

**PurityPlus**  
SPECIALTY GASES

**SPECIALTY GASES & EQUIPMENT CATALOG**

**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**<sup>®</sup>

SPECIALTY GAS. THERE WHEN YOU NEED IT.



**SPECIALTY  
GASES &  
EQUIPMENT  
CATALOG**

**THIRD EDITION**

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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 unequalled 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 ourselves 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 how 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 OF 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 |
|------------|------------|---------------|----------------------|------------------------|--------|------------|--------------|---------|-------|----------|-------------|
| 300        | 3AA2400    | 9x60          | 143                  | 1.73                   | 300    | 300        | A            | T       | K     | IL       | 49          |
| 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       |             |
|            |            |               |                      |                        |        |            |              |         |       |          |             |
| AL150      | 3AL2015    | 8x53          | 48                   | 1.04                   | 150A   | 150A       | B(AL)        | ALS     | AI    | 1R       | 30AL        |
| 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**



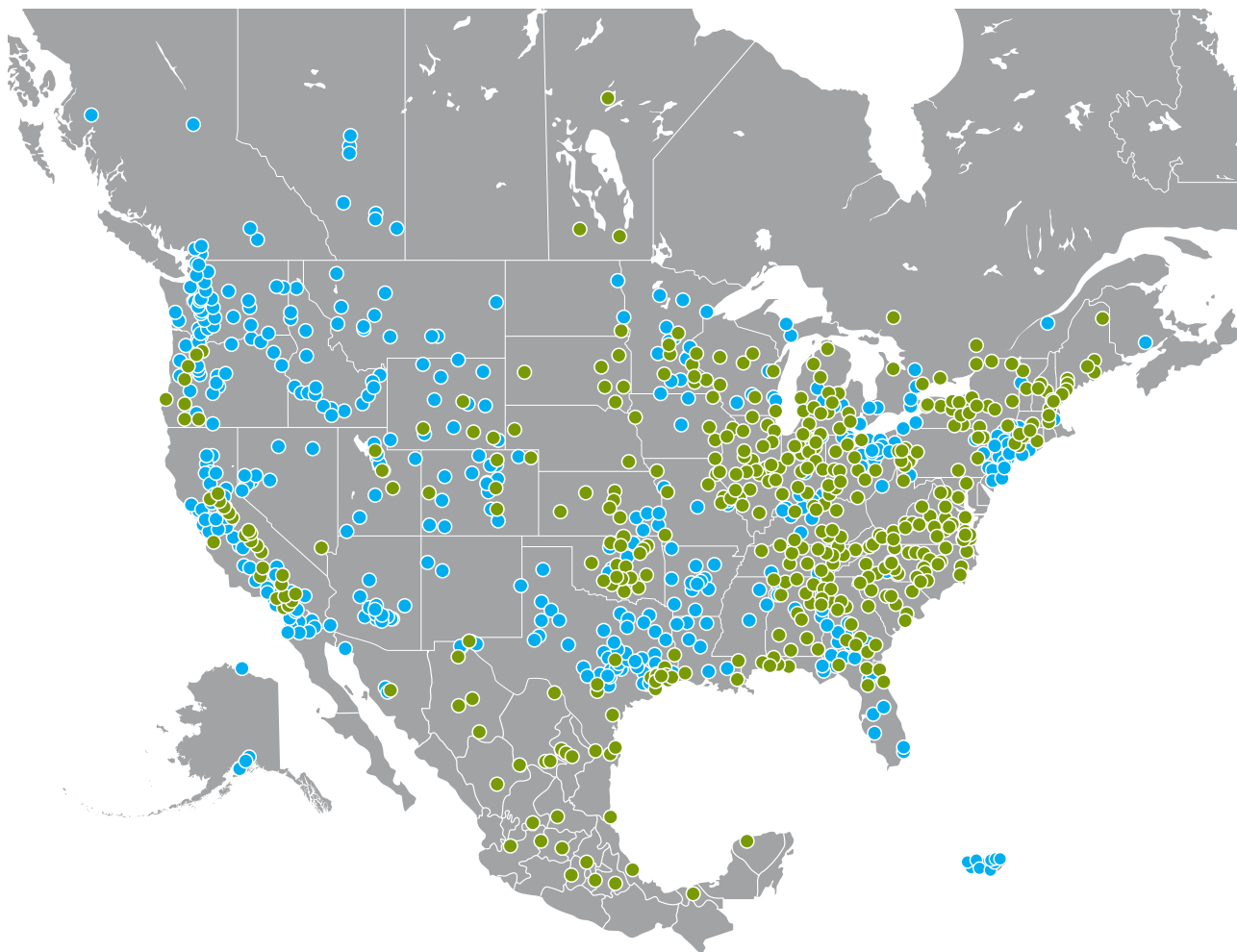
LOW PRESSURE LIQUID CYLINDERS

| <b>Specifications</b>                           |   |              |              |              |              |              |              |              |              |              |              |
|---|---|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| 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     |
| <b>CAPACITY</b>                                 |   |              |              |              |              |              |              |              |              |              |              |
| 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 <sub>2</sub> )*                          | ft <sup>3</sup> / Nm <sup>3</sup>         | 3685 / 97    | 3464 / 91    | 4099 / 108   | 3864 / 102   | 4375 / 115   | 4072 / 108   | 5024 / 132   | 4734 / 124   | 5769 / 152   | 5438 / 143   |
| Gas (O <sub>2</sub> )*                          | ft <sup>3</sup> / Nm <sup>3</sup>         | 4577 / 120   | 4348 / 114   | 5096 / 134   | 4843 / 127   | 5435 / 143   | 5048 / 133   | 6244 / 164   | 5930 / 156   | 7186 / 189   | 6811 / 179   |
| Gas (Ar)*                                       | ft <sup>3</sup> / Nm <sup>3</sup>         | 4448 / 117   | 4226 / 111   | 4961 / 130   | 4709 / 124   | 5290 / 139   | 4932 / 130   | 6073 / 160   | 5763 / 151   | 6982 / 183   | 6634 / 174   |
| Gas (CO <sub>2</sub> )*                         | ft <sup>3</sup> / Nm <sup>3</sup>         | --           | 3382 / 89    | --           | 3766 / 99    | --           | 4011 / 105   | --           | 4614 / 121   | --           | 5305 / 139   |
| Gas (N <sub>2</sub> O)*                         | ft <sup>3</sup> / Nm <sup>3</sup>         | --           | 3207 / 84    | --           | 3574 / 94    | --           | 3810 / 100   | --           | 4378 / 115   | --           | 5034 / 132   |
| <b>PERFORMANCE</b>                              |   |              |              |              |              |              |              |              |              |              |              |
| NER (N <sub>2</sub> )                           | % per day                                 | 2            | 2            | 1.9          | 1.9          | 1.85         | 1.85         | 1.8          | 1.8          | 2            | 2            |
| NER (O <sub>2</sub> - 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 <sub>2</sub> - N <sub>2</sub> O)        | % per day                                 | --           | 0.5          | --           | 0.5          | --           | 0.5          | --           | 0.5          | --           | 0.5          |
| Gas Flow (N <sub>2</sub> , O <sub>2</sub> , Ar) | ft <sup>3</sup> /hr / Nm <sup>3</sup> /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 <sub>2</sub> , N <sub>2</sub> O)   | ft <sup>3</sup> /hr / Nm <sup>3</sup> /hr | --           | 110 / 2.9    | --           | 110 / 2.9    | --           | 110 / 2.9    | --           | 110 / 2.9    | --           | 110 / 2.9    |
| <b>DIMENSIONS &amp; PRESSURE RATINGS</b>        |   |              |              |              |              |              |              |              |              |              |              |
| 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 <sub>2</sub> )                   | lb / kg                                   | 517 / 234    | 531 / 241    | 557 / 253    | 580 / 263    | 597 / 271    | 618 / 280    | 664 / 301    | 683 / 310    | 758 / 344    | 754 / 343    |
| (O <sub>2</sub> )                               | 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 <sub>2</sub> )                              | lb / kg                                   | --           | 667 / 303    | --           | 731 / 331    | --           | 779 / 353    | --           | 868 / 393    | --           | 967 / 439    |
| <i>*At relief valve settings</i>                |   |              |              |              |              |              |              |              |              |              |              |



## 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 150 members and more than 600 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.



# PURE GASES

 **PurityPlus**<sup>®</sup>  
SPECIALTY GASES

## Section 1 - Pure Gases

| Gas                     | Page Number | Gas                          | Page Number |
|-------------------------|-------------|------------------------------|-------------|
| Acetylene               | 1.1         | Isopentane                   | 1.28        |
| Air                     | 1.2         | Krypton                      | 1.29        |
| Ammonia                 | 1.3         | Methane                      | 1.30        |
| Argon                   | 1.4         | Methyl Chloride              | 1.31        |
| Boron Trichloride       | 1.5         | Methyl Fluoride              | 1.32        |
| Boron Trifluoride       | 1.6         | Methyl Mercaptan             | 1.33        |
| 1,3-Butadiene           | 1.7         | Monomethylamine (MMA)        | 1.34        |
| n-Butane                | 1.8         | Neon                         | 1.35        |
| 1-Butene                | 1.9         | Neopentane (Dimethylpropane) | 1.36        |
| CIS-2-Butene            | 1.10        | Nitric Oxide                 | 1.37        |
| Carbon Dioxide          | 1.11        | Nitrogen                     | 1.38        |
| Carbon Monoxide         | 1.12        | Nitrogen Dioxide             | 1.39        |
| Carbonyl Sulfide        | 1.13        | Nitrogen Trifluoride         | 1.40        |
| Chlorine                | 1.14        | Nitrous Oxide                | 1.41        |
| Deuterium               | 1.15        | Octafluorocyclobutane (R318) | 1.42        |
| Dimethyl Ether (DME)    | 1.16        | Octafluoropropane (HC-218)   | 1.43        |
| Ethane                  | 1.17        | Oxygen                       | 1.44        |
| Ethylene                | 1.18        | Propane                      | 1.45        |
| Helium                  | 1.19        | Propylene                    | 1.46        |
| Hexafluoroethane (R116) | 1.20        | Sulfur Dioxide               | 1.47        |
| Hexafluoropropylene     | 1.21        | Sulfur Hexafluoride          | 1.48        |
| Hydrogen                | 1.22        | Tetrafluoromethane (HC-14)   | 1.49        |
| Hydrogen Bromide        | 1.23        | Trans-2-Butene               | 1.50        |
| Hydrogen Chloride       | 1.24        | Trifluoromethane (R23)       | 1.51        |
| Hydrogen Sulfide        | 1.25        | Trimethylamine (TMA)         | 1.52        |
| Isobutane               | 1.26        | Xenon                        | 1.53        |
| Isobutylene             | 1.27        |                              |             |

## 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

A colorless, highly flammable gas.

## Acetylene

| Technical Information: |  |
|------------------------|--|
| Chemical Symbol:       | C <sub>2</sub> H <sub>2</sub>                      |
| Molecular Weight:      | 26.04  |
| Specific Volume        | 14.7 ft <sup>3</sup> /lb (0.91 m <sup>3</sup> /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          |
|---|--------|--|------------------------|
| <b>PurityPlus Purified 2.6</b><br>(For Atomic Absorption) | 99.6%  | Oxygen plus CH <sub>4</sub><br>PH <sub>3</sub> | < 4000 ppm<br>< 20 ppm |

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

| Standard Cylinder Sizes * | Contents ft <sup>3</sup> /m <sup>3</sup> | Cylinder Pressure PSIG | CGA Valve Connection |
|---------------------------|--|------------------------|----------------------|
| 380                       | 330                                      | 250                    | 510                  |
| 140                       | 130                                      | 250                    | 510                  |

\*Nonstandard cylinder sizes available upon request

## Air

A colorless, odorless, nonflammable gas.

| Technical Information: |  |
|------------------------|--|
| Chemical Symbol:       | N/A  |
| Molecular Weight:      | 28.96  |
| Specific Volume        | 13.3 ft <sup>3</sup> /lb (0.83 m <sup>3</sup> /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  |
|------------------------------|--------|---|--|
| <b>PurityPlus Ultra Zero</b> |        | Total Hydrocarbons<br>Moisture<br>Oxygen<br>Carbon Dioxide<br>Carbon Monoxide | < 0.1 ppm<br>< 3 ppm<br>19.5% to 23.5%<br>< 1 ppm<br>< 1 ppm |
| <b>PurityPlus Zero</b>       |        | Total Hydrocarbons<br>Oxygen  | <1 ppm<br>19.5% to 23.5%                                     |
| <b>PurityPlus Extra Dry</b>  |        | Moisture<br>Oxygen  | < 8 ppm<br>19.5% to 23.5%                                    |

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

| Standard Cylinder Sizes * | Contents ft <sup>3</sup> /m <sup>3</sup> | Cylinder Pressure PSIG | CGA Valve Connection |
|---------------------------|--|------------------------|----------------------|
| 300                       | 311                                      | 2640                   | 590                  |
| 200                       | 233                                      | 2200                   | 590                  |
| 80                        | 88                                       | 2200                   | 590                  |

\*Nonstandard cylinder sizes available upon request

A colorless, pungent, toxic gas.

## Ammonia

| Technical Information: |  |
|------------------------|--|
| Chemical Symbol:       | NH <sub>3</sub>                                    |
| Molecular Weight:      | 17.03  |
| Specific Volume        | 22.6 ft <sup>3</sup> /lb (1.41 m <sup>3</sup> /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        |
|--|---------|------------------|----------------------|
| <b>PurityPlus VLSI 4.5</b><br>(Liquid Phase) | 99.995% | Oil<br>Moisture  | < 0.5 ppm<br>< 3 ppm |
| <b>PurityPlus 2.5</b><br>(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

## Argon

A chemically inert, colorless, odorless, nontoxic gas.

| Technical Information: |  |
|------------------------|--|
| Chemical Symbol:       | Ar   |
| Molecular Weight:      | 39.948   |
| Specific Volume        | 9.7 ft <sup>3</sup> /lb (0.606 m <sup>3</sup> /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  |
|---|----------|---|--|
| <b>PurityPlus 6.0 (Research)</b>          | 99.9999% | Oxygen<br>Moisture<br>Nitrogen<br>Total Hydrocarbons<br>Carbon Monoxide<br>Carbon Dioxide | < 0.2 ppm<br>< 0.2 ppm<br>< 0.4 ppm<br>< 0.1 ppm<br>< 0.1 ppm<br>< 0.1 ppm |
| <b>PurityPlus 5.5 (Chromatograph)</b>     | 99.9995% | Oxygen<br>Moisture<br>Nitrogen<br>Total Hydrocarbons                                      | < 1 ppm<br>< 1 ppm<br>< 3 ppm<br>< 0.1 ppm                                 |
| <b>PurityPlus N<sub>2</sub> Free 5.0</b>  | 99.999%  | Oxygen<br>Moisture<br>Nitrogen<br>Total Hydrocarbons                                      | < 2 ppm<br>< 2 ppm<br>< 4 ppm<br>< 0.5 ppm                                 |
| <b>PurityPlus 5.0 (Ultra High Purity)</b> | 99.999%  | Oxygen<br>Moisture<br>Total Hydrocarbons  | < 1 ppm<br>< 1 ppm<br>< 0.5 ppm  |
| <b>PurityPlus 4.8 (Prepurified)</b>       | 99.998%  | Oxygen<br>Moisture<br>Total Hydrocarbons  | < 5 ppm<br>< 5 ppm<br>< 2 ppm  |
| <b>PurityPlus Zero 4.8</b>                | 99.998%  | Total Hydrocarbons  | < 0.5 ppm  |

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

| Standard Cylinder Sizes * | Contents ft <sup>3</sup> /m <sup>3</sup> | 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

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

## Boron Trichloride

| Technical Information: |  |
|------------------------|--|
| Chemical Symbol:       | BCl <sub>3</sub>                                   |
| Molecular Weight:      | 117.17   |
| Specific Volume        | 3.3 ft <sup>3</sup> /lb (0.202 m <sup>3</sup> /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 |
|---|-----------|------------------|---------------|
| <b>PurityPlus 5.0 (Research)</b>        | > 99.999% | Total Impurities | < 10 ppm      |
| <b>PurityPlus 3.0 (Electronic)</b>      | > 99.9%   | Total Impurities | < 1000 ppm    |
| <b>PurityPlus 2.5 (Chemically Pure)</b> | > 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

## Boron Trifluoride

A nonflammable, toxic and corrosive gas.

| Technical Information: |  |
|------------------------|--|
| Chemical Symbol:       | BF <sub>3</sub>                                    |
| Molecular Weight:      | 67.781   |
| Specific Volume        | 5.6 ft <sup>3</sup> /lb (0.350 m <sup>3</sup> /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<br>(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

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

## 1,3-Butadiene

| Technical Information: |  |
|------------------------|--|
| Chemical Symbol:       | C <sub>4</sub> H <sub>6</sub>                      |
| Molecular Weight:      | 54.09  |
| Specific Volume        | 6.9 ft <sup>3</sup> /lb (0.431 m <sup>3</sup> /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<br>(Chemically Pure) | > 99.0%<br>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

## n-Butane

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

| Technical Information: |   |
|------------------------|---|
| Chemical Symbol:       | C <sub>4</sub> H <sub>10</sub>                      |
| Molecular Weight:      | 58.12   |
| Specific Volume        | 6.34 ft <sup>3</sup> /lb (0.396 m <sup>3</sup> /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 |
|---|----------|------------------|---------------|
| <b>PurityPlus 4.0 (Research)</b>        | > 99.99% | Total Impurities | < 100 ppm     |
| <b>PurityPlus 2.5 (Instrument)</b>      | > 99.5%  | Total Impurities | < 0.5%        |
| <b>PurityPlus 2.0 (Chemically Pure)</b> | > 99.0%  | Total Impurities | < 1%          |

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

| Standard Cylinder Sizes * | Contents ft <sup>3</sup> /m <sup>3</sup> | 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

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

## 1-Butene

| Technical Information: |   |
|------------------------|---|
| Chemical Symbol:       | C <sub>4</sub> H <sub>8</sub>                       |
| Molecular Weight:      | 56.11   |
| Specific Volume        | 6.55 ft <sup>3</sup> /lb (0.409 m <sup>3</sup> /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                     |
|---|---------------------------|--|-----------------------------------|
| <b>PurityPlus 4.0<br/>(Polymer Grade)</b>   | > 99.99 %<br>Liquid Phase | Moisture<br>Total Sulfur<br>Total Impurities:<br>1,3 Butadiene,<br>Methane, Ethane,<br>trans-2-Butene,<br>cis-2-Butene,<br>Propane, Other C-4's,<br>Moisture, Sulfur | < 5 ppm<br>< 0.5 ppm<br>< 100 ppm |
| <b>PurityPlus 3.0<br/>(Research)</b>        | > 99.9 %<br>Liquid Phase  | Total Impurities   | < 1000 ppm                        |
| <b>PurityPlus 2.5<br/>(Instrument)</b>      | > 99.5 %<br>Gas Phase     | Total Impurities   | < 0.5 %                           |
| <b>PurityPlus 2.0<br/>(Chemically Pure)</b> | > 99.0 %<br>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

**CIS-2-Butene**

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

| Technical Information: |   |
|------------------------|---|
| Chemical Symbol:       | C <sub>4</sub> H <sub>8</sub>                     |
| Molecular Weight:      | 56.11   |
| Specific Volume        | 6.7 ft <sup>3</sup> /lb (0.42 m <sup>3</sup> /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                      |
|---|-------------------------|--|------------------------------------|
| <b>PurityPlus 2.0<br/>(Chemically Pure)</b> | > 99.0%<br>Liquid Phase | Other Hydrocarbons<br>Sulfur<br>Moisture<br>Total impurities | < 1%<br>< 1 ppm<br>< 5 ppm<br>< 1% |
| <b>PurityPlus 1.5<br/>(Technical)</b>       | > 95.0%<br>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

A colorless, odorless, nonflammable slightly acidic gas.

## Carbon Dioxide

| Technical Information: |  |
|------------------------|--|
| Chemical Symbol:       | CO <sub>2</sub>                                    |
| Molecular Weight:      | 44.04  |
| Specific Volume        | 8.76 ft <sup>3</sup> /lb (0.55 m <sup>3</sup> /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  |
|--|-----------|---|--|
| <b>PurityPlus 5.0 (Research)</b>           | 99.999%   | Oxygen<br>Nitrogen<br>Carbon Monoxide<br>Methane<br>Moisture<br>Carbon Dioxide      | < 1 ppm<br>< 1 ppm<br>< 0.1 ppm<br>< 0.5 ppm<br>< 2 ppm<br>99.999% |
| <b>PurityPlus 4.8 (Scientific)</b>         | 99.998%   | Argon + Oxygen<br>Moisture<br>Carbon Monoxide<br>THC (as methane)<br>Carbon Dioxide | < 2 ppm<br>< 3 ppm<br>< 1 ppm<br>< 2 ppm<br>99.998%                |
| <b>PurityPlus Laser 4.5</b>                | 99.995%   | Moisture<br>Oxygen<br>Total Hydrocarbons<br>Carbon Dioxide                          | < 5 ppm<br>< 5 ppm<br>< 1 ppm<br>99.995%                           |
| <b>PurityPlus Coleman 4.0 (Instrument)</b> | 99.99%    | Moisture<br>Oxygen<br>Nitrogen<br>Carbon Dioxide                                    | < 10 ppm<br>< 20 ppm<br>< 50 ppm<br>99.99%                         |
| <b>PurityPlus 3.0 Refrigerant R-744</b>    | 99.9% wt. | Moisture  | < 10 ppm wt.   |
| <b>PurityPlus Anaerobic 3.0</b>            | 99.9%     | Oxygen<br>Carbon Dioxide  | < 20 ppm<br>99.9%  |
| <b>PurityPlus 2.8 (Bone Dry)</b>           | 99.8%     | Moisture<br>Carbon Dioxide  | < 20 ppm<br>99.8%  |

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

## Carbon Monoxide

A colorless, odorless, toxic, flammable gas.

| Technical Information: |  |
|------------------------|--|
| Chemical Symbol:       | CO   |
| Molecular Weight:      | 28.01  |
| Specific Volume        | 13.8 ft <sup>3</sup> /lb (0.86 m <sup>3</sup> /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   |
|---|---------|--|---|
| <b>PurityPlus 4.0</b>                       | 99.99%  | Nitrogen<br>Oxygen<br>Carbon Dioxide<br>Hydrogen<br>Total Hydrocarbons<br>Moisture | < 10 ppm<br>< 2 ppm<br>< 20 ppm<br>< 10 ppm<br>< 5 ppm<br>< 5 ppm |
| <b>PurityPlus 2.5<br/>(Chemically Pure)</b> | > 99.5% | Total Impurities   | < 0.5%  |
| <b>PurityPlus 2.0<br/>(Technical)</b>       | 99.0%   | Total Impurities   | < 1.0%  |

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

| Standard Cylinder Sizes * | Contents ft <sup>3</sup> /m <sup>3</sup> | 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

A colorless gas with an unpleasant smell.

## Carbonyl Sulfide

| Technical Information: |                         |
|------------------------|-------------------------|
| Chemical Symbol:       | COS                     |
| Molecular Weight:      | 60.7                    |
| Specific Volume        | 2.1 ft <sup>3</sup> /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                                       |
|-----------------------|--------|--|---|
| <b>PurityPlus 3.0</b> | 99.9%  | Oxygen<br>Nitrogen<br>Moisture<br>Carbon Dioxide<br>Hydrogen Sulfide | < 0.01%<br>< 0.03%<br>< 0.01%<br>< 0.03%<br>< 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

## Chlorine

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

| Technical Information: |   |
|------------------------|---|
| Chemical Symbol:       | Cl <sub>2</sub>                                   |
| Molecular Weight:      | 70.91   |
| Specific Volume        | 5.4 ft <sup>3</sup> /lb (0.33 m <sup>3</sup> /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 |
|--|---------|------------------|---------------|
| <b>PurityPlus 3.0</b><br>(High Purity)     | > 99.9% | Total Impurities | < 1000 ppm    |
| <b>PurityPlus 2.5</b><br>(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

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

## Deuterium

| Technical Information: |  |
|------------------------|--|
| Chemical Symbol:       | D <sub>2</sub>                                     |
| Molecular Weight:      | 4.03   |
| Specific Volume        | 95.9 ft <sup>3</sup> /lb (5.95 m <sup>3</sup> /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   |
|-----------------------|----------|--|---|
| <b>PurityPlus 5.0</b> | 99.999%  | Hydrogen<br>Oxygen<br>Nitrogen<br>Moisture<br>Deuterium Hydride<br>Total Hydrocarbons<br>Carbon Monoxide<br>Carbon Dioxide | < 100 ppm<br>< 1 ppm<br>< 1 ppm<br>< 1 ppm<br>< 3000 ppm<br>< 1 ppm<br>< 1 ppm<br>< 1 ppm |
| <b>PurityPlus 4.0</b> | > 99.99% | Total Impurities   | < 100 ppm   |
| <b>PurityPlus 2.7</b> | > 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

## Dimethyl Ether (DME)

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

| Technical Information: |  |
|------------------------|--|
| Chemical Symbol:       | (CH <sub>3</sub> ) <sub>2</sub> O                  |
| Molecular Weight:      | 46.07  |
| Specific Volume        | 8.4 ft <sup>3</sup> /lb (0.524 m <sup>3</sup> /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   |
|---|-------------------------------|---|---|
| <b>PurityPlus 2.8<br/>(Chemically Pure)</b> | Min. 99.8 wt%<br>Liquid Phase | Other Volatiles<br>Sulfur Compounds<br>Moisture<br>Non-Volatile Residue | Max 0.2 wt%<br>Max 500 ppmw<br>Max 100 ppmw<br>Max 50g/100 ml |
| <b>PurityPlus 2.5<br/>(Technical)</b>       | > 99.5%<br>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

A colorless, odorless, flammable gas.

## Ethane

| Technical Information: |   |
|------------------------|---|
| Chemical Symbol:       | C <sub>2</sub> H <sub>6</sub>                       |
| Molecular Weight:      | 30.07   |
| Specific Volume        | 12.80 ft <sup>3</sup> /lb (0.79 m <sup>3</sup> /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 |
|---|---------|------------------|---------------|
| <b>PurityPlus 2.5<br/>(Instrument)</b>      | > 99.5% | Total Impurities | < 5000 ppm    |
| <b>PurityPlus 2.0<br/>(Chemically Pure)</b> | > 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

## Ethylene

A colorless, flammable gas with a sweet odor.

| Technical Information: |   |
|------------------------|---|
| Chemical Symbol:       | C <sub>2</sub> H <sub>4</sub>                       |
| Molecular Weight:      | 28.05   |
| Specific Volume        | 13.70 ft <sup>3</sup> /lb (0.86 m <sup>3</sup> /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          |
|---|--------|----------------------------|------------------------|
| <b>PurityPlus 4.0</b>                       | 99.99% | Ethane<br>Total Impurities | < 100 ppm<br>< 100 ppm |
| <b>PurityPlus 3.0<br/>(Polymer Grade)</b>   | 99.9%  | Ethane<br>Total Impurities | < 0.1%<br>< 0.1%       |
| <b>PurityPlus 2.5<br/>(Chemically Pure)</b> | 99.5%  | Ethane<br>Total Impurities | < 0.5%<br>< 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

A colorless, odorless, tasteless, inert gas.

## Helium

| Technical Information: |   |
|------------------------|---|
| Chemical Symbol:       | He  |
| Molecular Weight:      | 4.003   |
| Specific Volume        | 96.7 ft <sup>3</sup> /lb (6.0 m <sup>3</sup> /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   |
|---|----------|--|---|
| <b>PurityPlus 6.0<br/>(Research)</b>          | 99.9999% | Oxygen<br>Moisture<br>Nitrogen<br>Total Hydrocarbons<br>Carbon Monoxide<br>Carbon Dioxide<br>Total of all impurities | < 0.2 ppm<br>< 0.2 ppm<br>< 0.4 ppm<br>< 0.1 ppm<br>< 0.1 ppm<br>< 0.1 ppm<br>< 1 ppm |
| <b>PurityPlus 5.5<br/>(Chromatograph)</b>     | 99.9995% | Oxygen<br>Nitrogen<br>Moisture<br>Total Hydrocarbons   | < 1 ppm<br>< 3 ppm<br>< 1 ppm<br>< 0.5 ppm  |
| <b>PurityPlus 5.0 N2 Free</b>                 | 99.999%  | Oxygen<br>Moisture<br>Total Hydrocarbons<br>Nitrogen   | < 1 ppm<br>< 1 ppm<br>< 0.5 ppm<br>< 5 ppm  |
| <b>PurityPlus 5.0<br/>(Ultra High Purity)</b> | 99.999%  | Oxygen<br>Moisture<br>Total Hydrocarbons   | < 1 ppm<br>< 1 ppm<br>< 0.5 ppm   |
| <b>PurityPlus Zero 4.8</b>                    | 99.998%  | Total Hydrocarbons   | < 0.5 ppm   |
| <b>PurityPlus 4.7<br/>(Prepurified)</b>       | 99.997%  | Oxygen<br>Moisture   | < 5 ppm<br>< 5 ppm  |

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

| Standard Cylinder Sizes * | Contents ft <sup>3</sup> /m <sup>3</sup> | Cylinder Pressure PSIG | CGA Valve Connection |
|---------------------------|--|------------------------|----------------------|
| 300                       | 291                                      | 2640                   | 580                  |
| 200                       | 217                                      | 2200                   | 580                  |
| 80                        | 73                                       | 2200                   | 580                  |

\*Nonstandard cylinder sizes available upon request

## Hexafluoroethane (R116)

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

| Technical Information: |                               |
|------------------------|-------------------------------|
| Chemical Symbol:       | C <sub>2</sub> F <sub>6</sub> |
| Molecular Weight:      | 138.01                        |
| Specific Volume        | 2.8 ft <sup>3</sup> /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  |
|-----------------------|-------------------------|--|--|
| <b>PurityPlus 5.0</b> | 99.999%<br>Liquid Phase | Oxygen<br>Nitrogen<br>Moisture<br>Carbon Monoxide<br>Carbon Dioxide<br>Other Organics<br>Acidity<br>Total Impurities | < 2 ppm<br>< 8 ppm<br>< 1.5 ppm<br>< 0.5 ppm<br>< 0.5 ppm<br>< 0.5 ppm<br>< 0.1 ppmw<br>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

A colorless, odorless, nonflammable gas.

## Hexafluoropropylene

| Technical Information: |   |
|------------------------|---|
| Chemical Symbol:       | C <sub>3</sub> F <sub>6</sub>                       |
| Molecular Weight:      | 150.03  |
| Specific Volume        | 2.58 ft <sup>3</sup> /lb (0.161 m <sup>3</sup> /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<br>Unsaturated Hydrocarbons<br>Oxygen<br>Acidity | < 0.2 ppm<br>< 0.3 ppm<br>< 50 ppm<br>< 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

## Hydrogen

A colorless, odorless, flammable gas.

| Technical Information: |   |
|------------------------|---|
| Chemical Symbol:       | H <sub>2</sub>                                    |
| Molecular Weight:      | 2.02  |
| Specific Volume        | 192 ft <sup>3</sup> /lb (11.9 m <sup>3</sup> /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  |
|---|----------|--|--|
| <b>PurityPlus 6.0 (Research)</b>          | 99.9996% | Oxygen<br>Moisture<br>Nitrogen<br>THC<br>CO/CO <sub>2</sub>  | < 0.2 ppm<br>< 0.5 ppm<br>< 0.3 ppm<br>< 0.1 ppm<br>< 0.1 ppm  |
| <b>PurityPlus 5.5 (Chromatograph)</b>     | 99.9995% | Oxygen<br>Moisture<br>Nitrogen<br>Methane<br>Carbon Dioxide<br>Carbon Monoxide   | < 0.5 ppm<br>< 2 ppm<br>< 2 ppm<br>< 0.2 ppm<br>< 0.1 ppm<br>< 0.2 ppm   |
| <b>PurityPlus 5.0 (Ultra High Purity)</b> | 99.999%  | Oxygen<br>Moisture<br>Nitrogen<br>Total Hydrocarbons   | < 1 ppm<br>< 2 ppm<br>< 5 ppm<br>< 0.5 ppm   |
| <b>PurityPlus Zero 4.5</b>                | 99.995%  | Total Hydrocarbons   | < 0.5 ppm  |
| <b>PurityPlus 4.0 (Prepurified)</b>       | 99.99%   | Moisture<br>Oxygen   | < 10 ppm<br>< 20 ppm   |
| <b>PurityPlus 3.7 (Fuel Cell)</b>         | 99.97%   | Moisture<br>Oxygen<br>Helium<br>N <sub>2</sub> /Ar<br>Carbon Dioxide<br>Carbon Monoxide<br>Ammonia<br>Total Sulfurs<br>Formaldehyde<br>Formic Acid<br>Total Hydrocarbons (Non-Methane) | < 5 ppm<br>< 5 ppm<br>< 300 ppm<br>< 100 ppm<br>< 2 ppm<br>< 0.2 ppm<br>< 0.1 ppm<br>< 0.004 ppm<br>< 0.01 ppm<br>< 0.2 ppm<br>< 2 ppm |

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

| Standard Cylinder Sizes * | Contents ft <sup>3</sup> /m <sup>3</sup> | Cylinder Pressure PSIG | CGA Valve Connection |
|---------------------------|--|------------------------|----------------------|
| 300                       | 261                                      | 2400                   | 350                  |
| 200                       | 195                                      | 2000                   | 350                  |
| 80                        | 71                                       | 2000                   | 350                  |

\*Nonstandard cylinder sizes available upon request.

[purityplusgases.com](http://purityplusgases.com)

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 <sup>3</sup> /lb (0.297 m <sup>3</sup> /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 |
|---|-------------------------|------------------|---------------|
| <b>PurityPlus 2.8<br/>(Chemically Pure)</b> | > 99.8%<br>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

## Hydrogen Chloride

A colorless, corrosive, irritating, toxic gas.

| Technical Information: |  |
|------------------------|--|
| Chemical Symbol:       | HCl  |
| Molecular Weight:      | 36.46  |
| Specific Volume        | 10.6 ft <sup>3</sup> /lb (0.68 m <sup>3</sup> /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 |
|-----------------------------------|----------|---|---------------|
| <b>PurityPlus 5.0 (Research)</b>  | 99.999%  | Total Impurities (Nitrogen, Oxygen, CO, CO <sub>2</sub> , Total Hydrocarbons) | < 10 ppm      |
| <b>PurityPlus 4.5</b>             | 99.995%  | Total Impurities (Nitrogen, Oxygen, CO, CO <sub>2</sub> , Total Hydrocarbons) | < 50 ppm      |
| <b>PurityPlus 4.0</b>             | > 99.99% | Total Impurities  | < 100 ppm     |
| <b>PurityPlus 2.0 (Technical)</b> | > 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

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

## Hydrogen Sulfide

| Technical Information: |  |
|------------------------|--|
| Chemical Symbol:       | H <sub>2</sub> S                                   |
| Molecular Weight:      | 34.08  |
| Specific Volume        | 11.2 ft <sup>3</sup> /lb (0.69 m <sup>3</sup> /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 |
|--|---------|------------------|---------------|
| <b>PurityPlus 2.5</b><br>(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

## Isobutane

A colorless, flammable gas.

| Technical Information: |   |
|------------------------|---|
| Chemical Symbol:       | C <sub>4</sub> H <sub>10</sub>                    |
| Molecular Weight:      | 58.12   |
| Specific Volume        | 6.5 ft <sup>3</sup> /lb (0.40 m <sup>3</sup> /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 |
|---|----------|------------------|---------------|
| <b>PurityPlus 4.0<br/>(Research)</b>                  | > 99.99% | Total Impurities | < 100 ppm     |
| <b>PurityPlus 2.5<br/>(Instrument)</b>                | > 99.5%  | Total Impurities | < 0.5%        |
| <b>PurityPlus 2.0<br/>(Chemically Pure)</b>           | > 99%    | Total Impurities | < 1.0%        |
| <b>PurityPlus R600a<br/>(Liquid Phase Withdrawal)</b> |          | 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

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

## Isobutylene

| Technical Information: |                               |
|------------------------|-------------------------------|
| Chemical Symbol:       | C <sub>4</sub> H <sub>8</sub> |
| Molecular Weight:      | 56.11                         |
| Specific Volume        | 6.7 ft <sup>3</sup> /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                          |
|-----------------------|--------------------|--|--|
| <b>PurityPlus 3.0</b> | 99.9%<br>Gas Phase | Other Hydrocarbons<br>Sulfur<br>Moisture<br>Total impurities | < 0.1%<br>< 1 ppm<br>< 5 ppm<br>< 0.1% |
| <b>PurityPlus 2.5</b> | 99.5%<br>Gas Phase | Other Hydrocarbons<br>Sulfur<br>Moisture<br>Total impurities | < 0.5%<br>< 1 ppm<br>< 5 ppm<br>< 0.5% |
| <b>PurityPlus 2.0</b> | 99%<br>Gas Phase   | Other Hydrocarbons<br>Sulfur<br>Moisture<br>Total impurities | < 1%<br>< 1 ppm<br>< 10 ppm<br>< 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

## Isopentane

A colorless, flammable liquid having a mild gasoline odor.

| Technical Information: |                                |
|------------------------|--------------------------------|
| Chemical Symbol:       | C <sub>5</sub> H <sub>12</sub> |
| 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                          |
|-----------------------|--------------------|--|--|
| <b>PurityPlus 2.5</b> | 99.5%<br>Gas Phase | Other Hydrocarbons<br>Sulfur<br>Moisture<br>Total impurities | < 0.5%<br>< 1 ppm<br>< 5 ppm<br>< 0.5% |
| <b>PurityPlus 2.0</b> | 99%<br>Gas Phase   | Other Hydrocarbons<br>Sulfur<br>Moisture<br>Total impurities | < 1%<br>< 1 ppm<br>< 5 ppm<br>< 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

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

## Krypton

| Technical Information: |   |
|------------------------|---|
| Chemical Symbol:       | Kr  |
| Molecular Weight:      | 83.80   |
| Specific Volume        | 4.6 ft <sup>3</sup> /lb (0.29 m <sup>3</sup> /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  |
|-----------------------|---------|---|--|
| <b>PurityPlus 5.0</b> | 99.999% | Nitrogen<br>Oxygen<br>Hydrogen<br>CO/CO <sub>2</sub><br>Tetrafluoromethane<br>Total Hydrocarbons<br>Moisture<br>Xenon<br>Total Impurities | < 10 ppm   |
| <b>PurityPlus 4.5</b> | 99.995% | Nitrogen<br>Oxygen<br>Hydrogen<br>CO/CO <sub>2</sub><br>Tetrafluoromethane<br>Total Hydrocarbons<br>Moisture<br>Xenon                     | < 10 ppm<br>< 2 ppm<br>< 1 ppm<br>< 1 ppm<br>< 1 ppm<br>< 1 ppm<br>< 1 ppm<br>< 20 ppm |
| <b>PurityPlus 2.0</b> | > 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

## Methane

A colorless, odorless, tasteless, flammable gas.

| Technical Information: |  |
|------------------------|--|
| Chemical Symbol:       | CH <sub>4</sub>                                    |
| Molecular Weight:      | 16.04  |
| Specific Volume        | 23.7 ft <sup>3</sup> /lb (1.47 m <sup>3</sup> /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 |
|--|-----------|------------------|---------------|
| <b>PurityPlus 5.0</b><br>(Research)          | > 99.999% | Total Impurities | < 10 ppm      |
| <b>PurityPlus 4.0</b><br>(Ultra High Purity) | > 99.99%  | Total Impurities | < 100 ppm     |
| <b>PurityPlus 2.0</b><br>(Chemically Pure)   | > 99%     | Total Impurities | < 1.0%        |
| <b>PurityPlus 1.3</b><br>(Commercial)        | > 93%     | Total Impurities | < 7.0 %       |

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

| Standard Cylinder Sizes * | Contents ft <sup>3</sup> /m <sup>3</sup> | Cylinder Pressure PSIG | CGA Valve Connection |
|---------------------------|--|------------------------|----------------------|
| 300                       | 356                                      | 2400                   | 350                  |
| 200                       | 260                                      | 2000                   | 350                  |
| 80                        | 88                                       | 2000                   | 350                  |

\*Nonstandard cylinder sizes available upon request

A colorless, flammable, potentially harmful, liquefied gas.

## Methyl Chloride

| Technical Information: |   |
|------------------------|---|
| Chemical Symbol:       | CH <sub>3</sub> Cl                                |
| Molecular Weight:      | 50.49   |
| Specific Volume        | 7.5 ft <sup>3</sup> /lb (0.47 m <sup>3</sup> /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 |
|--|-------------------------|------------------|---------------|
| <b>PurityPlus 2.5</b><br>(Chemically Pure) | > 99.5%<br>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

## Methyl Fluoride

A colorless, flammable, liquefied gas.

| Technical Information: |  |
|------------------------|--|
| Chemical Symbol:       | CH <sub>3</sub> F                                    |
| Molecular Weight:      | 34.03  |
| Specific Volume        | 11.36 ft <sup>3</sup> /lb (0.709 m <sup>3</sup> /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<br>(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

A colorless, flammable, potentially harmful, liquefied gas.

## Methyl Mercaptan

| Technical Information: |  |
|------------------------|--|
| Chemical Symbol:       | CH <sub>3</sub> SH                                 |
| Molecular Weight:      | 48.1   |
| Specific Volume        | 8.0 ft <sup>3</sup> /lb (0.499 m <sup>3</sup> /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<br>(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

## Monomethylamine (MMA)

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

| Technical Information: |   |
|------------------------|---|
| Chemical Symbol:       | CH <sub>3</sub> NH <sub>2</sub>                     |
| Molecular Weight:      | 31.06   |
| Specific Volume        | 12.1 ft <sup>3</sup> /lb (0.755 m <sup>3</sup> /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<br>(Chemically Pure) | > 99.5%<br>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

A colorless, odorless, nonflammable, inert gas.

## Neon

| Technical Information: |  |
|------------------------|--|
| Chemical Symbol:       | Ne   |
| Molecular Weight:      | 20.18  |
| Specific Volume        | 19.2 ft <sup>3</sup> /lb (1.19 m <sup>3</sup> /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  |
|--|---------|--|--|
| <b>PurityPlus 5.0</b><br>(Ultra High Purity) | 99.999% | Helium<br>Nitrogen<br>Oxygen<br>Moisture<br>Hydrogen<br>Total Hydrocarbons | < 8 ppm<br>< 4 ppm<br>< 1 ppm<br>< 1 ppm<br>< 1 ppm<br>< 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

## Neopentane (Dimethylpropane)

A colorless, flammable, liquefied gas.

| Technical Information: |   |
|------------------------|---|
| Chemical Symbol:       | C <sub>5</sub> H <sub>12</sub>                      |
| Molecular Weight:      | 72.15   |
| Specific Volume        | 5.30 ft <sup>3</sup> /lb (0.330 m <sup>3</sup> /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<br>(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

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 <sup>3</sup> /lb (0.80 m <sup>3</sup> /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<br>(Chemically Pure) | > 99.0% | Total Impurities | < 1.0%        |

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

| Standard Cylinder Sizes * | Contents ft <sup>3</sup> /m <sup>3</sup> | Cylinder Pressure PSIG | CGA Valve Connection |
|---------------------------|--|------------------------|----------------------|
| 200                       | 53                                       | 500                    | 660                  |
| 80                        | 19                                       | 500                    | 660                  |

\*Nonstandard cylinder sizes available upon request

## Nitrogen

A colorless, odorless, chemically inert gas.

| Technical Information: |  |
|------------------------|--|
| Chemical Symbol:       | N <sub>2</sub>                                     |
| Molecular Weight:      | 28.01  |
| Specific Volume        | 13.8 ft <sup>3</sup> /lb (0.86 m <sup>3</sup> /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   |
|---|----------|--|---|
| <b>PurityPlus 6.0 (Research)</b>          | 99.9999% | Oxygen<br>Moisture<br>Total Hydrocarbons<br>Carbon Monoxide<br>Carbon Dioxide            | < 0.2 ppm<br>< 0.2 ppm<br>< 0.1 ppm<br>< 0.1 ppm<br>< 0.1 ppm                           |
| <b>PurityPlus 5.5 (Chromatograph)</b>     | 99.9995% | Oxygen<br>Moisture<br>Total Hydrocarbons<br>Carbon Monoxide<br>Carbon Dioxide            | < 1 ppm<br>< 1 ppm<br>< 0.1 ppm<br>< 1 ppm<br>< 1 ppm                                   |
| <b>PurityPlus 5.0 (Ultra High Purity)</b> | 99.999%  | Oxygen<br>Moisture<br>Total Hydrocarbons   | < 1 ppm<br>< 1 ppm<br>< 0.5 ppm   |
| <b>PurityPlus CEM</b>                     | 99.999%  | Oxygen<br>Moisture<br>THC<br>CO <sub>2</sub><br>CO<br>SO <sub>2</sub><br>NO <sub>x</sub> | < 1.0 ppm<br>< 2.0 ppm<br>< 0.1 ppm<br>< 1.0 ppm<br>< 0.5 ppm<br>< 0.1 ppm<br>< 0.1 ppm |
| <b>PurityPlus 4.8 (Prepurified)</b>       | 99.998%  | Oxygen<br>Moisture   | < 5 ppm<br>< 5 ppm  |
| <b>PurityPlus Zero 4.8</b>                | 99.998%  | Total Hydrocarbons   | < 0.5 ppm   |
| <b>PurityPlus O<sub>2</sub> Free 4.8</b>  | 99.998%  | Oxygen   | < 0.5 ppm   |

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

| Standard Cylinder Sizes * | Contents ft <sup>3</sup> /m <sup>3</sup> | Cylinder Pressure PSIG | CGA Valve Connection |
|---------------------------|--|------------------------|----------------------|
| 300                       | 304                                      | 2640                   | 580                  |
| 200                       | 228                                      | 2200                   | 580                  |
| 80                        | 76                                       | 2200                   | 580                  |

\*Nonstandard cylinder sizes available upon request

A brownish, toxic, corrosive, liquefied gas.

## Nitrogen Dioxide (Dinitrogen Tetroxide)

| Technical Information: |   |
|------------------------|---|
| Chemical Symbol:       | NO <sub>2</sub>                                   |
| Molecular Weight:      | 46.01   |
| Specific Volume        | 4.7 ft <sup>3</sup> /lb (0.29 m <sup>3</sup> /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<br>(liquid phase) | 99.5%  | Moisture<br>Particle (Metal Residue) | < 0.15%<br>< 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

## Nitrogen Trifluoride

A toxic, colorless, odorless, nonflammable gas.

| Technical Information: |  |
|------------------------|--|
| Chemical Symbol:       | NF <sub>3</sub>                                      |
| Molecular Weight:      | 71.00  |
| Specific Volume        | 5.043 ft <sup>3</sup> /lb (0.337 m <sup>3</sup> /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<br>Nitrogen<br>Tetrafluoromethane<br>Carbon Dioxide<br>Nitrous Oxide<br>Sulfur Hexafluoride<br>Moisture<br>Hydrogen Fluoride<br>Carbon Monoxide<br>Methane | < 5 ppm<br>< 5 ppm<br>< 40 ppm<br>< 3 ppm<br>< 3 ppm<br>< 5 ppm<br>< 1 ppm<br>< 1 ppm<br>< 1 ppm<br>< 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

A colorless, sweet-tasting, oxidizing gas.

## Nitrous Oxide

| Technical Information: |   |
|------------------------|---|
| Chemical Symbol:       | N <sub>2</sub> O                                  |
| Molecular Weight:      | 44.01   |
| Specific Volume        | 8.7 ft <sup>3</sup> /lb (0.54 m <sup>3</sup> /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  |
|----------------------------|---------|--|--|
| <b>PurityPlus VLSI 5.0</b> | 99.999% | Nitrogen<br>Oxygen<br>Carbon Dioxide<br>Total Hydrocarbons<br>Moisture<br>Carbon Monoxide<br>Ammonia<br>Nitric Oxide<br>Nitrogen Dioxide<br>Halogens | < 5 ppm<br>< 2 ppm<br>< 2 ppm<br>< 1 ppm<br>< 3 ppm<br>< 1 ppm<br>< 5 ppm<br>< 0.5 ppm<br>< 0.5 ppm<br>< 0.5 ppm |
| <b>PurityPlus 4.5</b>      | 99.995% | Oxygen<br>Moisture<br>Nitrogen<br>Total Hydrocarbons<br>CO/CO <sub>2</sub>   | < 5 ppm<br>< 5 ppm<br>< 20 ppm<br>< 5 ppm<br>< 5 ppm   |
| <b>PurityPlus 3.0</b>      | 99.9%   | Nitrogen<br>Oxygen<br>Carbon Dioxide<br>Total Hydrocarbons<br>Moisture<br>Carbon Monoxide  | < 400 ppm<br>< 100 ppm<br>< 250 ppm<br>< 30 ppm<br>< 50 ppm<br>< 50 ppm  |
| <b>PurityPlus AA 2.6</b>   | 99.6%   | Moisture<br>O <sub>2</sub> /N <sub>2</sub>   | < 30 ppm<br>< 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

## Octafluorocyclobutane (R318)

A colorless, odorless, non-flammable liquefied gas.

| Technical Information: |                               |
|------------------------|-------------------------------|
| Chemical Symbol:       | C <sub>4</sub> F <sub>8</sub> |
| Molecular Weight:      | 200.03                        |
| Specific Volume        | 1.85 ft <sup>3</sup> /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   |
|-----------------------|-------------------------|--|---|
| <b>PurityPlus 5.0</b> | 99.999%<br>Liquid Phase | Oxygen<br>Nitrogen<br>Moisture<br>Other Fluorocarbons<br>Acidity<br>Total Impurities                           | < 1 ppmw<br>< 3 ppmw<br>< 1 ppmw<br>< 4 ppmw<br>< 0.1 ppmw<br>10 ppm      |
| <b>PurityPlus 3.8</b> | 99.98%<br>Liquid Phase  | Oxygen<br>Nitrogen<br>Moisture<br>Tetrafluoromethane<br>Acidity<br>Total Impurities                            | < 20 ppmv<br>< 80 ppmv<br>< 10 ppmv<br>< 50 ppmv<br>< 0.1 ppmw<br>200 ppm |
| <b>PurityPlus 3.0</b> | 99.9%<br>Liquid Phase   | Air (N <sub>2</sub> , O <sub>2</sub> , CO, CO <sub>2</sub> )<br>Moisture<br>Other Organics<br>Total Impurities | < 300 ppmv<br>< 10 ppmv<br>< 1000 ppmv<br>< 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

A colorless, relatively non-reactive gas.

## Octafluoropropane (HC-218)

| Technical Information: |   |
|------------------------|---|
| Chemical Symbol:       | C <sub>3</sub> F <sub>8</sub>                       |
| Molecular Weight:      | 188.0   |
| Specific Volume        | 2.02 ft <sup>3</sup> /lb (0.126 m <sup>3</sup> /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 |
|-----------------------|---------|---|---------------|
| <b>PurityPlus 5.0</b> | 99.999% | Organic Impurities<br>Moisture<br>Carbon Monoxide<br>Carbon Dioxide<br>Nitrogen/Oxygen<br>Acidity (as HF) | < 10 ppm      |
| <b>PurityPlus 3.0</b> | > 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

## Oxygen

A colorless, odorless, tasteless, highly oxidizing gas.

| Technical Information: |  |
|------------------------|--|
| Chemical Symbol:       | O <sub>2</sub>                                     |
| Molecular Weight:      | 32   |
| Specific Volume        | 12.1 ft <sup>3</sup> /lb (0.76 m <sup>3</sup> /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   |
|---|---------|---|---|
| <b>PurityPlus 5.0<br/>(Research)</b>          | 99.999% | Moisture<br>Nitrogen<br>Total Hydrocarbons<br>CO/CO <sub>2</sub><br>Argon | < 1 ppm<br>< 5 ppm<br>< 0.5 ppm<br>< 1 ppm<br>< 5 ppm |
| <b>PurityPlus 4.3<br/>(Ultra High Purity)</b> | 99.993% | Moisture<br>Nitrogen<br>Total Hydrocarbons                                | < 3 ppm<br>< 10 ppm<br>< 0.5 ppm                      |
| <b>PurityPlus Zero 2.8</b>                    | 99.8%   | Total Hydrocarbons  | < 0.5 ppm   |
| <b>PurityPlus Extra Dry 2.6</b>               | 99.6%   | Moisture  | < 10 ppm  |

See page 4.1 for PurityPlus Co-Branded Equipment Catalog.

| Standard Cylinder Sizes * | Contents ft <sup>3</sup> /m <sup>3</sup> | Cylinder Pressure PSIG | CGA Valve Connection |
|---------------------------|--|------------------------|----------------------|
| 300                       | 337                                      | 2640                   | 540                  |
| 200                       | 249                                      | 2200                   | 540                  |
| 80                        | 83                                       | 2200                   | 540                  |

\*Nonstandard cylinder sizes available upon request

A colorless, flammable, liquefied, hydrocarbon gas.

## Propane

| Technical Information: |                               |
|------------------------|-------------------------------|
| Chemical Symbol:       | C <sub>3</sub> H <sub>8</sub> |
| Molecular Weight:      | 44.096                        |
| Specific Volume        | 8.8 ft <sup>3</sup> /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 |
|--|-----------|------------------|---------------|
| <b>PurityPlus 5.0<br/>(Research)</b>                 | > 99.999% | Total Impurities | < 10 ppm      |
| <b>PurityPlus 4.0<br/>(Ultra High Purity)</b>        | > 99.99%  | Total Impurities | < 100 ppm     |
| <b>PurityPlus 2.5<br/>(Instrument)</b>               | > 99.5%   | Total Impurities | < 0.5%        |
| <b>PurityPlus 2.0<br/>(Chemically Pure)</b>          | > 99.0%   | Total Impurities | < 1.0%        |
| <b>PurityPlus R290<br/>(Liquid Phase Withdrawal)</b> |           | 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

## Propylene

A colorless, flammable, liquefied, hydrocarbon gas.

| Technical Information: |   |
|------------------------|---|
| Chemical Symbol:       | C <sub>3</sub> H <sub>6</sub>                       |
| Molecular Weight:      | 42.08   |
| Specific Volume        | 8.88 ft <sup>3</sup> /lb (0.554 m <sup>3</sup> /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 |
|--|-----------|------------------|---------------|
| <b>PurityPlus 5.0</b><br>(Electronic)      | > 99.999% | Total Impurities | < 10 ppm      |
| <b>PurityPlus 4.5</b><br>(Research)        | > 99.995% | Total Impurities | < 50 ppm      |
| <b>PurityPlus 4.0</b>                      | > 99.99%  | Total Impurities | < 100 ppm     |
| <b>PurityPlus 3.0</b>                      | > 99.9%   | Total Impurities | < 1000 ppm    |
| <b>PurityPlus 2.5</b><br>(Polymer)         | > 99.5%   | Total Impurities | < 0.5%        |
| <b>PurityPlus 2.0</b><br>(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

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

## Sulfur Dioxide

| Technical Information: |   |
|------------------------|---|
| Chemical Symbol:       | SO <sub>2</sub>                                     |
| Molecular Weight:      | 64.06   |
| Specific Volume        | 5.99 ft <sup>3</sup> /lb (0.374 m <sup>3</sup> /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                    |
|---------------------------------------|----------|--------------------------------------|----------------------------------|
| <b>PurityPlus 3.8<br/>(Anhydrous)</b> | > 99.98% | Moisture<br>Residue<br>Sulfuric Acid | < 20 ppm<br>< 50 ppm<br>< 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

## Sulfur Hexafluoride

A colorless, odorless, liquefied gas.

| Technical Information: |  |
|------------------------|--|
| Chemical Symbol:       | SF <sub>6</sub>                                    |
| Molecular Weight:      | 146.05   |
| Specific Volume        | 2.50 ft <sup>3</sup> /lb (0.16 m <sup>3</sup> /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   |
|-----------------------|---------|---|---|
| <b>PurityPlus 5.0</b> | 99.999% | Air<br>Tetrafluoromethane<br>Moisture                           | < 6 ppm<br>< 2 ppm<br>< 2 ppm                             |
| <b>PurityPlus 4.0</b> | 99.99%  | Air<br>Tetrafluoromethane<br>Moisture<br>Oil<br>Acidity (as HF) | < 50 ppm<br>< 40 ppm<br>< 5 ppm<br>< 2 ppm<br>< 0.3 ppm   |
| <b>PurityPlus 3.0</b> | 99.9%   | Air<br>Tetrafluoromethane<br>Moisture<br>Oil<br>Acidity (as HF) | < 300 ppm<br>< 300 ppm<br>< 8 ppm<br>< 5 ppm<br>< 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

A colorless, odorless, nonflammable gas.

## Tetrafluoromethane (HC-14)

| Technical Information: |   |
|------------------------|---|
| Chemical Symbol:       | CF <sub>4</sub>                                     |
| Molecular Weight:      | 88.005  |
| Specific Volume        | 4.40 ft <sup>3</sup> /lb (0.027 m <sup>3</sup> /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   |
|-----------------------|---------|---|---|
| <b>PurityPlus 5.0</b> | 99.999% | Oxygen/Argon<br>Nitrogen<br>CO/CO <sub>2</sub><br>Other Halocarbons<br>Sulfur Hexafluoride<br>Moisture<br>Acidity (as HF) | < 1 ppm<br>< 4 ppm<br>< 1 ppm<br>< 2 ppm<br>< 1 ppm<br>< 1 ppm<br>< 0.1 ppmw    |
| <b>PurityPlus 4.0</b> | 99.99%  | Oxygen/Argon<br>Nitrogen<br>CO/CO <sub>2</sub><br>Other Halocarbons<br>Sulfur Hexafluoride<br>Moisture<br>Acidity (as HF) | < 5 ppm<br>< 20 ppm<br>< 10 ppm<br>< 5 ppm<br>< 5 ppm<br>< 3 ppm<br>< 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

## Trans-2-Butene

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

| Technical Information: |                               |
|------------------------|-------------------------------|
| Chemical Symbol:       | C <sub>4</sub> H <sub>8</sub> |
| Molecular Weight:      | 56.11                         |
| Specific Volume        | 7.6 ft <sup>3</sup> /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%<br>Liquid Phase | Other Hydrocarbons<br>Sulfur<br>Moisture<br>Total impurities | < 1%<br>< 1 ppm<br>< 5 ppm<br>< 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

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

## Trifluoromethane (R23)

| Technical Information: |                         |
|------------------------|-------------------------|
| Chemical Symbol:       | CHF <sub>3</sub>        |
| Molecular Weight:      | 70.01                   |
| Specific Volume        | 5.5 ft <sup>3</sup> /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   |
|-----------------------|-------------------------|--|---|
| <b>PurityPlus 5.0</b> | 99.999%<br>Liquid Phase | Air (N <sub>2</sub> , O <sub>2</sub> , CO, CO <sub>2</sub> )<br>Carbon Dioxide<br>Moisture<br>Other Organics<br>Acidity<br>Total Impurities            | < 10 ppm<br>< 10 ppm<br>< 5 ppm<br>< 10 ppm<br>< 0.1 ppmw<br>10 ppm           |
| <b>PurityPlus 4.5</b> | 99.995%<br>Liquid Phase | Air (N <sub>2</sub> , O <sub>2</sub> , CO, CO <sub>2</sub> )<br>Carbon Dioxide<br>Methane<br>Moisture<br>Other Organics<br>Acidity<br>Total Impurities | < 15 ppm<br>< 2 ppm<br>< 1 ppm<br>< 4 ppm<br>< 10 ppm<br>< 0.1 ppmw<br>50 ppm |
| <b>PurityPlus 3.0</b> | 99.9%<br>Liquid Phase   | Air (N <sub>2</sub> , O <sub>2</sub> , CO, CO <sub>2</sub> )<br>Moisture<br>Other Organics<br>Acidity<br>Total Impurities                              | < 500 ppm<br>< 10 ppm<br>< 1000 ppm<br>< 0.1 ppmw<br>< 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

## Trimethylamine (TMA)

A colorless, toxic, flammable gas.

| Technical Information: |  |
|------------------------|--|
| Chemical Symbol:       | (CH <sub>3</sub> ) <sub>3</sub> N                |
| Molecular Weight:      | 59.11  |
| Specific Volume        | 6.4 ft <sup>3</sup> /lb (0.4 m <sup>3</sup> /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<br>(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

A colorless, odorless, nontoxic, inert gas.

# Xenon

| Technical Information: |  |
|------------------------|--|
| Chemical Symbol:       | Xe   |
| Molecular Weight:      | 131.3  |
| Specific Volume        | 2.90 ft <sup>3</sup> /lb (0.18 m <sup>3</sup> /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 |
|--------------------------------------|---------|--|---------------|
| <b>PurityPlus 5.0<br/>(Research)</b> | 99.999% | Krypton<br>Moisture<br>Hydrogen<br>Oxygen<br>Nitrogen<br>Nitrous Oxide<br>Total Hydrocarbons<br>Tetrafluoromethane<br>Carbon Dioxide<br>Hexafluoroethane<br>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





# MIXED GASES

 **PurityPlus**<sup>®</sup>  
SPECIALTY GASES

## Section 2 - Mixed Gases

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## 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                  |                      |
|                  |               | 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           | 50-999 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                    |                      |
|                    | 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                  |                      |
| Custom             | 50-999 ppm    | 35            | 32              | 2000                  |                      |
|                    |               | 200           | 208             | 2000                  |                      |
|                    |               | 80            | 76              | 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                  |                      |
|                  |               | 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                  |                      |
| 200              |               | 226           | 2000            |                       |                      |
| 80               |               | 83            | 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                  |                      |
|                  |               | 200           | 226             | 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 |
| <b>Primary</b>     | 50ppm-0.9%    | 200           | 200             | 2000                  | 350                  |
| <b>Certified</b>   | 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                  |                      |
|                    | <b>Custom</b> | 50-999 ppm    | 200             | 200                   |                      |
| 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 |
| 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 |
| 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                   |                      |
| 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 |
| 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                   |                      |
| 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 |
| 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: |                        |                                   |
|-----------------------|------------------------|-----------------------------------|
| 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                   |                      |
| 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                   |                      |
| 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                   |                      |
| 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                  |                      |
|                   |               | 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      |

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                  |                      |
|                           | 100-9999 ppm  | 35AL          | 28              | 2000                  |                      |
|                           |               | 200           | 208             | 2000                  |                      |
|                           |               | 150AL         | 140             | 2000                  |                      |
|                           |               | 80            | 76              | 2000                  |                      |
|                           |               | 35            | 32              | 2000                  |                      |
|                           | 1-50%         | 35AL          | 28              | 2000                  |                      |
|                           |               | 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 Oxygen concentration |
|                 | 0.1-50%       | 200           | 226             | 2000                  |                                  |
| Certified       | 1-49 ppm      | 150AL         | 152             | 2000                  | Varies with Oxygen concentration |
|                 |               | 35AL          | 30              | 2000                  |                                  |
|                 | 50-999 ppm    | 150AL         | 152             | 2000                  |                                  |
|                 |               | 35AL          | 30              | 2000                  |                                  |
|                 | 0.1-50%       | 200           | 226             | 2000                  |                                  |
|                 |               | 80            | 83              | 2000                  |                                  |
| Custom          | 0.1-50%       | 35            | 35              | 2000                  |                                  |
|                 |               | 200           | 226             | 2000                  |                                  |
|                 |               | 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 Oxygen concentration |
|                  | 0.1-50%       | 200           | 200             | 2000                  |                                  |
| Certified        | 1-49 ppm      | 150AL         | 135             | 2000                  | Varies with Oxygen concentration |
|                  |               | 35AL          | 27              | 2000                  |                                  |
|                  | 50-999 ppm    | 150AL         | 135             | 2000                  |                                  |
|                  |               | 35AL          | 27              | 2000                  |                                  |
|                  | 0.1-50%       | 200           | 200             | 2000                  |                                  |
|                  |               | 80            | 73              | 2000                  |                                  |
| Custom           | 0.1-50%       | 35            | 32              | 2000                  |                                  |
|                  |               | 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: |                        |   |
|-----------------------|------------------------|---|
| 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 concentration |
|                    | 0.1-50%       | 200           | 208             | 2000                  |                                  |
| Certified          | 1-49 ppm      | 150AL         | 140             | 2000                  | Varies with Oxygen concentration |
|                    |               | 35AL          | 28              | 2000                  |                                  |
|                    | 50-999 ppm    | 150AL         | 140             | 2000                  |                                  |
|                    |               | 35AL          | 32              | 2000                  |                                  |
|                    | 0.1-50%       | 200           | 208             | 2000                  |                                  |
|                    |               | 80            | 76              | 2000                  |                                  |
| Custom             | 0.1-50%       | 35            | 32              | 2000                  |                                  |
|                    |               | 200           | 208             | 2000                  |                                  |
|                    |               | 80            | 76              | 2000                  |                                  |
|                    |               | 35            | 28              | 2000                  | Varies with Oxygen concentration |

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                  |                      |
|                            |               | 200           | 208             | 2000                  |                      |
|                            | 0.1-1%        | 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.







# SPECIAL APPLICATION MIXES

 **PurityPlus**<sup>®</sup>  
SPECIALTY GASES

## Section 3 - Special Application Mixtures

| Gas                                | Page Number |
|------------------------------------|-------------|
| Beverage and Food Gases            | 3.1 – 3.2   |
| Biological Atmosphere Gas Mixtures | 3.3         |
| Electron Capture Mixtures          | 3.4         |
| Nuclear Counter Mixtures           | 3.4         |
| EPA Protocol Mixtures              | 3.5         |
| Portable Calibration Standards     | 3.6 – 3.8   |
| Flame Ionization Fuel Mixtures     | 3.9         |
| Leak Detection Mixtures            | 3.9         |
| Laser Mixtures                     | 3.10        |
| TCD Carrier Gas Mixture            | 3.11        |
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| Hydrocarbon Mixtures               | 3.12 - 3.13 |
| Semiconductor Gases                | 3.14        |
| Medical Gases                      | 3.15– 3.18  |

## Beverage and Food Gases

3

### 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

3

**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

3

These mixtures are used as control atmospheres for the growth of aerobic and anaerobic biological cultures. Anaerobic 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

3

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.

| <b>P-5 Mixture</b>  | <b>Cylinder Size</b> | <b>Pressure</b> | <b>Contents</b> | <b>Connection</b> |
|---------------------|----------------------|-----------------|-----------------|-------------------|
| 5% Methane          | 300                  | 2400 PSIG       | 315 cf          | 350               |
| 95% Argon           | 200                  | 2000 PSIG       | 232 cf          | 350               |
| <b>P-10 Mixture</b> |                      |                 |                 |                   |
| 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.

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

| <b>Geiger Flow Gases</b> | <b>Cylinder Size</b> | <b>Pressure</b> | <b>Contents</b> | <b>Connection</b> |
|--------------------------|----------------------|-----------------|-----------------|-------------------|
| 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

3

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/<br>Balance Gas  | Connection | Minor Component/<br>Balance Gas   | Part No.        | Connection   |
| <b>CO<sub>2</sub> in Air</b><br>1-20% CO <sub>2</sub> /Air<br>300-9999 PPM CO <sub>2</sub> /Air<br>100-299 PPM CO <sub>2</sub> /Air  | 590        | <b>NO in N<sub>2</sub></b><br>0.5-1% NO/N <sub>2</sub><br>100-4999 PPM NO/N <sub>2</sub><br>30-99 PPM NO/N <sub>2</sub><br>10-29.9 PPM NO/N <sub>2</sub>  | EPA-2-NIT-XX-DN | 660  |
| <b>CO<sub>2</sub> in N<sub>2</sub></b><br>1-20% CO <sub>2</sub> /N <sub>2</sub><br>300-2999 PPM CO <sub>2</sub> /N <sub>2</sub><br>100-299 PPM CO <sub>2</sub> /N <sub>2</sub>   | 580        | 5-9.9 PPM NO/N <sub>2</sub><br>1-3.9 PPM NO/N <sub>2</sub>  |                 |  |
| <b>CO in Air</b><br>1-3% CO/Air<br>100-9999 PPM CO/Air<br>10-99 PPM CO/Air<br>8-9.9 PPM CO/Air   | 590        | <b>NO<sub>x</sub> in Air</b><br>500-5000 NO <sub>x</sub> /Air<br>100-499 NO <sub>x</sub> /Air<br>80-99 NO <sub>x</sub> /Air<br>5-29.9 NO <sub>x</sub> /Air<br>1-4.9 NO <sub>x</sub> /Air                                    | EPA-2-AIR-XX-DN | 660  |
| <b>CO in N<sub>2</sub></b><br>1-10% CO/N <sub>2</sub><br>100-9999 PPM CO/N <sub>2</sub><br>10-99 PPM CO/N <sub>2</sub><br>8-9.9 PPM CO/N <sub>2</sub><br>.5-7.9% CO/N <sub>2</sub>   | 350        | <b>O<sub>2</sub> in N<sub>2</sub></b><br>23-49% O <sub>2</sub> /N <sub>2</sub><br>5-22.9% O <sub>2</sub> /N <sub>2</sub><br>0.8-4.9% O <sub>2</sub> /N <sub>2</sub>   | EPA-2-NIT-XX-DN | <23% O <sub>2</sub> - 590<br>>23% O <sub>2</sub> - 296 |
| <b>H<sub>2</sub>S in Air</b><br>100-999 PPM H <sub>2</sub> S/Air<br>10-99 PPM H <sub>2</sub> S/Air<br>1-9.9 PPM H <sub>2</sub> S/Air   | 330        | <b>C<sub>3</sub>H<sub>8</sub> in Air</b><br>1000-6000 PPM C <sub>3</sub> H <sub>8</sub> /Air<br>100-999 PPM C <sub>3</sub> H <sub>8</sub> /Air<br>1-99 PPM C <sub>3</sub> H <sub>8</sub> /Air                               | EPA-2-AIR-XX-DN | 590  |
| <b>H<sub>2</sub>S in N<sub>2</sub></b><br>100-999 PPM H <sub>2</sub> S/N <sub>2</sub><br>10-99 PPM H <sub>2</sub> S/N <sub>2</sub><br>4-9.9 PPM H <sub>2</sub> S/N <sub>2</sub><br>1-3.9 PPM H <sub>2</sub> S/N <sub>2</sub> | 330        | <b>SO<sub>2</sub> in Air</b><br>500-4999 PPM SO <sub>2</sub> /Air<br>100-499 SO <sub>2</sub> /Air<br>40-99 SO <sub>2</sub> /Air<br>10-39 SO <sub>2</sub> /Air   | EPA-2-AIR-XX-DN | 660  |
| <b>CH<sub>4</sub> in Air</b><br>> 1 PPM CH <sub>4</sub> /Air<br>< 1 PPM CH <sub>4</sub> /Air   | 590        | <b>SO<sub>2</sub> in N<sub>2</sub></b><br>500-4999 PPM SO <sub>2</sub> /N <sub>2</sub><br>100-499 SO <sub>2</sub> /N <sub>2</sub><br>40-99 SO <sub>2</sub> /N <sub>2</sub><br>10-39 SO <sub>2</sub> /N <sub>2</sub>         | EPA-2-NIT-XX-DN | 660  |
| <b>CH<sub>4</sub> in N<sub>2</sub></b><br>> 1 PPM CH <sub>4</sub> /N <sub>2</sub><br><1 PPM CH <sub>4</sub> /N <sub>2</sub>  | 350        | <b>C<sub>3</sub>H<sub>8</sub> in N<sub>2</sub></b><br>1000 PPM C <sub>3</sub> H <sub>8</sub> /N <sub>2</sub><br>100-999 C <sub>3</sub> H <sub>8</sub> /N <sub>2</sub><br>1-99 C <sub>3</sub> H <sub>8</sub> /N <sub>2</sub> | EPA-2-NIT-XX-DN | 350  |

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

3

### 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

- |  |  |
|--|--|
| <ul style="list-style-type: none"> <li>• Refillable aluminum cylinder</li> <li>• 105 liters capacity at 1100 psi</li> <li>• 12.5" tall</li> <li>• 3.2" diameter</li> </ul> | <ul style="list-style-type: none"> <li>• C-10 valve connection</li> <li>• 5 year DOT stamp</li> <li>• Safety on cylinder valve</li> <li>• Stainless steel valve</li> </ul> |
|--|--|

#### EC180 Cylinder Specifications

- |   |   |
|---|---|
| <ul style="list-style-type: none"> <li>• Refillable aluminum cylinder</li> <li>• Up to 160 liter capacity at 2200 psig</li> <li>• 14" tall (with valve)</li> <li>• 3.2" diameter</li> </ul> | <ul style="list-style-type: none"> <li>• CGA 180/110 connection</li> <li>• 5 year DOT stamp</li> <li>• Safety on cylinder valve</li> <li>• Brass or Stainless steel valves</li> </ul> |
|---|---|



EC-180



#### Complete, Portable Calibration Kits

- |  |
|--|
| <ul style="list-style-type: none"> <li>• Sturdy carrying case</li> <li>• Enviro-Cyl™ refillable cylinder(s) or "One Timers" disposable cylinders</li> <li>• A regulator/flowmeter</li> <li>• Tedlar sample bags - available</li> <li>• Calibration tubing - available</li> </ul> |
|--|

## Portable Calibration Standards

3

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

3

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

Hydrogen Sulfide  
Carbon Monoxide  
Methane  
Oxygen  
Balance Nitrogen

#### 4 Component Mixture

Hydrogen Sulfide  
Carbon Monoxide  
Methane  
Balance Nitrogen

### Common Environmental 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

| Disposable 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-Cylinders

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

C-10\*

105 Liters

C-10

C-180\*

160 Liters

CGA 180/110

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

DN - Description number assigned by manufacturing location.

Calibration Kits and Accessories Available

\* Aluminum Cylinders recommended for reactive gases

[purityplusgases.com](http://purityplusgases.com)

## 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 Mix-<br>tures | 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

3

| 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% relative of the requested concentration. Tighter blend tolerances, and specific certifications are available.

| Carbon Dioxide Laser Mixtures  | Cylinder Size | Contents         | Connection |
|--|---------------|------------------|------------|
| <b>3.4% CO<sub>2</sub> / 15.6% N<sub>2</sub> / He</b><br><b>4.5% CO<sub>2</sub> / 13.5% N<sub>2</sub> / He</b><br><b>6% CO<sub>2</sub> / 18% N<sub>2</sub> / He</b><br><b>4.5% CO<sub>2</sub> / 13.5% N<sub>2</sub> / He</b><br><b>5% CO<sub>2</sub> / 40% N<sub>2</sub> / He</b>  | 300<br>200    | 264 cf<br>200 cf | 580        |
| <b>2% CO / 6% CO<sub>2</sub> / 6% N<sub>2</sub> / He</b><br><b>2% CO / 8% CO<sub>2</sub> / 8% N<sub>2</sub> / He</b><br><b>2% CO / 8% CO<sub>2</sub> / 16% N<sub>2</sub> / He</b><br><b>4% CO / 8% CO<sub>2</sub> / 16% N<sub>2</sub> / He</b><br><b>4% CO / 8% CO<sub>2</sub> / 16% He / N<sub>2</sub></b><br><b>4% CO / 8% CO<sub>2</sub> / 28% He / N<sub>2</sub></b> | 300<br>200    | 229 cf<br>167 cf | 350        |
| <b>0.4% H<sub>2</sub> / 4% CO / 8% CO<sub>2</sub> / 8% N<sub>2</sub> / He</b><br><b>0.4% H<sub>2</sub> / 4% CO / 6% CO<sub>2</sub> / 12% N<sub>2</sub> / He</b>  | 300<br>200    | 229 cf<br>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

3

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 Mix-<br>tures | 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

3

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         |
| Cyclopentane        | 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

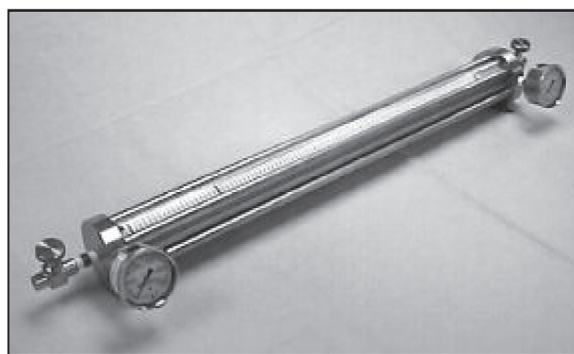
3

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

3

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 - SiH <sub>4</sub>                         | Arsine - AsH <sub>3</sub>           | Chlorine - Cl <sub>2</sub>                      | Argon - Ar                | Ammonia - NH <sub>3</sub>        |
| Dichlorosilane - SiH <sub>2</sub> Cl <sub>2</sub> | Phosphine - PH <sub>3</sub>         | Hydrogen Bromide - HBr                          | Helium - He               | Carbon Dioxide - CO <sub>2</sub> |
| Disilane - Si <sub>2</sub> H <sub>6</sub>         | Boron Trifluoride - BF <sub>3</sub> | Hydrogen Chloride - HCl                         | Hydrogen - H <sub>2</sub> | Nitrous Oxide - N <sub>2</sub> O |
| Silicon Tetrachloride - SiCl <sub>4</sub>         |                                     | Sulfur Hexafluoride - SF <sub>6</sub>           | Nitrogen - N <sub>2</sub> |                                  |
| Trichlorosilane - SiHCl <sub>3</sub>              |                                     | Halocarbon 14 - CF <sub>4</sub>                 | Oxygen - O <sub>2</sub>   |                                  |
|   |                                     | Halocarbon 22 - CHClF <sub>2</sub>              |                           |                                  |
|   |                                     | Halocarbon 23 - CHF <sub>3</sub>                |                           |                                  |
|   |                                     | Halocarbon C318 - C <sub>4</sub> F <sub>8</sub> |                           |                                  |

## Medical Gases

3

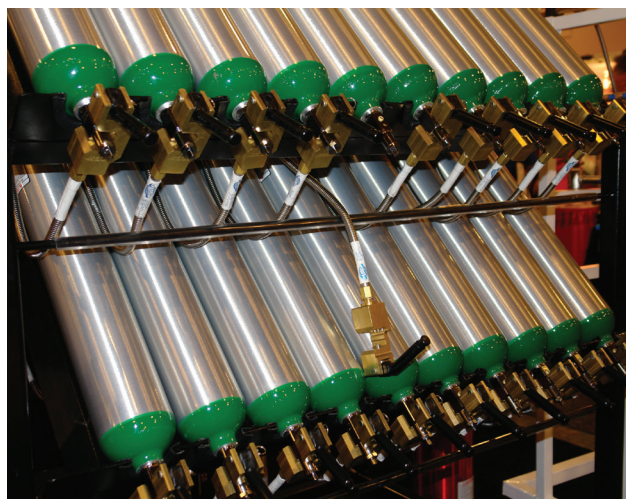
PurityPlus Medical Gases are manufactured in compliance to FDA current Good Manufacturing Practices (cGMPs). Our manufacturing facilities are independently audited by a third party auditor, as well as by the FDA (in Canada, the Health Products and Food Branch Inspectorate - HPFBI) to insure stringent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

3

| Product   | Purity             | Impurity   | Maximum              | Cylinder Size | Contents | Connection          |
|---|--------------------|--|----------------------|---------------|----------|---------------------|
| <b>Medical Air</b><br>Purified natural air or a blend of oxygen and nitrogen. Contains 19.5 to 23.5 vol% Oxygen | Oxygen             | CO   | ≤ 10ppm              | 200           | 233 cf   | 346                 |
|   | 19.5-23.5%         | CO <sub>2</sub>  | ≤ 500 ppm            | 20            | 23 cf    | 950                 |
|   | Bal N <sub>2</sub> | SO <sub>2</sub>  | ≤ 5 ppm              | 10            | 14 cf    | 950                 |
|   |                    | NO + NO <sub>2</sub>                                   | ≤ 2.5 ppm            |               |          |                     |
|   |                    | Odor:<br>Condensed H <sub>2</sub> O:<br>Condensed Oil: | None<br>None<br>None |               |          |                     |
| <b>Carbon Dioxide USP</b><br>Chemical Symbol: CO <sub>2</sub>   | > 99.0%            | H <sub>2</sub> S < 1 ppm                               | ≤ 1 ppm              | 200           | 64 lb    | 320                 |
|   |                    | CO   | ≤ 10 ppm             | 20            | 6.5 lb   | 940                 |
|   |                    | NO   | ≤ 2.5 ppm            | 10            | 4.0 lb   | 940                 |
|   |                    | NH <sub>3</sub>  | ≤ 25 ppm             |               |          |                     |
|   |                    | SO <sub>2</sub>  | ≤ 5 ppm              |               |          |                     |
|   |                    | H <sub>2</sub> O                                       | ≤ 200 ppm            |               |          |                     |
|   |                    | NO <sub>2</sub>  | ≤ 2.5 ppm            |               |          |                     |
| <b>Carbon Dioxide Cryogenic Liquid</b>  |                    |  |                      | 170L          | 378 lb   | Gas-320<br>Liq.-172 |
| <b>Helium USP</b><br>Chemical Symbol: He  | > 99.0%            | CO   | ≤ 10 ppm             | 200           | 218 cf   | 580                 |
|   |                    | Air  | ≤ 1.0%               | 20            | 22 cf    | 930                 |
|   |                    | Odor:  | None                 | 10            | 13 cf    | 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

| Product                         | Purity  | Impurity                     | Maximum              | Cylinder Size | Contents | Connection         |
|---------------------------------|---------|------------------------------|----------------------|---------------|----------|--------------------|
| Nitrogen NF                     | ≥ 99.0% | CO                           | < 10 ppm             | 200           | 228      | 580                |
|                                 |         | O <sub>2</sub>               | ≤ 1.0%               | 20            | 23       | 960                |
|                                 |         | Odor:                        | None                 | 10            | 14       | 960                |
| Nitrogen NF<br>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                |
|                                 |         | CO <sub>2</sub>              | ≤ 300 ppm            | 10            | 3.9 lb   | 910                |
|                                 |         | NO                           | ≤ 1 ppm              |               |          |                    |
|                                 |         | NO <sub>2</sub>              | ≤ 1 ppm              |               |          |                    |
|                                 |         | NH <sub>3</sub>              | ≤ 25 ppm             |               |          |                    |
|                                 |         | Halogens<br>H <sub>2</sub> O | ≤ 1 ppm<br>≤ 200 ppm |               |          |                    |
| Oxygen USP**                    | ≥ 99.0% | CO                           | ≤ 10 ppm             | 200           | 249 cf   | 540                |
|                                 |         | CO <sub>2</sub>              | ≤ 300 ppm            | 20            | 25 cf    | 870                |
|                                 |         | Odor                         | None                 | 10            | 15 cf    | 870                |
| Oxygen<br>Cryogenic Liquid      |         |                              |                      | 160L          | 4580 cf  | Gas-540<br>Liq-440 |

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

|                          |
|--------------------------|
| <b>Cryogenic Product</b> |
|--------------------------|

|   |
|---|
| 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

3

| 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







# EQUIPMENT

# **PurityPlus**<sup>®</sup>

## SPECIALTY GAS EQUIPMENT CATALOG

4



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## Section 4 - Equipment

|   |     |
|---|-----|
| High Purity Pressure Regulator Selection..... | 4.1 |
| Operation of Pressure Regulators .....        | 4.2 |
| Model Summary Matrix.....                     | 4.3 |

### Regulators

#### Cylinder Regulators

|   |             |
|---|-------------|
| PP701 Forged Brass Regulator .....                      | 4.4 - 4.5   |
| PP702 Forged Brass Regulator .....                      | 4.6 - 4.7   |
| PP703 Forged Brass Regulator .....                      | 4.8 - 4.9   |
| PP721/721C Brass Barstock Regulator .....               | 4.10 - 4.11 |
| PP722/722C Brass Barstock Regulator .....               | 4.12 - 4.13 |
| PP723/723C Brass Barstock Regulator .....               | 4.14 - 4.15 |
| PP741 Stainless Steel Barstock Regulator .....          | 4.16 - 4.17 |
| PP742 Stainless Steel Barstock Regulator .....          | 4.18 - 4.19 |
| PP743 Stainless Steel Barstock Regulator .....          | 4.20 - 4.21 |
| PP910EZ Regulator Mounting Station .....                | 4.23        |
| PP900 Switchover Manifolds Brass & Stainless Steel..... | 4.24        |
| PP905 Switchover Manifolds Brass & Stainless Steel..... | 4.25        |

# 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.

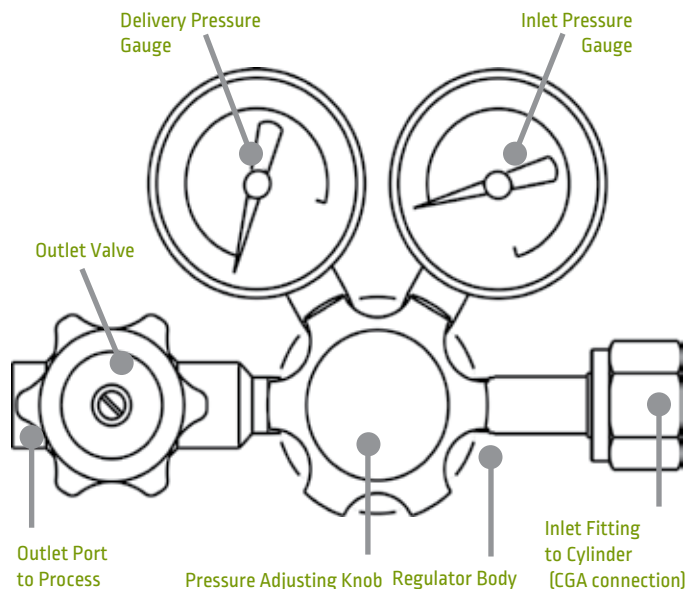
## Gas Purity

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.

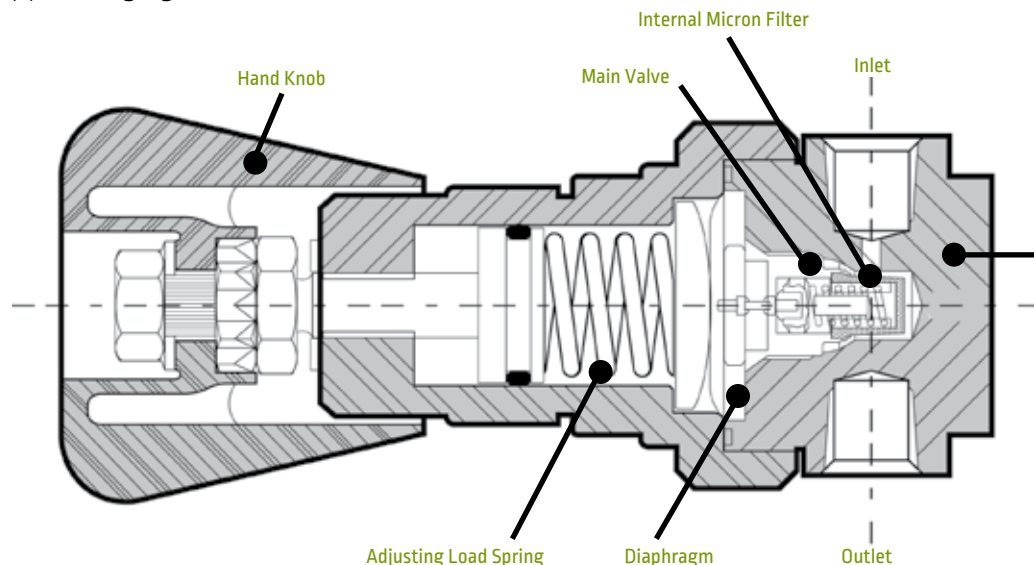
When gas from the delivery pressure chamber is sent to the end process, the resulting decrease in gas volume in the delivery chamber causes a pressure reduction in the chamber. When this occurs, the spring tension again causes the diaphragm to push the valve open, allowing additional gas to enter the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



# MODEL SUMMARY MATRIX

HIGH PURITY REGULATORS AND SWITCHOVER MANIFOLDS

## HIGH PURITY REGULATORS

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

## HIGH PURITY SWITCHOVERS

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

# PP701

FORGED BRASS REGULATOR (CHROME PLATED)



Model PP701-125-580-B shown

## 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                               |

## PP701 ORDERING INFORMATION

| MODEL NO. | 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                | <b>Gas Service Must Be Specified</b> |
|           |                                  |                             | 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 |                                      |

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).

## 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<sup>-8</sup> 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

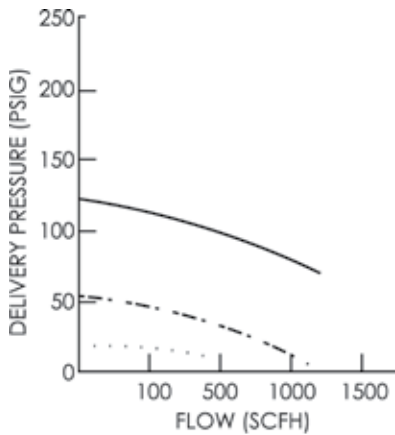
Wall mounting bracket P/N: 9101242



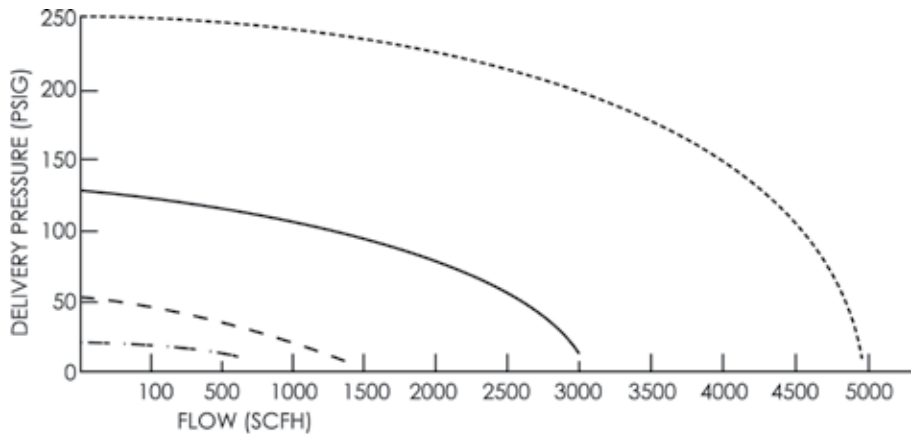
# PP701

4

## FLOW DATA



15 @ 200 PSIG INLET .....  
50 @ 200 PSIG INLET - - - - -  
125 @ 200 PSIG INLET ————

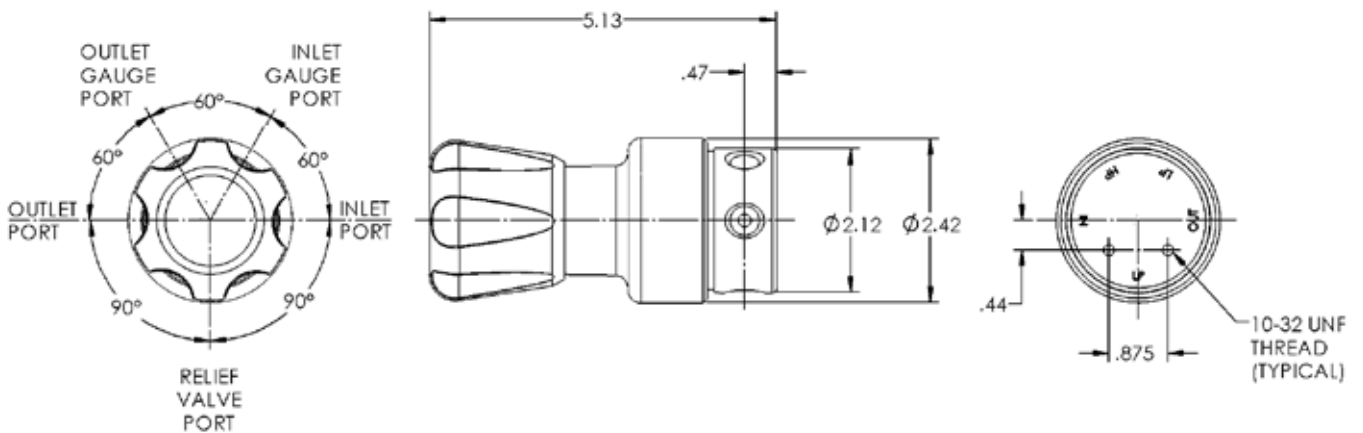


15 @ 2000 PSIG INLET - · - · - ·  
50 @ 2000 PSIG INLET - - - - -  
125 @ 2000 PSIG INLET ————  
250 @ 2000 PSIG INLET ······

## SPECIFICATIONS

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

## DIMENSIONS



# PP702

FORGED BRASS REGULATOR (CHROME PLATED)



Model PP702-125-580-B shown

## 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                               |

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).**

## 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<sup>-8</sup> 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

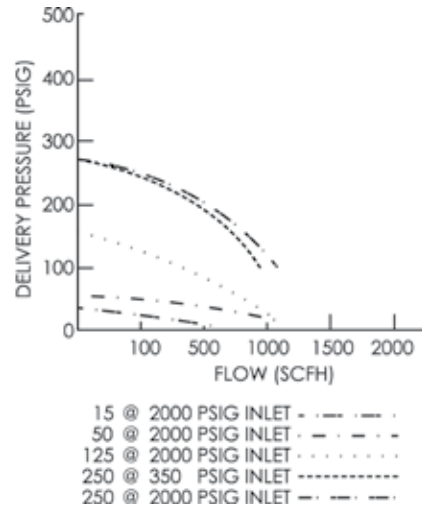
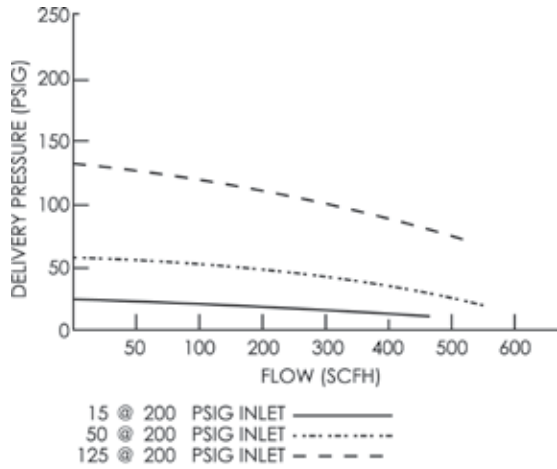
## PP702 ORDERING INFORMATION

| PP702     | -                 | XXX                         | -                 | XXX                                     | -                             | XXXX                    | -                             | XX |
|-----------|-------------------|-----------------------------|-------------------|---|-------------------------------|-------------------------|-------------------------------|----|
| MODEL NO. | DELIVERY PRESSURE |                             | CGA INLET FITTING |   | ACCESSORIES                   | OPTIONS                 |                               |    |
|           | DELIVERY          | (OUTLET GAUGE)              |                   |   |                               |                         |                               |    |
| 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 |                               |                         |                               |    |

# PP702

4

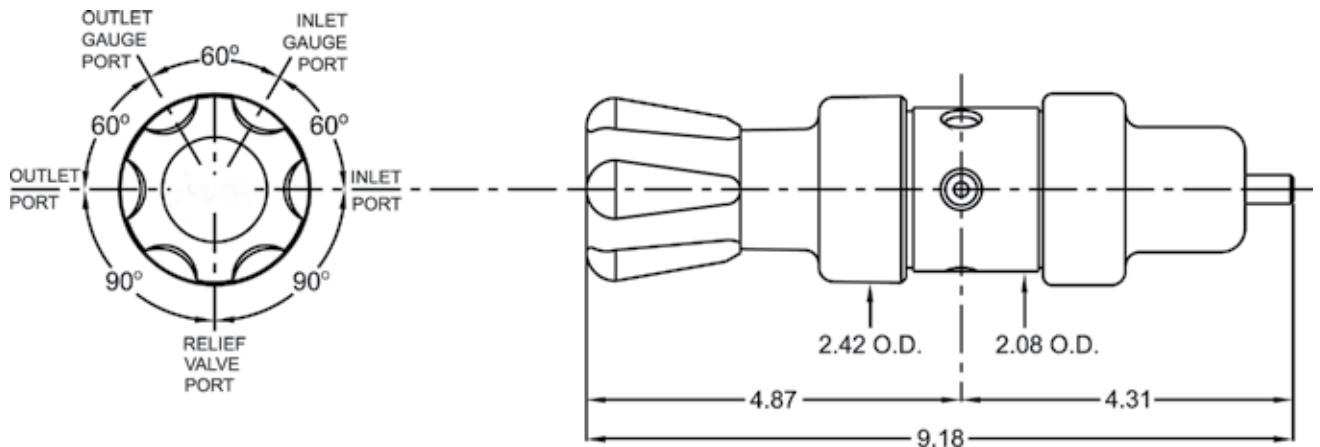
## FLOW DATA



## SPECIFICATIONS

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

## DIMENSIONS



# PP703

FORGED BRASS REGULATOR (CHROME PLATED)

4



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<sup>-8</sup> 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

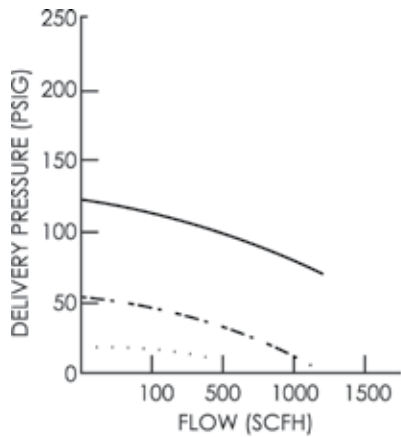
| PP 703    | -                 | XXX                              | -                                | XXX                       | -                       | XX | - | XX |
|-----------|-------------------|----------------------------------|----------------------------------|---------------------------|-------------------------|----|---|----|
| MODEL NO. | Delivery Pressure |                                  | INLET FITTING                    | ACCESSORIES               | OPTIONS                 |    |   |    |
|           | DELIVERY          | (OUTLET GAUGE)                   |                                  |                           |                         |    |   |    |
| 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.

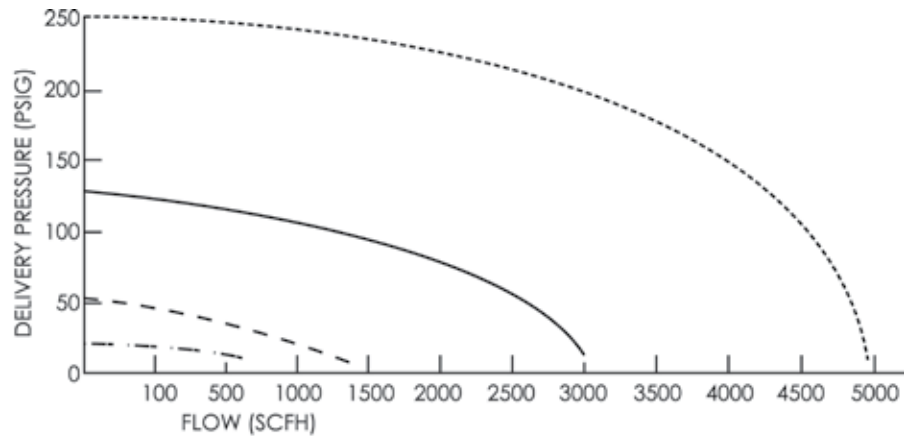
# PP703

4

## FLOW DATA



15 @ 200 PSIG INLET .....  
50 @ 200 PSIG INLET - - - - -  
125 @ 200 PSIG INLET \_\_\_\_\_

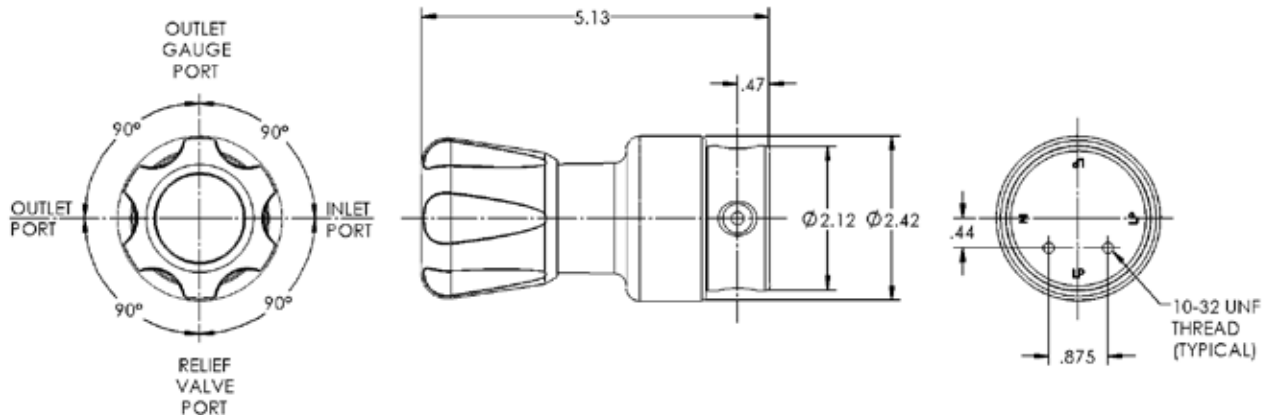


15 @ 2000 PSIG INLET - · - · - ·  
50 @ 2000 PSIG INLET - - - - -  
125 @ 2000 PSIG INLET \_\_\_\_\_  
250 @ 2000 PSIG INLET .....

## SPECIFICATIONS

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

## DIMENSIONS



# PP721/721C

BRASS BARSTOCK REGULATOR (BARE BRASS AND CHROME PLATED)



Model PP721C-125-350-B shown

Model PP721-125-350-B shown



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.**

## 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<sup>-9</sup> 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



## 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                               |

## PP721 ORDERING INFORMATION

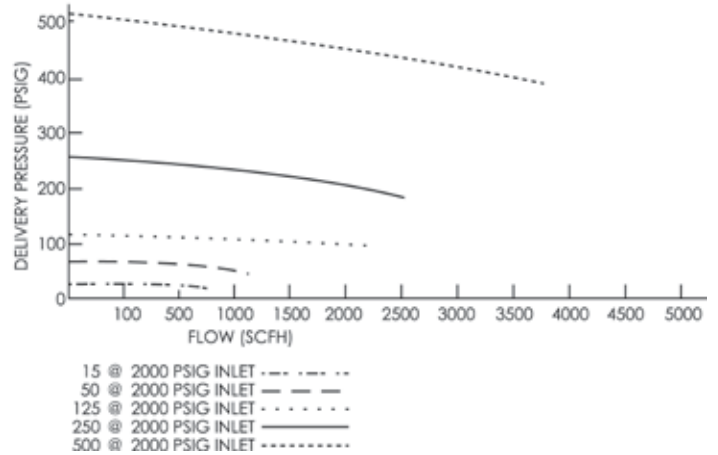
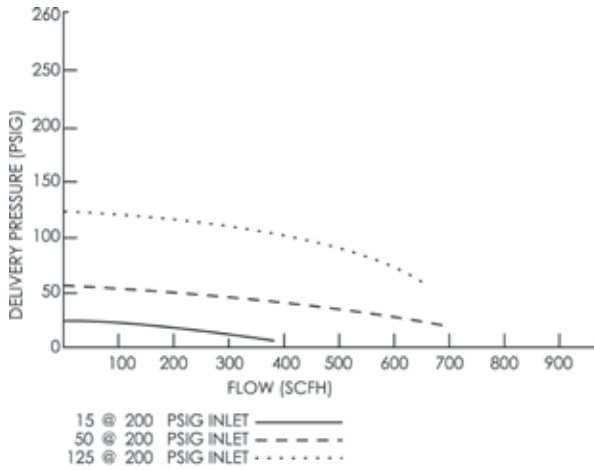
| MODEL NO.              | DELIVERY PRESSURE DELIVERY | DELIVERY PRESSURE (OUTLET GAUGE) | CGA/INLET FITTING | 350 | 510 | 540 | 580 | 590 | 326 | 346 | ACCESSORIES   | OPTIONS                    |
|------------------------|----------------------------|----------------------------------|-------------------|-----|-----|-----|-----|-----|-----|-----|---|----------------------------|
| PP721                  | 0-15 PSIG                  | {30" Hg Vac-30 psi/2 bar}        | 000 (1/4" FNPT)   |     |     |     |     |     |     |     | 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)   |     |     |     |     |     |     |     | B) 1/4" FNPT Diaph. Valve                                     | 2. He Leak Cert. (Inboard) |
|                        | 0-125 PSIG                 | {30" Hg Vac-200 psi/14 bar}      | 300               |     |     |     |     |     |     |     | C) 1/4" MNPT Nipple   | 3. No Gauges               |
|                        | 0-250 PSIG                 | {400 psi/28 bar}                 | 320               |     |     |     |     |     |     |     | D) 1/4" FNPT Port   | 5. He Leak Cert.(Outboard) |
|                        | 0-500 PSIG                 | {1000 psi/70 bar}                | 326               |     |     |     |     |     |     |     | E) 1/4" Tube Fitting  | 6. 400 psi inlet gauge     |
|                        |                            |                                  |                   | 346 |     |     |     |     |     |     |   | F) 1/8" Tube Fitting       |
|                        |                            |                                  |                   |     |     |     |     |     |     |     | G) Single Regulator Alarm                                     |                            |
|                        |                            |                                  |                   |     |     |     |     |     |     |     | R) SG 910 EZ BR Regulator Mounting Station 1 cyl 36" Pigtail* |                            |

\*Call for different lengths

# PP721/721C

4

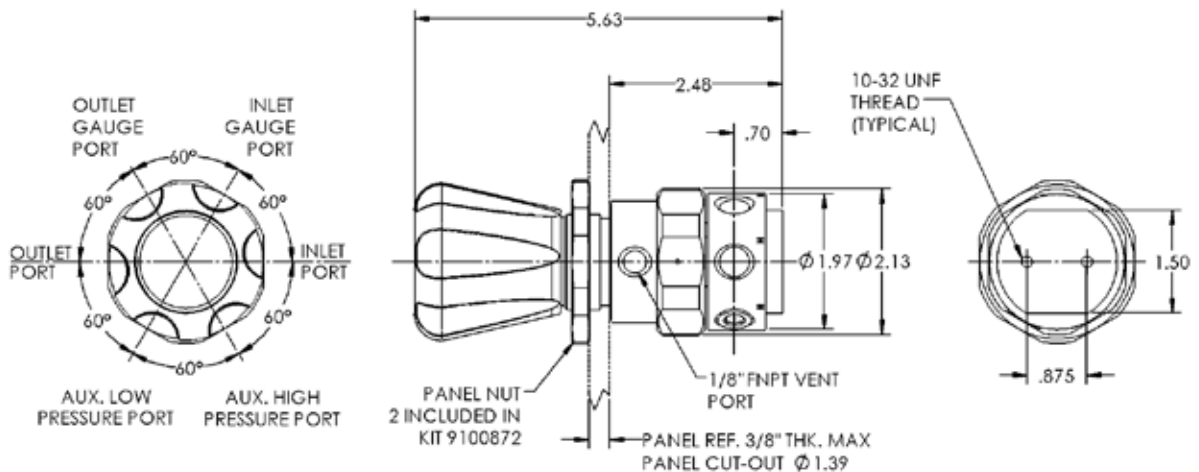
## FLOW DATA



## SPECIFICATIONS

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

## DIMENSIONS



# PP722/722C

BRASS BARSTOCK REGULATOR (BARE BRASS AND CHROME PLATED)

4



Model PP722-125-320-B shown

Model PP722C-125-320-B shown



## 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                               |

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.**

## 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<sup>-9</sup> 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

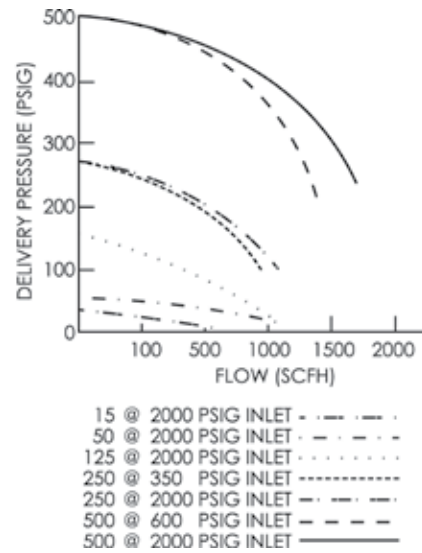
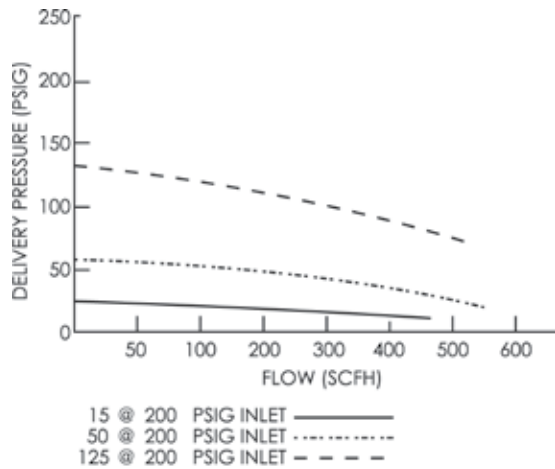
| MODEL NO.              | DELIVERY PRESSURE DELIVERY | (OUTLET GAUGE)              | CGA / INLET FITTING | ACCESSORIES                         | OPTIONS                     |
|------------------------|----------------------------|-----------------------------|---------------------|-------------------------------------|-----------------------------|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

\*Call for different lengths

# PP722/722C

4

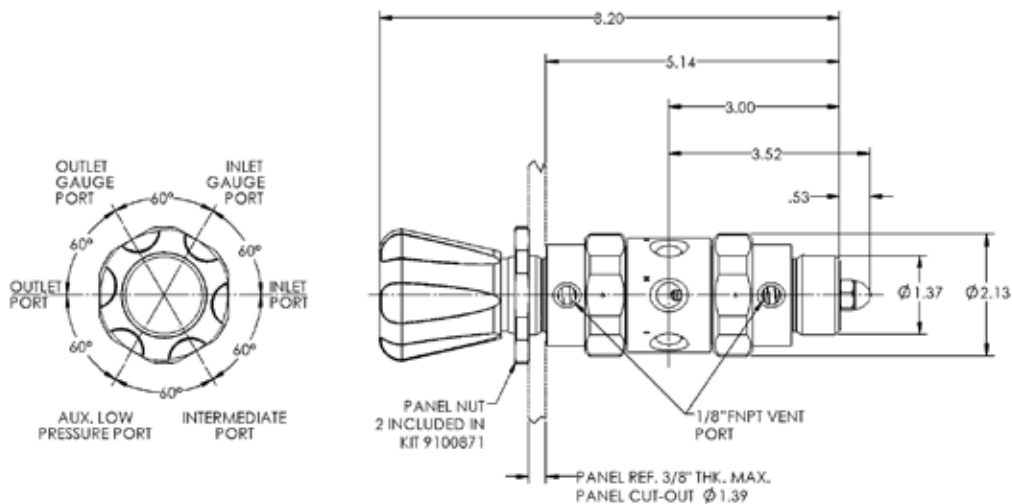
## FLOW DATA



## SPECIFICATIONS

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

## DIMENSIONS



# PP723/723C

BRASS BARSTOCK REGULATOR (BARE BRASS AND CHROME PLATED)



Model PP723-125-000-E shown

Model PP723C-125-000-E shown



## 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                               |

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.**

## 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<sup>-9</sup> 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

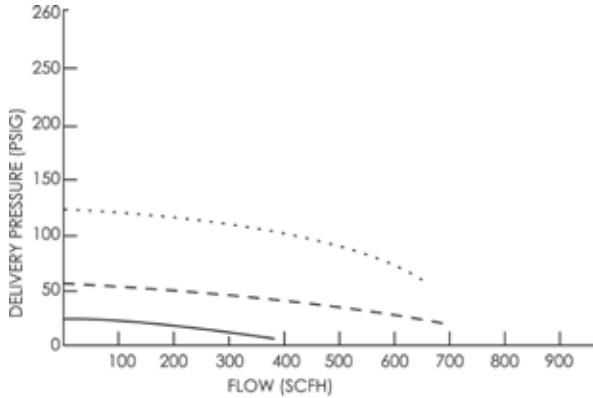
| PP723                  | -                 | XXX                         | -                       | XXX                           | -                           | XX      | - | XXXX |
|------------------------|-------------------|-----------------------------|-------------------------|-------------------------------|-----------------------------|---------|---|------|
| MODEL NO.              | DELIVERY PRESSURE |                             | INLET                   | ACCESSORIES                   |                             | OPTIONS |   |      |
|                        | DELIVERY          | (OUTLET GAUGE)              |                         |                               |                             |         |   |      |
| 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.

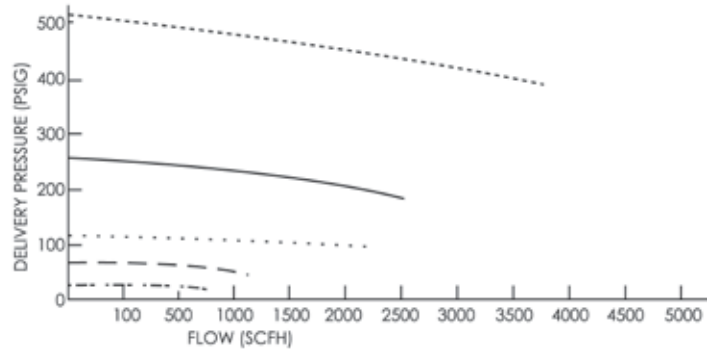
# PP723/723C

4

## FLOW DATA



15 @ 200 PSIG INLET ———  
50 @ 200 PSIG INLET - - - - -  
125 @ 200 PSIG INLET ·····

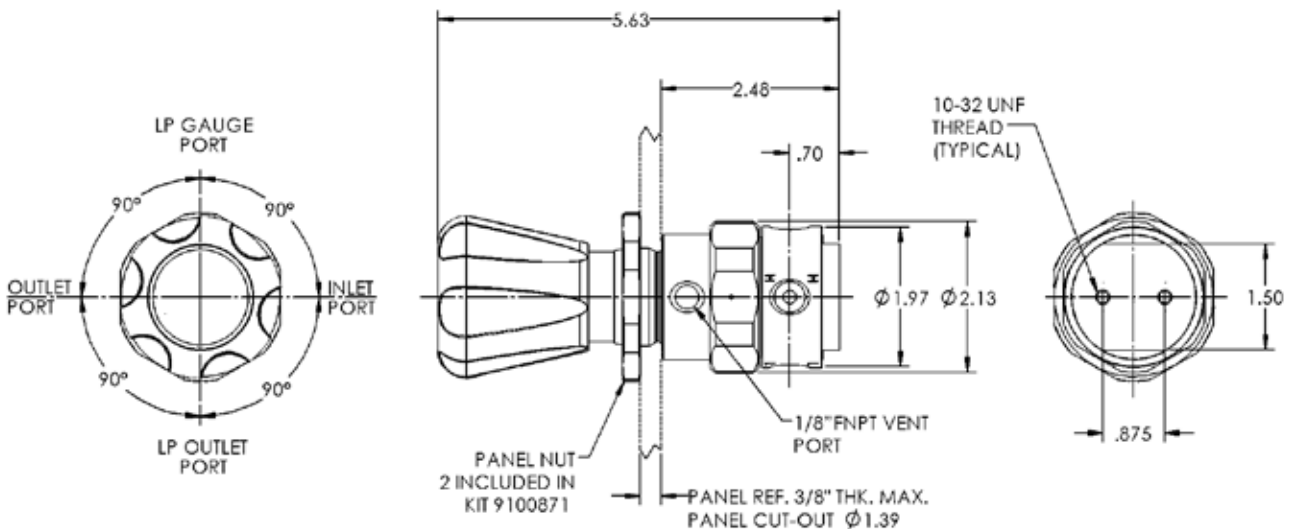


15 @ 2000 PSIG INLET ·····  
50 @ 2000 PSIG INLET - - - - -  
125 @ 2000 PSIG INLET ·····  
250 @ 2000 PSIG INLET ———  
500 @ 2000 PSIG INLET ·····

## SPECIFICATIONS

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

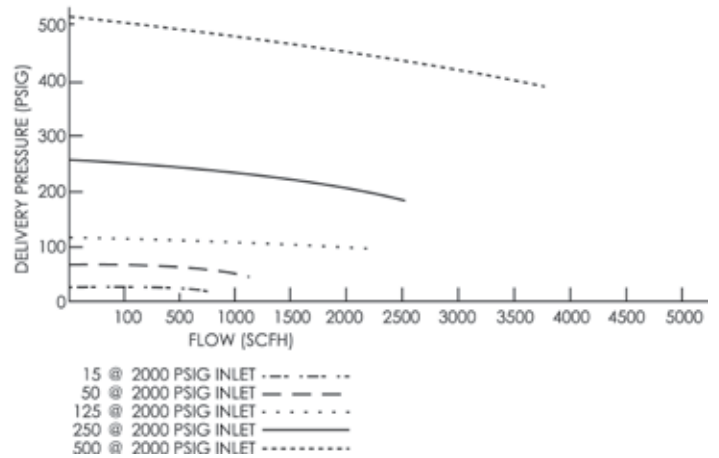
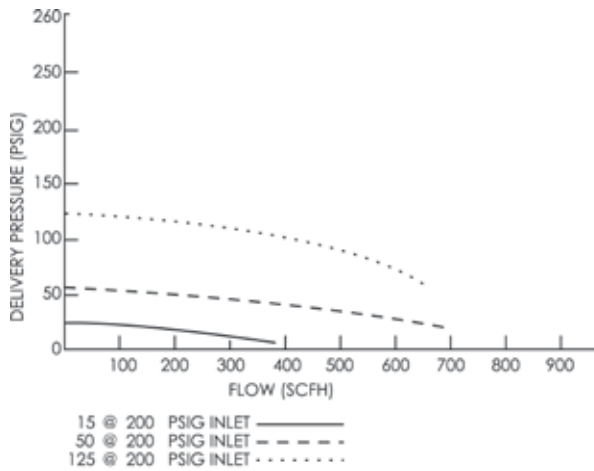
## DIMENSIONS





# PP741

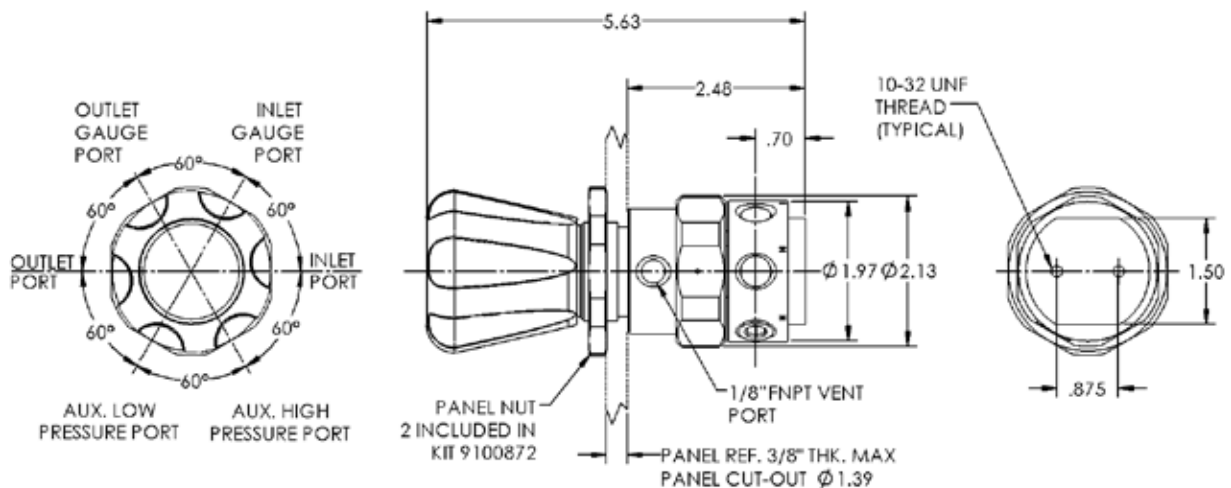
## FLOW DATA



## SPECIFICATIONS

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

## DIMENSIONS



# PP742

## STAINLESS STEEL BARSTOCK REGULATOR



Model PP742-125-580-A shown

### 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                          |

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.**

### 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)
- Designed to 1 x 10<sup>-9</sup> 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

| Model No. | Delivery Pressure                      | CGA/Inlet Fitting | Accessories                                | Options                     |
|-----------|--|-------------------|--|-----------------------------|
|           | Delivery (Outlet Gauge)                |                   |  |                             |
| 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 Regulator                      |                             |
|           |  | 001 (1/4" MNPT)   | Mounting Station station 1 Cyl 36" Pigtail |                             |

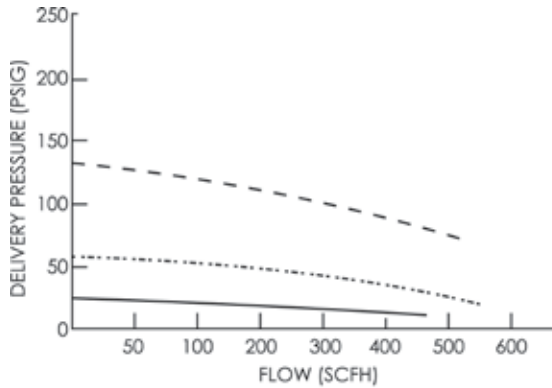
Call for different lengths

# PP742

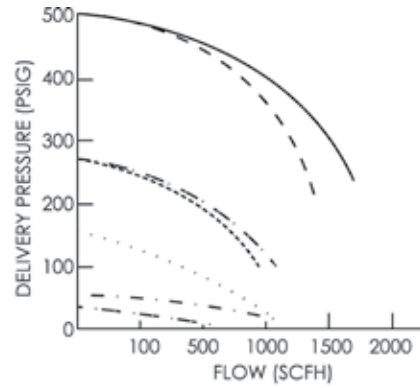
## TECHNICAL SPECIFICATIONS

4

### FLOW DATA



15 @ 200 PSIG INLET ———  
50 @ 200 PSIG INLET ·····  
125 @ 200 PSIG INLET - - - -

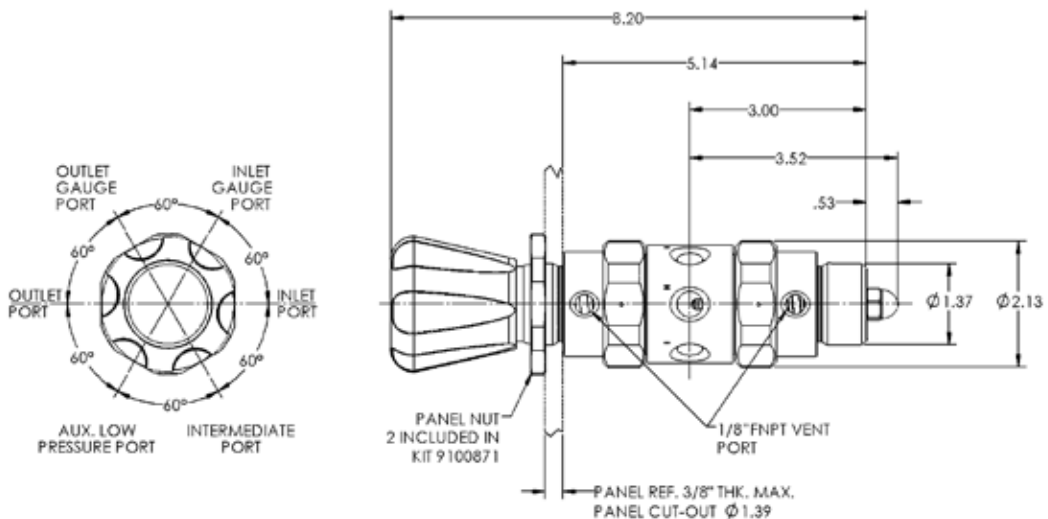


15 @ 2000 PSIG INLET - - - -  
50 @ 2000 PSIG INLET ·····  
125 @ 2000 PSIG INLET ·····  
250 @ 350 PSIG INLET ·····  
250 @ 2000 PSIG INLET ·····  
500 @ 600 PSIG INLET - - - -  
500 @ 2000 PSIG INLET ———

### SPECIFICATIONS

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

### DIMENSIONS



# PP743

## STAINLESS STEEL BARSTOCK REGULATOR

4



Model PP743-125-000-E shown



### 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                          |

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 (99.999) and higher.**

### 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<sup>-9</sup> 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

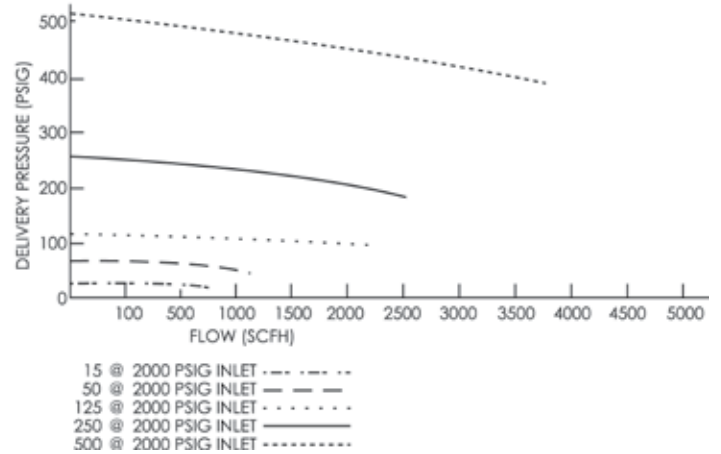
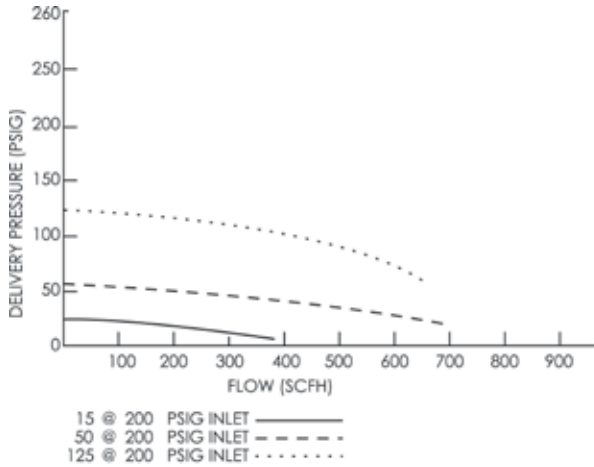
| MODEL NO. | DELIVERY PRESSURE |                             | INLET                   | ACCESSORIES               | OPTIONS                    |
|-----------|-------------------|-----------------------------|-------------------------|---------------------------|----------------------------|
| PP743     | DELIVERY          | (OUTLET GAUGE)              |                         |                           |                            |
|           | 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.

# PP743

4

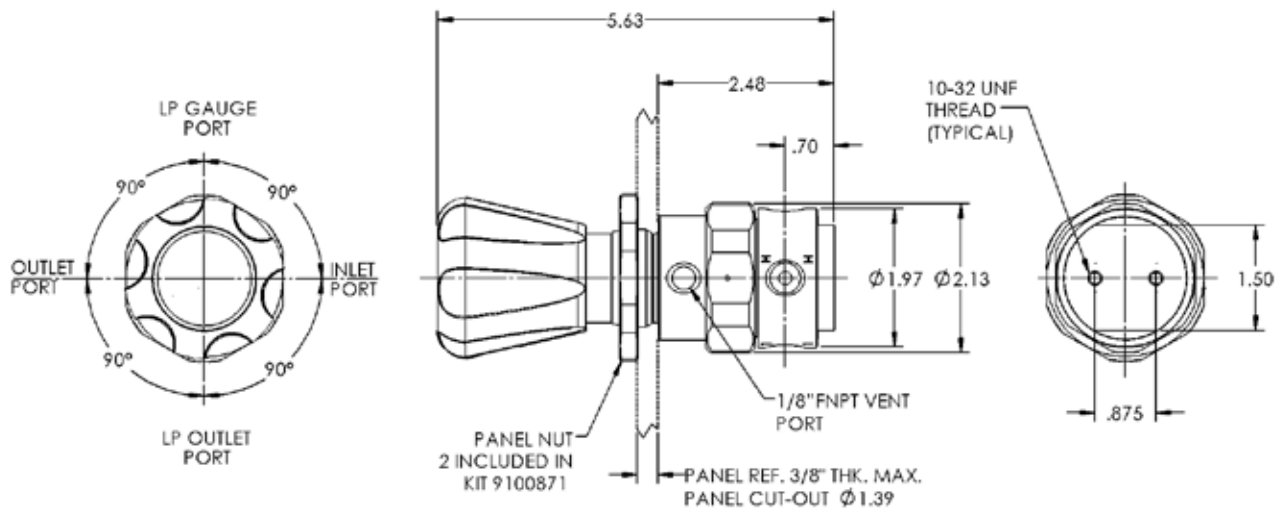
## FLOW DATA



## SPECIFICATIONS

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

## DIMENSIONS





**PurityPlus**  
SPECIALTY GASES

HARRIS PRODUCTS GROUP

# 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 contaminants 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 contaminants 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                 | Brass           | 721, 721C, 722, 722C | 1                   |
| Option 2 for part numbers for your specific application | 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

# PP900

## SWITCHOVER MANIFOLDS BRASS & STAINLESS STEEL

4



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        |
|----------|--------------------------------|-------------------|-------------------|------------------------|----------------------|---------------|------------------|------------------------|---------------------|---------------|------------------|
|          | <b>XX</b>                      | <b>XXX</b>        | <b>X</b>          | <b>X</b>               | <b>XX</b>            | <b>(X)</b>    | <b>X</b>         | <b>X</b>               | <b>XX</b>           | <b>(X)</b>    | <b>XXX</b>       |
| 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)    |
|          | 900S                           |                   |                   |                        |                      |               |                  |                        |                     |               | 346              |
|          | 900SV - Isolation Valve        |                   |                   |                        |                      |               |                  |                        |                     |               | 350              |
|          | 900SA - Alarm                  |                   |                   |                        |                      |               |                  |                        |                     |               | 500 (Brass Only) |
|          | 900SVA - Valve and Alarm       |                   |                   |                        |                      |               |                  |                        |                     |               | 540              |
| 316L     | 900SP - Purge                  |                   |                   |                        |                      |               |                  |                        |                     |               | 580              |
| SS       | 900SPA - Purge and Alarm       |                   |                   |                        |                      |               |                  |                        |                     |               | 590              |
|          |                                |                   |                   |                        |                      |               |                  |                        |                     |               | 660 (SS Only)    |
|          |                                |                   |                   |                        |                      |               |                  |                        |                     |               | 705 (SS Only)    |

# PP905

## SWITCHOVER MANIFOLDS BRASS & STAINLESS STEEL

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 pigtailed 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        |
|----------|--------------------------------|-------------------|-------------------|------------------|----------------------|---------------|------------------|-----------------|---------------------|---------------|------------------|
|          | <b>XX</b>                      | <b>XXX</b>        | <b>X</b>          | <b>X</b>         | <b>XX</b>            | <b>(X)</b>    | <b>X</b>         | <b>X</b>        | <b>XX</b>           | <b>(X)</b>    | <b>XXX</b>       |
| BRASS    | 905B                           | 015               | 1-25              | High             | 24" (std)            | 10" (std)     | 1-25             | High            | 24" (std)           | 10" (std)     | 000              |
|          | 905BV                          | 050               |                   | Pressure         | 36"                  | 5"            |                  | Pressure        | 36"                 | 5"            | (No CGA)         |
|          | 905BA - Alarm                  | 125               |                   | Cylinder         | 72"                  |               |                  | Cylinder        | 72"                 |               | 280 (Brass Only) |
|          | 905BVA - Valves and Alarm      | 250               |                   | Liquid           |                      |               |                  | Liquid          |                     |               | 320              |
|          | 905BP - Inlet Purge            | 500               |                   | Cylinder         |                      |               |                  | Cylinder        |                     |               | 326              |
|          | 905BPA - Inlet Purge and Alarm |                   |                   |                  |                      |               |                  |                 |                     |               | 330 (SS Only)    |
|          | 905S                           |                   |                   |                  |                      |               |                  |                 |                     |               | 346              |
|          | 905SV - Isolation Valve        |                   |                   |                  |                      |               |                  |                 |                     |               | 350              |
|          | 905SA - Alarm                  |                   |                   |                  |                      |               |                  |                 |                     |               | 500 (Brass Only) |
|          | 905SVA - Valve and Alarm       |                   |                   |                  |                      |               |                  |                 |                     |               | 540              |
| 316L SS  | 905SP - Purge                  |                   |                   |                  |                      |               |                  |                 |                     |               | 580              |
|          | 905SPA - Purge and Alarm       |                   |                   |                  |                      |               |                  |                 |                     |               | 590              |
|          |                                |                   |                   |                  |                      |               |                  |                 |                     |               | 660 (SS Only)    |
|          |                                |                   |                   |                  |                      |               |                  |                 |                     |               | 705 (SS Only)    |



# TECHNICAL INFORMATION

 **PurityPlus**<sup>®</sup>  
SPECIALTY GASES

## Section 5 - Technical Information

|                           | Page Number |
|---------------------------|-------------|
| Gas Safety and Material   |             |
| Compatibility Data Chart  | 5.1         |
| Conversion Factors        | 5.3         |
| Gases CGA Selection Chart | 5.5         |

## 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.

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| Gas                | Hazards for Humans |           |           | Materials of Construction |        |       |              |                 |        |        |         | Special Characteristics   |
|--------------------|--------------------|-----------|-----------|---------------------------|--------|-------|--------------|-----------------|--------|--------|---------|---|
|                    | Toxic              | Flammable | Corrosive | Aluminum                  | Copper | Brass | Carbon Steel | Stainless Steel | Monel® | Kel-F® | Teflon® |   |
| 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       |   |

**Legend**

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

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

## Gas Safety and Material Compatibility Data Chart

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| Gas                   | Hazards for Humans |           |           | Materials of Construction |        |       |              |                 |        |        |         | Special Characteristics                                  |
|-----------------------|--------------------|-----------|-----------|---------------------------|--------|-------|--------------|-----------------|--------|--------|---------|--|
|                       | Toxic              | Flammable | Corrosive | Aluminum                  | Copper | Brass | Carbon Steel | Stainless Steel | Monel® | Kel-F® | Teflon® |  |
| 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

## Length

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

## Flow

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

## Pressure

|                         | atm     | BAR     | Ft of H <sub>2</sub> O | in of Hg | in of H <sub>2</sub> O | kg/cm <sup>2</sup> | 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 <sub>2</sub> O | 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 <sub>2</sub> O  | 0.002   | 0.002   | 0.083                  | 0.074    | -----                  | 0.003              | 0.025   | 1.868    | 0.036  |
| kg/cm <sup>2</sup>      | 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   | -----  |

## Weight

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

## Volume

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

## 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   |
|-------------------|------------------------|---|
| Avagadro's Number | $6.022 \times 10^{23}$ | molecules/gm-mole                                       |
| Gas Law Constant  | 1.98719                | cal/(gm-mol)(°K)  |
|                   | 1.98719                | Btu/(lbs-mole)(°R)                                      |
|                   | 82.0568                | (cm <sup>3</sup> )(atm)/(gm-mole)(°K)                   |
|                   | 0.0820568              | (L)(atm)/(gm-mole)(°K)                                  |
|                   | 10.7314                | (ft <sup>3</sup> )(lb)/(in <sup>2</sup> )(lbs-mole)(°R) |
|                   | 0.730228               | (ft <sup>3</sup> )(atm)/(lbs-mole)(°R)                  |

## Density

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

## Scientific Notation

| Notation           | Equivalent     | Notation            | Equivalent   |
|--------------------|----------------|---------------------|--------------|
| $1 \times 10^{10}$ | 10,000,000,000 | $1 \times 10^{-1}$  | 0.1          |
| $1 \times 10^9$    | 1,000,000,000  | $1 \times 10^{-2}$  | 0.01         |
| $1 \times 10^8$    | 100,000,000    | $1 \times 10^{-3}$  | 0.001        |
| $1 \times 10^7$    | 10,000,000     | $1 \times 10^{-4}$  | 0.0001       |
| $1 \times 10^6$    | 1,000,000      | $1 \times 10^{-5}$  | 0.00001      |
| $1 \times 10^5$    | 100,000        | $1 \times 10^{-6}$  | 0.000001     |
| $1 \times 10^4$    | 10,000         | $1 \times 10^{-7}$  | 0.0000001    |
| $1 \times 10^3$    | 1,000          | $1 \times 10^{-8}$  | 0.00000001   |
| $1 \times 10^2$    | 100            | $1 \times 10^{-9}$  | 0.000000001  |
| $1 \times 10^1$    | 10             | $1 \times 10^{-10}$ | 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 Hexafluoride |
| 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 Hexafluoride            | Argon, Helium or Nitrogen         |
| 350                   | Sulfur Hexafluoride            | 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.





# GLOSSARY

## Section 6 - Glossary

|          | Page Number |
|----------|-------------|
| Glossary | 6.1 - 6.2   |

**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 adhere 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 NTP 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 H<sub>2</sub>O = 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.