0.1-50%	200	214	2000	
		80	78	2000	
		35	33	2000	

DN - Description number assigned by manufacturing location.

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Shipping Information:		
% of Ethylene:	< 6.0%	> 6.0%
DOT/TC Proper Name:	Compressed Gas, N.O.S.	Compressed Gas, Flammable, N.O.S.
Hazard Class:	2.2	2.1
I.D. Number:	UN 1956	UN 1954
Labels:	Non-flammable Gas	Flammable Gas

Ethylene in other balance gases are available upon request.

Helium

Helium in Argon					
Grade	**Concentration**	**Cylinder Size**	**Contents cu.ft.**	**Pressure psig @ 70° F**	**CGA Valve Connection**
Primary	500 ppm -50%	200	226	2000	580
Certified	1-49 ppm	200	226	2000	580
		80	83	2000	
		35	35	2000	
	50-999 ppm	200	226	2000	
		80	83	2000	
		35	35	2000	
	0.1-50%	200	226	2000	
		80	83	2000	
		35	35	2000	
Custom	50-999 ppm	200	226	2000	580
		80	83	2000	
		35	35	2000	
	0.1-50%	200	226	2000	
		80	83	2000	
		35	35	2000	

DN - Description number assigned by manufacturing location.

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Shipping Information:	
Major Component:	Argon
DOT/TC Proper Name:	Compressed gas, n.o.s.
Hazard Class:	2.2
I.D. Number:	UN 1956
Labels:	Non-flammable Gas

Helium in other balance gases are available upon request.

Helium (cont.)

Helium in Nitrogen					
Grade	**Concentration**	**Cylinder Size**	**Contents cu.ft.**	**Pressure psig @ 70° F**	**CGA Valve Connection**
Primary	500 ppm -50%	200	208	2000	580
Certified	1-49 ppm	200	208	2000	580
		80	76	2000	
		35	32	2000	
	50-999 ppm	200	208	2000	
		80	76	2000	
		35	32	2000	
	0.1-50%	200	208	2000	
		80	76	2000	
		35	32	2000	
Custom	50-999 ppm	200	208	2000	580
		80	76	2000	
		35	32	2000	
	0.1-50%	200	208	2000	
		80	76	2000	
		35	32	2000	

DN - Description number assigned by manufacturing location.

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Shipping Information:	
Major Component:	Nitrogen
DOT/TC Proper Name:	Compressed gas, n.o.s.
Hazard Class:	2.2
I.D. Number:	UN 1956
Labels:	Non-flammable Gas

Helium in other balance gases are available upon request.

Hexane

Hexane in Air					
Grade	**Concentration**	**Cylinder Size**	**Contents cu.ft.**	**Pressure psig @ 70° F**	**CGA Valve Connection**
Primary	10-49 ppm	200	214	2000	590
	50-700 ppm	200	214	2000	
Certified	100-999 ppb	150AL	144	2000	590
		35AL	29	2000	
	1-99 ppm	200	214	2000	
		35	33	2000	
	100-700 ppm	200	214	2000	
		35	33	2000	
Custom	100-700 ppm	200	214	2000	590
		35	33	2000	

Hexane in Nitrogen					
Grade	**Concentration**	**Cylinder Size**	**Contents cu.ft.**	**Pressure psig @ 70° F**	**CGA Valve Connection**
Primary	10-49 ppm	200	208	2000	350
	50-700 ppm	200	208	2000	
Certified	100-999 ppb	150AL	140	2000	350
		35AL	28	2000	
	1-99 ppm	200	208	2000	
		35	32	2000	
	100-700 ppm	200	208	2000	
		35	32	2000	
Custom	100-700 ppm	200	208	2000	350
		35	32	2000	

DN - Description number assigned by manufacturing location.

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Shipping Information:	
DOT/TC Proper Name:	Compressed Gas, N.O.S.
Hazard Class:	2.2
I.D. Number:	UN 1956
Labels:	Non-flammable Gas

Hexane in other balance gases are available upon request.

Hydrogen

Hydrogen in Air					
Grade	**Concentration**	**Cylinder Size**	**Contents cu.ft.**	**Pressure psig @ 70° F**	**CGA Valve Connection**
Primary	10 ppm-0.1%	150AL	144	2000	590
	0.1-2.0%	200	214	2000	
Certified	5-49 ppm	200	214	2000	590
		80	78	2000	
		35	33	2000	
	50-999ppm	200	214	2000	
		80	78	2000	
		35	33	2000	
	0.1-2.0%	200	214	2000	
		80	78	2000	
		35	33	2000	
Custom	50-999 ppm	200	214	2000	590
		80	78	2000	
		35	33	2000	
	0.1-2.0%	200	214	2000	
		80	78	2000	
		35	33	2000	

DN - Description number assigned by manufacturing location.

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Shipping Information:	
Major Component:	Air
% of Hydrogen:	< 2.8%
DOT/TC Proper Name:	Compressed Gas, N.O.S.
Hazard Class:	2.2
I.D. Number:	UN 1956
Labels:	Non-flammable Gas

Hydrogen in other balance gases are available upon request.

Hydrogen (cont.)

Hydrogen in Argon					
Grade	**Concentration**	**Cylinder Size**	**Contents cu.ft.**	**Pressure psig @ 70° F**	**CGA Valve Connection**
Primary	0.1-50%	150AL	226	2000	350
Certified	5-49 ppm	200	226	2000	350
		80	83	2000	
		35	35	2000	
	50-999ppm	200	226	2000	
		80	83	2000	
		35	35	2000	
	0.1-50%	200	226	2000	
		80	83	2000	
		35	35	2000	
Custom	50-999 ppm	200	226	2000	350
		80	83	2000	
		35	35	2000	
	0.1-50%	200	226	2000	
		80	83	2000	

DN - Description number assigned by manufacturing location.

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Shipping Information:		
Major Component:	Argon	Argon
% of Hydrogen:	< 2.9%	> 2.9%
DOT/TC Proper Name:	Compressed Gas, N.O.S.	Compressed Gas, Flammable, N.O.S.
Hazard Class:	2.2	2.1
I.D. Number:	UN 1956	UN 1954
Labels:	Non-flammable Gas	Flammable Gas

Hydrogen in other balance gases are available upon request.

Hydrogen (cont.)

Hydrogen in Helium					
Grade	**Concentration**	**Cylinder Size**	**Contents cu.ft.**	**Pressure psig @ 70° F**	**CGA Valve Connection**
Primary	0.1-50%	200	200	2000	350
Certified	5-49 ppm	200	200	2000	350
		150AL	135	2000	
		80	73	2000	
		35	32	2000	
		35AL	27	2000	
	50-999ppm	200	200	2000	
		80	73	2000	
		35	32	2000	
	0.1-50%	200	200	2000	
		80	73	2000	
		35	32	2000	
Custom	50-999 ppm	200	200	2000	350
		80	73	2000	
		35	32	2000	
	0.1-50%	200	200	2000	
		80	73	2000	

DN - Description number assigned by manufacturing location.

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Shipping Information:		
Major Component:	Helium	Helium
% of Hydrogen:	< 3.9%	> 3.9%
DOT/TC Proper Name:	Compressed Gas, N.O.S.	Compressed Gas, Flammable, N.O.S.
Hazard Class:	2.2	2.1
I.D. Number:	UN 1956	UN 1954
Labels:	Non-flammable Gas	Flammable Gas

Hydrogen in other balance gases are available upon request.

Hydrogen (cont.)

Hydrogen in Nitrogen					
Grade	**Concentration**	**Cylinder Size**	**Contents cu.ft.**	**Pressure psig @ 70° F**	**CGA Valve Connection**
Primary	10 ppm-0.1%	150AL	208	2000	350
Certified	5-49 ppm	200	208	2000	350
		80	76	2000	
		35	32	2000	
	50-999ppm	200	208	2000	
		80	76	2000	
		35	32	2000	
	0.1-2.0%	200	208	2000	
		80	76	2000	
		35	32	2000	
Custom	50-999 ppm	200	208	2000	350
		80	76	2000	
		35	32	2000	
	0.1-50%	200	208	2000	
		80	76	2000	
		35	32	2000	

DN - Description number assigned by manufacturing location.

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Shipping Information:		
Major Component:	Nitrogen	Nitrogen
% of Hydrogen:	< 5.7%	> 5.7%
DOT/TC Proper Name:	Compressed Gas, N.O.S.	Compressed Gas, Flammable, N.O.S.
Hazard Class:	2.2	2.1
I.D. Number:	UN 1956	UN 1954
Labels:	Non-flammable Gas	Flammable Gas

Hydrogen in other balance gases are available upon request.

Hydrogen Sulfide

Hydrogen Sulfide in Nitrogen					
Grade	**Concentration**	**Cylinder Size**	**Contents cu.ft.**	**Pressure psig @ 70° F**	**CGA Valve Connection**
Primary	10 ppm -0.5%	150AL	140	2000	330
Certified	0.5-9.9 ppm	150AL	140	2000	330
	10-50 ppm	150AL	140	2000	
	51-99 ppm	150AL	140	2000	
		35AL	28	2000	
	100 ppm-0.49%	150AL	140	2000	
		35AL	28	2000	
	0.5%-1%	200	208	2000	
		150AL	140	2000	
		35AL	28	2000	

DN - Description number assigned by manufacturing location.

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Hydrogen Sulfide in other balance gases are available upon request.

Shipping Information:			
Major Component:	Nitrogen	Nitrogen	Nitrogen
% of Hydrogen Sulfide:	< 4.3	>4.3% <14.24%	> 14.24%
DOT/TC Proper Name:	Compressed Gas, N.O.S.	Compressed Gas, Flammable, N.O.S.	Compressed Gas, Toxic, Flammable, N.O.S.
Hazard Class:	2.2	2.1	2.3
I.D. Number:	UN 1956	UN 1954	UN 1953
Labels:	Non-flammable Gas	Flammable Gas	Poison Gas, Inhalation Hazard and Flammable Gas

Isobutane

Isobutane in Air					
Grade	**Concentration**	**Cylinder Size**	**Contents cu.ft.**	**Pressure psig @ 70° F**	**CGA Valve Connection**
Primary	10-49 ppm	200	214	2000	590
	50ppm -0.9%	200	214	2000	
Certified	100-999 ppb	150AL	144	2000	590
		35AL	29	2000	
	1-49 ppm	200	214	2000	
		35	33	2000	
	50-999 ppm	200	214	2000	
		35	33	2000	
	0.1-0.9%	200	214	2000	
		35	33	2000	
Custom	50-999 ppm	200	214	2000	590
		35	33	2000	
	0.1-0.9%	200	214	2000	
		35	33	2000	

DN - Description number assigned by manufacturing location.

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Shipping Information:	
DOT/TC Proper Name:	Compressed Gas, N.O.S.
Hazard Class:	2.2
I.D. Number:	UN 1956
Labels:	Non-flammable Gas

Isobutane in other balance gases are available upon request.

Isobutane (cont.)

Isobutane in Nitrogen					
Grade	**Concentration**	**Cylinder Size**	**Contents cu.ft.**	**Pressure psig @ 70° F**	**CGA Valve Connection**
Primary	10-49 ppm	200	208	2000	350
	50ppm -1.0%	200	208	2000	
Certified	100-999 ppb	150AL	140	2000	350
		35AL	28	2000	
	1-49 ppm	200	208	2000	
		35	32	2000	
	50-999 ppm	200	208	2000	
		35	32	2000	
	0.1-1.0%	200	208	2000	
		35	32	2000	
Custom	50-999 ppm	200	208	2000	350
		35	32	2000	
	0.1-1.0%	200	208	2000	
		35	32	2000	

DN - Description number assigned by manufacturing location.

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Shipping Information:	
DOT/TC Proper Name:	Compressed Gas, N.O.S.
Hazard Class:	2.2
I.D. Number:	UN 1956
Labels:	Non-flammable Gas

Isobutane in other balance gases are available upon request.

Methane

Methane in Air					
Grade	**Concentration**	**Cylinder Size**	**Contents cu.ft.**	**Pressure psig @ 70° F**	**CGA Valve Connection**
Primary	10ppm-2.5%	200	214	2000	590
Certified	1-49 ppm	200	214	2000	590
		80	78	2000	
		35	33	2000	
	50-999 ppm	200	214	2000	
		80	78	2000	
		35	33	2000	
	0.1-2.5%	200	214	2000	
		80	78	2000	
		35	33	2000	
Custom	50-999 ppm	200	214	2000	590
		80	78	2000	
		35	33	2000	
	0.1-2.5%	200	214	2000	
		80	78	2000	
		35	33	2000	

DN - Description number assigned by manufacturing location.

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Shipping Information:	
Major Component:	Air
% of Methane:	< 2.5%
DOT/TC Proper Name:	Compressed Gas, N.O.S.
Hazard Class:	2.2
I.D. Number:	UN 1956
Labels:	Non-flammable Gas

Methane in other balance gases are available upon request.

Methane (cont.)

Methane in Argon					
Grade	**Concentration**	**Cylinder Size**	**Contents cu.ft.**	**Pressure psig @ 70° F**	**CGA Valve Connection**
Primary	1-49 ppm	200	226	2000	350
	50 ppm-50%	200	226	2000	
Certified	1-49 ppm	200	226	2000	350
		80	83	2000	
		35	35	2000	
	50-999 ppm	200	226	2000	
		80	83	2000	
		35	35	2000	
	0.1-50%	200	226	2000	
		80	83	2000	
		35	35	2000	
Custom	50-999 ppm	200	226	2000	350
		80	83	2000	
		35	35	2000	
	0.1-50%	200	226	2000	
		80	83	2000	
		35	35	2000	

DN - Description number assigned by manufacturing location.

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Shipping Information:		
Major Component:	Argon	Argon
% of Methane:	<10.0%	>10.0%
DOT/TC Proper Name:	Compressed Gas, N.O.S.	Compressed Gas, Flammable, N.O.S.
Hazard Class:	2.2	2.1
I.D. Number:	UN 1956	UN 1954
Labels:	Non-flammable Gas	Flammable Gas

Methane in other balance gases are available upon request.

Methane (cont.)

Methane in Hydrogen					
Grade	**Concentration**	**Cylinder Size**	**Contents cu.ft.**	**Pressure psig @ 70° F**	**CGA Valve Connection**
Primary	10-49 ppm	200	197	2000	350
	50 ppm-50%	200	197	2000	
Certified	1-49 ppm	200	197	2000	350
		80	72	2000	
		35	31	2000	
	50-999 ppm	200	197	2000	
		80	72	2000	
		35	31	2000	
	0.1-50%	200	197	2000	
		80	72	2000	
		35	31	2000	
Custom	50-999 ppm	200	197	2000	350
		80	72	2000	
		35	31	2000	
	0.1-50%	200	197	2000	
		80	72	2000	
		35	31	2000	

DN - Description number assigned by manufacturing location.

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Shipping Information:	
Major Component:	Hydrogen
DOT/TC Proper Name:	Compressed Gas, Flammable, N.O.S.
Hazard Class:	2.1
I.D. Number:	UN 2034
Labels:	Flammable Gas

Methane in other balance gases are available upon request.

Methane (cont.)

Methane in Nitrogen					
Grade	**Concentration**	**Cylinder Size**	**Contents cu.ft.**	**Pressure psig @ 70° F**	**CGA Valve Connection**
Primary	1-9 ppm	200	208	2000	350
	10 ppm-50%	200	208	2000	
Certified	1-49 ppm	200	208	2000	350
		80	76	2000	
		35	32	2000	
	50-999 ppm	200	208	2000	
		80	76	2000	
		35	32	2000	
	0.1-50%	200	208	2000	
		80	76	2000	
		35	32	2000	
Custom	50-999 ppm	200	208	2000	350
		80	76	2000	
		35	32	2000	
	0.1-50%	200	208	2000	
		80	76	2000	
		35	32	2000	

DN - Description number assigned by manufacturing location.

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Shipping Information:		
Major Component:	Nitrogen	Nitrogen
% of Methane:	< 14.3%	> 14.3%
DOT/TC Proper Name:	Compressed Gas, N.O.S.	Compressed Gas, Flammable, N.O.S.
Hazard Class:	2.2	2.1
I.D. Number:	UN 1956	UN 1954
Labels:	Non-flammable Gas	Flammable Gas

Methane in other balance gases are available upon request.

Nitric Oxide

Nitric Oxide in Nitrogen					
Grade	**Concentration**	**Cylinder Size**	**Contents cu.ft.**	**Pressure psig @ 70° F**	**CGA Valve Connection**
Primary	2.9-9 ppm	150AL	140	2000	660
	10-999 ppm	150AL	140	2000	
	0.1-0.5%	150AL	140	2000	
Certified	0.4-9.9 ppm	150AL	140	2000	660
		35AL	28	2000	
	10-99 ppm	150AL	140	2000	
		35AL	28	2000	
	100-999 ppm	150AL	140	2000	
		35AL	28	2000	
	0.1-0.99%	150AL	140	2000	
		35AL	28	2000	

DN - Description number assigned by manufacturing location.

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Shipping Information:	
% of Nitric Oxide:	< 2.3%
DOT/TC Proper Name:	Compressed Gas, N.O.S.
Hazard Class:	2.2
I.D. Number:	UN 1956
Labels:	Non-flammable Gas

Nitric Oxide in other balance gases are available upon request.

Nitrogen

Nitrogen in Argon					
Grade	**Concentration**	**Cylinder Size**	**Contents cu.ft.**	**Pressure psig @ 70° F**	**CGA Valve Connection**
Primary	200ppm - 50%	200	226	2000	580
Certified	1- 49 ppm	200	226	2000	580
		80	83	2000	
		35	35	2000	
	50-999 ppm	200	226	2000	
		80	83	2000	
		35	35	2000	
	0.1-50%	200	226	2000	
		80	83	2000	
		35	35	2000	
Custom	50-999ppm	200	226	2000	580
		80	83	2000	
		35	35	2000	
	0.1-50%	200	226	2000	
		80	83	2000	

DN - Description number assigned by manufacturing location.

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Shipping Information:	
Major Component:	Argon
DOT/TC Proper Name:	Compressed gas, n.o.s.
Hazard Class:	2.2
I.D. Number:	UN 1956
Labels:	Non-flammable Gas

Nitrogen in other balance gases are available upon request.

Nitrogen (cont.)

Nitrogen in Helium					
Grade	**Concentration**	**Cylinder Size**	**Contents cu.ft.**	**Pressure psig @ 70° F**	**CGA Valve Connection**
Primary	200ppm - 50%	200	200	2000	580
Certified	1- 49 ppm	200	200	2000	580
		80	73	2000	
		35	32	2000	
	50-999 ppm	200	200	2000	
		80	73	2000	
		35	32	2000	
	0.1-50%	200	200	2000	
		80	73	2000	
		35	32	2000	
Custom	50-999ppm	200	200	2000	580
		80	73	2000	
		35	32	2000	
	0.1-50%	200	200	2000	
		80	73	2000	

DN - Description number assigned by manufacturing location.

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Shipping Information:	
Major Component:	Helium
DOT/TC Proper Name:	Compressed gas, n.o.s.
Hazard Class:	2.2
I.D. Number:	UN 1956
Labels:	Non-flammable Gas

Nitrogen in other balance gases are available upon request.

Nitrogen (cont.)

Nitrogen in Hydrogen					
Grade	**Concentration**	**Cylinder Size**	**Contents cu.ft.**	**Pressure psig @ 70° F**	**CGA Valve Connection**
Primary	200ppm - 50%	200	197	2000	350
Certified	1- 49 ppm	200	197	2000	350
		80	72	2000	
		35	31	2000	
	50-999 ppm	200	197	2000	
		80	72	2000	
		35	31	2000	
	0.1-50%	200	197	2000	
		80	72	2000	
		35	31	2000	
Custom	50-999ppm	200	197	2000	350
		80	72	2000	
		35	31	2000	
	0.1-50%	200	197	2000	
		80	72	2000	
		80	31	2000	

DN - Description number assigned by manufacturing location.

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Shipping Information:	
Major Component:	Hydrogen
DOT/TC Proper Name:	Compressed Gas, Flammable, N.O.S.
Hazard Class:	2.1
I.D. Number:	UN 1954
Labels:	Flammable Gas

Nitrogen in other balance gases are available upon request.

Nitrogen Dioxide

Nitrogen Dioxide in Air					
Grade	**Concentration**	**Cylinder Size**	**Contents cu.ft.**	**Pressure psig @ 70° F**	**CGA Valve Connection**
Primary	500 ppm - 1.0%	150AL	144	2000	660
Certified	1-19.9 ppm	150AL	144	2000	660
		35AL	29	2000	
	20-999 ppm	150AL	144	2000	
		35AL	29	2000	
	0.1-1%	200	214	2000	
		150AL	144	2000	
		35AL	29	2000	

Nitrogen Dioxide in Nitrogen					
Grade	**Concentration**	**Cylinder Size**	**Contents cu.ft.**	**Pressure psig @ 70° F**	**CGA Valve Connection**
Primary	500 ppm - 2.2%	150AL	140	2000	660
Certified	1-19.9 ppm	150AL	140	2000	660
		35AL	28	2000	
	20-999 ppm	150AL	140	2000	
		35AL	28	2000	
	0.1-2.2%	200	208	2000	
		150AL	140	2000	
		35AL	28	2000	

DN - Description number assigned by manufacturing location.

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Shipping Information:	
% of Nitrogen Dioxide:	< 2.2%
DOT/TC Proper Name:	Compressed Gas, N.O.S.
Hazard Class:	2.2
I.D. Number:	UN 1956
Labels:	Non-flammable Gas

Nitrogen Dioxide in other balance gases are available upon request.

Nitrous Oxide

Nitrous Oxide in Nitrogen					
Grade	**Concentration**	**Cylinder Size**	**Contents cu.ft.**	**Pressure psig @ 70° F**	**CGA Valve Connection**
Primary	50 ppm -50%	200	208	2000	590
Certified	1-99 ppm	200	208	2000	590
		150AL	140	2000	
		80	76	2000	
		35	32	2000	
		35AL	28	2000	
	100-9999 ppm	200	208	2000	
		150AL	140	2000	
		80	76	2000	
		35	32	2000	
		35AL	28	2000	
	1-50%	200	208	2000	
		80	76	2000	
		35	32	2000	
Custom	100-9999 ppm	200	208	2000	590
		150AL	140	2000	
		80	76	2000	
		35	32	2000	
		35AL	28	2000	
	1-50%	200	208	2000	
		80	76	2000	
		35	32	2000	

DN - Description number assigned by manufacturing location.

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Shipping Information:	
DOT/TC Proper Name:	Compressed Gas, N.O.S.
Hazard Class:	2.2
I.D. Number:	UN 1956
Labels:	Non-flammable Gas

Nitrous Oxide in other balance gases are available upon request.

Oxygen

Oxygen in Argon

Grade	Concentration	Cylinder Size	Contents cu.ft.	Pressure psig @ 70° F	CGA Valve Connection
Primary	100-999 ppm	150AL	152	2000	Varies with Oxgyen concentration
	0.1-50%	200	226	2000	
Certified	1-49 ppm	150AL	152	2000	Varies with Oxgyen concentration
		35AL	30	2000	
	50-999 ppm	150AL	152	2000	
		35AL	30	2000	
	0.1-50%	200	226	2000	
		80	83	2000	
		35	35	2000	
Custom	0.1-50%	200	226	2000	Varies with Oxgyen concentration
		80	83	2000	
		35	35	2000	

Oxygen in Helium

Grade	Concentration	Cylinder Size	Contents cu.ft.	Pressure psig @ 70° F	CGA Valve Connection
Primary	100-999 ppm	150AL	135	2000	Varies with Oxgyen concentration
	0.1-50%	200	200	2000	
Certified	1-49 ppm	150AL	135	2000	Varies with Oxgyen concentration
		35AL	27	2000	
	50-999 ppm	150AL	135	2000	
		35AL	27	2000	
	0.1-50%	200	200	2000	
		80	73	2000	
		35	32	2000	
Custom	0.1-50%	200	200	2000	Varies with Oxgyen concentration
		80	73	2000	
		35	32	2000	

DN - Description number assigned by manufacturing location.

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Shipping Information:		
Major Component:	Argon or Helium	(Argon, Helium, Nitrogen) Note:
DOT/TC Proper Name:	Compressed gas, n.o.s.	> 23.5% O2 Compressed Gas, Oxidizing N.O.S.
Hazard Class:	2.2	2.2
I.D. Number:	UN 1956	UN 3156
Labels:	Non-flammable Gas	Non-flammable Gas and Oxidizers

Oxygen in other balance gases are available upon request.

Oxygen (cont.)

Oxygen in Nitrogen					
Grade	**Concentration**	**Cylinder Size**	**Contents cu.ft.**	**Pressure psig @ 70° F**	**CGA Valve Connection**
Primary	100-999 ppm	150AL	140	2000	Varies with Oxygen conentration
	0.1-50%	200	208	2000	
Certified	1-49 ppm	150AL	140	2000	Varies with Oxygen conentration
		35AL	28	2000	
	50-999 ppm	150AL	140	2000	
		35AL	32	2000	
	0.1-50%	200	208	2000	
		80	76	2000	
		35	32	2000	
Custom	0.1-50%	200	208	2000	Varies with Oxygen conentration
		80	76	2000	
		35	28	2000	

DN - Description number assigned by manufacturing location.

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Shipping Information:		
Major Component:	Nitrogen	(Argon, Helium, Nitrogen) Note:
DOT/TC Proper Name:	Compressed Gas, N.O.S.	> 23.5% O2 Compressed Gas, Oxidizing N.O.S.
Hazard Class:	2.2	2.2
I.D. Number:	UN 1956	UN 3156
Labels:	Non-flammable Gas	Non-flammable Gas and Oxidizers

Oxygen in other balance gases are available upon request.

n-Pentane

n-Pentane in Air					
Grade	**Concentration**	**Cylinder Size**	**Contents cu.ft.**	**Pressure psig @ 70° F**	**CGA Valve Connection**
Primary	1 ppm -0.7%	200	214	2000	590
Certified	1 ppm-0.7%	200	214	2000	590
		80	78	2000	
		35	33	2000	

n-Pentane in Nitrogen					
Grade	**Concentration**	**Cylinder Size**	**Contents cu.ft.**	**Pressure psig @ 70° F**	**CGA Valve Connection**
Primary	1 ppm -1.0%	200	208	2000	350
Certified	1 ppm-1.0%	200	208	2000	350
		80	76	2000	
		35	32	2000	

DN - Description number assigned by manufacturing location.

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Shipping Information:	
DOT/TC Proper Name:	Compressed Gas, N.O.S.
Hazard Class:	2.2
I.D. Number:	UN 1956
Labels:	Non-flammable Gas

n-Pentane in other balance gases are available upon request.

Propane

Propane in Air					
Grade	**Concentration**	**Cylinder Size**	**Contents cu.ft.**	**Pressure psig @ 70° F**	**CGA Valve Connection**
Primary	1-9.9 ppm	200	214	2000	590
	10 ppm -1.05%	200	214	2000	
Certified	100-999 ppb	150AL	144	2000	590
		35AL	29	2000	
	1-49 ppm	200	214	2000	
		35	33	2000	
	50-999 ppm	200	214	2000	
		35	33	2000	
	0.1-1.05%	200	214	2000	
		35	33	2000	
Custom	50-999 ppm	200	214	2000	590
		35	33	2000	
	0.1-1.05%	200	214	2000	
		35	33	2000	

DN - Description number assigned by manufacturing location.

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Shipping Information:	
DOT/TC Proper Name:	Compressed Gas, N.O.S.
Hazard Class:	2.2
I.D. Number:	UN 1956
Labels:	Non-flammable Gas

Propane in other balance gases are available upon request.

Propane (cont.)

Propane in Nitrogen					
Grade	**Concentration**	**Cylinder Size**	**Contents cu.ft.**	**Pressure psig @ 70° F**	**CGA Valve Connection**
Primary	1-9.9 ppm	200	208	2000	350
	10 ppm -4%	200	208	2000	
Certified	100-999 ppb	150AL	140	2000	350
		35AL	28	2000	
	1-49 ppm	200	208	2000	
		35	32	2000	
	50-999 ppm	200	208	2000	
		35	32	2000	
	0.1-4%	200	208	2000	
		35	32	2000	
Custom	50-999 ppm	200	208	2000	350
		35	32	2000	
	0.1-4%	200	208	2000	
		35	32	2000	

DN - Description number assigned by manufacturing location.

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Shipping Information:	
DOT/TC Proper Name:	Compressed Gas, N.O.S.
Hazard Class:	2.2
I.D. Number:	UN 1956
Labels:	Non-flammable Gas

Propane in other balance gases are available upon request.

Propylene

Propylene in Air					
Grade	**Concentration**	**Cylinder Size**	**Contents cu.ft.**	**Pressure psig @ 70° F**	**CGA Valve Connection**
Primary	1-9.9 ppm	200	214	2000	590
	10-49 ppm	200	214	2000	
	50 ppm-1.2%	200	214	2000	
Certified	100-999 ppb	150AL	144	2000	590
		35AL	29	2000	
	1-49 ppm	200	214	2000	
		35	33	2000	
	50-999 ppm	200	214	2000	
		35	33	2000	
	0.1-1.2%	200	214	2000	
		35	33	2000	
Custom	50-999 ppm	200	214	2000	590
		35	33	2000	
	0.1-1.2%	200	214	2000	
		35	33	2000	

DN - Description number assigned by manufacturing location.

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Shipping Information:		
% of Propylene:	< 5.6%*	> 5.6%*
DOT/TC Proper Name:	Compressed Gas, N.O.S.	Compressed Gas, Flammable, N.O.S.
Hazard Class:	2.2	2.1
I.D. Number:	UN 1956	UN 1954
Labels:	Non-flammable Gas	Flammable Gas
*According to CGA-PQ3		

Propylene in other balance gases are available upon request.

Propylene (cont.)

Propylene in Nitrogen					
Grade	**Concentration**	**Cylinder Size**	**Contents cu.ft.**	**Pressure psig @ 70° F**	**CGA Valve Connection**
Primary	1-9.9 ppm	200	208	2000	350
	10-49 ppm	200	208	2000	
	50 ppm-6%	200	208	2000	
Certified	100-999 ppb	150AL	140	2000	350
		35AL	28	2000	
	1-49 ppm	200	208	2000	
		35	32	2000	
	50-999 ppm	200	208	2000	
		35	32	2000	
	0.1-6%	200	208	2000	
		35	32	2000	
Custom	50-999 ppm	200	208	2000	350
		35	32	2000	
	0.1-6%	200	208	2000	
		35	32	2000	

DN - Description number assigned by manufacturing location.

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Shipping Information:		
% of Propylene:	< 5.6%*	> 5.6%*
DOT/TC Proper Name:	Compressed Gas, N.O.S.	Compressed Gas, Flammable, N.O.S.
Hazard Class:	2.2	2.1
I.D. Number:	UN 1956	UN 1954
Labels:	Non-flammable Gas	Flammable Gas
*According to CGA-PQ3		

Propylene in other balance gases are available upon request.

Sulfur Dioxide

Sulfur Dioxide in Air					
Grade	**Concentration**	**Cylinder Size**	**Contents cu.ft.**	**Pressure psig @ 70° F**	**CGA Valve Connection**
Primary	100 ppm-1%	150AL	144	2000	660
Certified	0.4-9.9 ppm	150AL	144	2000	660
	10-99 ppm	150AL	144	2000	
		35AL	29	2000	
	100-999 ppm	150AL	144	2000	
		35AL	29	2000	
	0.1-1%	200	214	2000	
		150AL	144	2000	
		35AL	29	2000	

DN - Description number assigned by manufacturing location.

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Shipping Information:	
DOT/TC Proper Name:	Compressed Gas, N.O.S.
Hazard Class:	2.2
I.D. Number:	UN 1956
Labels:	Non-flammable Gas

Sulfur Dioxide in other balance gases are available upon request.

Sulfur Dioxide (cont.)

Sulfur Dioxide in Nitrogen					
Grade	**Concentration**	**Cylinder Size**	**Contents cu.ft.**	**Pressure psig @ 70° F**	**CGA Valve Connection**
Primary	100 ppm-1%	150AL	140	2000	660
Certified	0.4-9.9 ppm	150AL	140	2000	660
		35AL	28	2000	
	10-99 ppm	150AL	140	2000	
		35AL	28	2000	
	100-999 ppm	150AL	140	2000	
		35AL	28	2000	
	0.1-1%	200	208	2000	
		150AL	140	2000	
		35AL	28	2000	

DN - Description number assigned by manufacturing location.

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Shipping Information:	
DOT/TC Proper Name:	Compressed Gas, N.O.S.
Hazard Class:	2.2
I.D. Number:	UN 1956
Labels:	Non-flammable Gas

Sulfur Dioxide in other balance gases are available upon request.

Sulfur Hexafluoride

Sulfur Hexafluoride in Air					
Grade	**Concentration**	**Cylinder Size**	**Contents cu.ft.**	**Pressure psig @ 70° F**	**CGA Valve Connection**
Primary	50 ppm -0.9%	200	214	2000	590
	1%-4.9%	200	214	2000	
	5-10%	200	214	2000	
Certified	1-49 ppm	200	214	2000	590
		80	78	2000	
		35	33	2000	
	50-999 ppm	200	214	2000	
		80	78	2000	
		35	33	2000	
	0.1-0.9%	200	214	2000	
		80	78	2000	
		35	33	2000	
	1.0-4.9%	200	214	2000	
		80	78	2000	
		35	33	2000	
	5-10%	200	214	2000	
		80	78	2000	
		35	33	2000	
Custom	50-999 ppm	200	214	2000	590
		80	78	2000	
		35	33	2000	
	0.1-0.9%	200	214	2000	
		80	78	2000	
		35	33	2000	
	1.0-4.9%	200	214	2000	
		80	78	2000	
		35	33	2000	
	5-10%	200	214	2000	
		80	78	2000	
		35	33	2000	

DN - Description number assigned by manufacturing location.

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Shipping Information:	
DOT/TC Proper Name:	Compressed Gas, N.O.S.
Hazard Class:	2.2
I.D. Number:	UN 1956
Labels:	Non-flammable Gas

Sulfur Hexafluoride in other balance gases are available upon request.

Sulfur Hexafluoride (cont.)

Sulfur Hexafluoride in Air					
Grade	**Concentration**	**Cylinder Size**	**Contents cu.ft.**	**Pressure psig @ 70° F**	**CGA Valve Connection**
Primary	50 ppm -0.9%	200	208		590
	1%-4.9%	200	208		
	5-10%	200	208		
Certified	1-49 ppm	200	208		590
		80	76		
		35	32		
	50-999 ppm	200	208		
		80	76		
		35	32		
	0.1-0.9%	200	208		
		80	76		
		35	32		
	1.0-4.9%	200	208		
		80	76		
		35	32		
	5-10%	200	208		
		80	76		
		35	32		
Custom	50-999 ppm	200	208		590
		80	76		
		35	32		
	0.1-0.9%	200	208		
		80	76		
		35	32		
	1.0-4.9%	200	208		
		80	76		
		35	32		
	5-10%	200	208		
		80	76		
		35	32		

DN - Description number assigned by manufacturing location.

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

Shipping Information:	
DOT/TC Proper Name:	Compressed Gas, N.O.S.
Hazard Class:	2.2
I.D. Number:	UN 1956
Labels:	Non-flammable Gas

Sulfur Hexafluoride in other balance gases are available upon request.

Three Component Mixtures

Primary Standard, Certified Standard, and Custom Mixture grades are available in a wide variety of gas combinations from two components to fifteen components or more. Listed below are common minor components in a variety of balance gases. For additional components, or for components not listed in the tables, contact the nearest sales office.

The cylinder pressure, cylinder contents, CGA connections, and recommended equipment will vary according to the gases and gas concentrations in the final mixture. Please contact the nearest sales office for the specific details of your mixture.

Minor Components			
Argon	Ethane	Isobutane	Oxygen
Butane	Ethylene	Methane	Propane
Carbon Dioxide	Helium	Nitrogen	Propylene
Carbon Monoxide	Hydrogen	Nitrous Oxide	

Balance Gases	
Air	Nitrogen
Argon	Oxygen
Hydrogen	

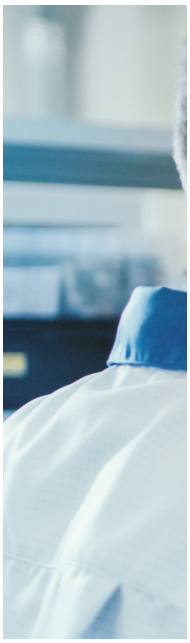
Standard Cylinder Sizes *	Contents**	CGA Valve Connection**
300		
200		
80		

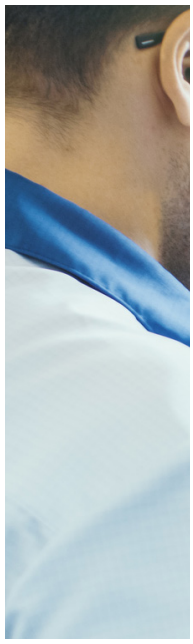
*Nonstandard cylinder sizes available upon request

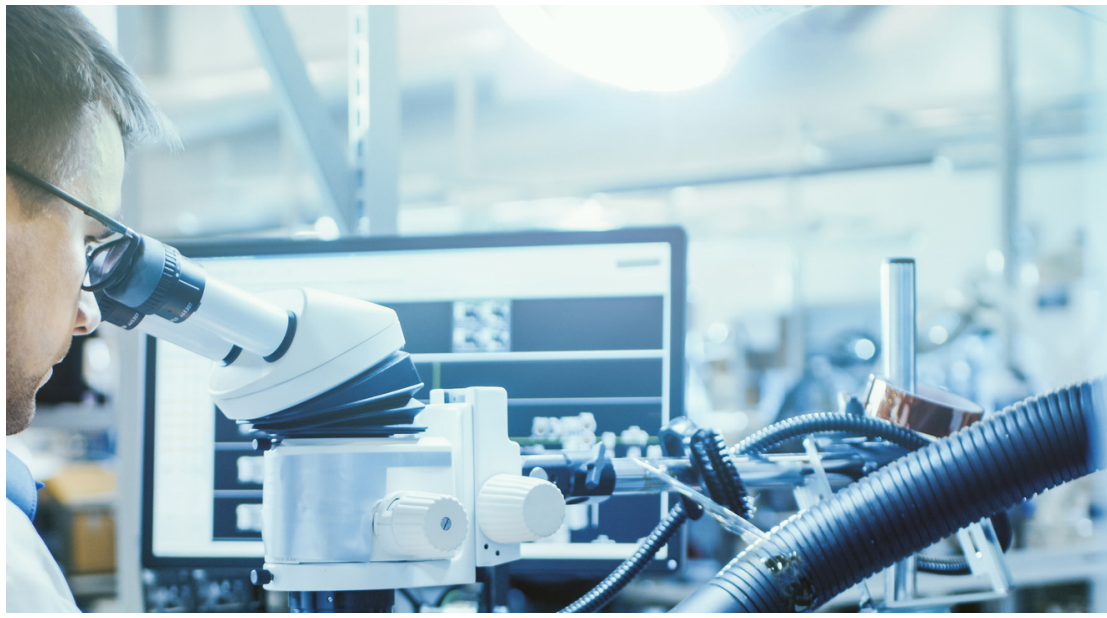
**The cylinder pressure, cylinder contents, CGA connections, and recommended equipment will vary according to the gases and gas concentrations in the final mixture. Please contact the nearest sales office for the specific details of your mixture.

Notes:

Notes:







SPECIAL APPLICATION MIXES

PurityPlus®
SPECIALTY GASES

Section 3 - Special Application Mixtures

Beverage and Food Gases

Carbonation

Many of the most popular beverages are soft drinks supplied with carbonation. To maintain the intricate taste of the drinks, high quality carbon dioxide is required. When carbon dioxide is dissolved into a water based liquid, it reacts with the water to form carbonic acid. This carbonic acid exists in equilibrium with the carbon dioxide and participates in the flavor of the product. The carbon dioxide must be of the highest quality to prevent undesirable flavors from being introduced into the product. PurityPlus use only the highest quality products and the most advanced manufacturing techniques to ensure product consistency.

Sparkling beverages where carbon dioxide is a by-product of the fermentation process can also be enhanced with beverage gases. Additional carbon dioxide can be added to these beverages. Pure carbon dioxide is used for wine, but a mixture of carbon dioxide and nitrogen can be used with beer to improve pressurization and dispensing. These mixtures are also used to control the "head" on the beer. The higher the nitrogen content, the flatter the product will be in the glass.

Food Freezing and Chilling

To improve flavor and shelf life, many of today's food products are frozen very quickly. Liquid carbon dioxide and liquid nitrogen can be used to increase the speed at which food products are frozen. Faster freezing reduces the product's core temperature thereby maintaining flavor, increasing shelf life, and reducing processing time, and increasing food safety. This is also true for products that are quick chilled, without actually freezing of the product.

Fish Hatcheries

Dissolved oxygen is important for the survival of hatchery raised fish and crustaceans. High concentration of animals along with naturally occurring algae can act to reduce the oxygen needed for survival. Adding oxygen to the water can increase the survivability of the animals. This is also true when transporting live animals.

Modified Atmosphere Packaging

Aerobic bacteria, molds, and oxygen can cause undesirable changes in foods. Food can become at best, unpalatable, or at worst, unsafe for consumption due to these processes. Use of Modified Atmosphere Packaging (MAP), with specially designed packaging, can extend the shelf life of some food products by slowing or preventing or slowing the reaction with oxygen, or preventing or slowing the growth of micro organisms.

The gases used in this process are primarily oxygen, nitrogen, and carbon dioxide. In special instances, carbon monoxide and the noble gases are also used.

Oxygen can be both detrimental as well as beneficial to packaged food items. Oxygen can cause oxidation of fats and pigments. Oxygen also supports the growth of aerobic micro organisms which are the primary cause of spoilage. On the other hand too little oxygen will cause deleterious changes in the coloration of meats. In addition, too little oxygen can also allow for the growth of anaerobic bacteria which can cause food poisoning. For these reasons, the oxygen concentration must be carefully controlled.

Beverage and Food Gases

Nitrogen is a non-reactive gas that does not support the growth of aerobic micro organisms and thus can inhibit the growth of spoilage bacteria. Nitrogen, however, does not effect the growth of anaerobic micro organisms. Since nitrogen does not react or dissolve into food products, it is also used to prevent package collapse caused by the absorption of other MAP gases.

Carbon dioxide is an acid gas. It readily dissolves into water and produces carbonic acid, thereby decreasing the pH of a solution. Carbon dioxide is also soluble in organic compounds and fats. Carbon dioxide does inhibit the growth of some pathogenic bacteria and is an important addition to many MAP gas mixtures. Unfortunately, too much carbon dioxide can lead to package collapse due to the absorption of carbon dioxide by the food product or permeation through the packaging. If package collapse is not desirable, nitrogen can be added to the MAP mixture to prevent or minimize collapse.

Carbon monoxide is a very flammable, reactive, and toxic gas. However, small amounts of carbon monoxide will enhance desirable pigmentation of red meat. Carbon monoxide is also used to prevent browning of packaged lettuce. Care must be taken when dealing with this flammable and toxic gas.

Other gases that can be added to MAP gas mixtures are the noble gases. These gases are truly non-reactive gases. They include **helium, argon, krypton,** and **xenon**. These gases have similar actions as nitrogen. Argon is used to extend the shelf life of several fruits and berries.

Depending on volume requirements, MAP gases are supplied premixed in size 300 cylinders. For larger volumes, micro and mini-bulk installations are available. Please contact our technical staff for additional information and consultation regarding your specific requirements.

Biological Atmosphere Gas Mixtures

These mixtures are used as control atmospheres for the growth of aerobic and anaerobic biological cultures. Anerobic cultures thrive when deprived of oxygen. These gas mixtures contain less than 10 PPM of oxygen. Aerobic cultures require oxygen to survive. COA not included.

Anaerobic Mixtures	Cylinder Size	Contents	Connection
0-5% Hydrogen	300	100 cf	350
Balance Carbon Dioxide	200	81 cf	350
5-10% Carbon Dioxide	300	276 cf	350
5-10% Hydrogen	200	207 cf	350
Balance Nitrogen			
0.5% Carbon Dioxide	300	301 cf	580
Balance Nitrogen	200	226 cf	580

Aerobic Mixtures			
5-10% Carbon Dioxide	300	293 cf	296
Balance Oxygen	200	220 cf	296
0.5-10% Carbon Dioxide	300	285 cf	590
Balance Air	200	214 cf	590

XX - Complete the part number with the desired cylinder size listed above.
DN - Description number assigned by manufacturing location.

Electron Capture Mixtures

Specially manufactured for use with Gas Chromatographs that utilize Electron Capture Detectors. Please refer to the Pure Gas section for helium and nitrogen carrier gases.

P-5 Mixture	Cylinder Size	Pressure	Contents	Connection
5% Methane	300	2400 PSIG	315 cf	350
95% Argon	200	2000 PSIG	232 cf	350
P-10 Mixture				
10% Methane	300	2400 PSIG	315 cf	350
90% Argon	200	2000 PSIG	232 cf	350

XX - Complete the part number with the desired cylinder size listed above.
DN - Description number assigned by manufacturing location.

Nuclear Counter Mixtures

For measuring radioactivity and ionization.

Ultra P-5	Cylinder Size	Pressure	Contents	Connection
5% Methane UHP	300	2400 PSIG	315 cf	350
95% Argon UHP	200	2000 PSIG	232 cf	350
Ultra P-10				
10% Methane UHP	300	2400 PSIG	315 cf	350
90% Argon UHP	200	2000PSIG	232 cf	350
Quench Gas				
1.3% n-Butane	300	1050 PSIG	121 cf	350
98.7% Helium	200	1050 PSIG	107 cf	350

Geiger Flow Gases	Cylinder Size	Pressure	Contents	Connection
0.95% Isobutane	300	2400 PSIG	262 cf	350
99.05% Helium	200	2000 PSIG	197 cf	350
1.5% Propane	300	2400 PSIG	262 cf	350
98.5% Helium	200	2000 PSIG	197 cf	350

XX - Complete the part number with the desired cylinder size listed above.
DN - Description number assigned by manufacturing location.

EPA Protocol Mixtures

EPA Protocol Mixtures are manufactured to stringent EPA specifications and procedures, utilizing the most advanced cylinder preparation procedures. These mixtures are then analyzed with NIST traceable standards. Aluminum cylinders are recommended for maximum shelf life.

EPA Protocol Mixtures - Two Component Mixtures

Minor Component/ Balance Gas	Connection	Minor Component/ Balance Gas	Part No.	Connection
CO2 in Air	590	**NO in N2**	EPA-2-NIT-XX-DN	660
1-20% CO2/Air		0.5-1% NO/N2		
300-9999 PPM CO2/Air		100-4999 PPM NO/N2		
100-299 PPM CO2/Air		30-99 PPM NO/N2		
CO2 in N2	580	10-29.9 PPM NO/N2		
1-20% CO2/N2		5-9.9 PPM NO/N2		
300-2999 PPM CO2/N2		1-3.9 PPm NO/N2		
100-299 PPM CO2/N2		**NOx in Air**	EPA-2-AIR-XX-DN	660
CO in Air	590	500-5000 NOx/Air		
1-3% CO/Air		100-499 NOx/Air		
100-9999 PPM CO/Air		80-99 NOx/Air		
10-99 PPM CO/Air		5-29.9 NOx/Air		
8-9.9 PPM CO/Air		1-4.9 NOx/Air		
CO in N2	350	**O2 in N2**	EPA-2-NIT-XX-DN	<23% O2 - 590
1-10% CO/N2		23-49% O2/N2		>23% O2 - 296
100-9999 PPM CO/N2		5-22.9% O2/N2		
10-99 PPM CO/N2		0.8-4.9% O2/N2		
8-9.9 PPM CO/N2		**C3H8 in Air**	EPA-2-AIR-XX-DN	590
.5-7.9% CO/N2		1000-6000 PPM C3H8/Air		
H2S in Air	330	100-999 PPM C3H8/Air		
100-999 PPM H2S/Air		1-99 PPM C3H8/Air		
10-99 PPM H2S/Air		**SO2 in Air**	EPA-2-AIR-XX-DN	660
1-9.9 PPM H2S/Air		500-4999 PPM SO2/Air		
H2S in N2	330	100-499 SO2/Air		
100-999 PPM H2S/N2		40-99 SO2/Air		
10-99 PPM H2S/N2		10-39 SO2/Air		
4-9.9 PPM H2S/N2		**SO2 in N2**	EPA-2-NIT-XX-DN	660
1-3.9 PPM H2S/N2		500-4999 PPM SO2/N2		
CH4 in Air	590	100-499 SO2/N2		
> 1 PPM CH4/Air		40-99 SO2/N2		
< 1 PPM CH4/Air		10-39 SO2/N2		
CH4 in N2	350	**C3H8 in N2**	EPA-2-NIT-XX-DN	350
> 1 PPM CH4/N2		1000 PPM C3H8/N2		
<1 PPM CH4/N2		100-999 C3H8/N2		
		1-99 C3H8/N2		

XX - Complete the part number with the desired cylinder size.
DN - Description number assigned by manufacturing location.

3 and 4 Component Mixtures available with concentrations of minor components as listed in this section. Please contact the nearest Sales Office for pricing and availability.

Cylinder Sizes *	Contents
150A	150 cf
80A	80 cf
35A	35 cf

Portable Calibration Standards

Refillable, Portable Calibration Gases

The portable calibration gas cylinder is an alternative to standard disposable cylinders. The Enviro-Cyl™ calibration gas cylinder offers many advantages over disposables:

- portable light weight refillable
- economical 50 - 100% more capacity than disposables
- no cylinders to dispose of...simply return for refill
- eliminates disposal fees and regulatory paperwork
- no more problems with landfills or recycling
- cost efficient; no deposits or rental fees

C-10

C10 Cylinder Specifications	
• Refillable aluminum cylinder • 105 liters capacity at 1100 psi • 12.5” tall • 3.2” diameter	• C-10 valve connection • 5 year DOT stamp • Safety on cylinder valve • Stainless steel valve

EC-180

EC180 Cylinder Specifications	
• Refillable aluminum cylinder • Up to 160 liter capacity at 2200 psig • 14” tall (with valve) • 3.2” diameter	• CGA 180/110 connection • 5 year DOT stamp • Safety on cylinder valve • Brass or Stainless steel valves

Complete, Portable Calibration Kits
• Sturdy carrying case • Enviro-Cyl™ refillable cylinder(s) or “One Timers” disposable cylinders • A regulator/flowmeter • Tedlar sample bags - available • Calibration tubing - available

Portable Calibration Standards

One Timers are perfect for all your calibration applications. They cover a broad range of applications from industrial hygiene to petrol chemical.

One Timers provide outstanding quality, performance, and value. They also eliminate cylinder rental and demurrage charges, and the added portability of these cylinders makes them perfect for small jobs.

103 Liter Steel Disposable Cylinder for Non-Reactive Gas

- Steel disposable
- 103 liter low pressure capacity
- Cylinder height: 13.77”
- Cylinder diameter: 3.27”
- CGA: C-10 5/8” - 18 UNF
- Contents: 103 liters
- Weight: 2.3 lbs
- Service pressure: 1000 psi
- DOT Specs: 39 steel cylinder

34 Liter Steel Disposable Cylinder for Non-Reactive Gas

- Steel disposable
- 34 liter low pressure capacity
- Cylinder height: 10.75”
- Cylinder diameter: 3”
- CGA: 600
- Contents: 34 liters
- Weight: 1.8 lbs
- Service pressure: 500 psi
- DOT specs: 39 steel cylinder

17 Liter Steel Disposable Cylinder for Non-Reactive Gas

- Steel disposable
- 17 liter low pressure capacity
- Cylinder height: 10.75”
- Cylinder diameter: 3”
- CGA: 600
- Contents: 17 liters
- Weight: 1.1 lbs
- Service pressure: 250 psi
- DOT specs: 39 steel cylinder

58 Liter Aluminum Disposable Cylinder for Reactive Gas

- Aluminum disposable
- 58 liter low pressure capacity
- Cylinder height: 14.25”
- Cylinder diameter: 3.5”
- Outlet Fitting: C-10 5/8” 18 UNF
- Contents: 58 liters
- Weight 1.6 lbs
- Service pressure: 500 psi
- DOT specs: 39 NRC aluminum cylinder

29 Liter Aluminum Disposable Cylinder for Reactive Gas

- Aluminum disposable
- 29 liter low pressure capacity
- Cylinder height: 10.64”
- Cylinder diameter: 3”
- Outlet Fitting: C-10 5/8” 18 UNF
- Contents: 34 liters
- Weight 1.3 lbs
- Service pressure: 500 psi
- DOT specs: 39 NRC aluminum cylinder

Portable Calibration Standards

All Portable Gas Standards are manufactured to meet certified standards and are manufactured with NIST traceable standards. These standards are also manufactured under ISO 17025 Quality Requirements.

Confined Space Standards	
Entry into confined spaces require testing for several contaminants.	
4 & 5 Component Mixtures normally contain the following products, but the minor components can vary. The concentrations of these components can vary according to the equipment manufacturer. Please check with your equipment manufacturer as to the exact mixture you need.	
5 Component Mixture	**4 Component Mixture**
Hydrogen Sulfide Carbon Monoxide Methane Oxygen Balance Nitrogen	Hydrogen Sulfide Carbon Monoxide Methane Balance Nitrogen
Common Enviornmental Compliance Mixtures	
Environmental Compliance Mixtures are primarily for remediation and testing. These are normally just two component mixtures, but additional minor components are available.	
Isobutylene Balance Air	Carbon Monoxide Balance Air
Propane Balance Nitrogen	HCFC 134a Balance Nitrogen
Methane Balance Air	Chlorine Balance Nitrogen
Ammonia Balance Nitrogen	Ethylene Oxide Balance Nitrogen
Additional minor components are available. Please contact the nearest Sales office for additional details.	
BTEX Standards	
Benzene Toluene Ethyl Benzene o-Xylene Balance Nitrogen	

Disposible Cylinder Sizes	**Approximate Contents**	**Connection**
58AL*	58 Liters	C-10
29AL*	29 Liters	C-10
103S	103 liters	C-10
34S	34 Liters	CGA 600
17S	17 Liters	CGA 600
Refillable-Cyl Cylinders		
C-10*	105 Liters	C-10
C-180*	160 Liters	CGA 180/110

* Aluminum Cylinders recommended for reactive gases

XX - Complete the part number with the desired cylinder size.
DN - Description number assigned by manufacturing location.

Calibration Kits and Accessories Available

Flame Ionization Fuel Mixtures

These mixtures are used with Flame Ionization Detectors (FIDs) in gas chromatography or Total Hydrocarbon Analyzer (THC) when analyzing for trace quantities of hydrocarbons. Please refer to the Pure Gas section for Zero and Hydrocarbon Free grades of air, argon, helium, hydrogen, nitrogen, and oxygen carrier gases.

FID Fuel	Cylinder Size	Contents	Connection
40% Hydrogen	300	266 cf	350
60% Nitrogen	200	203 cf	350
40% Hydrogen	300	259 cf	350
60% Helium	200	195 cf	350

XX - Complete the part number with the desired cylinder size listed above.
DN - Description number assigned by manufacturing location.

Leak Detection Mixtures

Leak detection mixtures are used with special instrumentation designed to detect the minor component at very low concentrations. The primary use is to detect very minute leaks in gas systems.

Leak Detection Mixtures	Cylinder Size	Contents	Connection
.5%-10% Helium	300	285	580
Balance Nitrogen	200	210	580
50ppm-1% Sulfur Hexafluoride	300	289	580
Balance Nitrogen	200	213	580
1%-5% Sulfur Hexafluoride	300	292	580
Balance Nitrogen	200	215	580

XX - Complete the part number with the desired cylinder size listed above.
DN - Description number assigned by manufacturing location.

Laser Mixtures

Source Material Purities::	
Carbon Dioxide:	99.995%
Nitrogen	99.999%
Helium	99.999%
Carbon Monoxide:	99.5%
Hydrogen	99.99%

The concentration of the minor components in the mixture shall be within +/- 5% realtive of the requested concentration. Tighter blend tolerances, and specific certifications are available.

Carbon Dioxide Laser Mixtures	Cylinder Size	Contents	Connection
3.4% CO_2 / 15.6% N_2 / He **4.5% CO_2 / 13.5% N_2 / He** **6% CO_2 / 18% N_2 / He** **4.5% CO_2 / 13.5% N_2 / He** **5% CO_2 / 40% N_2 / He**	300 200	264 cf 200 cf	580
2% CO / 6% CO_2 / 6% N_2 / He **2% CO / 8% CO_2 / 8% N_2 / He** **2% CO / 8% CO_2 / 16% N_2 / He** **4% CO / 8% CO_2 / 16% N_2 / He** **4% CO / 8% CO_2 / 16% He / N_2** **4% CO / 8% CO_2 / 28% He / N_2**	300 200	229 cf 167 cf	350
0.4% H_2 / 4% CO / 8% CO_2 / 8% N_2 / He **0.4% H_2 / 4% CO / 6% CO_2 / 12% N_2 / He**	300 200	229 cf 167 cf	350

XX - Complete the part number with the desired cylinder size listed above.
DN - Description number assigned by manufacturing location.

*Other combinations and sizes available upon request

TCD Carrier Gas Mixture

This mixture is intended to enhance the sensitivity of a chromatograph using a thermal conductivity detector.

TCD Carrier Gas Mixture	Cylinder Size	Contents	Connection
8.5% Hydrogen	300	262 cf	350
91.5% Helium	200	192 cf	350

XX - Complete the part number with the desired cylinder size listed above.
DN - Description number assigned by manufacturing location.

Spark Chamber Mixtures

Used as the medium for atomic particle studies.

Spark Chamber Mixtures	Cylinder Size	Contents	Connection
10% Helium	300	269	580
90% Neon	200	201	580
	150A	135	580
20% Helium	300	269	580
80% Neon	200	201	580
	150A	135	580
25 % Helium	300	269	580
75% Neon	200	201	580
	150A	135	580

XX - Complete the part number with the desired cylinder size listed above.
DN - Description number assigned by manufacturing location.

Multi-Component Hydrocarbon Mixtures

Today's gas and oil industries are more demanding than ever. With critical specifications and tolerances tighter than ever, it is imperative, for continued top level operation, that **gas and liquid standards** be manufactured with the highest quality gases in the highest quality labs. Our hydrocarbon gases are manufactured to meet the most stringent requirements that our customers demand. Whether your hydrocarbon requirement is for a refinery, petrochemical plant, chemical plant, or gas processing plant you can depend on PurityPlus gases to meet your processing challenges with reliable gas standards the first time, every time. Five, ten, twenty or more components mixtures are routine for us. For pricing and delivery, please contact the nearest sales office with your mixture requirements.

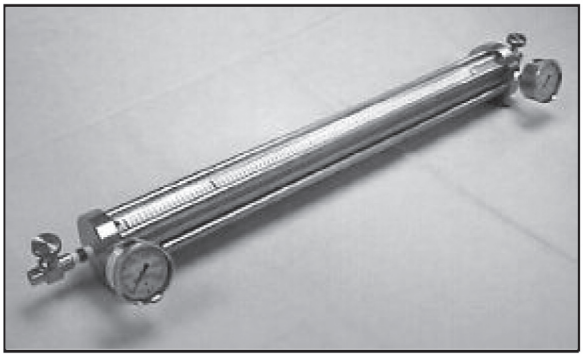
Typical reference standards can include any or all of the following gases.	
Argon	Hydrogen Sulfide
Benzene	Isobutane
1-3 Butadiene	Isobutylene
n-Butane	Isopentane
cis-2-Butene	Isoprene
trans-2-Butene	Methane
1-Butene	2-Methylpentane
Carbon Dioxide	3-Methylpentane
Carbon Monoxide	Nitrogen
Cyclohexane	n-Nonane
Cyclopenane	n-Octane
n-Decane	n-Pentene
2,2 Dimethyl butane	Propane
n-Dodecane	Propylene
Ethane	Neopentane
Ethylene	n-Tridecane
Helium	n-Undecane
n-Heptane	

Liquid Hydrocarbon Mixtures

Liquid Hydrocarbon Standards are often required for analysis of liquid petroleum gas or liquefied hydrocarbon streams. PurityPlus liquid hydrocarbon standards are available in low pressure cylinders with dual valves and/or full length eductor tubes. When the composition of these mixtures span a wide range of vapor pressures and boiling points, we recommend the use of Welker Piston Cylinders to provide constant supply pressure and limit fractionalization of the mixture. These cylinders can supply up to 3600 PSI working pressure by applying equivalent nitrogen pressure to the gas side of the piston, thus maintaining the pressure and mixture you need. This cylinder is available in several volumes and can be refilled.

Please contact your nearest sales office for pricing of mixtures and cylinders.

Welker Engineering Constant Pressure Sample Cylinder
style cp-42-ga



Welker Engineering High Pressure DOT Cylinder
style cp2-hp

Semiconductor Gases

PurityPlus gas manufacturers are committed to the semiconductor industry with the implementation of our ISO Quality Management Program. From silanes to dopant gases to etchant gases and purge gases, the network of PurityPlus manufactures have implemented the strict SOPs and QA procedures to meet the semiconductor industry demands. The table below outlines the available process gases. For detailed information, please contact the nearest sales office.

PurityPlus gas manufacturers have been supplying electronic grade gases to the semi-conductor industry since its inception. We currently supply bulk hydrogen, nitrogen, argon, and oxygen to many semiconductor manufacturers. We also supply cylinder gases to the exacting demands of this industry. If you have an electronic gas requirement please contact us for pricing and availability.

Silanes	Dopants	Etchants	Purge Gases	Other
Silane - SiH4	Arsine - AsH3	Chlorine - Cl2	Argon - Ar	Ammonia - NH3
Dichlorosilane - SiH2Cl2	Phosphine - PH3	Hydrogen Bromide - HBr	Helium - He	Carbon Dioxide - CO2
Disilane - Si2H6	Boron Trifluoride - BF3	Hydrogen Chloride - HCl	Hydrogen - H2	Nitrous Oxide - N2O
Silicon Tetrachloride - SiCl4		Sulfur Hexafluoride - SF6	Nitrogen - N2	
Trichlorosilane - SiHCl3		Halocarbon 14 - CF4	Oxygen - O2	
		Halocarbon 22 - CHClF2		
		Halocarbon 23 - CHF3		
		Halocarbon C318 - C4F8		

Medical Gases

PurityPlus Medical Gases are manufactured in compliance to FDA current Good Manufacturing Practices (cGMPs). Our manufacturing facilities are independently audited by a third party auditor, as well as by the FDA (in Canada, the Health Products and Food Branch Inspectorate - HPFBI) to insure stringent compliance with all applicable regulations.

Our Medical Gases are manufactured to meet all U.S. Pharmacopeia (USP) and National Formulary (NF) specifications in accordance with cGMPs.

IWDC Members provide a full range of gases and related equipment for the Healthcare, Pharmaceutical, and Biotechnology fields. We use state-of-the-art filling facilities and analytical laboratories to provide high purity gases and high accuracy mixtures for all research, inhalation, and diagnostic applications.

We carry a full line of cryogenic equipment including cryogenic freezers, liquid withdrawal devices, and personal safety equipment. We have a full line capability from portable liquid containers, to micro and mini-bulk systems, to large bulk gas installations.

Included in this section are the most common medical gases and medical gas mixtures. Depending on use, special request mixtures may require additional approvals.

Medical Gases

Product	Purity	Impurity	Maximum	Cylinder Size	Contents	Connection
Medical Air Purified natural air or a blend of oxygen and nitrogen. Contains 19.5 to 23.5 vol% Oxygen	Oxygen 19.5-23.5% Bal N2	CO CO2 SO2 NO + NO2 Odor: Condensed H2O: Condensed Oil:	≤ 10ppm ≤ 500 ppm ≤ 5 ppm ≤ 2.5 ppm None None None	200 20 10	233 cf 23 cf 14 cf	346 950 950
Carbon Dioxide USP Chemical Symbol: CO2	> 99.0%	H2S< 1 ppm CO NO NH3 SO2 H2O NO2	≤ 1 ppm ≤ 10 ppm ≤ 2.5 ppm ≤ 25 ppm ≤ 5 ppm ≤ 200 ppm ≤ 2.5 ppm	200 20 10	64 lb 6.5 lb 4.0 lb	320 940 940
Carbon Dioxide Cryogenic Liquid				170L	378 lb	Gas-320 Liq.-172
Helium USP Chemical Symbol: He	> 99.0%	CO Air Odor:	≤ 10 ppm ≤ 1.0% None	200 20 10	218 cf 22 cf 13 cf	580 930 930

XX - Complete the part number with the desired cylinder size listed above.

Cryogenic Product
See Cryogenic Equipment Section, page 4.134

*Nonstandard cylinder sizes available upon request

Medical Gases

Product	Purity	Impurity	Maximum	Cylinder Size	Contents	Connection
Nitrogen NF	≥ 99.0%	CO	< 10 ppm	200	228	580
		O2	≤ 1.0%	20	23	960
		Odor:	None	10	14	960
Nitrogen NF Cryogenic Liquid				160L	3690	gas-580
				180L	4110	Liq.-295
Nitrous Oxide USP	≥ 99.0	CO	≤ 10 ppm	200	64 lb	326
		Air	≤ 1.0%	20	6.4 lb	910
		CO2	≤ 300 ppm	10	3.9 lb	910
		NO	≤ 1 ppm			
		NO2	≤ 1 ppm			
		NH3	≤ 25 ppm			
		Halogens	≤ 1 ppm			
		H20	≤ 200 ppm			
Oxygen USP**	≥ 99.0%	CO	≤ 10 ppm	200	249 cf	540
		CO2	≤ 300 ppm	20	25 cf	870
		Odor	None	10	15 cf	870
Oxygen Cryogenic Liquid				160L	4580 cf	Gas-540
						Liq-440

XX - Complete the part number with the desired cylinder size listed above.

Cryogenic Product
See Cryogenic Equipment Section, page 4.158

*Nonstandard cylinder sizes available upon request

**Oxygen that is produced by the air-liquefaction process is exempt from the requirements of the tests for carbon dioxide and carbon monoxide.

Medical Gases

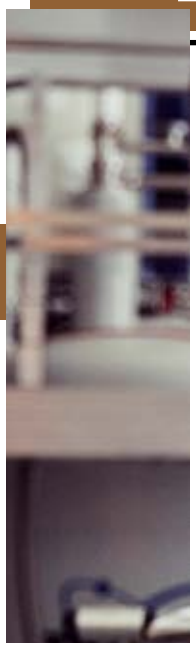
Medical Drug Gases - Therapy	Cylinder Size	Contents	Connection
5% Carbon Dioxide in Oxygen	200	226 cf	280
10% Carbon Dioxide in Oxygen	200	226 cf	500
20% Oxygen in Helium	200	199 cf	280
30% Oxygen in Helium	200	199 cf	280
Medical Device Gases - Diagnostic - Certified Standards*	**Cylinder Size**	**Contents**	**Connection**
Lung Diffusion Gases			
0.3% Carbon Monoxide, 10% Helium, 21% Oxygen in Nitrogen	200	209 cf	500
0.3% Carbon Monoxide, 0.5% Neon,, 21% Oxygen in Nitrogen	200	213 cf	500
0.3% Carbon Monoxide, 0.3% Methane, 21% Oxygen in Nitrogen	200	213 cf	500
0.3% Acetylene, 0.3% Carbon Monoxide, 0.3% Methane, 21% Oxygen in Nitrogen	200	213 cf	500
Blood Gas Mixtures			
2-14% Carbon Dioxide in Nitrogen	200	228 cf**	500
7-12% Carbon Dioxide in Oxygen	200	233 cf**	500
1-19% Oxygen in Nitrogen	200	228 cf**	500
2-12% Carbon Dioxide, 12-15% Oxygen in Nitrogen	200	228 cf**	500
	** Contents Approximate		

XX - Complete the part number with the desired cylinder size listed above.
DN - Description number assigned by manufacturing location.

*Primary Standard Grade Mixtures are also available
*Nonstandard cylinder sizes available upon request
*Additional custom blends are available upon request

Notes:

Notes:



EQUIPMENT

PurityPlus®
SPECIALTY GASES

PurityPlus®

SPECIALTY GAS EQUIPMENT CATALOG

HARRIS SPECIALTY GAS Equipment

Section 4 - Equipment

High Purity Pressure Regulator Selection

Gases can be supplied in compressed gas high-pressure cylinders, liquid low-pressure cylinders or from low-pressure pipeline supply. The pressure from the supply source must be reduced to the desired working pressure for the application, to accomplish this a pressure reducing valve commonly referred to a regulator needs to be selected. Proper selection is critical for a safe and effective transfer of the gas from the gas supply to the instrument. Regulators are designed to control pressure. Regulators will not measure or control flow. An external device such as a flowmeter or metering valve specifically designed for flow control should be used for that purpose.

Selection of the correct regulator involves many variables. All items must be considered in making the proper regulator selection.

Materials Compatibility

Materials used to construct the pressure regulator need to be compatible with the intended gas service. All the wetted areas (parts of the regulator in contact with the gas) must be selected to avoid any reaction with the gas that can cause contamination in the gas stream or deterioration of the regulator components. Refer to Gas Materials Compatibility Table on Page 114.

Inlet Pressure Rating

Inlet pressures can range from low pressure in pipeline usage to high pressure from compressed gas cylinders. Regulators used in a pipeline will normally have only one gauge to indicate delivery pressure while a cylinder regulator will have two gauges; one to show inlet pressure and the other to show delivery pressure. An exception to this would be the use of regulators for liquid gas cylinders. In this application, only the delivery pressure gauge would be required since the supply pressure is generally constant. When selecting the regulator it must be capable of handling the incoming inlet pressure. When the gas is supplied from a cylinder the CGA (Compressed Gas Association) inlet connection number will dictate the maximum supply pressure. This pressure can range from 100 PSI to over 6000 PSI.

Delivery Pressure Range

The desired working pressure for the operation may range from low pressure up to 15 PSIG to a much higher working pressure (7500-PSIG). The regulator selected must be able to supply the proper working pressure consistent with the requirements of the process.

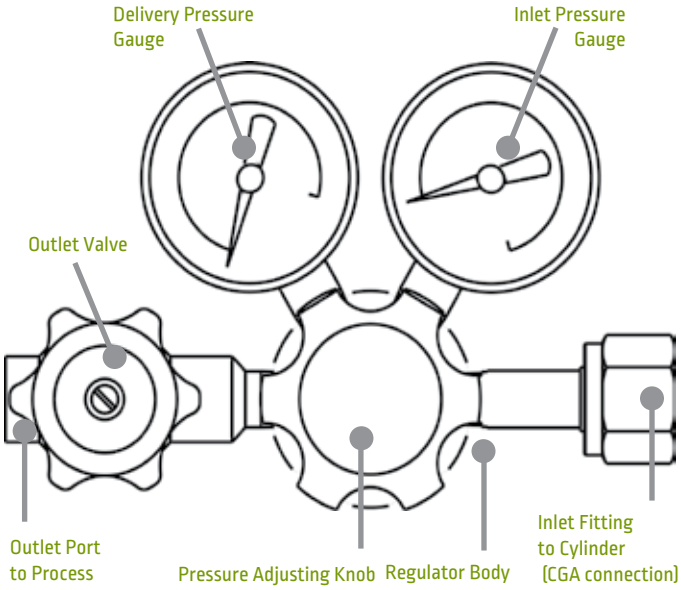
Gas Purity

Maintaining the purity level of the gas is of primary importance in the selection of the regulator. The selected regulator must be resistant to any introduction of contaminants that can be detrimental to the process. In addition to the proper selection of materials for gas compatibility, the design, assembly and testing of the regulator are critical items to consider in the selection process. Clean room assembly and Helium leak testing are common procedures used to insure the integrity of the regulator.

Pressure Regulation, Single-Stage or Two-Stage Design

All regulators are designed to reduce the inlet pressure to a desired working pressure. The regulator can reduce the pressure in either one step or two steps. A single-stage regulator reduces the pressure in one step and a two-stage regulator reduces the pressure in two steps, either may be suitable for the application based on the desired pressure control. Single-Stage regulators are best suited for applications where manual periodic adjustment of the delivery pressure settings is not a problem and the inlet pressure remains constant, such as the case in gas withdrawal from liquid cylinders.

Two-stage regulators are two regulators built into a single regulator body. The first regulator (first stage) is preset at a non-adjustable pressure to reduce the incoming pressure to a lower pressure referred to as the intermediate stage. The second regulator (second stage) is adjustable within the desired delivery range. The two-stage regulator allows for steady delivery pressure without periodic adjustment, well suited for applications requiring constant pressure from full to nearly empty cylinder.



Operation of Pressure Regulators

Single-Stage Regulators

Gas enters the inlet (high-pressure) chamber and its pressure is indicated on the inlet pressure gauge. When the pressure adjusting knob is turned counterclockwise and completely backed out to the stop, a valve and seat assembly located between the inlet chamber and the delivery (low pressure) chamber prevents gas from moving any further. A filter located at the inlet to the valve and seat assembly, removes particulate matter from the gas stream to help protect the seat area.

Turning the pressure-adjusting knob clockwise causes the adjusting screw to push against a spring button that compresses the pressure adjusting spring. The force of the compressed spring, in turn, causes the diaphragm to flex and push against the valve. This opens the regulator allowing gas to flow from the inlet chamber to the delivery chamber of the regulator.

Gas entering the delivery pressure chamber begins to build pressure and creates a counter-force (counter to the pressure adjusting spring) on the diaphragm. This pressure is indicated on the delivery pressure gauge attached to the delivery chamber. When pressure builds sufficiently to counteract the spring tension, it pushes the diaphragm away from the poppet allowing the regulator valve to close. In this manner, pressure in the delivery chamber is controlled or regulated by the amount of spring tension placed on the diaphragm and is selectable by turning the pressure adjusting knob until desired pressure is indicated on the delivery pressure gauge.

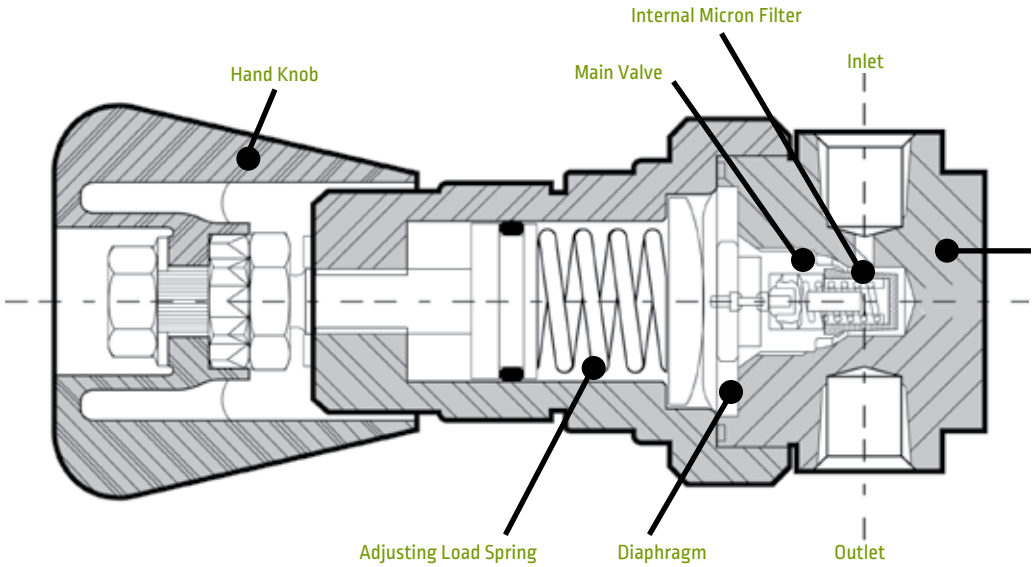
When gas from the delivery pressure chamber is sent to the end process, the resulting decrease in gas volume in the delivery chamber causes a pressure reduction in the chamber. When this occurs, the spring tension again causes the diaphragm to push the valve open, allowing additional gas to enter the delivery chamber.

Two-Stage Regulators

These regulators incorporate all components of a single-stage regulator. In addition, however, they also contain a second pressure adjusting spring, diaphragm, and valve seat assembly. The first stage is not user adjustable with the pressure adjusting spring "pre-compressed" at the factory. This allows the first stage to feed pressure to the second (adjustable) stage. The normal maximum delivery pressure for two-stage regulators is 500 PSI.

The second stage then performs in a manner similar to that of a single-stage regulator, except that the inlet pressure to the second stage is relatively constant. The two-step pressure reduction produces a final delivery pressure showing little effect from changes in cylinder pressure.

Components of a Single Stage Regulator



PurityPlus® SPECIALTY GASES

MODEL SUMMARY MATRIX

HIGH PURITY REGULATORS AND SWITCHOVER MANIFOLDS

HIGH PURITY REGULATORS

		Type	Stages	Type	Stages	Type	Stages
		Cylinder	1	Cylinder	2	Line	1
Construction	Forged	PP701		PP702		PP703	
Body	Brass						
Finish	Chrome-plated						
Construction	Machined bar stock	PP721		PP722		PP723	
Body	Brass						
Finish	Brass						
Construction	Machined bar stock	PP721C		PP722C		PP723C	
Body	Brass						
Finish	Chrome-plated						
Construction	Machined bar stock	PP741		PP742		PP743	
Body	Stainless steel						
Finish	Stainless steel						

HIGH PURITY SWITCHOVERS

		Semi automatic	Semi automatic
		2 inlet regulators	Combo inlet regulator
Construction	Machined bar stock	PP900B	PP905B
Body	Brass		
Finish	Chrome-plated		
Construction	Machined bar stock	PP900S	PP905S
Body	Stainless steel		
Finish	Stainless steel		

PurityPlus® SPECIALTY GASES

PP701

FORGED BRASS REGULATOR (CHROME PLATED)

MADE IN THE USA

Model PP701-125-580-B shown

Model PP701 is a chrome plated single stage cylinder regulator with a stainless steel diaphragm for general laboratory use. The PP701 can be used when a slight pressure rise from full to empty cylinder can be tolerated. The PP701 is suitable for:

- Non-corrosive gases
- Purging
- Pressure testing
- Blanketing

Recommended for gas purity up to Grade 5.0 (99.999).

MATERIALS

Body	Chrome Plated Brass
Bonnet	Chrome Plated Die Cast
Diaphragm	302 Stainless Steel
Nozzle	Brass
Seat	PTFE Teflon
Seals	PTFE Teflon
Filter	Nickel-Plated Sintered Bronze - 10 Micron
Seat Return Spring	PH-17 Stainless Steel
Adjusting Knob	ABS Plastic

FEATURES

- 2 - 1/8" 302 stainless steel diaphragm eliminates contamination from diffusion or outgassing
- One-piece encapsulated seat design to protect seat from particulate contamination
- Chrome plated bonnet, body and fittings
- 2" chrome plated dual scale gauges (psi/bar)
- External relief valve standard
- Designed to 1 x 10-8 cc/sec. inboard helium leak rate
- to maintain gas purity levels
- Maximum inlet pressure 3000 PSIG except for models with CGA 300 and 510 and equipped with 400 PSIG inlet gauge

RELATED OPTIONS

Wall mounting bracket P/N: 9101242

PP701 ORDERING INFORMATION

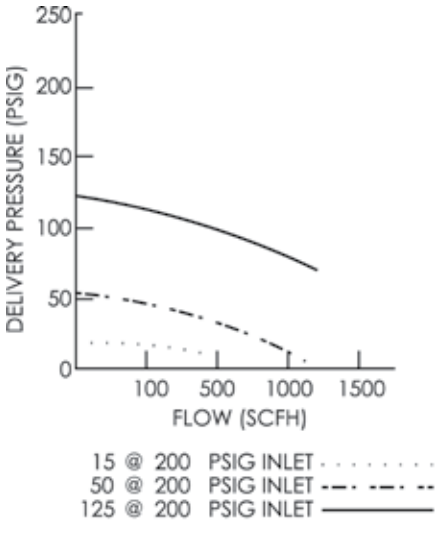
PP701 - XXX - XXX - XXXX - XXX

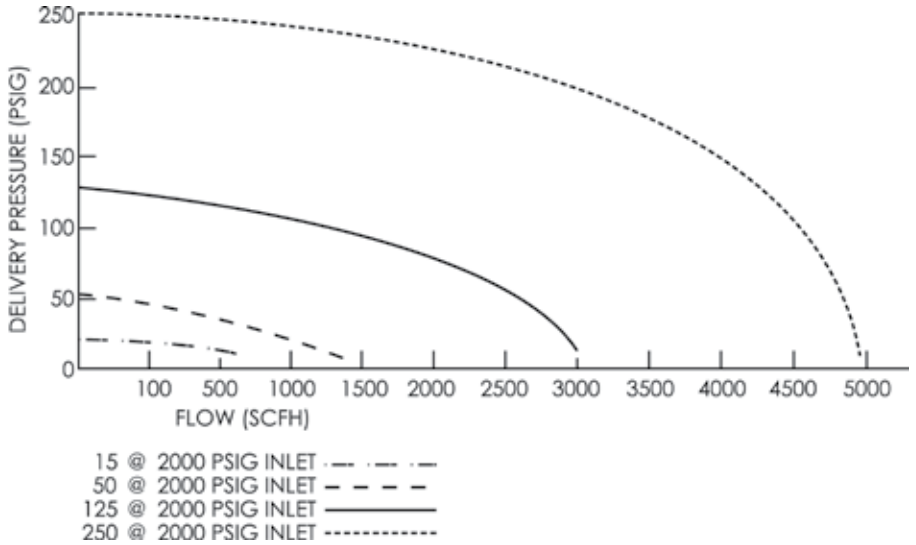
MODEL NO.	DELIVERY	DELIVERY PRESSURE (OUTLET GAUGE)	CGA / INLET FITTING		ACCESSORIES	OPTIONS
PP701	0-15 PSIG	(30" Hg Vac-30 psi/2 bar)	280	350	A) 1/4" MNPT Needle Valve	1) Without Relief Valve
	0-50 PSIG	(30" Hg Vac-100 psi/7 bar)	296	500	B) 1/4" FNPT Diaph. Valve	3) No Gauges
	0-125 PSIG	(30" Hg Vac-200 psi/14 bar)	300	510	C) 1/4" MNPT Nipple	6) 400 psi inlet gauge
	0-250 PSIG	(400 psi/28 bar)	320	540	D) 1/4" FNPT Port	
			326	555	E) 1/4" Tube Fitting	**Gas Service Must Be Specified**
			346	580	F) 1/8" Tube Fitting	
			000 (1/4" FNPT)	590	G) 1/4" Hose barb x 1/4" MNPT	
			001 (1/4" MNPT)		H) 1/8" Hose barb x 1/4" MNPT	
					I) 1/4" Hose barb x 1/4" FNPT	
					J) 1/4" FNPT Needle Valve	
					K) Single Regulator Alarm	
					L) SG 910 BR Protocol w/36" Pigtail	

PurityPlus® SPECIALTY GASES

PP701

FLOW DATA

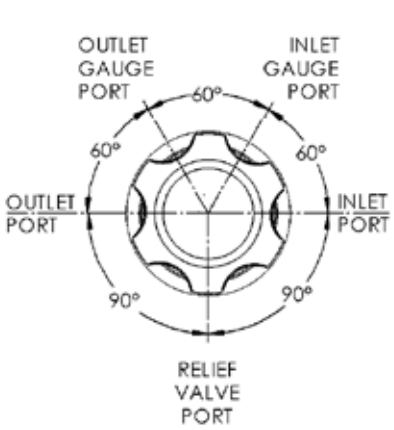


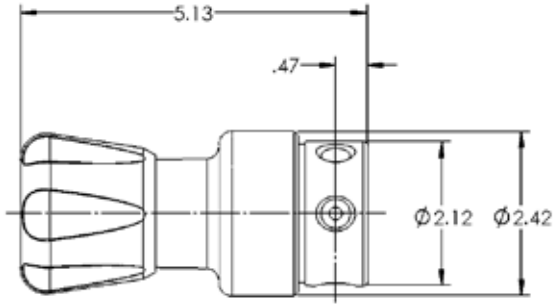


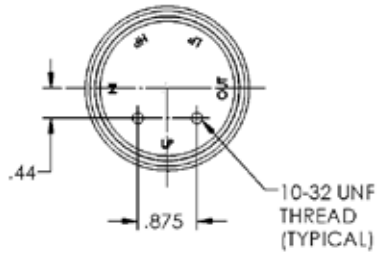
SPECIFICATIONS

- C_v: .17
- Pressure Regulation: 1.3 PSIG/100 PSIG
- Weight: 3.5 Lbs.

DIMENSIONS







PurityPlus® SPECIALTY GASES

PP702

FORGED BRASS REGULATOR (CHROME PLATED)

Model PP702-125-580-B shown

Model PP702 is a chrome plated brass two stage cylinder regulator with a stainless steel diaphragm for general laboratory use. The HP 702 provides constant delivery pressure from full to near empty cylinder conditions.
The PP702 is suitable for:

- Non-corrosive gases
- Purging
- Pressure testing
- Blanketing
- Incubators

Recommended for gas purity up to Grade 5.0 (99.999).

MATERIALS

Body	Chrome Plated Brass
Bonnets	Chrome Plated Die Cast
Diaphragms	302 Stainless Steel
Nozzles	Brass
Seat	PTFE Teflon
Seals	PTFE Teflon
Filter	Nickel-Plated Sintered Bronze - 10 Micron
Seat Return Spring	PH-17 Stainless Steel
Adjusting Knob	ABS Plastic

FEATURES

- 2 1/8" 302 stainless steel diaphragm eliminates contamination from diffusion or outgassing
- One-piece encapsulated seat design to protect seat from particulate contamination
- Chrome plated bonnet, body and fittings
- 2" chrome plated dual scale gauges (psi/bar)
- External relief valve standard
- Designed to 1 x 10^{-8} cc/sec. inboard helium leak rate to maintain gas purity levels
- Maximum inlet 3000 PSIG except for models with CGA 300 and 510 equipped with 400 PSIG inlet gauge

PP702 ORDERING INFORMATION

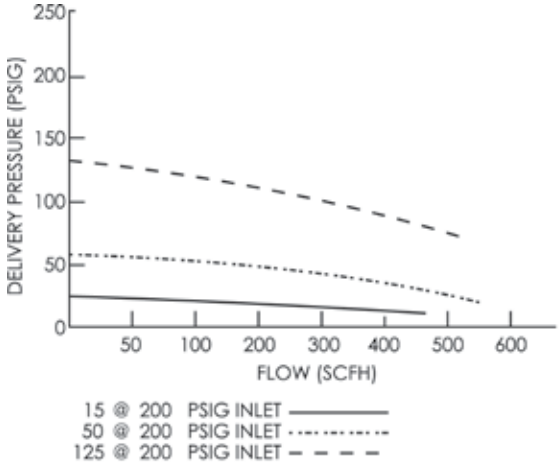
PP702	-	XXX	-	XXX	-	XXXX	-	XX

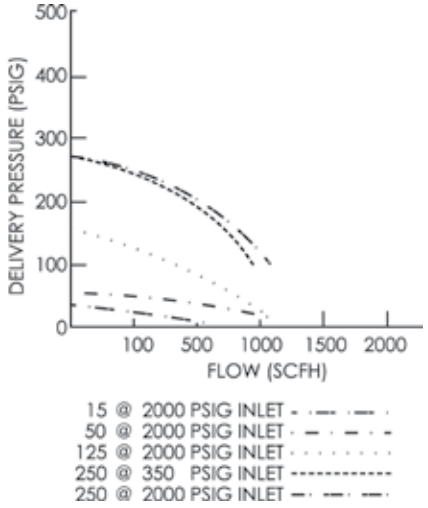
MODEL NO.	DELIVERY	DELIVERY PRESSURE (OUTLET GAUGE)	CGA INLET FITTING		ACCESSORIES	OPTIONS
PP702	0-15 PSIG	(30" Hg Vac-30 psi/2 bar)	000 (1/4" FNPT)	350	A. 1/4" MNPT Needle Valve	1. Without Relief Valve
	0-50 PSIG	(30" Hg Vac-100 psi/7 bar)	001 (1/4" MNPT)	500	B. 1/4" FNPT Diaph. Valve	3. No Gauges
	0-125 PSIG	(30" Hg Vac-200 psi/14 bar)	280	510	C. 1/4" MNPT Nipple	
	0-250 PSIG	(400 psi/28 bar)	296	540	D. 1/4" FNPT Port	
			300	555	E. 1/4" Tube Fitting	
			326	580	F. 1/8" Tube Fitting	
			346	590	G. 1/4" Hose barb x 1/4" MNPT	
					H. 1/8" Hose barb x 1/4" MNPT	
					I. 1/4" Hose barb x 1/4" FNPT	
					J. 1/4" FNPT Needle Valve	
					K. Single Regulator Alarm	
					L. SG 910 BR Regulator Mounting Station	

PurityPlus® SPECIALTY GASES

PP702

FLOW DATA

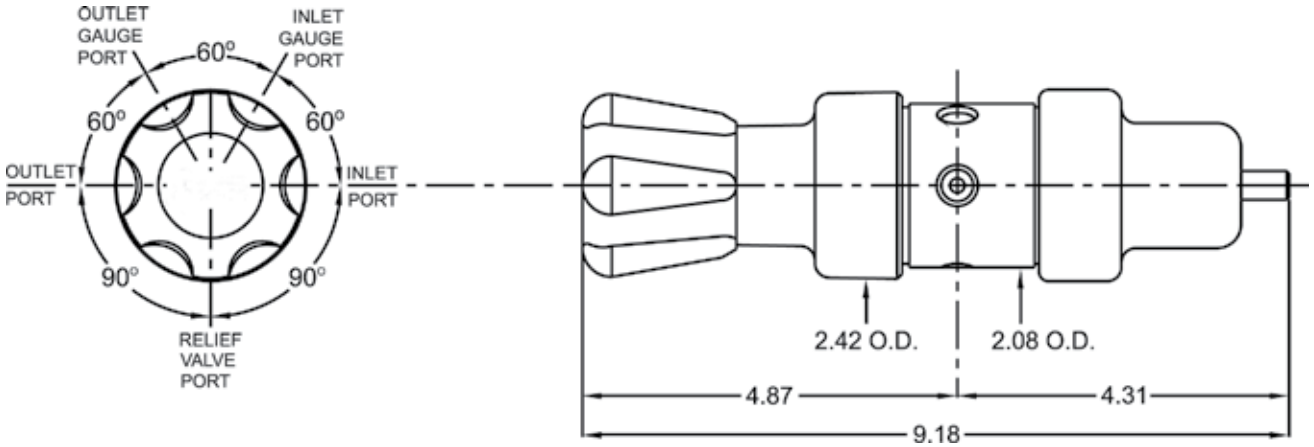




SPECIFICATIONS

- C_v: .15
- Pressure Regulation: 0.04 PSIG/100 PSIG
- Weight:: 4.48 lbs.

DIMENSIONS



PurityPlus® SPECIALTY GASES

PP703

FORGED BRASS REGULATOR (CHROME PLATED)

Model PP703-125-000-D shown

Model PP703 is a chrome plated brass single stage pipeline regulator with a stainless steel diaphragm for general laboratory use. The PP703 is suitable for:

- Non-corrosive gases
- Purging
- Pressure testing
- Blanketing

Recommended for gas purity up to Grade 5.0 (99.999).

FEATURES

- 2 - 1/8" 302 stainless steel diaphragm eliminates contamination from diffusion or outgassing
- One-piece encapsulated seat design to protect seat from particulate contamination
- Chrome plated bonnet, body and fittings
- 2" chrome plated dual scale gauge (psi/bar)
- External relief valve standard
- Designed to 1 x 10^{-8} cc/sec. inboard helium leak rate to maintain gas purity levels
- Max inlet 3000 PSIG

RELATED OPTIONS

Wall mounting bracket P/N: 9101242

MATERIALS

Body	Chrome Plated Brass
Bonnet	Chrome Plated Die Cast
Diaphragm	302 Stainless Steel
Nozzle	Brass
Seat	PTFE Teflon
Seals	PTFE Teflon
Filter	Nickel-Plated Sintered Bronze - 10 Micron
Seat Return Spring	PH-17 Stainless Steel
Adjusting Knob	ABS Plastic

PP703 ORDERING INFORMATION

PP 703 - XXX - XXX - XX - XX

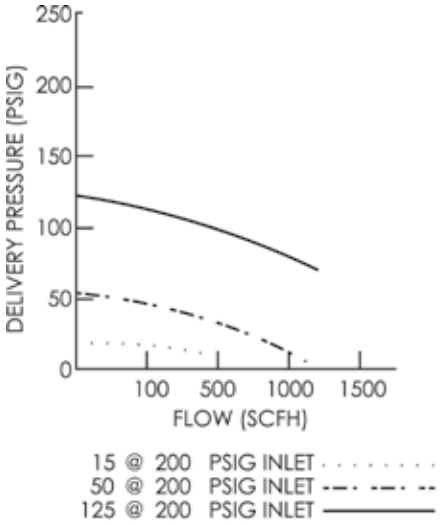
MODEL NO.	DELIVERY	Delivery Pressure (OUTLET GAUGE)	INLET FITTING	ACCESSORIES	OPTIONS
PP 703	0-15 PSIG	(30" Hg Vac-30 psi/2 bar)	000 (1/4" FNPT)	A. 1/4" MNPT Needle Valve	1. Without Relief Valve
	0-50 PSIG	(30" Hg Vac-100 psi/7 bar)	001 (1/4" MNPT)	B. 1/4" FNPT Diaph. Valve	3. No Gauge
	0-125 PSIG	(30" Hg Vac-200 psi/14 bar)	002 (1/4" Tube Fitting)	C. 1/4" MNPT Nipple	
	0-250 PSIG	(400 psi/28 bar)	003 (1/8" Tube Fitting)	D. 1/4" FNPT Port	
			004 (1/4" Hose barb x 1/4" MNPT)	E. 1/4" Tube Fitting	
			005 (1/8" Hose barb x 1/4" MNPT)	F. 1/8" Tube Fitting	
				G. 1/4" Hose barb x 1/4" MNPT	
				H. 1/8" Hose barb x 1/4" MNPT	
				I. 1/4" Hose barb x 1/4" FNPT	
				J. 1/4" FNPT Needle Valve	

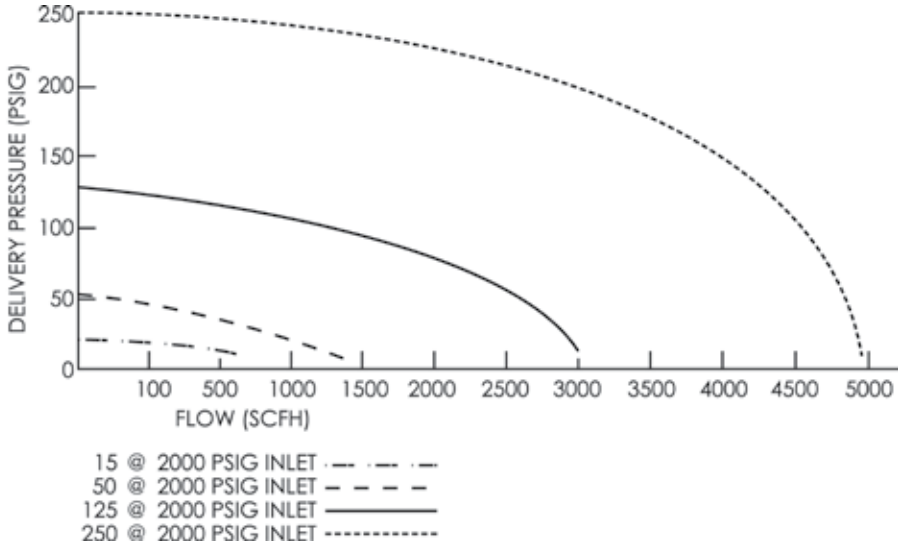
NOTE: Regulators with delivery pressure above 15 PSIG should not be used with acetylene.

PurityPlus® SPECIALTY GASES

PP703

FLOW DATA

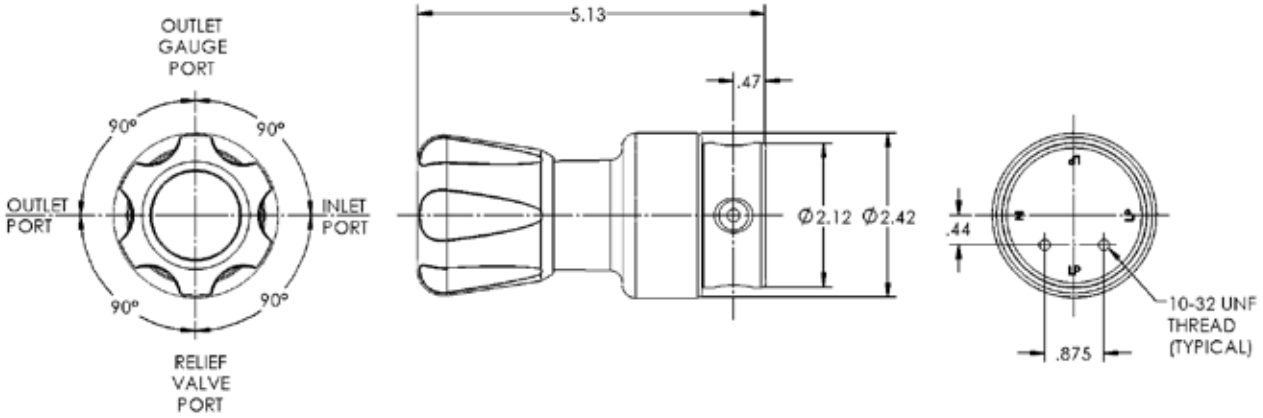




SPECIFICATIONS

- C_v: .17
- Pressure Regulation: 1.8 PSIG/100 PSIG
- Weight: 2.92 lbs.

DIMENSIONS



PurityPlus® SPECIALTY GASES

PP721/721C

BRASS BARSTOCK REGULATOR (BARE BRASS AND CHROME PLATED)

Model PP721C-125-350-B shown

Model PP721-125-350-B shown

MADE IN THE USA

Model PP721 is a single stage cylinder regulator available in brass (PP721) or chrome plated brass (HP 721C) barstock for pressure control of non corrosive gases when pressure rise is not critical. The PP721 is suitable for:

- High purity gas applications
- Research sample systems gases
- Process analyzer gases
- Gas chromatography
- EPA protocol gases
- Laser gas systems
- Emission monitoring systems

Recommended for gas purity levels of Grade 5.0 (99.999) and higher.

MATERIALS

Body/Bonnet	Brass Barstock
Diaphragm	316L Stainless Steel
Nozzle	Brass
Seat	PTFE Teflon
Seals	PTFE Teflon
Filter	Nickel-Plated Sintered Bronze - 10 Micron
Seat Return Spring	PH17-7 Stainless Steel
Adjusting Knob	ABS Plastic

FEATURES

- 1-11/16" 316L stainless steel diaphragm eliminates contamination from diffusion or outgassing
- One piece encapsulated seat design includes a sintered filter to protect the seat from particulate contamination
- 2" dual scale brass gauges (psi/bar)
- Designed to 1 x 10^{-9} cc/sec. inboard helium leak rate to maintain gas purity levels
- Front or back panel mountable
- Maximum inlet 3000 PSIG except for models with CGA 300 and 510 equipped with 400 PSIG Inlet gauge
- External relief valve standard

RELATED OPTIONS

Front Panel Mount Kit P/N: 9100871
Wall Mounting Bracket P/N: 9101242

PP721 ORDERING INFORMATION

PP721 - XXX - XXX - XXXX - XXXXX

MODEL NO.	DELIVERY	DELIVERY PRESSURE (OUTLET GAUGE)	CGA/INLET FITTING		ACCESSORIES	OPTIONS
PP721	0-15 PSIG	(30" Hg Vac-30 psi/2 bar)	000 (1/4" FNPT)	350	A) 1/4" MNPT Needle Valve	1. Without Relief Valve
PP721C (chrome plated)	0-50 PSIG	(30" Hg Vac-100 psi/7 bar)	001 (1/4" MNPT)	510	B) 1/4" FNPT Diaph. Valve	2. He Leak Cert. (Inboard)
	0-125 PSIG	(30" Hg Vac-200 psi/14 bar)	300	540	C) 1/4" MNPT Nipple	3. No Gauges
	0-250 PSIG	(400 psi/28 bar)	320	580	D) 1/4" FNPT Port	5. He Leak Cert.(Outboard)
	0-500 PSIG	(1000 psi/70 bar)	326	590	E) 1/4" Tube Fitting	6. 400 psi inlet gauge
			346		F) 1/8" Tube Fitting	**Gas Service Must Be Specified**
					G) Single Regulator Alarm	
					R) SG 910 EZ BR Regulator Mounting Station 1 cyl 36" Pigtail*	

*Call for different lengths

PurityPlus® SPECIALTY GASES

PP721/721C

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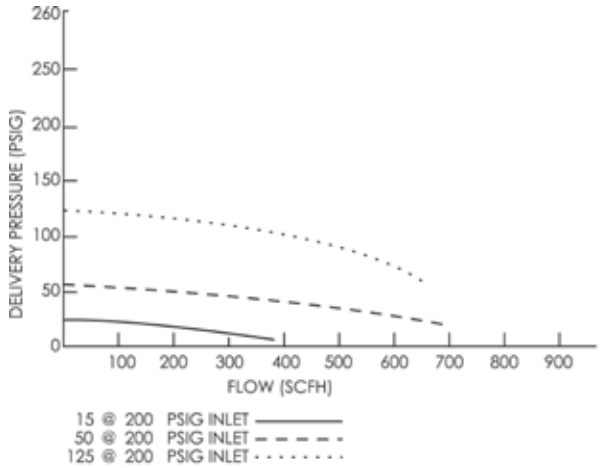
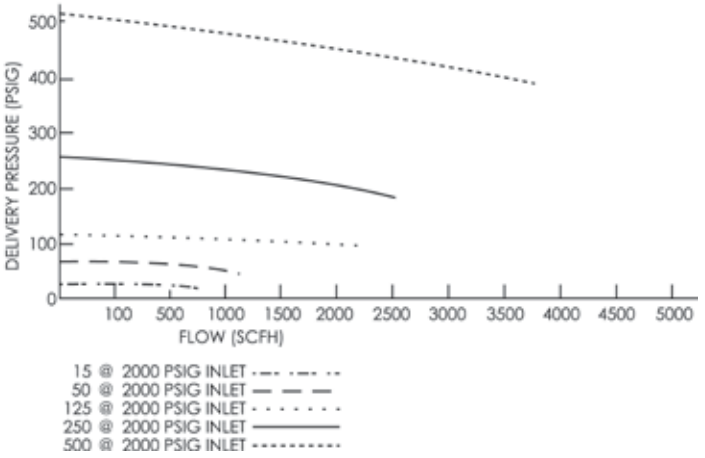
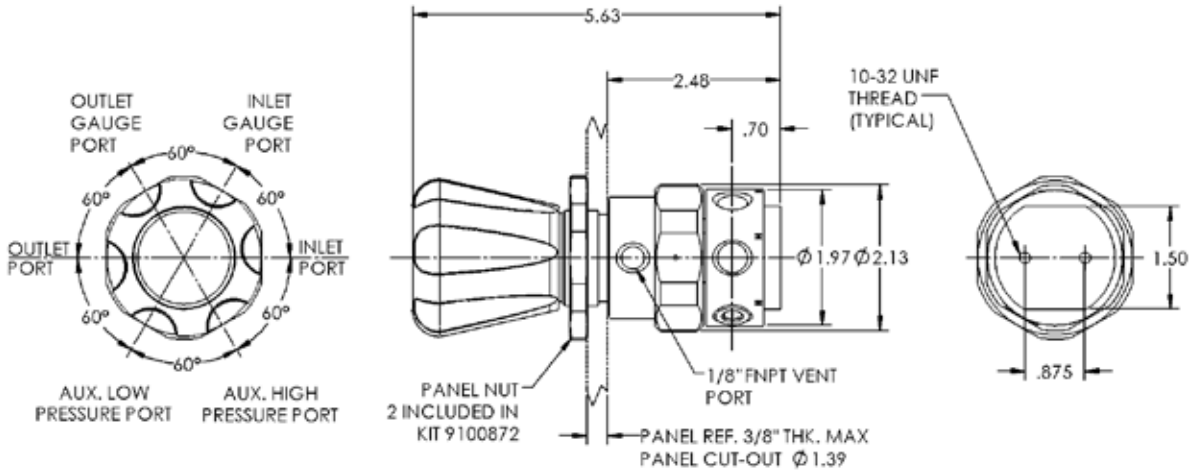




SPECIFICATIONS

- Cv: .08
- Pressure Regulation: 1.8 PSIG/100 PSIG
- Weight: 2.92 lbs.

DIMENSIONS



PurityPlus® SPECIALTY GASES

PP722/722C

BRASS BARSTOCK REGULATOR (BARE BRASS AND CHROME PLATED)

Model PP722C-125-320-B shown

Model PP722-125-320-B shown

MADE IN THE USA

Model PP722 is a two stage cylinder regulator available in brass (PP722) or chrome plated brass (PP722C) barstock for constant delivery pressure from full to near empty cylinder conditions. The PP 722 is suitable for:

- High purity gas applications
- Research sample systems gases
- Process analyzer gases
- Gas chromatography
- EPA protocol gases
- Laser gas systems
- Emission monitoring systems

Recommended for gas purity levels of Grade 5.0 (99.999) and higher.

MATERIALS

Body/Bonnet	Brass Barstock
Diaphragm	316L Stainless Steel
Nozzle	Brass
Seat	PTFE Teflon
Seals	PTFE Teflon
Filter	Nickel-Plated Sintered Bronze - 10 Micron
Seat Return Spring	PH17-7 Stainless Steel
Adjusting Knob	ABS Plastic

FEATURES

- 1 11/16" 316L stainless steel diaphragm eliminates contamination from diffusion or outgassing
- One piece encapsulated seat design includes a sintered filter to protect the seat from particulate contamination
- 2" dual scale brass gauges (psi/bar)
- Designed to 1 x 10-9 cc/sec. inboard helium leak rate to maintain gas purity levels
- Front and rear panel mountable
- Maximum inlet 3000 PSIG except for models with CGA 300 and 510 equipped with 400 PSIG inlet gauge
- External relief valve standard

RELATED OPTIONS

Front Panel Mount Kit P/N: 9100871

PP722 ORDERING INFORMATION

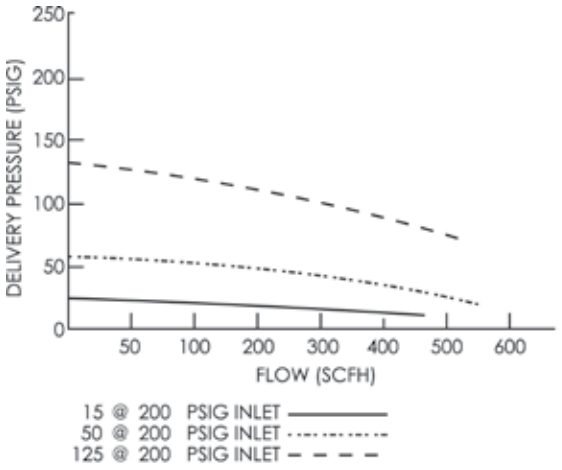
HP 722 - xxx - xxx - xxxx - xxxx

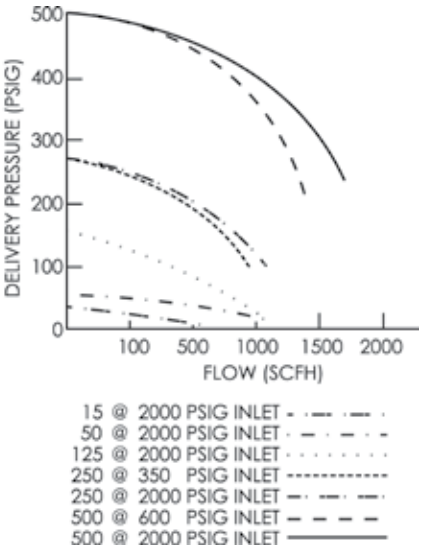
MODEL NO.	DELIVERY	DELIVERY PRESSURE (OUTLET GAUGE)	CGA / INLET FITTING		ACCESSORIES	OPTIONS
PP722	0-15 PSIG	(30" Hg Vac-30 psi/2 bar)	000 (1/4" FNPT)	346	A. 1/4" MNPT Needle Valve	1. Without Relief Valve
PP722C (chrome plated)	0-50 PSIG	(30" Hg Vac-100 psi/ 7 bar)	001 (1/4" MNPT)	350	B. 1/4" FNPT Diaph. Valve	2. He Leak Cert. (Inboard)
	0-125 PSIG	(30" Hg Vac-200 psi/14 bar)	296	510	C. 1/4" MNPT Nipple	3. No Gauges
	0-250 PSIG	(400 psi/28 bar)	300	540	D. 1/4" FNPT Port	5. He Leak Cert. (Outboard)
	0-500 PSIG	(1000 psi/70 bar)	320	580	E. 1/4" Tube Fitting	
			326	590	F. 1/8" Tube Fitting	
					G. Single Regulator Alarm	
					R. SG 910 EZ BR Regulator Hose Barb Mounting Station 1 cyl 36" Pigtail*	
					*Call for different lengths	

PurityPlus® SPECIALTY GASES

PP722/722C

FLOW DATA

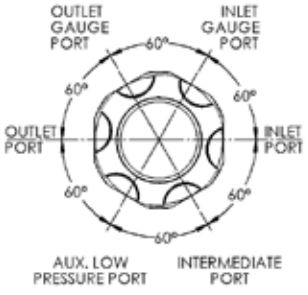


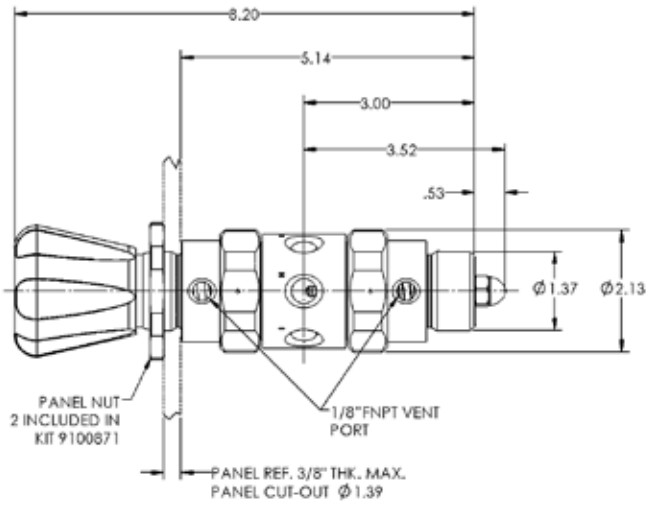


SPECIFICATIONS

- Cv: .06
- Pressure Regulation: .05 PSIG/100 PSIG
- Weight: 4.43 lbs.

DIMENSIONS





PurityPlus® SPECIALTY GASES

PP723/723C

BRASS BARSTOCK REGULATOR (BARE BRASS AND CHROME PLATED)

Model PP723C-125-000-E shown

Model PP723-125-000-E shown

Model PP723 is a single stage pipeline regulator available in brass (PP723) or chrome plated brass (HP 723C) barstock and are rated up to 3000 psig inlet pressure.
The PP723 is suitable for:

- High purity gas applications
- Research sample systems gases
- Process analyzer gases
- Gas chromatography
- EPA protocol gases
- Laser gas systems
- Emission monitoring systems

Recommended for gas purity levels of Grade 5.0 (99.999) and higher.

MADE IN THE USA

MATERIALS

Body/Bonnet	Brass Barstock
Diaphragm	316L Stainless Steel
Nozzle	Brass
Seat	PTFE Teflon
Seals	PTFE Teflon
Filter	Nickel-Plated Sintered Bronze - 10 Micron
Seat Return Spring	PH 17-7 Stainless Steel
Adjusting Knob	ABS Plastic

FEATURES

- 1-11/16" 316L stainless steel diaphragm eliminates contamination from diffusion or outgassing
- One piece encapsulated seat design includes a sintered filter to protect the seat from particulate contamination
- 2" dual scale brass gauge (psi/bar)
- Designed to 1 x 10-9 cc/sec. inboard helium leak rate to maintain gas purity levels
- Front or back panel mountable
- External relief valve standard
- Maximum inlet 3000 PSIG

RELATED OPTIONS

Front Panel Mount Kit P/N: 9100871
Wall mounting bracket P/N: 9101242

PP723 ORDERING INFORMATION

PP723 - XXX - XXX - XX - XXXX

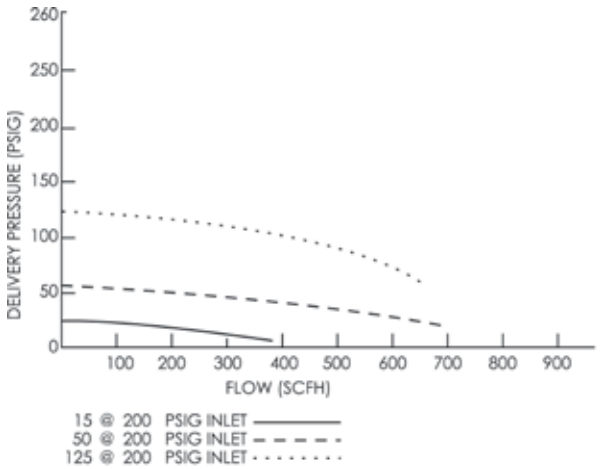
MODEL NO.	DELIVERY PRESSURE DELIVERY	(OUTLET GAUGE)	INLET	ACCESSORIES	OPTIONS
PP723	0-15 PSIG	(30" Hg Vac-30 psi/2 bar)	000 (1/4" FNPT)	A. 1/4" MNPT Needle Valve	1. Without Relief Valve
PP723C (chrome plated)	0-50 PSIG	(30" Hg Vac-100 psi/7 bar)	001 (1/4" MNPT)	B. 1/4" FNPT Diaph. Valve	2. He Leak Cert. (Inboard)
	0-125 PSIG	(30" Hg Vac-200 psi/14 bar)	002 (1/4" Tube fitting)	C. 1/4" MNPT Nipple	3. No Gauge
	0-250 PSIG	(400 psi/28 bar)	003 (1/8" Tube fitting)	D. 1/4" FNPT Port	5. He Leak Cert. (Outboard)
	0-500 PSIG	(1000 psi/70 bar)		E. 1/4" Tube Fitting	
				F. 1/8" Tube Fitting	
				G. 1/4" Hose barb x 1/4" MNPT	
				H. 1/8" Hose barb x 1/4" MNPT	

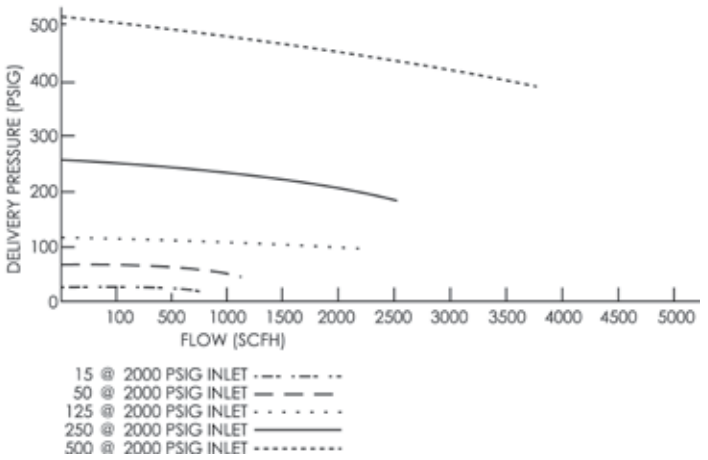
NOTE: Regulators with delivery pressure above 15 PSIG should not be used with acetylene.

PurityPlus® SPECIALTY GASES

PP723/723C

FLOW DATA

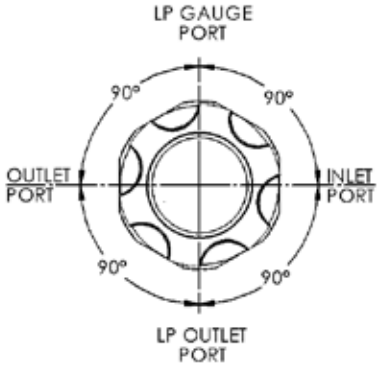


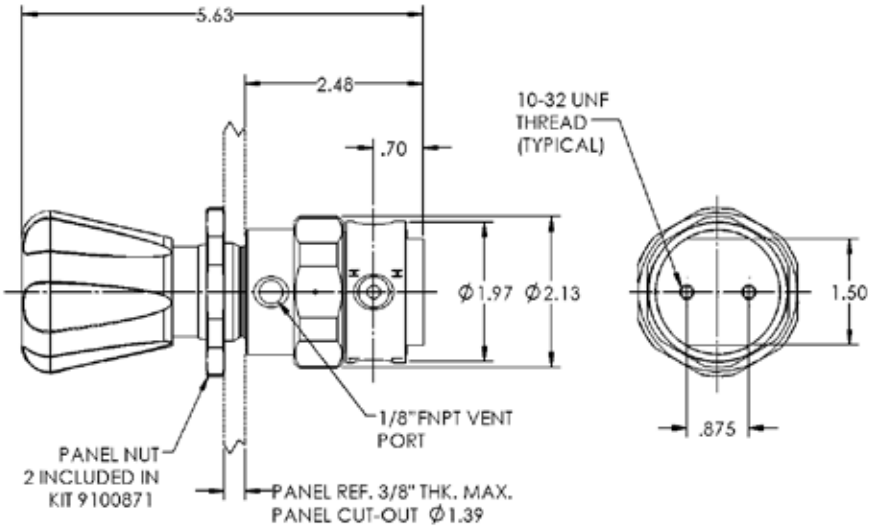


SPECIFICATIONS

- Cv: .08
- Pressure Regulation: 1.8 PSIG/100 PSIG
- Weight: 2.68 lbs.

DIMENSIONS





PurityPlus® SPECIALTY GASES

PP741

STAINLESS STEEL BARSTOCK REGULATOR

Model PP741-125-580-A shown

MADE IN THE USA

Model HP 741 is a single stage, stainless steel cylinder regulator for applications where a slight rise in delivery pressure from full to empty cylinder can be tolerated. The Model HP 741 is suitable for:

- Corrosive gas applications
- High purity gas applications
- Research sample systems gases
- Process analyzer gases
- Gas chromatography
- EPA protocol gases
- Laser gas systems
- Emission monitoring systems

Recommended for corrosive gases or purity levels of Grade 6.0 (99.9999) and higher.

MATERIALS

Body	316L Stainless Steel Barstock
Bonnet	Chrome Plated Brass Barstock
Diaphragm	316L Stainless Steel
Nozzle	316L Stainless Steel
Seat	PTFE Teflon
Seals	PTFE Teflon
Filter	Sintered Stainless Steel - 10 Micron
Seat Return Spring	316L Stainless Steel
Adjusting Knob	ABS Plastic

FEATURES

- 1 - 11/16" 316L stainless steel diaphragm eliminates contamination from diffusion or outgassing
- One piece encapsulated seat design includes a sintered filter to protect the seat from particulate contamination
- Chrome plated bonnet, 316L SS body and fittings
- 2" stainless steel dual scale gauges (psi/bar)
- 1 x 10-9 cc/sec. inboard helium leak rate to maintain gas
- purity levels
- Front or back panel mountable
- Maximum inlet 3000 PSIG except for models with
- CGA 240 and 510 equipped with 400 PSIG inlet gauge

RELATED OPTIONS

Front Panel Mount Kit P/N: 9100871
Wall mounting Bracket P/N: 9101242

PP741 ORDERING INFORMATION

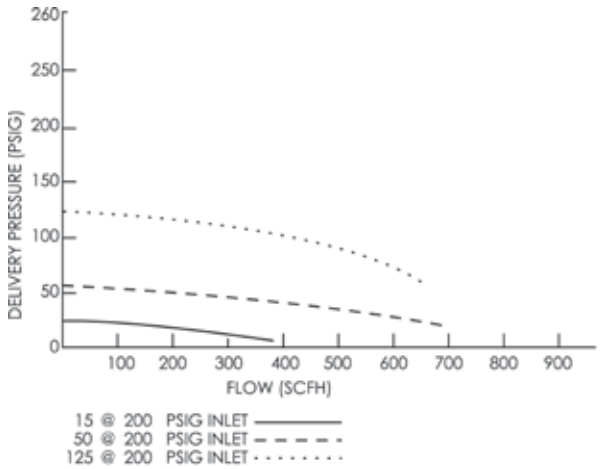
PP741 - XXX - XXX - XXXX - XXXXX

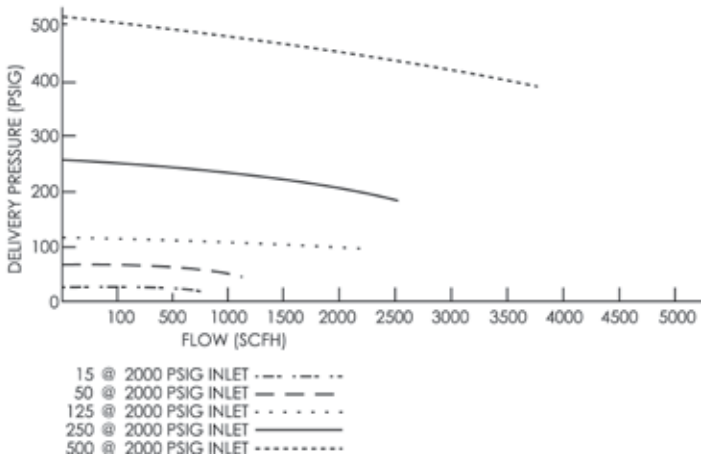
MODEL NO.	DELIVERY PRESSURE DELIVERY	(OUTLET GAUGE)	CGA INLET FITTING		ACCESSORIES	OPTIONS
PP741	0-15 PSIG	(30" Hg Vac-30 psi/2 bar)	240	510	A) 1/4" FNPT Diaph. Valve	2) He Leak Cert. (Inboard)
	0-50 PSIG	(30" Hg Vac-100 psi/7 bar)	320	540	B) 1/4" MNPT Nipple	3) No Gauges
	0-125 PSIG	(30" Hg Vac-200 psi/14 bar)	326	580	C) 1/4" FNPT Port	4) With Relief Valve
	0-250 PSIG	(400 psi/28 bar)	330	590	D) 1/4" Tube Fitting	5) He Leak Cert.(Outboard)
	0-500 PSIG	(1000 psi/70 bar)	346	660	E) 1/8" Tube Fitting	6) 400 PSI Inlet Gauge
			350	705	F) Single Regulator Alarm	**Gas Service Must Be Specified**
			000 (1/4" FNPT)		R) SG910 EZ Regulator mounting station 1 Cyl 36" Pigtail*	
			001 (1/4" MNPT)		*Call for different lengths	

PurityPlus® SPECIALTY GASES

PP741

FLOW DATA

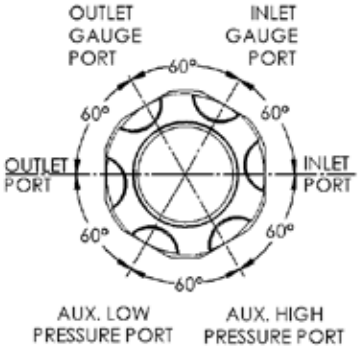


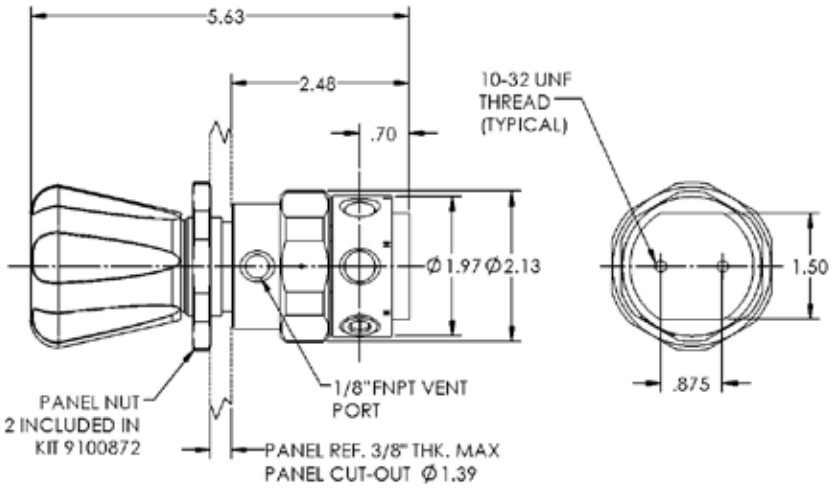


SPECIFICATIONS

- Cv: .08
- Pressure Regulation: 1.8 PSIG/100 PSIG
- Weight: 2.92 lbs.

DIMENSIONS





PurityPlus® SPECIALTY GASES

PP742

STAINLESS STEEL BARSTOCK REGULATOR

MADE IN THE USA

Model PP742-125-580-A shown

Model PP742 is a two stage stainless steel cylinder regulator for constant delivery pressure from full to near empty cylinder conditions. The HP 742 is suitable for:

- Corrosive gas applications
- High purity gas applications
- Research sample systems gases
- Process analyzer gases
- Gas chromatography
- EPA protocol gases
- Laser gas systems
- Emission monitoring systems

Recommended for corrosive gases or purity levels of Grade 6.0 (99.9999) and higher.

MATERIALS

Body	316L Stainless Steel Barstock
Bonnet	Chrome Plated Brass Barstock
Diaphragm	316L Stainless Steel
Nozzle	316L Stainless Steel
Seat	PTFE Teflon
Seals	PTFE Teflon
Filter	Sintered Stainless Steel - 10 Micron
Seat Return Spring	316L Stainless Steel
Adjusting Knob	ABS Plastic

FEATURES

- 1 11/16" 316L stainless steel diaphragm eliminatescontamination from diffusion or outgassing
- One piece encapsulated seat design includes a sintered filter to protect the seat from particulate contamination
- Chrome plated bonnet, 316L SS body and fittings
- 2" stainless steel dual scale gauges (psi/bar)
- Designed to 1 x 10-9 cc/sec. inboard helium leak rate to maintain gas purity levels
- Maximum inlet 3000 PSIG except for models with CGA 240 and 510 equipped with 400 PSIG inlet gauge
- Front panel mountable

RELATED OPTIONS

Front Panel Mount Kit P/N: 9100871

PP742 ORDERING INFORMATION

PP742 - xxx - xxx - xxxx - xxxx

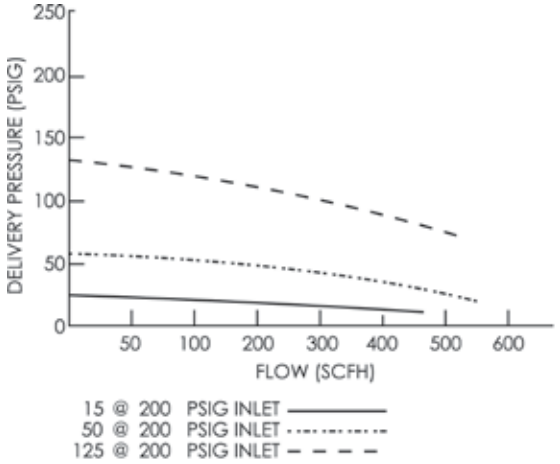
Model No.	Delivery	Delivery Pressure (Outlet Gauge)	CGA/Inlet Fitting		Accessories	Options
PP742	0-15 PSIG	(30" Hg Vac-30 psi/2 bar)	240	510	A) 1/4" FNPT Diaph. Valve	2) He Leak Cert. (Inboard)
	0-50 PSIG	(30" Hg Vac-100 psi/7 bar)	320	540	B) 1/4" MNPT Nipple	3) No Gauges
	0-125 PSIG	(30" Hg Vac-200 psi/14 bar)	326	580	C) 1/4" FNPT Port	4) With Relief Valve
	0-250 PSIG	(400 psi/28 bar)	330	590	D) 1/4" Tube Fitting	5) He Leak Cert. (Outboard)
	0-500 PSIG	(1000 psi/70 bar)	346	660	E) 1/8" Tube Fitting	
			350	705	F) Single Regulator Alarm	
			000 (1/4" FNPT)		R) SG910 EZ Regullator	
			001 (1/4" MNPT)		Mounting Station station 1 Cyl 36" Pigtail	
					Call for different lengths	

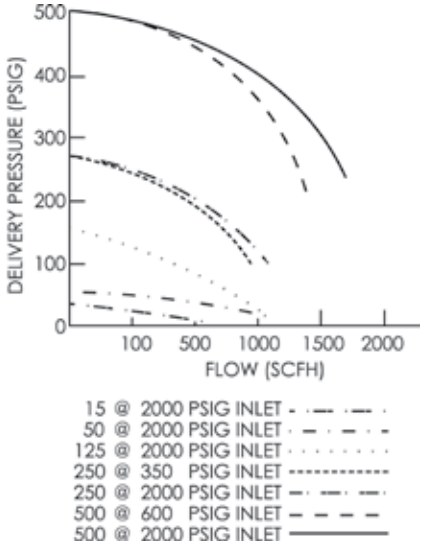
PurityPlus® SPECIALTY GASES

PP742

TECHNICAL SPECIFICATIONS

FLOW DATA

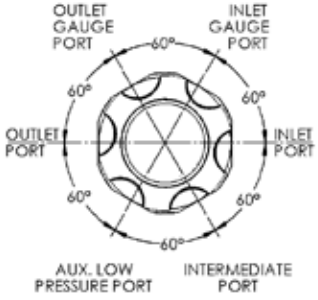


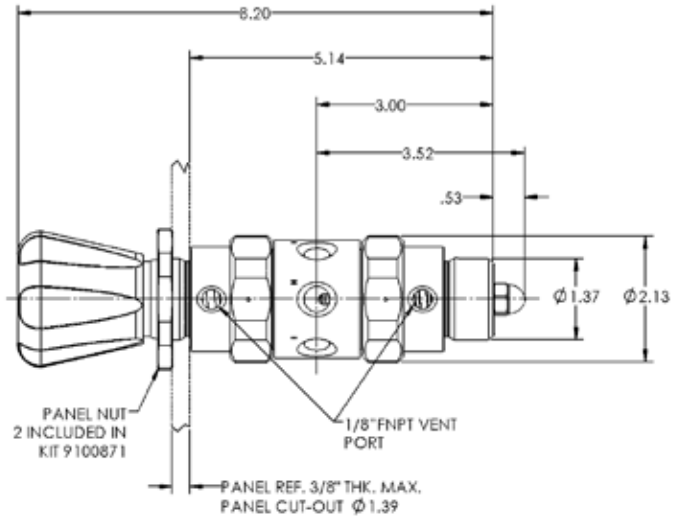


SPECIFICATIONS

- Cv: .06
- Pressure Regulation: .05 PSIG/100 PSIG
- Weight: 4.43 lbs.

DIMENSIONS





PurityPlus® SPECIALTY GASES

PP743

STAINLESS STEEL BARSTOCK REGULATOR

Model PP743-125-000-E shown

MADE IN THE USA

Model HP 743 is a single stage stainless steel pipeline regulator for pipeline and other applications up to 3000 PSIG inlet pressure. The Model HP 743 is suitable for:

- Corrosive gas applications
- High purity gas applications
- Research sample systems gases
- Process analyzer gases
- Gas chromatography
- EPA protocol gases
- Laser gas systems
- Emission monitoring systems

Recommended for corrosive gases or purity levels of Grade 6.0 (99.9999) and higher.

MATERIALS

Body	316L Stainless Steel Barstock
Bonnet	Chrome Plated Brass Barstock
Diaphragm	316L Stainless Steel
Nozzle	316L Stainless Steel
Seat	PTFE Teflon
Seals	PTFE Teflon
Filter	Sintered Stainless Steel - 10 Micron
Seat Return Spring	316L Stainless Steel
Adjusting Knob	ABS Plastic

FEATURES

- 1-11/16" 316L stainless steel diaphragm eliminates contamination from diffusion or outgassing
- One piece encapsulated seat design includes a sintered filter to protect the seat from particulate contamination
- Chrome plated bonnet, 316L body and fittings
- 2" stainless steel single scale gauge (psi/bar)
- Designed to 1 x 10-9 cc/sec. inboard helium leak rate to maintain gas purity levels
- Maximum inlet 3000 PSIG
- Front or back panel mountable

RELATED OPTIONS

Front Panel Mount Kit P/N: 9100871
Wall mounting Bracket P/N: 9101242

PP743 ORDERING INFORMATION

PP743 - XXX - XXX - XX - XXXX

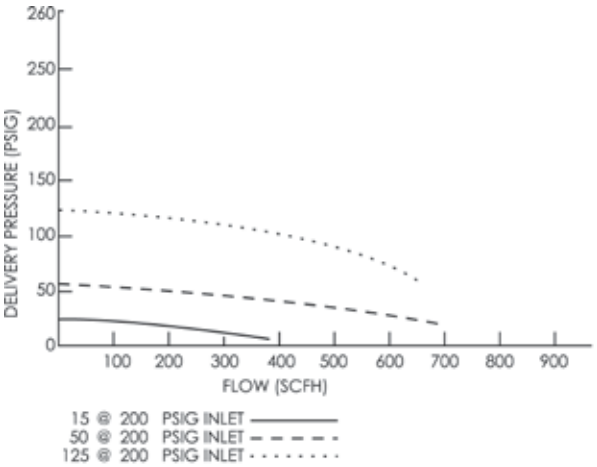
MODEL NO.	DELIVERY PRESSURE DELIVERY	(OUTLET GAUGE)	INLET	ACCESSORIES	OPTIONS
PP743	0-15 PSIG	(30" Hg Vac-30 psi/2 bar)	000 (1/4" FNPT)	A. 1/4" FNPT Diaph. Valve	2. He Leak Cert. (Inboard)
	0-50 PSIG	(30" Hg Vac-100 psi/7 bar)	001 (1/4" MNPT)	B. 1/4" MNPT Nipple	3. No Gauge
	0-125 PSIG	(30" Hg Vac-200 psi/14 bar)	002 (1/4" Tube fitting)	C. 1/4" FNPT Port	4. With Relief Valve
	0-250 PSIG	(400 psi/28 bar)	003 (1/8" Tube fitting)	D. 1/4" Tube Fitting	5. He Leak Cert (Outboard)
	0-500 PSIG	(1000 psi/70 bar)		E. 1/8" Tube Fitting	

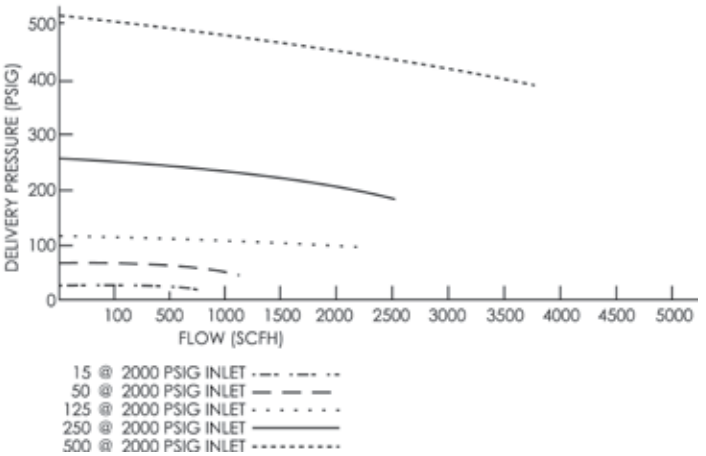
NOTE: Regulators with delivery pressure above 15 PSIG should not be used with acetylene.

PurityPlus® SPECIALTY GASES

PP743

FLOW DATA

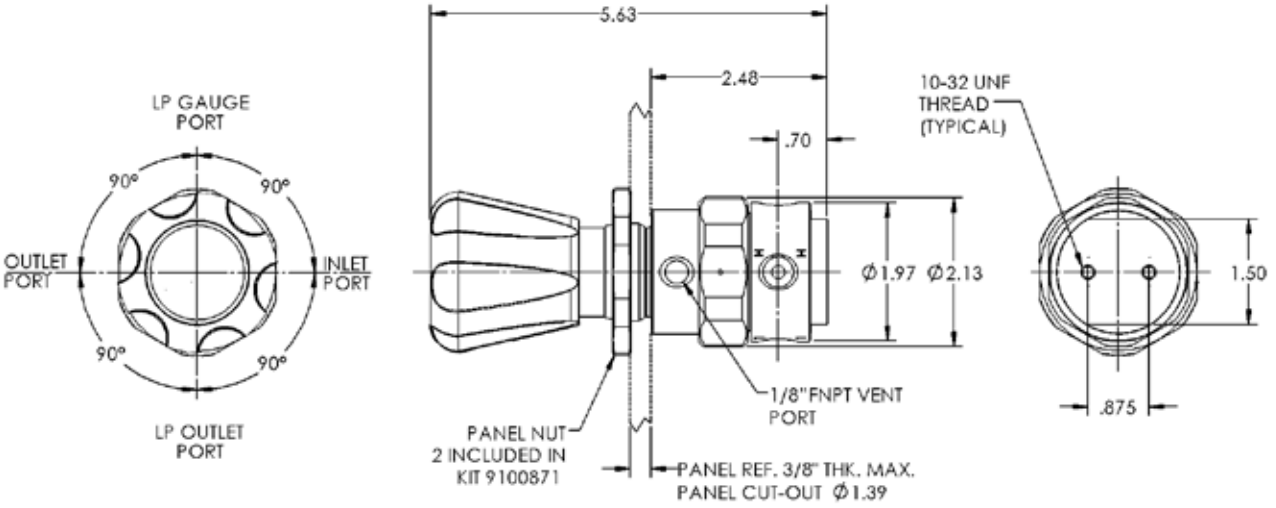




SPECIFICATIONS

- Cv: .08
- Pressure Regulation: 1.8 PSIG/100 PSIG
- Weight: 2.68 lbs.

DIMENSIONS




PurityPlus
SPECIALTY GASES

PurityPlus® SPECIALTY GASES

PP910EZ

REGULATOR MOUNTING STATION

Model 721C - 050 - 580 - BER shown

The EZ Mount accessory enables a practical and safe wall-mounted installation of any Harris high-purity bar stock cylinder regulator. This simple design allows for right out-of-the-box installation of the regulator assembly onto a wall or structure. The convenient, compact design significantly minimizes the amount of valuable wall space normally required to wall mount regulators.

The EZ Mount accessory is available with a choice of 1 or 2 all stainless steel flexible pigtails in 36", 48" or 72" lengths and a wall-mount bracket.It is equipped with a CGA connection with integrated check valves to prevent contaminates from entering the gas delivery supply during cylinder change out. The mounting brackets are fabricated from 16 gauge aluminum for durable, long-life service and are suitable for most environments and locations.

- Compact design minimizes valuable wall space required to wall mount regulators
- Convenient installation - ready to mount right out-of-the-box
- Regulator available with a packless diaphragm valve for easy shut-off
- Safe & efficient - eliminates the need to handle regulator during cylinder change-outs
- Regulator available with a wide range of outlet compression fittings
- Check valve CGA prevents contaminates from entering gas stream
- Maximum inlet pressure 3000 psig
- Cleaned to CGA G-4.1

910EZ ORDERING INFORMATION

PART NO.	MATERIAL	REGULATORS	NUMBER OF CYLINDERS
Call customer service at 1.800.733.4043 Option 2 for part numbers for your specific application	Brass	721, 721C, 722, 722C	1
	Brass	721, 721C, 722, 722C	2
	Stainless Steel	741 & 742	1
	Stainless Steel	741 & 742	2

SPECIFICATIONS

Maximum Rated Inlet Pressure: 3000 psig
Temperature Range: -40°F to +165°F
Weight: 2 lbs (without regulator)
Bracket: 16 Gauge Aluminum
Pigtail - One or Two
Available lengths are 36", 48" and 72" 316 stainless steel flexible hose (other lengths are available by special order)

Choose EZ Mount as an accessory when ordering regulators listed below.

Model 721/ 721C see P. 14
Model 722/ 722C see P. 16
Model 741 see P.8
Model 742 see P.10

PurityPlus® SPECIALTY GASES

PP900

SWITCHOVER MANIFOLDS BRASS & STAINLESS STEEL

MADE IN THE USA

The PP900 BR / PP905 SS semi-automatic high purity switchover prevents downtime by automatically switching gas supply from the primary cylinder bank to the reserve cylinder bank. The user resets the primary bank by turning the knob. Manual adjustment of the individual regulators is not required. All systems include a line control regulator.

FEATURES

- Wall mounting panel and brackets included
- Maximum inlet pressure 3000 PSIG
- Delivery pressure: 0-15, 0-50, 0-125, 0-250, 0-500 except acetylene (CGA 510A) 0-15 psig
- Inlet/outlet - 1/4" NPT Ports
- Headers include diaphragm-type shut-off valves
- All systems include stainless steel pigtails with integral check in the CGA stem added safety.
- Acetylene (CGA 510A) includes dry-type flash arrestors on pigtail end

RELATED OPTIONS

4302473 - Two Cylinder Process Station
4302615 - Four Cylinder Process Station
4302616 - Six Cylinder Process Station

PP900 ORDERING INFORMATION

MATERIAL	MODEL	DELIVERY PRESSURE	RIGHT # CYLINDERS	GAS SOURCE RIGHT	PIGTAIL LENGTH RIGHT	VALVE SPACING	LEFT # CYLINDERS	GAS SOURCE LEFT	PIGTAIL LENGTH LEFT	VALVE SPACING	INLET CGA
	XX	XXX	X	X	XX	(X)	X	X	XX	(X)	XXX
BRASS	900B	015	1-25	High Pressure Cylinder	24" (std)	10" (std)	1-25	High Pressure Cylinder	24" (std)	10" (std)	000
	900BV- Isolation Valve	050			36"	5"			36"	5"	(No CGA)
	900BA - Alarm	125			72"				72"		280 (Brass Only)
	900BVA - Valves and Alarm	250									320
	900BP - Inlet Purge	500									326
	900BPA - Inlet Purge and Alarm										330 (SS Only)
316L SS	900S										346
	900SV - Isolation Valve										350
	900SA - Alarm										500 (Brass Only)
	900SVA - Valve and Alarm										540
	900SP - Purge										580
	900SPA - Purge and Alarm										590
											660 (SS Only)
											705 (SS Only)

PurityPlus® SPECIALTY GASES

PP905

SWITCHOVER MANIFOLDS BRASS & STAINLESS STEEL

MADE IN THE USA

The PP905 BR / PP905 SS semi-automatic high-purity switchover prevents downtime by automatically switching gas supply from the primary cylinder bank to the reserve cylinder bank. The user resets the primary bank by turning the knob. Manual adjustment of the individual regulators is not required. All systems include a line control regulator.

FEATURES

- Wall mounting panel and brackets included
- Maximum inlet pressure 3000 PSIG
- Delivery pressure: 0-15, 0-50, 0-125, 0-250, 0-500 except acetylene (CGA 510A) 0-15 psig
- Inlet/outlet - 1/4" NPT
- Headers include diaphragm-type shut-off valves
- All systems include stainless steel pigtails with check valves and stainless steel inner core and armor casing for added safety.
- Acetylene (CGA 510A) includes dry-type flash arrestors on pigtail end

RELATED OPTIONS

4302473 - Two Cylinder Process Station
4302615 - Four Cylinder Process Station
4302616 - Six Cylinder Process Station

PP905 ORDERING INFORMATION

MATERIAL	MODEL	DELIVERY PRESSURE	RIGHT # CYLINDERS	GAS SOURCE RIGHT	PIGTAIL LENGTH RIGHT	VALVE SPACING	LEFT # CYLINDERS	GAS SOURCE LEFT	PIGTAIL LENGTH LEFT	VALVE SPACING	INLET CGA
	XX	XXX	X	X	XX	(X)	X	X	XX	(X)	XXX
BRASS	905B	015	1-25	High Pressure Cylinder Liquid Cylinder	24" (std)	10" (std)	1-25	High Pressure Cylinder Liquid Cylinder	24" (std)	10" (std)	000
	905BV	050			36"	5"			36"	5"	(No CGA)
	905BA - Alarm	125			72"				72"		280 (Brass Only)
	905BVA - Valves and Alarm	250									320
	905BP - Inlet Purge	500									326
	905BPA - Inlet Purge and Alarm										330 (SS Only)
316L SS	905S										346
	905SV - Isolation Valve										350
	905SA - Alarm										500 (Brass Only)
	905SVA - Valve and Alarm										540
	905SP - Purge										580
	905SPA - Purge and Alarm										590
											660 (SS Only)
											705 (SS Only)

TECHNICAL INFORMATION

PurityPlus®
SPECIALTY GASES

Section 5 - Technical Information

Gas Safety and Material Compatibility Data Chart

This data has been compiled from the best information available and is offered as a guide to proper material selection. The data presented are generalized for average conditions of temperature and pressure. The user should always investigate the characteristics of the gas being handled and take all the proper precautions. Our technical staff will be pleased to give free advice and technical information on any gas or chemical product of interest.

Legend
◊ - Primary Hazard
S - Satisfactory
U - Unsatisfactory
C - Conditional use

	Hazards for Humans			Materials of Construction								
Gas	**Toxic**	**Flammable**	**Corrosive**	**Aluminum**	**Copper**	**Brass**	**Carbon Steel**	**Stainless Steel**	**Monel®**	**Kel-F®**	**Teflon®**	**Special Characteristics**
Acetylene		◊		S	U	C	S	S		S	S	Do not use at pressures exceeding 15 psig
Air				S	S	S	S	S	S	S	S	
Ammonia	◊	◊	◊	S	U	U	C	S		S	S	Causes stress cracking of copper and copper alloys
Argon				S	S	S	S	S		S	S	
Arsine*	◊	◊		U	S	S	S	S		S	S	Highly toxic, excessive exposure may have delayed effect
Boron Trichloride	◊		◊	U	C	U	S	S	C	S	S	
Boron Trifluoride	◊		◊	U	C	C	S	S	S	S	S	
1-3, Butadiene		◊		S	S	S	S	S		S	S	
Butane		◊		S	S	S	S	S		S	S	
Butenes		◊		S	S	S	S	S		S	S	
Carbon Dioxide				S	S	S	S	S		S	S	
Carbon Monoxide	◊	◊		S	S	S	S	S		S	S	
Carbonyl Sulfide	◊	◊		S	S	S	S	S		S	S	Poor if moisture present; Treat as Hydrogen Sulfide, affects central nervous system
Chlorine	◊		◊	U	U	U	S	S	C	S	S	Very toxic and damaging to the respiratory system
Cyanogen*	◊	◊		U	U	U	S	S		S	S	Treat as cyanides
Deuterium		◊		S	S	S	S	S		S	S	
Dimethylamine	◊	◊	◊	U	U	U	S	S		S	S	Attacks copper and copper alloys rapidly
Dimethyl Ether		◊		S	S	S	S	S		C	S	
Ethane		◊		S	S	S	S	S		S	S	
Ethyl Chloride	◊	◊		U	C	C	C	C		S	S	
Ethylene		◊		S	S	S	S	S		S	S	
Ethylene Oxide	◊	◊		U	U	U	S	S		S	S	Carcinogen; Exposure of liquid on skin or clothing can cause dermatitis
Fluorine*	◊		◊	S	S	C		S	S	U	C	Strong oxidant, can ignite combustible materials and metals
Helium				S	S	S	S	S		S	S	
Hydrogen		◊		S	S	S	S	S		S	S	
Hydrogen Bromide	◊		◊	U	U	U	C	C	C	S	S	Steel or stainless steel serviceable in dry liquid or gas service
Hydrogen Chloride	◊		◊	U	U	U	C	C	C	S	S	Steel or stainless steel serviceable in dry liquid or gas service
Hydrogen Fluoride*	◊		◊	U	U	U	S	S		S	S	Exposure can attack skin, bones and fingernails
Hydrogen Selenide	◊	◊		U	U	U	S	S		S	S	Extremely toxic, odor deadens the olfactory nerves
Hydrogen Sulfide*	◊	◊		C	U	U	C	S		S	S	Odor deadens olfactory nerves, can cause paralysis
Isobutane		◊		S	S	S	S	S		S	S	
Isobutylene		◊		S	S	S	S	S		S	S	

*It is recommended that users thoroughly familiarize themselves with the specific properties of this gas.

Gas Safety and Material Compatibility Data Chart

	Hazards for Humans			Materials of Construction								
Gas	**Toxic**	**Flammable**	**Corrosive**	**Aluminum**	**Copper**	**Brass**	**Carbon Steel**	**Stainless Steel**	**Monel®**	**Kel-F®**	**Teflon®**	**Special Characteristics**
Krypton				S	S	S	S	S		S	S	
Methane	◊	◊		S	S	S	S	S		S	S	
Methyl Acetylene		◊		S	U	C	S	S		S	S	
Methyl Bromide	◊	◊		U	U	U	S	S		S	S	Forms explosive compounds with aluminum
Methyl Chloride	◊	◊		U	C	C	S	S		S	S	Forms explosive compounds with aluminum
Methyl Mercaptan	◊	◊		U	U	U	S	S		S	S	
Monoethylamine	◊	◊		U	U	U	S	S		C	S	Attacks copper and copper alloys rapidly
Monomethylamine	◊	◊		U	U	U	S	S		C	S	Attacks copper and copper alloys rapidly
Neon				S	S	S	S	S		S	S	
Nitric Oxide	◊		◊	S	U	U	S	S	U	S	S	Readily reacts with Oxygen to form Nitrogen Dioxide
Nitrogen				S	S	S	S	S		S	S	
Nitrosyl Chloride	◊		◊	U	U	U	U	U	S		S	Very corrosive, attacks most metals except nickel
Nitrous Oxide				C	S	S	S	S		S	S	
Oxygen*				C	S	S	C	C	S	S	S	Strong oxidant, ignites combustible matter spontaneously
Phosgene	◊		◊	U	U	U	C	C		S	S	Very toxic
Phosphine*	◊	◊		S	U	S	S	S		S	S	Highly toxic, high concentrations are pyrophoric
Propane		◊		S	S	S	S	S		S	S	
Propylene		◊		S	S	S	S	S		S	S	
Silane*	◊	◊		S	S	S	S	S		S	S	Pyrophoric
Silicon Tetrafluoride	◊		◊	U	U	U	C	C		S	S	
Sulfur Dioxide	◊		◊	C	U	U	S	S		S	S	
Sulfur Hexafluoride				S	S	S	S	S		S	S	
Sulfur Tetrafluoride	◊		◊	C	S	S	S	S		S	S	
Trimethylamine	◊	◊		U	U	U	S	S		S	S	Attacks copper and copper alloys rapidly
Xenon				S	S	S	S	S		S	S	

*It is recommended that users thoroughly familiarize themselves with the specific properties of this gas.

All data presented are considered accurate and reliable but supplier assumes no liability or responsibility of any kind.

Legend

◊ - Primary Hazard
S - Satisfactory
U - Unsatisfactory
C - Conditional use

5

Length

	Å	cm	ft	in	m	micron	mm	yd
				Multiply By				
Å	--------	1×10^{-8}	3.28×10^{-9}	3.93×10^{-9}	1×10^{-10}	1×10^{-4}	1×10^{-7}	1.09×10^{-10}
cm	1×10^{8}	--------	3.28×10^{-2}	3.94×10^{-1}	1×10^{-2}	1×10^{4}	10	1.09×10^{-2}
ft	3.04×10^{9}	3.048×10^{1}	--------	1.2×10^{1}	3.04×10^{-1}	3.04×10^{5}	3.04×10^{2}	3.33×10^{-1}
in	2.54×10^{8}	2.54×10^{0}	8.33×10^{-2}	--------	2.54×10^{2}	2.54×10^{4}	2.54×10^{1}	2.77×10^{2}
m	1×10^{10}	1×10^{2}	3.281×10^{0}	3.93×10^{1}	--------	1×10^{6}	1×10^{3}	1.09×10^{0}
micron	1×10^{4}	1×10^{-4}	3.28×10^{-6}	3.93×10^{-5}	1×10^{-6}	--------	1×10^{-3}	1.09×10^{-6}
mm	1×10^{7}	1×10^{-3}	3.28×10^{-3}	3.93×10^{-2}	1×10^{-2}	1×10^{3}	--------	1.09×10^{-3}
yd	9.14×10^{9}	9.14×10^{1}	3×10^{0}	3.6×10^{1}	9.14×10^{-1}	9.14×10^{5}	9.14×10^{2}	--------

Flow

	cm^3/min	cm^3/sec	ft^3/hr	ft^3/min	m^3/hr	m^3/min	L/hr	L/min
				Multiply By				
cm^3/min	--------	1.66×10^{-2}	2.12×10^{-3}	3.53×10^{-5}	6×10^{-5}	1×10^{-6}	6.0×10^{-2}	1×10^{-2}
cm^3/sec	6×10^{1}	--------	1.27×10^{-1}	2.12×10^{-3}	3.6×10^{-3}	6×10^{-5}	3.6×10^{0}	6×10^{-2}
ft^3/hr	4.72×10^{2}	7.87×10^{1}	--------	1.67×10^{-2}	2.83×10^{-2}	4.72×10^{-4}	2.83×10^{1}	4.72×10^{-1}
ft^3/min	2.83×10^{4}	4.72×10^{2}	6.0×10^{1}	--------	1.7×10^{1}	2.83×10^{-2}	1.7×10^{-2}	2.83×10^{1}
m^3/hr	1.67×10^{4}	2.78×10^{2}	3.53×10^{1}	5.89×10^{-2}	--------	1.67×10^{-2}	1×10^{3}	1.67×10^{1}
m^3/min	1×10^{6}	1.67×10^{4}	2.12×10^{3}	3.53×10^{1}	6.0×10^{1}	--------	6.0×10^{4}	1×10^{3}
L/hr	1.67×10^{1}	2.78×10^{-1}	3.53×10^{-2}	5.89×10^{-4}	1×10^{-3}	1.67×10^{-5}	--------	1.67×10^{-2}
L/min	1×10^{3}	1.67×10^{1}	2.12×10^{0}	3.53×10^{-2}	6.0×10^{-2}	1×10^{-3}	6.0×10^{1}	--------

Pressure

	atm	BAR	Ft of H_2O	in of Hg	in of H_2O	kg/cm^2	kPa	mm of Hg	PSI
				Multiply By					
atm	--------	1.013	33.932	29.921	407.183	1.033	101.317	760	14.696
BAR	0.987	--------	33.488	29.530	401.859	1.019	100	750.062	14.504
Ft. of H_2O	0.029	0.029	--------	0.883	12	0.030	2.989	22.419	0.433
in of Hg	0.033	0.034	1.134	--------	13.6	0.035	3.377	25.4	0.491
in of H_2O	0.002	0.002	0.083	0.074	--------	0.003	0.025	1.868	0.036
kg/cm^2	0.968	0.981	32.808	28.959	393.701	--------	98.039	735.559	14.223
kPa	0.009	0.010	0.335	0.296	4.015	0.010	--------	7.501	0.145
mm of Hg	0.001	0.001	0.045	0.039	0.535	0.001	0.133	--------	0.019
PSI	0.06805	0.06895	2.3089	2.0360	27.7085	0.07031	6.89465	51.175	--------

5

Weight

	gm	kg	mg	oz	lbs	Ton
			Multiply By			
gm	--------	.001	1000	0.035	0.002	1.1×10^{-6}
kg	1000	--------	1×10^{6}	3.53×10^{1}	2.205	0.001
mg	0.001	1×10^{-6}	--------	3.53×10^{-4}	2.205×10^{-6}	1.1×10^{-9}
oz	2.83×10^{1}	2.83×10^{-2}	2.83×10^{4}	--------	6.25×10^{-2}	3.13×10^{-5}
lbs	4.54×10^{2}	4.54×10^{1}	4.54×10^{5}	16	--------	5.0×10^{-4}
Ton	9.07×10^{5}	9.07×10^{2}	9.07×10^{8}	3.2×10^{4}	2.0×10^{3}	--------

Volume

	cm^3 (ml)	ft^3	in^3	m^3	US gal.	L
			Multiply By			
cm^3 (ml)	--------	3.53×10^{-5}	6.10×10^{-2}	1×10^{-6}	2.56×10^{-3}	1×10^{-3}
ft^3	2.83×10^{4}	--------	1.73×10^{3}	2.83×10^{-2}	7.48	2.83
in^3	1.64	5.79×10^{-6}	--------	1.64×10^{-5}	4.33×10^{-3}	1.64×10^{-2}
m^3	1×10^{6}	3.53	6.10×10^{4}	--------	2.64×10^{2}	1×10^{3}
US gal.	3.79×10^{3}	1.34×10^{-1}	2.31×10^{2}	3.79×10^{-3}	--------	3.79
L	1×10^{3}	3.54×10^{-1}	6.10×10^{1}	1×10^{-3}	2.64×10^{-1}	--------

Concentration

Concentration	Equivalent
1,000,000 ppm	100%
100,000 ppm	10%
10,000 ppm	1%
1,000 ppm	0.1%
100 ppm	0.01%
10 ppm	0.001%
1 ppm	0.0001%
1,000 ppb	1 ppm
100 ppb	0.1 ppm
10 ppb	0.001 ppm

Temperature

	°C	°F	°K	°R
	Multiply By			
°C + 17.78	--------	1.8	--------	--------
°C + 273.16	--------	--------	1	--------
°F - 32	0.55556	--------	--------	--------
°F + 459.72	--------	--------	--------	1
°K + 273.16	1	--------	--------	--------
°R - 459.72	--------	1	--------	--------

Physical Constants

	Value	Units
Avagardro's Number	6.022×10^{23}	molecules/gm-mole
Gas Law Constant	1.98719	cal/(gm-mol)(°K)
	1.98719	Btu/(lbs-mole)(°R)
	82.0568	$(cm^3)(atm)/(gm\text{-}mole)(°K)$
	0.0820568	(L)(atm)/(gm-mole)(°K)
	10.7314	$(ft^3)(lb)/(in^2)(lbs\text{-}mole)(°R)$
	0.730228	$(ft^3)(atm)/(lbs\text{-}mole)(°R)$

Density

	gms/cm^3	kg/cm^3	lbs/ft^3	lbs/in^3	lbs/US gal.
			Multiply By		
gms/cm^3	--------	1000	6.24×10^{1}	3.61×10^{-2}	8.35
kg/cm^3	1×10^{-3}	--------	6.24×10^{-2}	3.61×10^{-3}	8.35×10^{-3}
lbs/ft^3	1.60×10^{-2}	1.60×10^{1}	--------	3.61×10^{-5}	1.33×10^{-1}
lbs/in^3	2.77×10^{1}	2.77×10^{4}	1.73×10^{3}	--------	2.31×10^{2}
lbs/US gal.	1.2×10^{-1}	1.2×10^{2}	7.48	4.33×10^{-3}	--------

Scientific Notation

Notation	Equivalent	Notation	Equivalent
1×10^{10}	10,000,000,000	1×10^{-1}	0.1
1×10^{9}	1,000,000,000	1×10^{-2}	0.01
1×10^{8}	100,000,000	1×10^{-3}	0.001
1×10^{7}	10,000,000	1×10^{-4}	0.0001
1×10^{6}	1,000,000	1×10^{-5}	0.00001
1×10^{5}	100,000	1×10^{-6}	0.000001
1×10^{4}	10,000	1×10^{-7}	0.0000001
1×10^{3}	1,000	1×10^{-8}	0.00000001
1×10^{2}	100	1×10^{-9}	0.000000001
1×10^{1}	10	1×10^{-10}	0.0000000001

PURE GASES CGA SELECTION CHART FOR FITTINGS

CGA Fittings Required	Pure Gases
510/300	Acetylene
590/346/347/702	Air
240/660/705	Ammonia
580/680/677	Argon
350	Arsine*
320	Carbon Dioxide
350	Carbon Monoxide
660	Chlorine
510	Cyclopropane
350	Deuterium
350	Ethane
350	Ethylene
510	Ethylene Oxide
580/680/677	Helium
350/695/703	Hydrogen
330	Hydrogen Chloride
330	Hydrogen Sulfide
580	Krypton
350/695/703	Methane
510	Methyl Chloride
580/680/677	Neon
580/680/677	Nitrogen
326	Nitrous Oxide
540/577/701	Oxygen*
350	Phosphine
510	Propane
350	Silane*
668/660	Sulfur Dioxide
590	Sulfur Hexaflouride
580/680/677	Xenon

MIXED GASES CGA SELECTION CHART FOR FITTINGS

CGA Fittings Required	Mixed Gases	
	Minor Component	**in Major Component**
240/660/705	Ammonia	Nitrogen
350	Butane	Nitrogen
296	Carbon Dioxide	Oxygen
580	Carbon Dioxide	Helium or Nitrogen
580	Carbon Dioxide and/or Nitrogen	Helium
590	Carbon Monoxide	Air
330	Chlorine	Nitrogen
350	Diborane	Argon, Helium, Hydrogen, Nitrogen
580	Freon-12	Nitrogen
296	Helium	Oxygen
350	Hexane	Nitrogen
350	Isobutane	Nitrogen
580	Krypton	Argon
590	Methane	Air
580	Moisture	Argon, Helium or Nitrogen
660	Nitric Oxide	Nitrogen
660	Nitrogen Dioxide	Air or Nitrogen
590	Nitrous Oxide	Nitrogen
590	Oxygen	Nitrogen or Helium
350	Propane	Nitrogen or Helium
590	Propane	Air
660	Sulfur Dioxide	Air or Nitrogen
590	Sulfur Hexaflouride	Argon, Helium or Nitrogen
350	Sulfur Hexaflouride	Hydrogen

It is recommended that the user thoroughly familiarize himself with the specific properties of these gases.

The Compressed Gas Association (CGA) has selected and standardized the valve outlet to be used on each gas cylinder. These standards, contained in the document "CGA STANDARD V-1, Compressed Gas Cylinder Valve Outlet Connections" , have been adopted to prevent the inadvertent mixing of gases which could be reactive and to avoid other possible misuse hazards.

The above chart may be used for guide purposes only. Consult your gas supplier to determine the actual CGA connection required when ordering a regulator.

Since the combined characteristics of a mixture of gases often differ from the properties of the separate components, different CGA connections are often required. The CGA has selected and standardized the valve outlets to be used with mixed gases. These standards are described in CGA publication V-7 - "Standard Method for Determining Cylinder Valve Outlet Connections for Industrial Gas Mixtures".

Mixtures which use the same CGA connection as if the minor component were in its pure gas form have not been included for the sake of brevity. The proper fitting for these mixtures can be determined by looking up the minor component on the chart for pure gases.

Notes:

GLOSSARY

PurityPlus®
SPECIALTY GASES

Section 6 - Glossary

Absolute Pressure – The total pressure exerted on a system, equal to the gauge pressure plus atmospheric pressure. Absolute pressure is designated as PSIA. Often pressure measurements utilize a gauge to record the difference between the system and the atmospheric pressure. This is called gauge pressure and is designated as PSIG.

Atmospheric Pressure – The pressure exerted by the weight of the atmosphere at sea level, equal to 14.696 PSI or 0.98692 Bar.

Absolute Zero – The zero point of the ideal gas temperature scale designated as 0° Kelvin, -273.15° Celsius, and -459.67° Fahrenheit.

Absorption – Physical or chemical process in which the atoms or molecules of a material penetrate into another material. The atoms or molecules are taken up by the volume in the material, not the surface.

Adsorption – Adhesion of the atoms or molecules of a material to the surface of another material (called an adsorbent). Usually a gas, a liquid or a dissolved substance will adheres to the surfaces of a solid.

Anhydrous – The general term describing a material that does not contain any water molecules.

Atomic Weight – Ratio of the average mass of a chemical element's atoms to carbon-12. The standard atomic weight of a naturally occurring element is the ratio of the weighted average of all of the naturally occurring isotopes to carbon-12, expressed in atomic mass units.

Atomic Mass Unit – 1/12th the mass of carbon 12.

Asphyxiant Gas – Non-toxic gas that can displace the oxygen containing atmosphere, resulting in unconsciousness and death.

ACGIH – American Conference of Government Industrial Hygienists – Professional Society devoted to the advancement of occupational and environmental health.

Boiling Point – Temperature at which the pressure of a liquid is equal to the pressure exerted by the surrounding atmosphere. See Normal Boiling Point.

BTU – British Thermal Unit – The quantity of heat required to raise the temperature of one pound of water 1° F.

Calibration Gas – A gas or gas mixture of accurately known composition used as a comparative standard.

Calorie –The amount of heat required to raise the temperature of one gram of water 1° C.

Catalyst – A substance that reduces the activation energy of a chemical reaction. Catalysts participate in reactions, but are not consumed by the reaction.

CGA – Compressed Gas Association – Professional Organization dedicated to the development and promotion of Safety Standards and Safe Practices in the Industrial Gas Industry.

CAS – Chemical Abstract Services – A division of the American Chemical Society (ACS) that provides comprehensive databases of publicly disclosed research in chemistry and related sciences, including the world's largest collection of substance information, the CAS RegistrySM.

Compressed Gas – Any Material or mixture with a pressure exceeding 40 PSIA at 70° F or having an absolute pressure exceeding 104 PSIA at 130° F or any flammable liquid having a vapor pressure exceeding 40 PSI at 100° F.

Corrosive – A Chemical compound which visibly destroys or irreversibly damages living tissue or chemically attacks and eats away rubber, metal, or other substances.

Critical Temperature – The lowest temperature at which a gas cannot be liquefied, no matter how much pressure is applied. At this temperature, the liquid and gas have the same density.

Critical Pressure – The pressure required to liquefy a gas at its critical temperature.

Cryogenic Liquid – A liquid with a boiling point below -60° C.

Density – The ration of the mass of a substance to its volume.

DOT – Department of Transportation – Government agency whose purview is to regulate the transportation of hazardous materials.

Dew Point – The temperature at which water vapor begins to condense into liquid water.

EPA – Environmental Protection Agency – Government agency established in 1970 for the establishment and enforcement of environmental protection standards.

Fill Density – The percent ratio of the weight of a liquefied gas in a container to the weight of the water that the container will hold at 68° F.

Flammable Limits – The concentration of a flammable vapor in air at normal atmospheric pressure and temperature that will propagate a flame upon contact with an ignition source. See LEL, UEL.

Flash Point – The lowest temperature at which a liquid gives off enough vapor to form a flammable mixture with air.

Inert Gas – A gas which does not react with other materials at NTP.

Liquefied Compressed Gas – A gas that can be liquefied in a container with increased pressure at normal temperature.

LEL – Lower Explosive Limit – The maximum concentration of a specific flammable vapor in air at NPT that will propagate a flame upon contact with an ignition source. Concentrations below this level will not propagate a flame upon contact with an ignition source.

Mole – The mass in grams of a substance that is equal to the molecular weight the substance. Also called gram molecular weight.

Molecular Weight – The sum of the atomic weights of all atoms in a molecule.

Normal Boiling Point – The temperature at which the vapor pressure of a liquid equals 1 atmosphere (14.696 PSIA).

NTP – Normal Temperature and Pressure – 20° C and 760 torr.

OSHA – Occupational Safety and Health Administration – An agency of the Department of Labor whose mission is to prevent work related injuries and illnesses by issuing and enforcing standards for workplace safety and health.

Oxidizer – Substance that causes or contributes to the combustion of another material. An oxidizer is not necessarily combustible in itself.

PPM – Parts Per Million – Notation for specifying precise amounts of very low concentrations of chemical elements or compounds. For gases, denotes the number of molecules of a gas or gas mixture found in every 1 million molecules of the gas of gas mixture.

Specific Gravity – The ration of the weight of a given volume of a substance to the weight of an equal volume of a reference material. Liquids and solids are normally compared to water (sp. gr. of H2O = 1), while gases are normally compared to air (sp. gr. of air = 1).

Specific Heat – The amount of heat required to change the temperature of a unit of mass (or a quantity, such as a mole) of a substance one degree at either constant pressure (CV) or constant temperature (CP).

Specific Volume – The volume occupied by a unit mass of a material at a given temperature. The specific volume of a gas is normally expressed as cubic feet of volume per pound of gas.

STP - Standard Temperature and Pressure – 0° C at 760 Torr.

Torr – Common unit of measure for vapor pressure. 1 Torr = 1 mm of mercury.

Toxic Gas – A gas that has an LC50 in air of 200 PPM or less.Even low concentrations of a gas may cause injury or death.

UEL – Upper Explosive Limit – The maximum concentration of a specific flammable vapor in air at NTP which will propagate a flame upon contact with an ignition source. Concentrations above this level will not propagate a flame upon contact with an ignition source.

Vapor Pressure – The pressure exerted by a vapor in equilibrium with its liquid or solid phase at a given temperature. The vapor pressure of gases is normally measured at 70° F.