



CGA V-1—2023 STANDARD FOR COMPRESSED GAS CYLINDER VALVE OUTLET AND INLET CONNECTIONS

SIXTEENTH EDITION

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Work Item 26-20
Cylinder Valve Committee

NOTE—Technical changes from the previous edition are underlined.

NOTE—Appendix I (Normative) is a requirement.

NOTE—Appendices II and III (Informative) are for information only.

SIXTEENTH EDITION: 2023
FIFTEENTH EDITION: 2021
FOURTEENTH EDITION: 2019 (Corrected 9/13/2019)
THIRTEENTH EDITION: 2013
TWELFTH EDITION: 2005

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V-1 MAJOR CHANGES

V-1, 1987, Sixth Edition

The 1987 edition included 65 valve outlet connections providing standards or alternate standards for almost 200 different compressed gases and mixtures.

- The following connections and their assigned gases were unchanged except in the instances where their use as alternate standards was phased out.

165	180	182	200	240	280	295	410	440	450	500	520
540	580	792	795	800	820	845	850	855	870	880	890
900	910	920	930	940	950	960	965				

- One connection was eliminated because it reached its phase out date of January 1, 1982.

840

- The following connections were unchanged but their gas assignments were revised.

296 320 330 350 510 670 677 679

- Ten new connections were added.

347 415 577 600 680 695 701 702 703 973

- Most drawings were changed to provide tolerances and to update minor details. The following drawings underwent significant changes.

326 346 705 860

- Ten connections were changed from alternate standard (due to be phased out) to standard or limited standard.

110 160 170 290 300 555 590 660 677 678

- Three connections were changed from standard to alternate standard.

668 750 755

V-1, 1994, Seventh Edition

The 1994 edition included 86 cylinder valve outlet connections providing standards for almost 200 different compressed gases and mixtures.

- The following connections and their assigned gases were unchanged except in the instances where their use as alternate standards was phased out.

160 240 330 510 660 677 679

- Three connections were eliminated because they reached the phase out date of January 1, 1992.

668 750 755

- One connection was eliminated because it reached the phase out date of January 1, 1993.

410

- The following connections were unchanged but their gas assignments were revised.

165 320 350 510 660 670

- Twenty-five new connections were added.

167	621	622	624	632	634	636	638	640	642	712	714
716	718	720	722	724	726	728	790	820C	852	977	981
985											

V-1, 2000, Eighth Edition

The 2000 edition included 113 valve outlet connections providing standards or alternate standards for 264 different compressed gases and mixtures.

- The following connections were unchanged but their gas assignments were revised.

632	642	716	724	728
-----	-----	-----	-----	-----

- Five new connections were added.

724	791	810	851	853
-----	-----	-----	-----	-----

- The following connection was revised to include standard or limited standard.

320

- The following connection's header page definitions were modified.

590	851	853
-----	-----	-----

- Other major technical changes included:

- Added plating allowance on NGO external outlet threads.
- Updated Appendix III to include limited standards and new assignments.

320	330	555	590	625	632	626	660	716	724	728	791
810	851	853									

- Plus several international changes:

- Revised to reflect dimensional and pictorial changes.

630	710
-----	-----

- The following CGA Technical Bulletins were added.

TB-14	TB-16
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- Connection No. 410 was a limited standard for Canada, which expired January 1, 1992, and was removed for the 1994 edition. At that time, connection 415 became the active standard for uses in Canada. Due to requests from Canada, connection 410 was reinstated and connection 415 was made obsolete.

V-1, 2001, Ninth Edition

The 2001 edition includes 115 valve outlet connections providing standards or alternate standards for 268 different compressed gases and mixtures.

- The following connections were unchanged but their gas assignments were revised.

716	660	350	724
-----	-----	-----	-----

- Two new connections were added.

323	989
-----	-----

- The following connection's header page definitions were modified.

621

- Other major technical changes included:
 - Added unique test protocol for ultra high integrity connections since there were differences with the existing test protocol for the standard connections.
 - Requirements were added to eliminate unauthorized field changes for outlet connections on liquid and medical gas cylinders.

V-1, 2002, Tenth Edition

The 2002 edition includes 115 valve outlet connections providing standards or alternate standards for 268 different compressed gases and mixtures.

- Major technical changes included:
 - Added a pin configuration as an option for the antirotational feature for the ultra high integrity connections and their outlet seal caps.
 - Revised statements associated with inlet threads and their installation into cylinders.

V-1, 2003, Eleventh Edition

The 2003 edition includes 115 valve outlet connections providing standards or alternate standards for 268 different compressed gases and mixtures.

- The following connections were unchanged but their gas assignments were revised.

728 716

- Figure 1 was revised.
- Appendix I was updated.

V-1, 2005, Twelfth Edition

The 2005 edition includes 113 valve outlet connections providing standards or alternate standards for 268 different compressed gases and mixtures.

- The following connections were unchanged but their gas assignments were revised.

320 634

- Added liquid cylinder venting designations to the following connection.

350

- The following connections were revised to include a limited standard:
 - For liquid cylinder venting of carbon dioxide: 622
 - For liquid cylinder venting of hydrogen: 795
- Connections 851 and 853 were removed from the standard.

V-1, 2013, Thirteenth Edition

The 2013 edition includes 115 valve outlet connections providing standards or alternate standards for 270 different compressed gases and mixtures.

- Three new connections were added.
789 793 812
- The following connections were unchanged but their gas assignments were revised.
330 580 634 636
- Two connections were changed to include a standard or limited standard.
166 660 678 679
- The established pressure range for intermediate high pressure connections was revised.
347 621 680 695
- Two established intermediate pressure ranges were revised for oxygen.
577 701
- The established high pressure range was revised.
677 702 703
- Most drawings were changed to provide tolerances and to update minor details. The following drawings underwent significant changes.
790 791 800 845 860
- The pressure at temperature rating was changed from 120 °F to 70 °F (48.9 °C to 21.1 °C) to the standard, intermediate high, and high pressure range connections for a number of reasons:
 - The DOT now allows UN 200 BAR cylinders to be transported. The pressure ratings of these connections have been increased to allow them to be used on these UN 200 BAR cylinders.
 - Qualification testing of these connections was performed at pressures associated with cylinders filled to 3000 psi at 70 °F with successful results;
 - This change makes all the pressure at temperature ratings consistent, at 70 °F instead of some connections at 70 °F and some at 120 °F.

V-1, 2019, Fourteenth Edition

The 2019 edition includes 124 valve outlet connections providing standards or alternate standards for 274 different compressed gases and mixtures.

- Seven new connections were added.
164 320R 540R 580R 590R 802 803
- One connection was changed to include a standard or limited standard.
510

- | | | | | | | | | | | | |
|-----|-----|------|------|------|-----|-----|-----|------|-----|-----|-----|
| 110 | 160 | 180 | 200 | 240 | 290 | 295 | 300 | 320R | 323 | 326 | 350 |
| 500 | 510 | 540R | 580R | 590R | 677 | 802 | 803 | 860 | | | |

FOREWORD

HISTORY

The first efforts to develop standards for compressed gas cylinder valve connections followed immediately after World War I and were inspired by the difficulties encountered both by industry and by military services because of the multiplicity of connections then in use and because of the danger from using the same connection for incompatible gases.

Through the activity of the Gas Cylinder Valve Thread Committee of the Compressed Gas Manufacturers' Association, Inc. (CGMA), substantial progress was made through the years that followed and, when the United States became involved in World War II, gas industries materially improved this situation. Several compressed gas industries had achieved virtual standardization at tremendous cost for replacement of valve equipment. Their standards, however, were not completely formalized nor fully coordinated with other related standards. Much of the progress between World War I and World War II was the result of interest in this problem by the Federal Specifications Board.

These circumstances surrounding industrial and military users of compressed gases during World War II brought into clear focus the need for acceleration of the standardization project for cylinder valve needs. They created not only the necessity but also an opportunity for the compressed gas industry, military services, and other federal agencies to cooperatively study standardization problems of valve outlet threads. These studies resulted in closer definition and appreciation of each valve outlet and a more balanced relationship between many types and sizes.

When standards associations representing Great Britain, Canada, and the United States met in Ottawa in October 1945 to consider unification of screw threads, a well-developed plan for standardization of compressed gas cylinder valve threads was presented to the conference by the Valve Standardization Committee of CGMA. These proposed standards represented the experience and knowledge of compressed gas manufacturers and needs and requirements of varied users of gas cylinder valves, including military services and other federal agencies. Approval of these standards, to the extent to which they were then developed, was given by U.S. Department of Commerce, U.S. Army, and U.S. Navy through the Interdepartmental Screw Thread Committee following a joint meeting with the representatives of CGMA in July 1945. Much progress was made later in that year at the Canadian Section Meeting of CGMA to unify United States and Canadian practices. During January 1946, through conference between representatives of the CGMA Valve Thread Standardization Committee and the Interdepartmental Screw Thread Committee in Washington, agreements were reached that resulted in final approval of considerable additional gas cylinder valve thread data for inclusion in the *National Bureau of Standards Handbook H-28*.

CGMA changed its name in January 1949 to the Compressed Gas Association (CGA), and its Valve Thread Standardization Committee became the Valve Standards Committee. In 1971, the Valve Standards Committee became the Connections Standards Committee to recognize a broadened scope to cover all compressed gas connections. During the interval between January 1946 and February 1949, this committee had developed its standards sufficiently to present them to the American Standards Association (ASA) and the Canadian Standards Association (CSA). They were accepted as National Standards for Canada and the United States in 1949, accomplishing an objective established some 30 years before. Since that date, additional connections have been developed and have been included in subsequent editions of the standard. Similarly, alternate standard connections were removed as they became obsolete.

With the growth of electronic, chemical, and other high technology industries where new gases were developed within the past 15 to 20 years, the need to classify all gases became a reality. A system was developed in the late 1960s that took into account fire potential, toxicity, state of the gas, and corrosiveness of each gas, known as the FTSC Code. New connections were designed to fit into the existing system of noninterchangeable connections. These were tested and then assigned to new gases or other various groups of gases as needed. A goal of only one standard valve outlet connection for each gas was established. All these changes appeared in the 1977 edition of V-1.

The 1977 edition of V-1 also established phase out dates for all alternate connections for the first time. Industry believed that it was not necessary to make arbitrary changes to a new or different connection when many years of safe operation and proven performance were considered.

Therefore, the 1987 edition of V-1 reflected the more realistic requirements of industry and public safety. It allowed for more than one connection to be used for some gases where safety is not compromised. It recognized that the use of a valve outlet connection, per se, does not ensure complete safety from interconnection and that proper labeling shall be used to identify the gas involved. Four pressure ranges were established to clearly separate the choice of connections that apply to gases in each pressure range and to protect directly connected downstream equipment against overpressurization. Finally, all numerical data listed in the 1987 edition was shown in metric as well as English units.

The 1994 edition of V-1 continued the philosophy of the 1987 edition to allow for more than one connection to be used for some gases where safety is not compromised. An entirely new set of connections with a unique design for ultra high integrity service [UHIS] (630 and 710 series) was developed for specific gases used by the electronic industry for high integrity service.

The 2000 edition of V-1 established additional gas assignments for ultra high integrity connections (630 and 710 series). In addition, two connections were added to accommodate the propane industry's requirement for connections that can be made without the use of tools, which also would not allow the flow of gas before a connection was made. These new connections (791 and 810) were intended to maximize safety in the making and breaking of gas connections performed by nonprofessionals in user applications. Finally, new connections (851 and 853) were assigned for breathing mixtures containing various percentages of oxygen for the self-contained underwater breathing apparatus (SCUBA) industry.

Connections 851 and 853 were eliminated in the 2005 edition because they were not properly used by the diving industry.

The 2013 edition of V-1 added new connections for vapor withdrawal of liquefied petroleum gas in vapor engine fuel service and for propane gas withdrawal. In addition, the connection rating temperature was changed from 120 °F to 70 °F (48.9 °C to 21.1 °C) to several pressure connection ranges to allow the connections to be used on UN 200 BAR cylinders that are now permitted by DOT; qualification testing of these connections was performed with successful results; and this change makes all the pressure at temperature ratings consistent, at 70 °F instead of some connections at 70 °F and some at 120 °F.

The 2013 edition also addresses requirements for the diameter of the valve inlet to minimize propulsion effects should the valve be accidentally severed at the top of the cylinder neck. Seal gasket requirements were added to CGA 860 pin index yoke connections. Lastly, the Pin Index Safety System connections should be limited to E size of smaller cylinders and shall be labeled as a drug or medical device (use of certain cylinders with just one exception—connection no. 950). Connections in the Pin Index Safety System may also be used for calibration gases.

The 2019 edition added new connections for use on valves that contain residual pressure valves (RPV). These "R" connections (e.g., 320R) were created to standardize the connection pin lengths in order to provide consistent RPV actuation and prevent RPV damage. These connections are only intended for fill plant use and are not intended for field use.

The 2019 edition also added new connections (164, 802 and 803) for specific applications. Outlet connection No. 164 was added for ASHRAE A2L type designated refrigerants. Connection Nos. 802 (helium) and 803 (hydrogen) were added for higher pressure applications.

The 2021 edition added new connections for use on valves that contain RPVs (346R, 347R, 350R, 555R, 680R). These connections are only intended for fill plant use. The standard connections shall be used in the field.

The 2023 edition added and clarified technical definitions used in this publication. Additionally, one new connection was added: CGA 971. Changes were made to the gas assignments for connections CGA 350, 660, 716, and 724. For CGA 860, dimensional tolerances were updated.

1 Introduction

CGA's Cylinder Valve Committee, applying the experience and knowledge of gas producers, valve manufacturers, military services, federal agencies, and gas users, established detailed dimensions for the manufacture of new cylinder valve outlet and inlet connections.

2 Scope

The scope of this standard is to provide connections that minimize the possibility of hazardous misconnections. This standard is based on a coordinated plan for the inclusion of future connections as they are required on cylinders that are not permanently manifolded during transport and use. Standard outlet connections for respective gases are fully defined and complete in themselves. These outlet connections are designed to minimize the possibility of hazardous misconnections.

2.1 Material specifications

Material specifications are not covered by this standard except where they are essential for maintaining the integrity of noninterchangeability between connections intended for different gas services. See connection nos. 860, 630, and 710. Chemical and physical properties of gases, including pressure, shall be considered to determine the strength and suitability of materials used.

2.2 Commodities

Some of the commodities covered by this standard do not meet the generally accepted definition of compressed gas, as defined by the U.S. Department of Transportation (DOT) [1].¹ Some products are handled in compressed gas cylinders. In these cases, the cylinder shall have the standard outlet to minimize hazardous misconnections even though it is not required for safe packaging.

2.3 Liquid and gas withdrawal

Standards for any of the liquefied gases are suitable for both liquid and gas withdrawal except where a connection standard is limited to liquid withdrawal.

2.4 Dimensional units

All dimensions are in inches (millimeters).

In 1970, Canadian Parliament unanimously endorsed the *White Paper on Metric Conversion in Canada*, proposing the adoption of the most up-to-date metric system of measurement, système international d'unités or SI. The Metric Commission was established in June 1971 to prepare an overall plan for metric conversion. Today, many sectors of industry and commerce in Canada, including the gas industry, sell their products in metric sizes and packages. Since CGA V-1 is used in Canada, it is published with dual units. Conversion factors can be found in CGA P-11, *Guideline for Metric Practice in the Compressed Gas Industry* [2].

Unless otherwise specified, the metric conversion in this standard is soft and affects no change in the shape of the threads and dimensions to maintain complete interchangeability between parts made either from U.S. customary units or SI measurements. Metric dimensions appear within parentheses and are in millimeters, unless otherwise specified. Exceptionally, the nominal designations of threads (for example, .825-14NGO-RH-EXT) have not been metricated.

Metric thread dimensions have been rounded toward the interior of the tolerance zone. Maximum limits have been rounded downward, while minimum limits have been rounded upward. This method of rounding was selected to permit the use of existing gauges. Other dimensions have been rounded to the nearest significant digit.

¹ References are shown by bracketed numbers and are listed in order of appearance in the reference section.

2.5 Marking and labeling of containers

Although the main purpose in standardizing valve outlets is to prevent interconnection with noncompatible gases, relying only on the valve outlet as the sole method of preventing such interconnection is not advised. The primary means for identifying the contents of any container of compressed gas shall be by means of the chemical name or the commercially accepted name of the material legibly marked on the container.

All cylinders shall be well marked as to contents in accordance with CGA C-7, *Guide to Classification and Labeling of Compressed Gases* [3]. The user shall rely on such markings to identify contents and understand the properties of the gas or gases to be used to ensure system compatibility.

2.6 Effective date

Unless otherwise stated, the effective date of this edition of this standard is July 6, 2023 and shall not be applied retroactively.

2.7 Blunting

Modification of the lead thread (blunting) is allowed as long as there is no loss of sealing or structural integrity. Blunting is used to reduce galling.

3 Definitions

For the purpose of this standard, the following definitions apply.

3.1 Publication terminology

3.1.1 Shall

Indicates that the procedure is mandatory. It is used wherever the criterion for conformance to specific recommendations allows no deviation.

3.1.2 Should

Indicates that a procedure is recommended.

3.1.3 May

Indicates that the procedure is optional.

3.1.4 Will

Is used only to indicate the future, not a degree of requirement.

3.1.5 Can

Indicates a possibility or ability.

3.2 Technical definitions

3.2.1 Blunting

Intentional and controlled flattening of the crest of the lead thread of externally threaded portions of cylinder valve connections.

3.2.2 Check valve

Valve designed to provide for flow in one direction.

NOTE—The internal components of the valve are designed to prevent flow in the reverse direction.

3.2.3 Compressed gas

Material that is entirely gaseous at 68 °F (20 °C) at standard pressure of 101.3 kPa and which when packaged under pressure for transportation is entirely gaseous at –58 °F (–50 °C) with a critical temperature less than or equal to –58 °F (–50 °C) or partially liquid at temperatures greater than –58 °F (–50 °C).²

3.2.4 Filter

Device for the removal of solids from a fluid wherein the resistance to motion of such solids is in a torturous path.

3.2.5 Flow restrictor

Device that is designed to limit the maximum flow through the valve outlet.

3.2.6 Gas mixture

Purposeful combination of two or more commodities resulting in a compressed gas.

3.2.7 Inlet connection

Connection between the compressed gas cylinder valve and the cylinder.

3.2.8 Outlet connection

Specially designed mechanical connection to which equipment is attached to withdraw contents from a compressed gas cylinder.

3.2.9 Residual pressure valve types

There are two types of residual pressure valves (RPVs): Type 1 and Type 2. Use of either Type 1 or Type 2 is dependent upon operational and gas quality requirements. Both types contain a residual pressure device to retain a positive pressure in the cylinder.

3.2.9.1 Type 1

RPV that retains a positive pressure in the cylinder greater than the pressure downstream of the valve outlet and also incorporates a nonreturn feature to prevent backflow into the cylinder from a higher pressure on the valve outlet.

NOTE—Cylinders with Type 1 RPVs cannot be filled or evacuated unless the RPV is deactivated or a special fill connector is used to overcome the nonreturn feature.

3.2.9.2 Type 2

RPV that retains a positive pressure in the cylinder greater than atmospheric pressure but does not prevent backflow into the cylinder if the pressure on the valve outlet is high enough to overcome the RPV mechanism and the residual pressure in the cylinder.

NOTE—Cylinders with Type 2 RPVs can be filled with a conventional fill connector but cannot be evacuated unless the RPV is deactivated or a special fill connector is used.

4 Outlet connections

4.1 Basic division

Threaded outlets are separated into four basic divisions: internal, external, right hand, and left hand. Further separation is made within each division by varying the diameter of threads. These diameters within each division are spaced so that adjoining sizes do not engage. Further separation is made by varying the size and shape of seats and nipples for any given thread size.

With the exception of outlets having taper threads that seal at the threads, each outlet provides for screw threads that do not seal but merely hold the nipple against a seat in the valve outlet or against a washer. For the purpose of this standard, nipples modified to incorporate soft tips or O-rings, and handwheels to permit hand-tight connections are in compliance if noninterchangeability is maintained.

² psi, bar, and kPa shall indicate gauge pressure unless otherwise noted as (psia; bar, abs; and kPa, abs) for absolute pressure or (psid; bar, dif; and kPa, dif) for differential pressure. All kPa values are rounded off per CGA P-11.1.²¹

The outlet connection is assigned a unique identifier. These connections are listed in numerical order in Table 1. Gas assignments for these connections are shown in alphabetical order in Table 2.

4.1.1 Modifications to flow passages

For the purpose of this standard, flow passages modified to incorporate filters, flow restrictors, check valves, or other features are in compliance if the integrity of the joint and noninterchangeability are maintained.

4.1.2 Marking of valves, nuts, and nipples

Where size permits, it is recommended that valves, nuts, and nipples be marked with their CGA connection number. For the purpose of this standard, hex nuts modified to incorporate marking are in compliance if the integrity of the joint and noninterchangeability are maintained.

For additional required valve markings, refer to CGA V-9, *Compressed Gas Association Standard for Compressed Gas Cylinder Valves* [4].

For marking of residual pressure valves (RPVs) and RPV fill connectors, see Section E.

4.1.3 Pin-indexed yoke connections

There is a separate group of pin-indexed yoke connections for medical gases (connection nos. 870 through 985) where pins in the yoke and mating holes in the valve body preclude unintended connections.

4.1.4 Alternate and limited standards

Alternate and limited standards have been established for some gases. A standard connection is the connection recommended for a particular gas or gases. A limited standard is a connection used at present that is not expected to be discontinued and its use is limited to the particular application mentioned in the standard. An alternate standard is a connection used at present that is expected to be phased out in favor of the standard within 5 years unless otherwise stated.

Past practice has firmly established many outlet connections for specific gases or groups of gases and in many cases these connections were retained.

By adhering to existing outlets where practical, it was possible to put the new standard system into effect without the inconvenience and expense of a cumbersome and costly changeover.

4.2 Connection standard drawing tolerances

Unless otherwise specified, the following tolerances apply:

Dimensions in inches	Tolerance
Three place decimals ³	± .005 in
Two place decimals ³	± .010 in
Stock (forging, hex, bar, tubing)	Standard mill tolerances
Chamfers and countersinks	Adhere to good commercial practices
Dimensions in millimeters	Tolerance
Two place decimals ³	± 0.13 mm
One place decimal ³	± 0.25 mm
Stock (forging, hex, bar, tubing)	Standard mill tolerances
Chamfers and countersinks	Adhere to good commercial practices
Angles	Tolerance
Seat angles	+ 1 degree
Chamfers and countersinks	± 5 degrees

³ Except chamfers, countersinks, and bar stock.

4.3 Outlet threads

4.3.1 Outlet thread systems

Outlet threads are of two systems: National Gas Outlet (NGO) and Unified (UN); with the exception of connections nos. 160 and 240, which use National Gas Taper (NGT); connection nos. 167 and 790, which use ACME threads; and connection no. 852, which uses Whitworth threads. These two systems are similar in form and kind and use 60 degree threads.

NGO threads served to consolidate the practice of the industry in 1945. Where NGO threads were used for connections before 1977, they are retained because of the satisfactory experience with them, both as to production and performance and because tools and gauges are well provided.

UN threads came into being in 1948 and 1949. Some new connections added in the 1977 edition are UN threads because they meet the demands of valve connections and are widely accepted as the American National Standard. Additional connections added in the 1977 edition are NGO threads because of the satisfactory experience with them.

4.3.2 Identification of left hand threads

Left hand threads in both NGO and UN systems are identified by a V-groove in the hexagon nut. CGA recommends that this designation be used on left hand connections in gas systems and further recommends that the V-groove in a connection used in gas systems is not used to designate anything else.

4.3.3 ACME threads

ACME threads were introduced in the 1994 edition. These threads have been successfully used in industry for many years, especially in high thrust applications such as jack screws, and hence are ideally suited for outlet thread connections.

4.3.4 Whitworth threads

Whitworth threads were introduced in the 1994 edition. This thread form is widely used in Europe for cylinder valve outlet threads and is included in this standard to promote international thread connection cooperation.

Many of these threads, before being selected for CGA connections, were satisfactorily used in compressed gas service for small cylinders, regulator and hose connections, manifold fittings, refrigeration fittings, cryogenic transfer lines, and high pressure fittings.

4.4 NGO thread details

The full designation for NGO threads describes the major diameter of the valve outlet in inches, the number of threads per inch, the identifying letters NGO, the letters RH or LH to denote the thread direction, and the letters EXT or INT to denote an external or internal thread. For example:

.903—14NGO-RH-EXT

.965—14NGO-LH-INT

For the purpose of this standard, all NGO outlet threads with a .005 allowance may have up to .0028 of this allowance used to accommodate plating or coating of these threads.

4.5 UN thread details

The full designation for UN threads includes the major diameter of threads in inches, the number of threads per inch, the identifying letters UN with any additional letters (C, F, EF, S) to denote its series, and the class such as 2A or 2B where A denotes an external thread and B an internal thread. For example:

.750—16UNF-2A

In ANSI/ASME B1.1, *Unified Inch Screw Threads (UN, UNR, and UNJ Thread Forms)* all threads are understood to be right hand unless LH is added [5]. In this valve outlet standard, RH, LH, INT, and EXT are added to the UN designations for the sake of uniformity with NGO practice. The previous UN designation therefore appears in this standard as:

.750—16UNF-2A-RH-EXT

Unified threads fall into several series:

UNC = Unified Coarse

UNF = Unified Fine

UNEF = Unified Extra Fine

UN = Unified Constant Pitch

UNS = Unified Special, where the diameter or its pitch do not fall into the standard diameter-pitch combinations

Class 2A and 2B tolerances have been selected with the exception of internal minor diameters that have been specified with 3B limits. Internal thread designations, therefore, are shown as modified (MOD). An exception is connection no. 600.

4.6 ACME thread details

The full designation for ACME threads includes the major diameter of the thread in inches, the number of threads per inch, and the classification for tolerance and allowance. For example:

1 1/4—5 ACME 2G

4.7 Whitworth thread details

The full designation for Whitworth threads is the symbol R followed by a fraction or a digit. For example:

R5/8, R2

4.8 Reference literature for threads

Thread series	Detailed dimensions	Gauges and gauging
NGO	H28/9 [6]	H28/6 [7]
UNC, UNF, UNEF, UN	H28/2 or ANSI/ASME B1.1 [8, 5]	ANSI/ASME B1.3M, H28/6 or H28/20, ANSI/ASME B1.2 [9, 7, 10, 11]
UNS	H28/2 or ANSI/ASME B1.1 [8, 5]	H28/6 or ANSI/ASME B1.3M, ANSI/ASME B1.2 [7, 9, 11]
NGT, NGT (CL)	H28/9, ANSI/ASME B1.20.1, or Table 4 [6, 12]	H28/9 [6]
ACME	H28/12 or ANSI/ASME B1.5 [13, 14]	H28/12 or ANSI/ASME B1.5 [13, 14]
WHITWORTH	ISO 228-1 [15]	ISO 228-2 [16]

4.9 Valve clearance

The maximum circumscribing radius of any part of a cylinder valve from center line of the valve inlet thread with outlet cap or plug installed has been specified since 1946. This was to ensure that the standard cylinder valve protection cap available at that time would clear the valve when installed.

Certain connection drawings still show a maximum radius. For the purpose of this standard, where this dimension is exceeded, it is still acceptable provided that the integrity of the joint, noninterchangeability, and cylinder valve protection are maintained.

4.10 Valves for small cylinders

For the purpose of this standard, small cylinders are understood to mean cylinders having a maximum capacity of 110 in³ (1.80 L) (4 lb [1.81 kg] of water).

Besides being available in commercial cylinders of conventional sizes, nearly all gases are also supplied in small cylinders that may incorporate a valve connection different from the one used on the larger cylinders. Before 1977, small cylinders, commonly known as lecture bottles, used connection nos. 110 and 170 for all gases. These connections were intended to be phased out in favor of connection no. 180, but in 1980 a decision was made to retain all three connections since all had a good record of performance and safety.

Acetylene connection no. 200 (normally having 3/8" NGT inlet thread) is a limited standard restricted to cylinders holding approximately 10 ft³ (283 L) of acetylene. Connection no. 300 is a limited standard for acetylene restricted to cylinders containing greater than 50 ft³ (1416 L) of acetylene. Acetylene connection no. 520 (normally having a 3/8" NGT inlet thread) is a limited standard restricted to cylinders containing between 35 ft³ and 75 ft³ (991 L to 2124 L) of acetylene.

4.11 Outlet connection for industrial liquid cylinders

The outlet connection of an industrial liquid cylinder⁴ valve shall be:

- threaded or socket connection, silver brazed, welded, or attached by other methods to the valve body in a manner that prevents removal or would render the connection or valve body outlet unusable if removal were attempted or accomplished;
- permanent and integral part of the valve body; and
- threaded connection with a device that deters removal of the fitting and provides indication that removal was attempted.

See 8.2 for medical gas outlet connection requirements.

4.12 Residual pressure valves outlet and fill connectors

Historically, the design dimensions of RPVs varied between manufacturers, and therefore fill connectors were not always interchangeable between valves from different manufacturers. In the fourteenth edition, CGA standardized valve outlet and fill connector dimensions for valves equipped with Type 1 RPVs. This allows for the use of common fill connectors on valves that meet the new standard. However, there are many RPVs in use that do not meet the new standard and as such specific fill connectors are still required. Standardized RPV fill connectors and valve outlets are designated with an "R" after the connection number, for example: 540R and 320R.

5 Outlet connection pressure range

A number of pressure ranges have been established to safeguard the selection of the cylinder valve outlet connection. These ranges have been chosen to protect downstream regulators and other ancillary equipment from overpressurized conditions. The gas filler shall always first comply with DOT or Transport Canada (TC) requirements on pressure relief devices (PRDs) and their set pressures. PRD set pressures are based on DOT or TC pressure rating of the cylinder, not on the pressure rating of the connection. Pressure relief valves used with

⁴ Portable cryogenic vessels or dewars, most commonly the DOT-4L/TC-4LM series of cylinders.

liquefied gases in high pressure cylinders shall be set equivalent to the settings authorized for the same gas in low pressure cylinders. For more detailed information see CGA S-1.1, *Pressure Relief Device Standards—Part 1—Cylinders for Compressed Gases* [17]. It is the gas filler's responsibility to ensure that the PRD is correct. It is the user's responsibility when attaching regulators or other ancillary equipment to a connection to ensure that the regulator or equipment is rated by the manufacturer to operate safely at the maximum range recommended for that connection.

5.1 Low pressure range

The lowest range is from 0 psi to 500 psi (0 kPa to 3450 kPa).⁵ Most of the gases packaged with these connections are liquefied gases whose cylinder pressure is limited by their own individual vapor pressure. Cylinders containing liquefied gases or acetylene shall not exceed the maximum filling densities or capacities prescribed in Title 49 of the U.S. *Code of Federal Regulations* (49 CFR) 173.303(b) or 173.304, or CSA B340, *Selection and use of cylinders, spheres, tubes, and other containers for the transportation of dangerous goods, Class 2* [1, 18].

In cases where permanent gases or filling densities permit filling to 500 psi (3450 kPa), these connections shall not be used for pressures greater than 500 psi at 70 °F (3450 kPa at 21.1 °C). These valve outlets are:

160	164	165	167	182	200	240	290	295	300	410	440
450	510	520	599	600	601	622	624	789	790	791	793
800	810	812	820	820C	845	920					

5.2 Standard pressure range

The standard pressure range from 0 psi to 3000 psi at 70 °F (0 kPa to 20 680 kPa [207 bar] at 21.1 °C) includes all of the permanent gases and a number of liquefied gases.⁶ Cylinders containing liquefied gases shall not exceed the maximum filling densities prescribed in 49 CFR 173.304 or CSA B340 [1, 18].

These connections shall not be used for pressures greater than 3000 psi at 70 °F (20 680 kPa [207 bar] at 21.1 °C). These connections shall not be used for cylinders whose pressures are greater than 3000 psi at 70 °F (20 680 kPa [207 bar] at 21.1 °C). These valve outlets are:

110	170	180	280	296	320	320R	326	330	346	346R	350
350R	500	540	540R	555	555R	580	580R	590	590R	625	626
660	670	678	679	705	870	880	890	900	910	930	940
950	960	965	<u>971</u>	973	977	981	985	989			

NOTE—CGA recommends that no cylinder be stored at temperatures greater than 125 °F (51.7 °C) or used at temperatures greater than 120 °F (48.9 °C).

5.2.1 Ultra high integrity service connections

A family of outlet connections has been established for ultra high integrity service (UHIS). These connections may be used with cylinders rated up to 3000 psi at 70 °F (20 680 kPa [207 bar] at 21.1 °C). These valve outlets are:

632	634	636	638	640	642	712	714	716	718	720	722
724	726	728									

⁵ Two connections, nos. 792 and 795, used exclusively for cryogenic liquids are rated at 140 psi (970 kPa).

⁶ Connection no. 323 is rated for pressures up to 1800 psi (12 410 kPa) for small cylinder service.

5.2.2 Diving industry connections

Two standard yoke connections are commonly used in the diving industry, for example, SCUBA. Based on historical use and SCUBA regulator and ancillary equipment designs, these connections may be used with cylinders rated up to 3000 psi at 70 °F (20 680 kPa at 21.1 °C) and filled in a manner that complies with that rating. These valve outlets are:

850 855

A high pressure range has been established for use in the diving industry in which there is one connection. The range of this connection shall be from 3001 psi to 5500 psi at 70 °F (20 690 kPa to 37 900 kPa [207 bar to 379 bar] at 21.1 °C). The valve outlet in this category is:

852

5.3 Intermediate high pressure range

An intermediate high pressure range has been established in which there are six valve outlet connections. The range of these six connections shall be from 3001 psi to 4700 psi as measured at 70 °F (20 690 kPa to 32 400 kPa as measured at 21.1 °C). These valve outlets are:

347	Air
347R	Air
621	Oil-tolerant nitrogen
680	Inert gases
680R	Inert gases
695	Flammable gases (for example, hydrogen, methane, natural gas, carbon monoxide)

In addition to these six connections, two intermediate high pressure ranges were established for oxygen. These valve outlets are:

577	Oxygen 3001 psi to 3500 psi at 70 °F (20 690 kPa to 24 130 kPa at 21.1 °C)
701	Oxygen 3501 psi to 4700 psi at 70 °F (24 140 kPa to 32 400 kPa at 21.1 °C)

5.4 High pressure ranges greater than 4700 psi

A high pressure range has been established and three valve outlet connections are in this category. The range of these three connections shall be from 4701 psi to 6400 psi as measured at 70 °F (32 410 kPa to 44 100 kPa as measured at 21.1 °C). These valve outlets are:

677	Inert gases
702	Air
703	Flammable gases (for example, hydrogen, methane, natural gas)

Another high pressure range has been established and two valve outlet connections are in this category. The range of these three connections shall be from 6401 psi to 11 600 psi as measured at 70 °F (44 133 kPa to 79 979 kPa as measured at 21.1 °C). These valve outlets are:

802	Helium
803	Hydrogen

6 Valve inlet

Inlet threads on the valve and mating cylinder neck threads also have been standardized and are included in Section F. See Figures 1 and 2.

On Figure 2, the diameter d_o is the valve inlet diameter. This diameter shall be kept to a minimum within constraints of other design requirements to minimize propulsion effects if the valve is accidentally severed at the top of the cylinder neck. Except for valves used in liquefied gas service, this inlet hole diameter shall be restricted to

0.300 in (7.62 mm). For straight threads, this depth shall not be greater than the minimum full thread length on the cylinder valve. This requirement is for cylinders that have both a service pressure of 501 psi (3450 kPa) or greater and water capacity of less than 125 lb (56.7 L). Special design requirements such as PRDs, provisions for the eductor tube installations, or compressed gas valves used in fire control systems that have high blow-down flow requirements can dictate greater bore diameters and depths.

7 Adapters

In the standardization of compressed gas cylinder valve outlet connections, more than one outlet is specified for some gases. To provide interchangeability of users' equipment *for the same gas*, adapters may be required. CGA recognizes adapters designed to connect a cylinder valve outlet to a regulator, charging connection, or other mating part having a different connection *for the same gas*. Adapters are permitted for standard connections between standard, alternate standard, or limited standard connections *for the same gas*, unless the use of such adapters could result in undesirable connections. For example, *even for the same gas, adapters shall not be used to connect a high pressure source to equipment rated at a lower pressure*. Suppliers of gases or related equipment at their facilities may use other adapters. Adapters shall not be used on DOT-4L/TC-4LM cylinders. See CGA V-23, *Standard for Cylinder Connections on Portable Cryogenic Liquid Cylinders (formerly SB-26)* [19].

8 Medical gas connections

When used in this standard, the term medical gases shall mean liquefied, nonliquefied, or cryogenic gas alone or in combination with other gases that are drugs or medical devices as defined by the Federal Food Drug and Cosmetic Act, or other applicable regulations [20].

The definition of drugs and medical devices as it relates to these gases shall be that as promulgated by the Food and Drug Administration (FDA) in the United States and by Health Canada in Canada [20, 21].

8.1 Pin Index Safety System connections

The use of connections in the Pin Index Safety System should be limited to E size or smaller cylinders and cylinders shall be labeled as either a drug or medical device. The only exception to this is connection no. 950 that is designated for breathing air and medical air (USP). Connections in the Pin Index Safety System may also be used for calibration gases, which in turn are used to calibrate medical equipment or instrumentation to test medical gases.

8.2 Medical gas outlet connections

The outlet connection of a medical liquid cylinder ⁷ valve shall be:

- threaded or socket connection, silver brazed, welded, or attached by other methods to the valve body in a manner that prevents removal or would render the connection or valve body outlet unusable if removal were attempted or accomplished; and
- permanent and integral part of the valve body.

8.3 Nonmedical cylinders in health care

Compressed gas cylinder valves used in hospitals and the health care industry that do not use the Pin Index Safety System shall use standard compressed gas connections, irrespective of the size of the cylinder. An example is an instrument carrier gas.

9 Procedure for approval of new gas assignments or connections

Historically, the following general considerations were used to assign cylinder valve outlet connections:

- Connection could not create a hazardous cross connection with other outlet connections;
- Flammable/pyrophoric gases were assigned to left hand threaded connections;

⁷ Portable cryogenic vessels or dewars, most commonly the DOT-4L/TC-4LM series of cylinders.

- Connection numbers were unique to a specific connection and a given geometry;
- In most cases, the larger the assignment number, the larger the thread diameter. This consideration ceased with the 800 series of connections;
- Blocks of connection numbers could be reserved for specific applications such as the 630/710 series of outlets used solely for UHIS gases;
- Connection numbers were separated by predetermined pressure ranges to avoid damage to downstream equipment;
- Repository of unassigned connections (commonly known as "the bank") was developed for future use. For more information on unassigned connections, contact CGA at cga@cganet.com; and
- Exceptions to connection assignments were made on a case-by-case basis such as limited standard assignments of select gases to a connection.

In the future, connection assignments will be made with as much consideration as possible with these philosophies of the past.

Suppliers and users of gases or gas mixtures for which there is no standard outlet shall go to CGA's website (www.cganet.com) and submit a proposed change to this standard or CGA V-7, *Standard Method of Determining Cylinder Valve Outlet Connections for Industrial Gas Mixtures* [22]. Proposed changes for additional valve outlets or gas assignments to this standard are evaluated according to the following process.

Requests are reviewed only when an affiliated organization or industry group has:

- documented a possible inconvenience or hazard when a specified CGA connection is contemplated being used or is in existing use; or
- demonstrated a need to promulgate a change from the existing connection as shown in this standard.

Initial consideration will be the possible assignment of presently designed and tested but unassigned connections on file with CGA. When this procedure does not fulfill the need, a new design will be considered.

Basic information to be supplied with new designs shall include dimensional drawings, working prototypes if available, laboratory and field test data, safety data sheets (SDSs), FTSC codes (if known), and other test data that may be required by CGA. All submitted information will become the property of CGA. See Appendix I.

If the new design includes use of a patented item, the patent holder shall comply with CGA's Patent Policy. A copy of CGA's Patent Policy can be made available upon written request.

10 References

Unless otherwise specified, the latest edition shall apply.

[1] *Code of Federal Regulations*, Title 49 (Transportation), U.S. Government Printing Office. www.gpo.gov

[2] CGA P-11, *Guideline for Metric Practice in the Compressed Gas Industry*, Compressed Gas Association, Inc. www.cganet.com

[3] CGA C-7, *Guide to Classification and Labeling of Compressed Gases*, Compressed Gas Association, Inc. www.cganet.com

[4] CGA V-9, *Compressed Gas Association Standard for Compressed Gas Cylinder Valves*, Compressed Gas Association. www.cganet.com

[5] ANSI/ASME B1.1 *Unified Inch Screw Threads (UN, UNR, and UNJ Thread Forms)*, American Society of Mechanical Engineers. www.asme.org

- [6] FED-STD-H28/9, *Screw-Thread Standards for Federal Services, Section 9, Gas Cylinder Valve Outlet And Inlet Threads*, U.S. Department of Defense. www.dsp.dla.mil
- [7] FED-STD-H28/6, *Screw-Thread Standards for Federal Services, Section 6, Gages and Gaging for Unified Screw Threads-UN and UNR Thread Forms*, U.S. Department of Defense. www.dsp.dla.mil
- [8] FED-STD-H28/2, *Screw-Thread Standards for Federal Services, Section 2, Unified Inch Screw Threads- UN and UNR Thread Forms*, U.S. Department of Defense. www.dsp.dla.mil
- [9] ANSI/ASME B1.3M, *Screw Thread Gaging Systems Dimensional Acceptability Inch Metric Screw Threads (UN, UNR, UNJ, M, MJ)*, American Society of Mechanical Engineers. www.asme.org
- [10] FED-STD-H28/20, *Screw-Thread Standards for Federal Services, Section 20, Inspection Methods for Acceptability of UN, UNR, UNJ, M, and MJ Screw Threads*, U.S. Department of Defense. www.dsp.dla.mil
- [11] ANSI/ASME-B1.2, *Gages and Gaging for Unified Inch Screw Threads*, American Society of Mechanical Engineers. www.asme.org
- [12] ANSI/ASME B1.20.1, *Pipe Threads, General Purpose, Inch*, American Society of Mechanical Engineers. www.asme.org
- [13] FED-STD-H28/12, *Screw-Thread Standards for Federal Services, Section 12, Acme Threads*, U.S. Department of Defense. www.dsp.dla.mil
- [14] ANSI/ASME B1.5, *Acme Screw Threads*, American Society of Mechanical Engineers. www.asme.org
- [15] ISO 228-1, *Pipe threads where pressure-tight joints are not made on the threads—Part 1: Dimensions, tolerances and designation*, American National Standards Institute. www.ansi.org
- [16] ISO 228-2, *Pipe threads where pressure-tight joints are not made on the threads—Part 2: Verification by means of limit gauges*, American National Standards Institute. www.ansi.org
- [17] CGA S-1.1, *Pressure Relief Device Standards—Part 1—Cylinders for Compressed Gases*, Compressed Gas Association, Inc. www.cganet.com
- [18] CSA B340, *Selection and use of cylinders, spheres, tubes, and other containers for the transportation of dangerous goods, Class 2*, Canadian Standards Association. www.csagroup.org
- [19] CGA V-23, *Standard for Cylinder Connections on Portable Cryogenic Liquid Cylinders (Formerly SB-26)*, Compressed Gas Association, Inc. www.cganet.com
- [20] *Code of Federal Regulations*, Title 21 (Food and Drugs), U.S. Government Printing Office. www.gpo.gov
- [21] *Good Manufacturing Practices (GMP) for Medical Gases*, Health Canada. www.hc-sc.gc.ca
- [22] CGA V-7, *Standard Method of Determining Cylinder Valve Outlet Connections for Industrial Gas Mixtures*, Compressed Gas Association, Inc. www.cganet.com
- [23] CGA V-21, *Torque Guidelines for Sealing CGA Valve Outlet Connections (formerly TB-14)*, Compressed Gas Association, Inc. www.cganet.com
- [24] SAE J513, *Refrigeration Tube Fittings—General Specifications*, Society of Automotive Engineers. www.sae.org
- [25] Drawing No. 131, *Pamphlet 17—Packaging Plant Safety and Operational Guidelines*, The Chlorine Institute. www.chlorineinstitute.org
- [26] CGA G-7, *Compressed Air for Human Respiration*, Compressed Gas Association, Inc. www.cganet.com
- [27] CGA P-5, *Care of High Pressure Cylinders for Underwater Breathing*, Compressed Gas Association, Inc. www.cganet.com

- [28] CGA V-17, *Guideline for Handling and Use of the CGA 630/710 Series Ultra High Integrity Service Connections (formerly TB-9)*, Compressed Gas Association, Inc. www.cganet.com
- [29] ASTM E499, *Standard Practice for Leaks Using the Mass Spectrometer Leak Detector in the Detector Probe Mode*, ASTM International. www.astm.org
- [30] ISO 407, *Small medical gas cylinders—Pin-index yoke-type valve connections*, American National Standards Institute. www.ansi.org
- [31] CGA V-14, *Performance Standard for Sealing Gaskets Used on CGA 870 Connections for Medical Oxygen Service at a Maximum Service Pressure of 3000 psi*, Compressed Gas Association, Inc. www.cganet.com
- [32] CGA V-15, *Use of Residual Pressure Valves*, Compressed Gas Association, Inc. www.cganet.com
- [33] CGA V-7.1, *Standard Method of Determining Cylinder Valve Outlet Connections for Medical Gases*, Compressed Gas Association, Inc. www.cganet.com
- [34] CGA V-19, *Marking Requirements to Mitigate Potential Cylinder and Cylinder Valve Thread Mismatches*, Compressed Gas Association. www.cganet.com
- [35] FED-STD-H28, *Screw-Thread Standards for Federal Services*, U.S. Department of Defense. www.dsp.dla.mil
- [36] CSA B339, *Cylinders, spheres, and tubes for the transportation of dangerous goods*, Canadian Standards Association. www.csagroup.org
- [37] ISO 11114-2, *Gas cylinders – Compatibility of cylinder and valve materials with gas contents – Part 2: Non-metallic materials*, American National Standards Institute. www.ansi.org
- [38] BS 341-1, *Transportable gas container valves. Specification for industrial valves for working pressures up to and including 300 bar*, British Standards Institution. www.bsi-global.com
- [39] BS EN 850, *Transportable gas cylinders. Pin-index, yoke-type valve outlet connections for medical use*, British Standards Institution. www.bsi-global.com
- [40] DIN 477-1, *Gas Cylinder Valves Rated for Cylinder Test Pressures up to 300 Bar—Part 1: Valve Inlet and Outlet Connections*. German Institute for Standardization (DIN). www.din.de
- [41] DIN EN 850, *Transportable gas cylinders. Pin-index, yoke-type valve outlet connections for medical use*, German Institute for Standardization (DIN). www.din.de
- [42] NF E29-650, *Gas cylinders. Valve outlet connections*, Association Française de Normalisation (AFNOR). www.afnor.org
- [43] JIS B 8246, *Valves for high pressure gas cylinders*, Japanese Standards Association. www.jsa.or.jp
- [44] JIS B 8244, *Valves for dissolved acetylene cylinder*, Japanese Standards Association. www.jsa.or.jp

Table 1—Numerical list of cylinder valve outlet connections

Connection no.	Description	Maximum pressure ^{1), 2)}		Section(s)
		psi	kPa	
110	.3125-32UNEF-2B-RH-INT	3 000	20 680	A
160	1/8-27NGT-RH-INT	500	3 450	A
164	.4375-20 UNF-2A-LH-EXT (1/4" SAE Flare)	500	3 450	A
165	.4375-20 UNF-2A-RH-EXT (1/4" SAE Flare)	500	3 450	A
166	.500-16 ACME-2G-LH-EXT	500	3 450	A
167	.500-16 ACME-2G-RH-EXT	500	3 450	A
170	.5625-18UNF-2A-RH-EXT	3 000	20 680	A
180	.625-18UNF-2A-RH-EXT	3 000	20 680	A
182	.625-18UNF-2A-RH-EXT (3/8" SAE Flare)	500	3 450	A
200	.625-20NGO-RH-EXT (Conical Nipple)	500	3 450	A
240	3/8-18NGT-RH-INT	500	3 450	A
280	.745-14NGO-RH-EXT	3 000	20 680	A and D
290	.745-14NGO-LH-EXT	500	3 450	A
295	.750-16UNF-2A-RH-EXT (1/2" SAE Flare)	500	3 450	A
296	.803-14UNS-2B-RH-INT	3 000	20 680	A and D
300	.825-14NGO-RH-EXT (Conical Nipple)	500	3 450	A
320	.825-14NGO-RH-EXT (Flat Nipple)	3 000	20 680	A
320R	.825-14NGO-RH-EXT (Flat Nipple)	3 000	20 680	E
323	.825-14NGO-RH-EXT	1 800	12 410	A
326	.825-14NGO-RH-EXT (Small Round Nipple)	3 000	20 680	A
330	.825-14NGO-LH-EXT (Flat Nipple)	3 000	20 680	A
346	.825-14NGO-RH-EXT (Large Round Nipple)	3 000	20 680	A
346R	.825-14NGO-RH-EXT (Large Round Nipple)	3 000	20 680	E
347	.825-14NGO-RH-EXT (Long Round Nipple)	4 700	32 400	A
347R	.825-14NGO-RH-EXT (Long Round Nipple)	4 700	32 400	E
350	.825-14NGO-LH-EXT (Round Nipple)	3 000	20 680	A and D
350R	.825-14NGO-LH-EXT (Round Nipple)	3 000	20 680	E
410	.850-14NGO-LH-EXT (Round Nipple)	500	3 450	A
440	.875-14UNF-2A-RH-EXT (5/8" SAE Flare)	500	3 450	A
450	.875-14UNF-2A-LH-EXT (5/8" Flare)	500	3 450	A
500	.885-14NGO-RH-INT (Bullet Nipple)	3 000	20 680	A and D
510	.885-14NGO-LH-INT (Bullet Nipple)	500	3 450	A
520	.895-18NGO-RH-EXT	500	3 450	A
540	.903-14NGO-RH-EXT	3 000	20 680	A
540R	.903-14NGO-RH-EXT	3 000	20 680	E
555	.903-14NGO-LH-EXT	3 000	20 680	A
555R	.903-14NGO-RH-EXT	3 000	20 680	E
577	.960-14NGO-RH-EXT	3 500	24 130	A
580	.965-14NGO-RH-INT	3 000	20 680	A and D
580R	.903-14NGO-RH-EXT	3 000	20 680	E

Connection no.	Description	Maximum pressure ^{1), 2)}		Section(s)
		psi	kPa	
590	.965-14NGO-LH-INT	3 000	20 680	A
590R	.965-14NGO-LH-INT	3 000	20 680	E
599	.9375-20UNEF-RH-EXT	500	3 450	A
600	1.000-20UNEF-RH-EXT	500	3 450	A
601	1.000-20UNEF-LH-EXT	500	3 450	A
620	Basic Dimensional Drawing for Connection Nos. 621 through 626			A
621	1.030-14NGO-LH-EXT	4 700	32 400	A
622	1.030-14NGO-RH-EXT	500	3 450	A
624	1.030-14NGO-RH-EXT	500	3 450	A
625	1.030-14NGO-LH-EXT	3 000	20 680	A
626	1.030-14NGO-RH-EXT	3 000	20 680	A
630	Basic Dimensional Drawing for Connection Nos. 632 through 642			C
632	1.030-14NGO-RH-EXT	3 000	20 680	C
634	1.030-14NGO-RH-EXT	3 000	20 680	C
636	1.030-14NGO-RH-EXT	3 000	20 680	C
638	1.030-14NGO-RH-EXT	3 000	20 680	C
640	1.030-14NGO-RH-EXT	3 000	20 680	C
642	1.030-14NGO-RH-EXT	3 000	20 680	C
660	1.030-14NGO-RH-EXT (Face Washer)	3 000	20 680	A
670	1.030-14NGO-LH-EXT (Face Washer)	3 000	20 680	A
677	1.030-14NGO-LH-EXT (Round Nipple)	6 400	44 100	A
678	1.030-14NGO-LH-EXT (Recessed Washer)	3 000	20 680	A
679	1.030-14NGO-LH-EXT (Tipped Nipple)	3 000	20 680	A
680	1.045-14NGO-RH-INT	4 700	32 400	A
680R	1.045-14NGO-RH-INT	4 700	32 400	E
695	1.045-14NGO-LH-INT	4 700	32 400	A
701	1.103-14NGO-RH-EXT	4 700	32 400	A
702	1.125-14NGO-RH-INT	6 400	44 100	A
703	1.125-14NGO-LH-INT	6 400	44 100	A
705	1.125-14UNS-2A-RH-EXT	3 000	20 680	A
710	Basic Dimensional Drawing for Connection Nos. 712 through 728			C
712	1.125-14NGO-RH-EXT	3 000	20 680	C
714	1.125-14NGO-RH-EXT	3 000	20 680	C
716	1.125-14NGO-RH-EXT	3 000	20 680	C
718	1.125-14NGO-RH-EXT	3 000	20 680	C
720	1.125-14NGO-RH-EXT	3 000	20 680	C
722	1.125-14NGO-RH-EXT	3 000	20 680	C
724	1.125-14NGO-RH-EXT	3 000	20 680	C
726	1.125-14NGO-RH-EXT	3 000	20 680	C
728	1.125-14NGO-RH-EXT	3 000	20 680	C
789	1.250-5 ACME-2G-LH-EXT	500	3 450	A
790	1.250-5ACME-2G-RH-EXT	500	3 450	A



Connection no.	Description	Maximum pressure ^{1), 2)}		Section(s)
		psi	kPa	
791	1.312-5ACME-2G-RH-EXT	500	3 450	A
792	1.500-12UNF-2A-RH-EXT	140	970	A
793	1.312-5 ACME-2G-RH-EXT	500	3 450	A
795	1.500-12UNF-2A-LH-EXT	140	970	A
800	3/8-18NGT-RH-INT (Yoke)	500	3 450	A
802	1.250-14NGO-RH-INT	11 600	79 979	A
803	1.250-14NGO-LH-INT	11 600	79 979	A
810	Socket/Plug Connection	500	3 450	A
812	Socket/Plug Connection	500	3 450	A
820	1.030-14NGO-RH-EXT (Yoke) (Washer on Outer Face)	500	3 450	A
820C	1.030-14NGO-RH-EXT (Yoke) (Washer on Outer Face)	500	3 450	A
845	1.125-14UNS-2A-RH-EXT (Yoke)	500	3 450	A
850	YOKE CONNECTION FOR AIR	3 000	20 680	B
852	G5/8-14 WHITWORTH-RH-INT	5 500	37 900	B
855	YOKE CONNECTION FOR AIR	3 000	20 680	B
860	Basic Dimensional Drawing for Connection Nos. 870 through 989			D
870	PIN-INDEXED YOKE FOR MEDICAL GASES, PINS 2-5	3 000	20 680	D
880	PIN-INDEXED YOKE FOR MEDICAL GASES, PINS 2-6	3 000	20 680	D
890	PIN-INDEXED YOKE FOR MEDICAL GASES, PINS 2-4	3 000	20 680	D
900	PIN-INDEXED YOKE FOR MEDICAL GASES, PINS 1-3	3 000	20 680	D
910	PIN-INDEXED YOKE FOR MEDICAL GASES, PINS 3-5	3 000	20 680	D
920	PIN-INDEXED YOKE FOR MEDICAL GASES, PINS 3-6	500	3 450	D
930	PIN-INDEXED YOKE FOR MEDICAL GASES, PINS 4-6	3 000	20 680	D
940	PIN-INDEXED YOKE FOR MEDICAL GASES, PINS 1-6	3 000	20 680	D
950	PIN-INDEXED YOKE FOR MEDICAL GASES, PINS 1-5	3 000	20 680	D
960	PIN-INDEXED YOKE FOR MEDICAL GASES, PINS 1-4	3 000	20 680	D
965	PIN-INDEXED YOKE FOR MEDICAL GASES, PIN 7	3 000	20 680	D
970	PIN-INDEXED YOKE FOR MEDICAL GASES, PINS 11-21	3 000	20 680	D
971	PIN-INDEXED YOKE FOR MEDICAL GASES, PINS 11-22	3 000	20 680	D
972	PIN-INDEXED YOKE FOR MEDICAL GASES, PINS 11-23	3 000	20 680	D
973	PIN-INDEXED YOKE FOR MEDICAL GASES, PINS 11-24	3 000	20 680	D
974	PIN-INDEXED YOKE FOR MEDICAL GASES, PINS 12-21	3 000	20 680	D
975	PIN-INDEXED YOKE FOR MEDICAL GASES, PINS 12-22	3 000	20 680	D
976	PIN-INDEXED YOKE FOR MEDICAL GASES, PINS 12-23	3 000	20 680	D
977	PIN-INDEXED YOKE FOR MEDICAL GASES, PINS 12-24	3 000	20 680	D
978	PIN-INDEXED YOKE FOR MEDICAL GASES, PINS 13-21	3 000	20 680	D
979	PIN-INDEXED YOKE FOR MEDICAL GASES, PINS 13-22	3 000	20 680	D
980	PIN-INDEXED YOKE FOR MEDICAL GASES, PINS 13-23	3 000	20 680	D
981	PIN-INDEXED YOKE FOR MEDICAL GASES, PINS 13-24	3 000	20 680	D
982	PIN-INDEXED YOKE FOR MEDICAL GASES, PINS 14-21	3 000	20 680	D
983	PIN-INDEXED YOKE FOR MEDICAL GASES, PINS 14-22	3 000	20 680	D
984	PIN-INDEXED YOKE FOR MEDICAL GASES, PINS 14-23	3 000	20 680	D



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Connection no.	Description	Maximum pressure ^{1), 2)}		Section(s)
		psi	kPa	
985	PIN-INDEXED YOKE FOR MEDICAL GASES, PINS 14-24	3 000	20 680	D
986	PIN-INDEXED YOKE FOR MEDICAL GASES, PINS 15-21	3 000	20 680	D
987	PIN-INDEXED YOKE FOR MEDICAL GASES, PINS 15-22	3 000	20 680	D
988	PIN-INDEXED YOKE FOR MEDICAL GASES, PINS 15-23	3 000	20 680	D
989	PIN-INDEXED YOKE FOR MEDICAL GASES, PINS 15-24	3 000	20 680	D
¹⁾ Maximum pressures have been established to safeguard downstream regulators and ancillary equipment from overpressurization. See Section 5 for a complete explanation. ²⁾ In this standard, psi, bar, and kPa indicate gauge pressure.				

Table 2—Alphabetical list of gases and connections assigned

Gas		Standard	Limited Standard
Acetylene	Greater than 50 ft ³ (1.39 m ³)	510	300, 410 ¹⁾
	Between 35 ft ³ and 75 ft ³ (990 L and 2120 L)		520
	Approx. 10 ft ³ (280 L)		200
Air (R729)	Up to 500 psi (3450 kPa)		599
	Up to 3000 psi (20 680 kPa) Threaded	346, 346R	
	Up to 3000 psi (20 680 kPa)		
	(not for breathing applications) Threaded		590
	Yoke	950	850 ²⁾ , 855 ^{2), 3)}
	3001 to 5500 psi (20 690 to 37 900 kPa)		852 ²⁾
	3001 to 4700 psi (20 690 to 32 400 kPa)	347, 347R	
	4701 to 6400 psi (32 410 to 44 100 kPa)	702	
	Cryogenic liquid withdrawal	440	
	Gas withdrawal	510	
Allene	Liquid withdrawal	555, 555R	
Allylene: See Methylacetylene			
Ammonia (R717)	Threaded	240, 705	660
	Yoke	800, 845	
	Ultra high integrity	720	
Antimony pentafluoride		330	
Argon	Up to 3000 psi (20 680 kPa)	580, 580R	
	3001 to 4700 psi (20 690 to 32 400 kPa)	680, 680R	
	4701 to 6400 psi (32 410 to 44 100 kPa)	677	
	Cryogenic liquid withdrawal and fill connection	295	
	Liquid cylinder vent connection	295	
	Ultra high integrity	718	
Arsine		350, 350R	
	Ultra high integrity	632	
Arsenic pentafluoride		642	
Bis (trifluoromethyl) peroxide: See hexafluorodimethyl peroxide			
Boron chloride: See boron trichloride			
Boron fluoride: See boron trifluoride			
<u>Boron tribromide</u>		660	
Boron trichloride		660	
	Ultra high integrity	634	
Boron trifluoride		330	
	Ultra high integrity	642	
<u>Bromine</u>		660	
Bromine pentafluoride		670	
Bromine trifluoride		670	
Bromoacetone		660	
Bromochlorodifluoromethane (R12B1)		660	165, 182
Bromochloromethane		660	165, 182
Bromoethylene: See vinyl bromide			
Bromomethane: See methyl bromide			
Bromotrifluoroethylene (R113B1)		510	
Bromotrifluoromethane (R13B1)		660	165, 182
1,3-Butadiene	Gas withdrawal	510	
	Liquid withdrawal	555, 555R	
Butane (R600)	Gas withdrawal	510	
	Liquid withdrawal	555, 555R	


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Gas		Standard	Limited Standard
1-Butene	Gas withdrawal	510	
	Liquid withdrawal	555, 555R	
2-Butene	Gas withdrawal	510	
	Liquid withdrawal	555, 555R	
α -Butylene: See 1-Butene			
β -Butylene: See 2-Butene			
1-Butyne: See ethylacetylene			
Carbon dioxide (R744)	Threaded	320, 320R	
	Yoke	940	
	Refrigerated liquid withdrawal	622	
	Refrigerated liquid cylinder vent connection	295	622
	Ultra high integrity	716	
	Small cylinder service (up to 1800 psi [12 410 kPa]) ⁵⁾	323	
Carbonic acid: See carbon dioxide			
Carbon monoxide		350, 350R	
	3 001 to 4 700 psi (20 690 to 32 400 kPa)	695	
	Ultra high integrity	724	
Carbon oxysulfide: See carbonyl sulfide			
Carbon tetrafluoride: See tetrafluoromethane			
Carbonyl chloride: See phosgene			
Carbonyl fluoride		660	
Carbonyl sulfide	Threaded	330	
	Ultra high integrity	722	
Chlorine	Threaded		660 ⁴⁾
	Yoke	820, 820C	
	Ultra high integrity	728	634 ⁶⁾
Chlorine pentafluoride		670	
Chlorine trifluoride		670	
	Ultra high integrity	728	
1-Chloro-1, 1-difluoroethane (R142b)		510	
Chlorodifluoromethane (R22)		660	165, 182
Chloroethane: See ethyl chloride			
Chloroethylene: See vinyl chloride			
Chlorofluoromethane (R31)		510	
Chloroheptafluorocyclobutane (RC317)		660	165, 182
Chloromethane: See methyl chloride			
Chloropentafluoroethane (R115)		660	165, 182
	Ultra high integrity	716	
1-Chloro-1,2,2,2-tetrafluoroethane (R124)		660	165, 182
1-Chloro-2,2,2-trifluoroethane (R133a)		660	165, 182
Chlorotrifluoroethylene (R1113)		510	
Chlorotrifluoromethane (R13)		660	165, 182, 320
	Ultra high integrity	716	
Cyanogen		660	
Cyanogen chloride		660	
Cyclobutane	Gas withdrawal	510	
	Liquid withdrawal	555, 555R	
Cyclopropane	Threaded	510	
	Liquid withdrawal	555, 555R	
	Yoke	920	
Deuterium		350, 350R	
	Ultra high integrity	724	
Deuterium chloride		330	



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Gas		Standard	Limited Standard
Deuterium fluoride		670	660
Deuterium selenide		350, 350R	660
Deuterium sulfide		330	
Diborane		350, 350R	
Ultra high integrity		632	
Dibromodifluoroethane		660	165, 182
Dibromodifluoromethane (R12B2)		660	165, 182
1,2-Dibromotetrafluoroethane (R114B2)		660	165, 182
1,2-Dichlorodifluoroethylene		660	165, 182
Dichlorodifluoromethane (R12)		660	165, 182
Ultra high integrity		716	
1,2-Dichloroethylene (R1130)		660	164, 165, 182
Dichlorofluoromethane (R21)		660	165, 182
1,2-Dichlorohexafluorocyclobutane (RC316)		660	165, 182
Dichlorosilane		678	
Ultra high integrity		636	
1,1-Dichlorotetrafluoroethane (R114a)		660	165, 182
1,2-Dichlorotetrafluoroethane (R114)		660	165, 182
2,2-Dichloro-1,1,1-trifluoroethane (R123)		660	165, 182
Dicyane: See cyanogen			
Diethyltelluride		Ultra high integrity	726
Diethylzinc		510	
Ultra high integrity		726	
Difluorodibromomethane: See Dibromodifluoromethane			
1,1-Difluoroethane (R152a)		510	
1,1-Difluoroethylene (R1132a)		350, 350R	
Difluoromonochloroethane: See chlorodifluoroethane			
Dimethylamine		705	
Dimethyl ether		Gas withdrawal	510
Liquid withdrawal		555, 555R	
Dimethylhexafluoroperoxide: See hexafluorodimethyl peroxide			
2,2-Dimethylpropane		Gas withdrawal	510
Liquid withdrawal		555, 555R	
Dimethylzinc		Ultra high integrity	726
Dinitrogen oxide: See nitrous oxide			
Dinitrogen tetroxide: See nitrogen dioxide			
Dinitrogen trioxide: See nitrogen trioxide			
Diphosgene		660	
Disilane		Ultra high integrity	632
Epoxyethane: See ethylene oxide			
Ethane (R170)		350, 350R	
Ultra high integrity		724	
Ethene: See ethylene			
Ethylacetylene		Gas withdrawal	510
Liquid withdrawal		555, 555R	
Ethylamine: See monoethylamine			
Ethyl Chloride (R160)		300	
Ethyldichlorarsine		660	
Threaded		350, 350R	
Ethylene (R1150)		Yoke	900
Ultra high integrity		724	
Ethylene dichloride: See Dichloroethylene			
Ethylene oxide		510	

Gas		Standard	Limited Standard
Ethyl ether	Gas withdrawal	510	
	Liquid withdrawal	555, 555R	
Ethyl fluoride		660	
Ethylidene fluoride: See 1,1-Difluoroethane			
Ethyl methyl ether: See methyl ethyl ether			
Ethyne: See acetylene			
Fluorine		679	
	Ultra high integrity	728	
Fluoroethylene: See vinyl fluoride			
Fluoroform (R23)		660	165, 182, 320
	Ultra high integrity	716	
Fluoromethane: See methyl fluoride			
Gases in small cylinders: See 4.10			
Germane		350, 350R	660
	Ultra high integrity	632	
Germanium tetrafluoride		330	
	Ultra high integrity	642	
Helium	Up to 3000 psi (20 680 kPa) Threaded	580, 580R	
	Yoke	930	
	3001 to 4700 psi (20 690 to 32 400 kPa)	680, 680R	
	4701 to 6400 psi (32 410 to 44 100 kPa)	677	
	6401 to 11 600 psi (44 133 to 79 979 kPa)	802	
	Cryogenic liquid withdrawal	792	
	Cryogenic vapor venting	295	
	Ultra high integrity	718	
Heptafluorobutyronitrile		660	
Heptafluoropropane (HFC 227)	Up to 3000 psi (20 680 kPa) Threaded	660	
	Up to 500 psi (3450 kPa)	165, 182	
Hexafluoroacetone		330	
Hexafluorocyclobutene		660	
Hexafluorodimethyl peroxide		660	
Hexafluoroethane (R116)		660	165, 182, 320
	Ultra high integrity	716	
Hexafluoro-1,3-butadiene: See perfluorobutadiene			
Hexafluoro-2-propanone: See hexafluoroacetone			
Hexafluoropropylene (R1216)		660	165, 182
Hydriodic acid, anhydrous: See hydrogen iodide			
Hydrochloric acid, anhydrous: See hydrogen chloride			
Hydrocyanic acid, anhydrous: See hydrogen cyanide			
Hydrofluoric acid, anhydrous: See hydrogen fluoride			
Hydrogen	Up to 3000 psi (20 680 kPa)	350, 350R	
	3001 to 4700 psi (20 690 to 32 400 kPa)	695	
	4701 to 6400 psi (32 410 to 44 100 kPa)	703	
	6401 to 11 600 psi (44 133 to 79 979 kPa)	803	
	Cryogenic liquid withdrawal	795	
	Liquid cylinder vent connection	350	795
	Ultra high integrity	724	
		330	
Hydrogen bromide		634	
	Ultra high integrity		
Hydrogen chloride		330	
	Ultra high integrity	634	
Hydrogen cyanide		660	
Hydrogen fluoride		670	660

Gas		Standard	Limited Standard
Ultra high integrity		638	
Hydrogen iodide		330	
	Ultra high integrity	634	
Hydrogen selenide		350, 350R	660
	Ultra high integrity	632	
Hydrogen sulfide		330	
	Ultra high integrity	722	
Industrial gas mixtures: See CGA V-7 [22]			
Iodine pentafluoride		670	
Isoamylene: See 3-methyl-1-butene			
Isobutane (R601)	Gas withdrawal	510	
	Liquid withdrawal	555, 555R	
Isobutene: See isobutylene			
Isobutylene	Gas withdrawal	510	
	Liquid withdrawal	555, 555R	
Isopropylethylene: See 3-methyl-1-butene			
Krypton	Up to 3000 psi (20 680 kPa)	580, 580R	
	3001 to 4700 psi (20 690 to 32 400 kPa)	680, 680R	
	4701 to 6400 psi (32 410 to 44 100 kPa)	677	
	Ultra high integrity	718	
Laughing gas: See nitrous oxide			
Lewisite [Dichloro (2-chlorovinyl) arsine]		660	
Liquid dioxide: See nitrogen dioxide			
Marsh gas: See methane			
Medical gas mixtures: See Table 3			
Methane (R50)	Up to 500 psi (3450 kPa)	510	
	Up to 3000 psi (20 680 kPa)	350, 350R	
	3001 to 4700 psi (20 690 to 32 400 kPa)	695	
	4701 to 6400 psi (32 410 to 44 100 kPa)	703	
	Cryogenic liquid withdrawal	450	
	Ultra high integrity	724	
Methanethiol: See methyl mercaptan			
Methoxyethylene: See vinyl methyl ether			
Methylacetylene	Gas withdrawal	510	
	Liquid withdrawal	555, 555R	
Methylamine: See monomethylamine			
Methyl bromide		330	320
3-Methyl-1-butene		510	
3-Methyl-2-butene	Gas withdrawal	510	
	Liquid withdrawal	555, 555R	
Methyl chloride (R40)		510	
	Ultra high integrity	724	
Methyldichloroarsine		660	
Methylene fluoride (R32)		350, 350R, 724	
Methyl ether: See dimethyl ether			
Methyl ethyl ether	Gas withdrawal	510	
	Liquid withdrawal	555, 555R	
Methyl fluoride (R41)		350, 350R, 724	
Methyl iodide		330	660
Methyl mercaptan		330	
2-Methylpropene: See isobutylene			
Methyl vinyl ether: See vinyl methyl ether			



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Gas		Standard	Limited Standard
Monochlorodifluoromethane: See chlorodifluoromethane			
Monochloropentafluoroethane: See chloropentafluoroethane			
Monochlorosilane		678	
	Ultra high integrity	636	
Monochlorotetrafluoroethane: See chlorotetrafluoroethane			
Monochlorotrifluoromethane: See chlorotrifluoromethane			
Monoethylamine (R631)		705	
Monomethylamine (R630)		705	
Mustard gas [Bis (2-chloroethyl) Sulfide]		660	
Natural gas	Up to 500 psi (3450 kPa)	510	
	Up to 3000 psi (20 680 kPa)	350, 350R	
	3001 to 4700 psi (20 690 to 32 400 kPa)	695	
	4701 to 6400 psi (32 410 to 44 100 kPa)	703	
	Cryogenic liquid withdrawal	450	
Neon	Up to 3000 psi (20 680 kPa)	580, 580R	
	3001 to 4700 psi (20 690 to 32 400 kPa)	680, 680R	
	4701 to 6400 psi (32 410 to 44 100 kPa)	677	
	Cryogenic liquid withdrawal	792	
	Ultra high integrity	718	
Neopentane: See 2,2-Dimethylpropane			
Nickel carbonyl		660	
Nickel tetracarbonyl: See nickel carbonyl			
Nitric oxide		660	
	Ultra high integrity	728	
Nitrogen	Up to 3000 psi (20 680 kPa) Threaded	580, 580R	555, 590
	Yoke	960	
	Oil-tolerant 3001 to 4700 psi (20 690 to 32 400 kPa)	621	
	3001 to 4700 psi (20 690 to 32 400 kPa)	680, 680R	
	4701 to 6400 psi (32 410 to 44 100 kPa)	677	
	Cryogenic liquid withdrawal and fill connection	295	
	Liquid cylinder vent connection	295	
	Ultra high integrity	718	
		660	
Nitrogen dioxide			
Nitrogen peroxide: See nitrogen dioxide			
Nitrogen sesquioxide: See nitrogen trioxide			
Nitrogen tetroxide: See nitrogen dioxide			
Nitrogen trifluoride		670	330
	Ultra high integrity	640	
Nitrogen trioxide		660	
Nitrosyl chloride		330	660
Nitrosyl fluoride		330	
Nitrous oxide (R744a)	Threaded	326	
	Yoke	910	
	Refrigerated liquid withdrawal and fill connection	624	
	Liquid cylinder vent connection	624	
	Ultra high integrity	712	
Nitryl fluoride		330	
Octafluorocyclobutane (RC318)		660	165, 182
	Ultra high integrity	716	



Gas		Standard	Limited Standard
Octafluorocyclopentene		660	
	Ultra high integrity	716	
Octafluoropropane (R218)		660	165, 182
	Ultra high integrity	716	
<u>Octafluorotoluene</u>		<u>350</u>	<u>510</u>
	<u>Ultra high integrity</u>	<u>724</u>	
Oxirane: See ethylene oxide			
Oxygen	Up to 500 psi (3450 kPa)		601
	Up to 3000 psi (20 680 kPa) Threaded	540, 540R	
	Yoke	870	
	3001 to 3500 psi (20 690 to 24 130 kPa)	577	
	3501 to 4700 psi (24 140 to 32 400 kPa)	701	
	Cryogenic liquid withdrawal	440	
Oxygen difluoride		714	
		679	
Ozone			
Pentaborane		350, 350R	
Pentachlorofluoroethane		660	165, 182
Pentafluoroethane (HFC 125)		660	165, 182
	Ultra high integrity	716	
Pentafluoroethyl iodide		660	165, 182
Pentafluoropropionitrile		660	
Perchloryl fluoride		670	
Perfluoroacetone: See hexafluoroacetone			
Perfluorobutadiene		350, 350R	
	Ultra high integrity	724	
Perfluorobutane (FC-3-1-10)		660	165, 182
Perfluoro-2-butene		660	165, 182
	Ultra high integrity	716	
Perfluorocyclobutane: See octafluorocyclobutane			
Perfluorodimethyl peroxide: See hexafluorodimethyl peroxide			
Perfluoroethane: See hexafluoroethane			
Perfluoropropane: See octafluoropropane			
Phenylcarbylamine chloride		330	
Phosgene		660	160
Phosphine		350, 350R	
	Ultra high integrity	632	
Phosphorous pentafluoride		330	660
	Ultra high integrity	642	
Phosphorous trifluoride		330	660
Propadiene: See allene			
Propane (R290)	Gas withdrawal	510, 789, 791, 793, 810	600
	Liquid withdrawal	555, 555R	
	Liquid and gas withdrawal	790	
Propene: See propylene			
Propylene (R1270)	Gas withdrawal	510	600
	Liquid withdrawal	555, 555R	
	Gas withdrawal	791	
	Ultra high integrity	724	

Gas	Standard	Limited Standard
Propyne: See methylacetylene		
R452B (mixture of Difluoromethane [R32], 2,3,3,3 Tetrafluoropropene [R1234yf], and Pentafluoroethane [HFC125])		164
R454A (mixture of 2,3,3,3 Tetrafluoropropene [R1234yf] and Difluoromethane [R32])		164
R454C (mixture of 2,3,3,3 Tetrafluoropropene [R1234yf] and Difluoromethane [R32])		164
REFRIGERANTS "numerical listing"		
HFC23: See trifluoromethane		
HFC 227: See heptafluoropropane		
R11: See trichlorofluoromethane		
R12: See dichlorodifluoromethane		
R12B1: See bromochlorodifluoromethane		
R12B2: See dibromodifluoromethane		
R13: See chlorotrifluoromethane		
R13B1: See bromotrifluoromethane		
R14: See tetrafluoromethane		
R21: See dichlorofluoromethane		
R22: See chlorodifluoromethane		
R23: See fluoroform		
R31: See chlorofluoromethane		
R32: See methylene fluoride		
R40: See methyl chloride		
R41: See methyl fluoride		
R50: See methane		
R112: See 1,1,2,2-tetrachlorodifluoroethane		
R112a: See 1,1,1,2-tetrachlorodifluoroethane		
R113: See 1,1,2-trichlorotrifluoroethane		
R113a: See 1,1,1-Trichlorotrifluoroethane		
R113B1: See bromotrifluoroethylene		
R114: See 1,2-dichlorotetrafluoroethane		
R114a: See 1,1-dichlorotetrafluoroethane		
R114B2: See 1,2-dibromotetrafluoroethane		
R115: See chloropentafluoroethane		
R116: See hexafluoroethane		
R123: See 2,2-dichloro-1,1,1-trifluoroethane		
R124: See 1,-chloro-1,2,2,2-tetrafluoroethane		
HFC 125: See pentafluoroethane		
R133a: See 1-chloro-2,2,2-trifluoroethane		
R134a: See 1,1,1,2-tetrafluoroethane		
R152b: See 1-chloro-1,1-difluoroethane		
R143a: See 1,1,1-trifluoroethane		
R152a: See 1,1-difluoroethane		
R160: See ethyl chloride		
R170: See ethane		
R218: See octafluoropropane		
R290: See propane		
RC316: See dichlorohexafluorocyclobutane		
RC317: See chloroheptafluorocyclobutane		
RC318: See octafluorocyclobutane		
R600: See butane		
R601: See isobutane		
R630: See monomethylamine		
R631: See monoethylamine		
R717: See ammonia		
R729: See air		
R744: See carbon dioxide		
R744a: See nitrous oxide		
R764: See sulfur dioxide		
R1113: See chlorotrifluoroethylene		
R1114: See tetrafluoroethylene		
R1130: See 1,2-dichloroethylene		
R1132a: See 1,1-difluoroethylene		
R1140: See vinyl chloride		
R1141: See vinyl fluoride		



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Gas	Standard	Limited Standard
R1150: See ethylene		
R1216: See hexafluoropropylene		
R1234yf: See 2,3,3,3-tetrafluoro-1-propene		
R1270: See propylene		
Silane	Up to 500 psi (3450 kPa)	510
	Up to 3000 psi (20 680 kPa)	350, 350R
	Ultra high integrity	632
Silicon tetrachloride		678
	Ultra high integrity	636
Silicon tetrafluoride		330
	Ultra high integrity	642
Silicon tetrahydride: See silane		
Stibine	350, 350R	
Sulfur dioxide (R764)	660	
Sulfur hexafluoride	590, 590R	
	Ultra high integrity	716
Sulfur tetrafluoride	330	
Sulfuryl fluoride	660	
1,1,1,2-tetrachlorodifluoroethane (R112a)	660	165, 182
1,1,2,2-tetrachlorodifluoroethane (R112)	660	165, 182
1,1,2,2-tetrafluoro-1-chloroethane	660	165, 182
1,1,1,2-tetrafluoroethane (R134a)	167	165, 660
	Ultra high integrity	716
Tetrafluoroethylene (R1114)	350, 350R	165, 182
Tetrafluorohydrazine	679	
Tetrafluoromethane (R14)	580, 580R	320
	Ultra high integrity	716
2,3,3,3,-tetrafluoro-1-propene (R1234yf)	166, 678	
	Gas withdrawal	812
Tetrafluorosilane: See silicon tetrafluoride		
Tetramethyllead		
Tetramethylmethane: See 2,2-dimethylpropane		
Trichloroethylene	580, 580R	
Trichlorofluoromethane (R11)	660	
Trichloromonofluoromethane: See trichlorofluoromethane		
Trichlorosilane	678	
	Ultra high integrity	636
1,1,1-Trichlorotrifluoroethane (R113a)	660	165, 182
1,1,2-Trichlorotrifluoroethane (R113)	660	
	Ultra high integrity	716
Triethylaluminum	510	
	Ultra high integrity	726
Triethylborane	660	
Trifluoroacetonitrile	660	
Trifluoroacetyl chloride	330	
Trifluorobromomethane: See bromotrifluoromethane		
Trifluorochloroethylene: See chlorotrifluoroethylene		
1,1,1-Trifluoroethane (R143a)	510	
Trifluoroethylene	510	
Trifluoromethane (HFC 23): See fluoroform		
Trifluoromethyl chloride: See chlorotrifluoromethane		
Trifluoromethyl hypofluorite	679	
Trifluoromethyl iodide	660	165, 182
Trifluorovinyl bromide: See bromotrifluoroethylene		



Documents

Document Sharing Hub

Gas		Standard	Limited Standard
Trimethyl silane	Ultra high integrity	632	
Trimethylamine		705	
Trimethylene: See cyclopropane			
Trimethylmethane: See isobutane			
Trimethylstibine			
Tungsten hexafluoride		670	
	Ultra high integrity	638	
Uranium hexafluoride		330	
Vinyl bromide		510	290
Vinyl chloride (R1140)		510	290
Vinyl fluoride (R1141)		350, 350R	
Vinylidene fluoride: See 1,1-difluoroethylene			
Vinyl methyl ether	Gas withdrawal	510	290
	Liquid withdrawal	555, 555R	
Xenon	Up to 3000 psi (20 680 kPa)	580, 580R	
	3001 to 4700 psi (20 690 to 32 400 kPa)	680, 680R	
	4701 to 6400 psi (32 410 to 44 100 kPa)	677	
	Ultra high integrity	718	

- 1) Limited standard for Canada only.
- 2) Limited to SCUBA use.
- 3) Formerly CGA 1310.
- 4) For use in the specialty gas industry only.
- 5) For use in the paintball industry.
- 6) Limited standard for Asia only.

Table 3—Alphabetical list of medical gas¹⁾ mixtures^{2), 3)} and connections assigned

Medical gas mixtures for pressures up to 3000 psi (20 680 kPa)		Standard	Limited Standard
Carbon dioxide and oxygen (carbon dioxide less than 7%)	Threaded Yoke	280 880	
Carbon dioxide and oxygen (carbon dioxide 4.9% to 5.2%) for neurological therapy	Yoke	989	
Carbon dioxide and oxygen (carbon dioxide greater than 7%)	Threaded Yoke	500 940	
Carbon dioxide, oxygen, nitrogen	Threaded Yoke	500 973	
Blood gas mixtures	Threaded Yoke	500 973	
Gas mixtures, medical ^{1), 3)} flammable	Threaded Yoke	350, 350R 981	
Gas mixtures, medical ^{1), 3)} Nonflammable, noncorrosive	Threaded Yoke	500 973	
Gas mixtures, medical ^{1), 3)} Nonflammable, noncorrosive, not containing oxidizing components	Threaded Yoke	580 985	
Helium and oxygen (helium less than 80%)	Threaded Yoke	280 890	
Helium and oxygen (helium greater than 80%)	Threaded Yoke	500 930	
Lung diffusion mixtures	Threaded Yoke	500 973	
Therapeutic nitric oxide mixtures	Threaded Yoke	626 Not permitted	
Nitric oxide mixtures and nitrogen dioxide mixtures (for medical calibration use only)	Threaded Yoke	625 Not permitted	
Nitrogen and oxygen (oxygen greater than 23.5%)	Threaded Yoke	280 890	
Nitrous oxide and oxygen (nitrous oxide 47.5% to 52.5%)	Threaded Yoke	280 965	
Oxidizing mixtures	Threaded Yoke	296 977	
<u>Xenon</u>	<u>Yoke</u>	<u>971</u>	
Xenon and oxygen (oxygen greater than 20%)	Threaded Yoke	280 890	
¹⁾ For a definition of the term medical gases, see Section 8. ²⁾ Nominal mixture concentration; normal mixture tolerances are allowable. ³⁾ Gas mixtures labeled as drugs or medical devices and not having another connection assignment.			

Section A—Outlet connections for compressed gas service

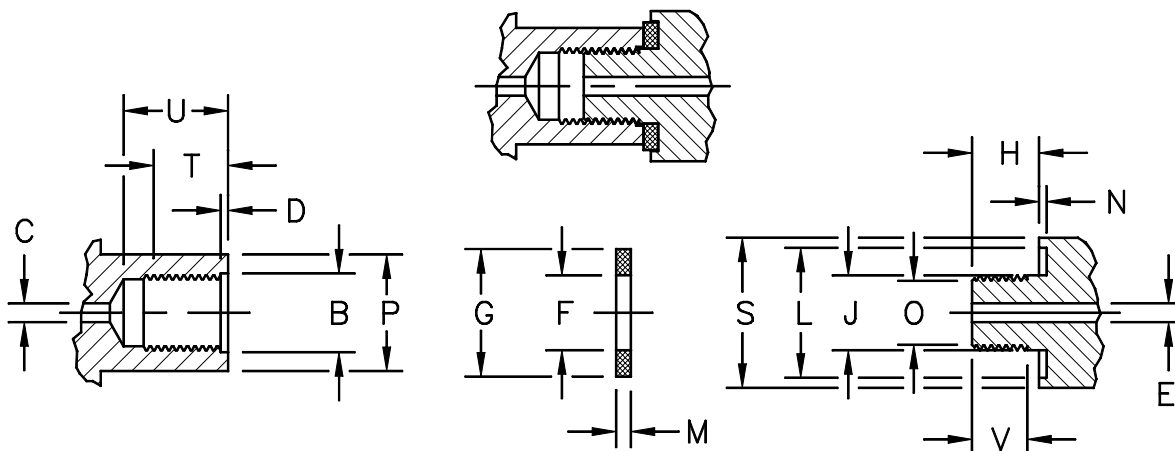
Connections in this section are primarily assigned to compressed gases. Those connections that are also used in medical gas service are also listed in Section D.

For recommendations of sealing torques for CGA outlet connections, see CGA V-21, *Torque Guidelines for Sealing CGA Valve Outlet Connections* [23].

Some connections in this section comply with SAE J513, *Refrigeration Tube Fittings—General Specifications* [24]. See the following connection drawing notes for additional information.

.3125-32UNEF-2B-RH-INT

LIMITED^① STANDARD CYLINDER VALVE OUTLET CONNECTION FOR
ALL GASES^② IN SMALL CYLINDERS
FOR PRESSURES UP TO 3000 psi (20 680 kPa)

**VALVE OUTLET**

THREAD	.3125-32UNEF-2B-RH-INT (MOD.)	
MINOR DIA.	.2790 -.2847(3B)	(7.087-7.231)
PITCH DIA.	.2922 -.2964	(7.422-7.528)
MAJOR DIA.	.3125 Min.	(7.938) Min.
C'BORE DIA.	B .328 ± .015	(8.33 ± 0.38)
DRILL DIA.	C .078 ± .015	(1.98 ± 0.38)
C'BORE	D .031 ± .015	(0.79 ± 0.38)
DEPTH		
BOSS DIA.	P .485 ± .015	(12.32 ± 0.38)
FULL THREAD	T .312 Min.	(7.92) Min.
BORE DEPTH	U .437 ± .015	(11.10 ± 0.38)

WASHER

HOLE DIA.	F .312-.327	(7.92-8.30)
DIAMETER	G .521-.535	(13.24-13.59)
THICKNESS	M .057-.077	(1.44-1.95)

NIPPLE

THREAD	.3125-32UNEF-2A-RH-EXT	
MAJOR DIA.	.3115 -.3055	(7.912 - 7.760)
PITCH DIA.	.2912 -.2880	(7.396 - 7.316)
MINOR DIA.	.2732 Max.	(6.939) Max.
DRILL DIA.	E .078 ± .015	(1.98 ± 0.38)
BOSS LENGTH	H .281 ± .015	(7.14 ± 0.38)
INNER RECESS DIA.	J .312 - .306	(7.92 - 7.77)
OUTER RECESS DIA.	L .541	(13.74)
RECESS DEPTH	N .031	(0.79)
CHAMFER DIA.	O 45° X .266	(6.76)
BODY DIA.	S .625 Min.	(15.88) Min.
FULL THREAD	V .219 Min.	(5.56) Min.

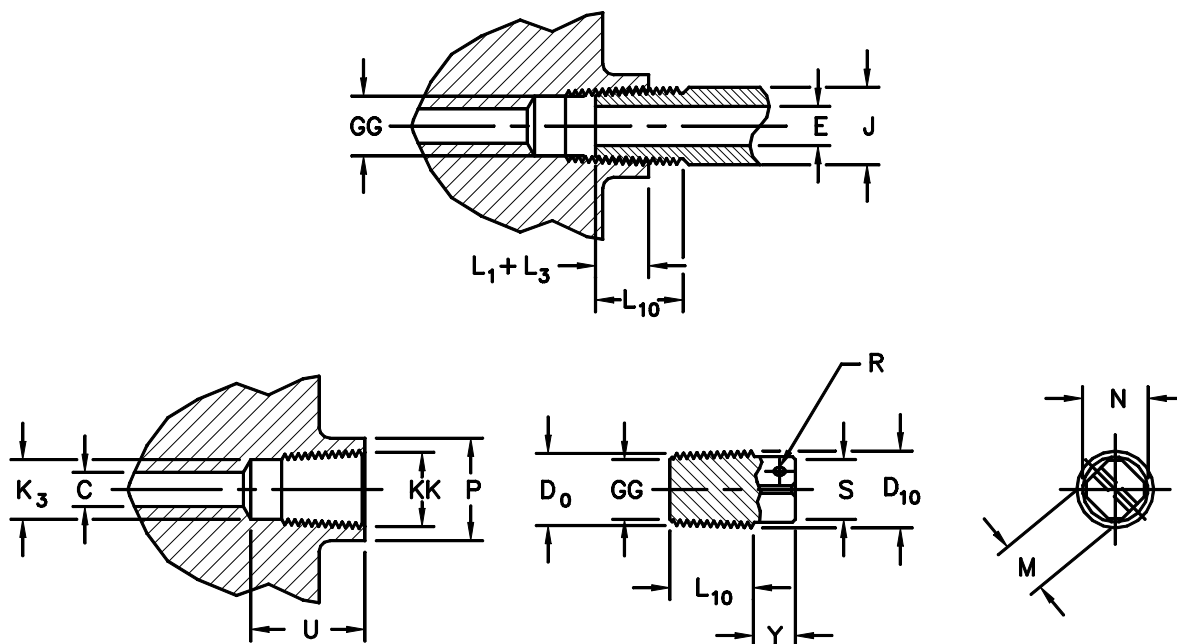
All dimensions are in inches (millimeters).

① Limited to small cylinders as defined in 4.10.

② Including gas mixtures: see CGA V-7 [22].

1/8-27NGT-RH-INT^①

LIMITED STANDARD CYLINDER VALVE OUTLET CONNECTION FOR
PRESSURES UP TO 500 psi (3450 kPa) FOR
Phosgene

**VALVE OUTLET**

THREAD	1/8-27NGT-RH-INT	
DRILL DIA.	C	.187 Max. (4.75) Max
BORE DIA.	K ₃	①
BOSS DIA.	P	.562 Min. (14.27) Min.
BORE DEPTH	U	.625±.015 (15.88±0.38)
C'SINK DIA	KK	①

NIPPLE

THREAD	1/8-27NGT-RH-EXT	
BORE DIA.	E	.215 Max. (5.46) Max.
OUTSIDE DIA.	J	.405 Min. (10.29) Min.
HAND ENGAGEMENT	L ₁	①
WRENCH ENGAGEMENT	L ₁ +L ₃	①
THREAD LENGTH	L ₁₀	①
CHAMFER AT END DIA.	GG	①

PLUG

THREAD	1/8-27NGT-RH-EXT	
MAJOR DIA. LARGE END	D ₁₀	①
MAJOR DIA. SMALL END	D ₀	①
THREAD LENGTH	L ₁₀	①
SQUARE HEAD	M	.271-.281 (6.89-7.14)
CORNERS OF HEAD DIA.	N	.344-.359 (8.74-9.12)
SEAL HOLE DIA.	R	.062±.015 (1.57±0.38)
CHAMFER DIA. AT CORNERS	S	45° X .328 (8.33)
HEIGHT OF HEAD	Y	.24 Min. (6.1) Min.
CHAMFER DIA. AT END	GG	①

All dimensions are in inches (millimeters).

① For dimensions, see Table 4.

② No. 160 nipple can also be used with valve outlet no. 660 if optional internal thread is used.

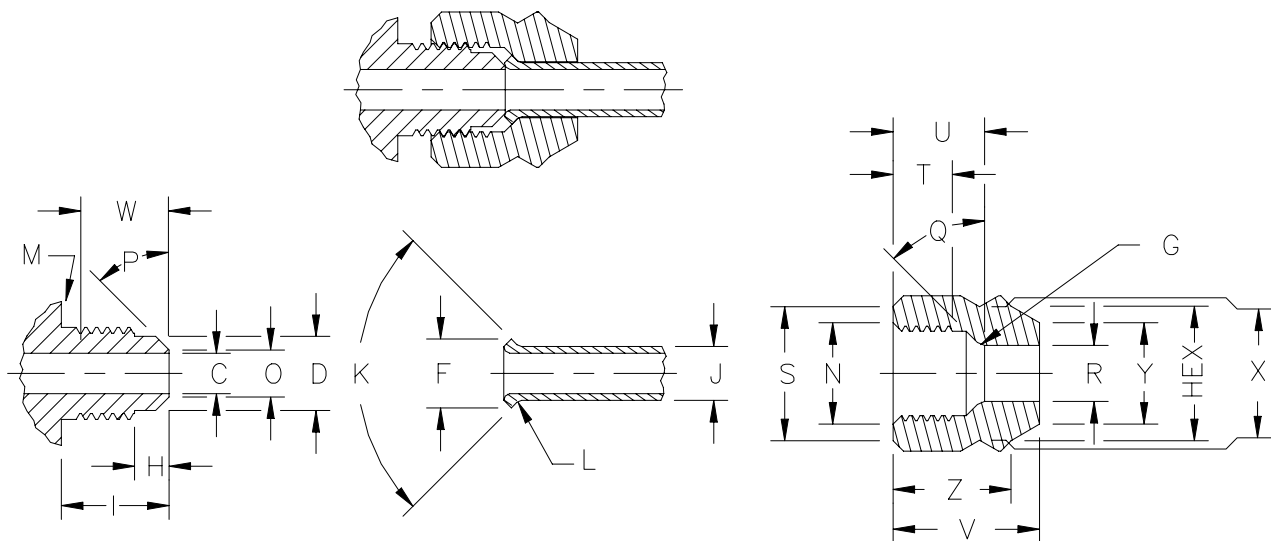
.4375-20 UNF-2A-LH-EXT (1/4" SAE Flare)[®]

LIMITED[®] STANDARD CYLINDER VALVE OUTLET CONNECTION FOR
PRESSURES UP TO 500 psi (3450 kPa) FOR

R452B (mixture of Difluoromethane [R32], 2,3,3,3 Tetrafluoropropene [R1234yf],
and Pentafluoroethane [HFC125])

R454A (mixture of 2,3,3,3 Tetrafluoropropene [R1234yf] and Difluoromethane [R32])

R454C (mixture of 2,3,3,3 Tetrafluoropropene [R1234yf] and Difluoromethane [R32])
1,2-Dichloroethylene [R1130]

**VALVE OUTLET****.4375-20 UNF-2A-LH-EXT**

THREAD		
MAJOR DIA.	.4362-.4281	(11.079-10.874)
PITCH DIA.	.4037-.3995	(10.254-10.147)
MINOR DIA.	.3749 Max.	(9.522) Max.
BORE DIA.	C .186-.192	(4.73-4.88)
RELIEF DIA.	D .344 ±.010	(8.74 ±0.25)
CUTBACK	H .16	(4.1)
LENGTH	I .50	(12.7)
UNDERCUT	M NOT PERMITTED	
CHAMFER DIA.	O .219 ±.010	(5.56 ±0.25)
ANGLE	P 45° ±1°	
FULL THREAD	W .41 Min.	(10.4) Min.

TUBE

FLARE DIA.	F .320	(8.13)
DIAMETER	J .250 ±.002	(6.35 ±0.05)
ANGLE	K 90° ±1/2°	
RADIUS	L .015-.031	(0.38-0.79)

HEXAGON NUT**.4375-20 UNF-2B-LH-INT (MOD.)**

THREAD		
MINOR DIA.	.3830-.3916 (3B)	(9.729-9.946)
PITCH DIA.	.4050-.4104	(10.287-10.424)
MAJOR DIA.	.4375 Min.	(11.113) Min.
HEX	5/8	(15.9)
RADIUS	G .047 ±.010	(1.19 ±0.25)
C'SINK DIA	N 90° x .45-.47	(11.4-11.9)
ANGLE	Q 43° - 45°	
HOLE DIA.	R .255-.260	(6.48-6.60)
CHAMFER DIA.	S 45° x .59-.62	(15.0-15.7)
FULL THREAD	T .27 Min.	(6.9) Min.
DEPTH	U .34	(8.6)
LENGTH	V .59-.68	(15.0-17.3)
DIAMETER	Y .47 Min.	(11.9) Min.
LENGTH	Z .41-.47	(10.4-11.9)
GROOVE DIA.	X 60° x .66	(16.7)

All dimensions are in inches (millimeters).

①Complies with SAE J513 (except left handed) [24].

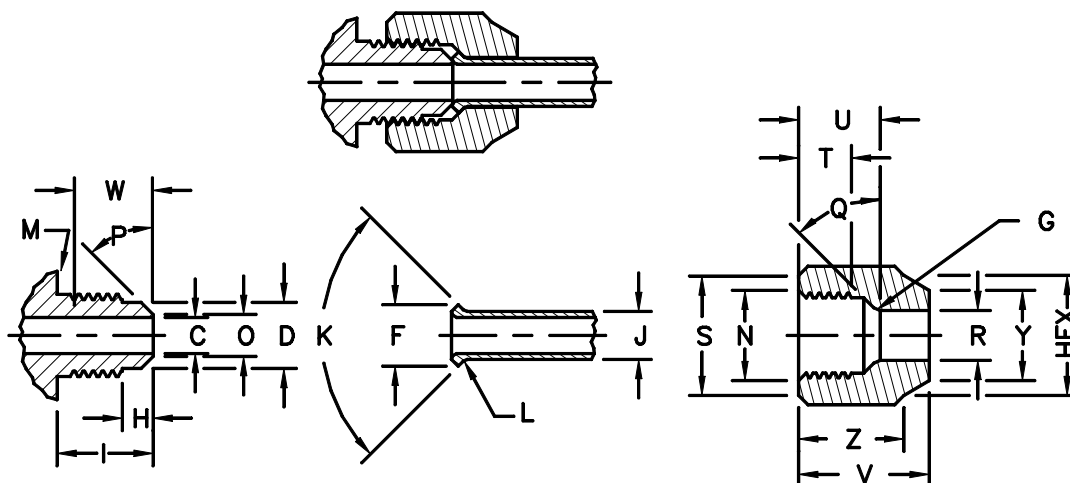
②Limited for use in refrigerant industry, including gas mixtures: see CGA V-7 [22].

.4375-20 UNF-2A-RH-EXT (1/4" SAE Flare)[®]
LIMITED[®] STANDARD CYLINDER VALVE OUTLET CONNECTION FOR
PRESSURES UP TO 500 psi (3450 kPa) FOR

Bromochlorodifluoromethane (R12B1)
 Bromochloromethane
 Bromotrifluoromethane (R13B1)
 Chlorodifluoromethane (R22)
 Chloroheptafluorocyclobutane (RC317)
 Chloropentafluoroethane (R115)
 1-chloro-1, 2, 2, 2-tetrafluoroethane (R124)
 1-chloro-2, 2, 2-trifluoroethane (R113a)
 Chlorotrifluoromethane (R13)
 Dibromodifluoroethane
 Dibromodifluoromethane (R12B2)
 1, 2-dibromotetrafluoroethane (R114B2)
 1, 2-dichlorodifluoroethylene

Dichlorodifluoromethane (R12)
 1, 2-dichloroethylene (R1130)
 Dichlorofluoromethane (R21)
 1, 2-dichlorohexafluorocyclobutane (RC316)
 1, 1-dichlorotetrafluoroethane (R114a)
 1, 2-dichlorotetrafluoroethane (R114)
 2, 2-dichloro-1, 1, 1-trifluoroethane (R123)
 Fluoroform (R23)
 Hexafluoroethane (R116)
 Hexafluoropropylene (R1216)
 Octafluorocyclobutane (RC318)
 Octafluoropropane (R218)
 Heptafluoropropane (HFC 227)

Pentachlorofluoroethane
 Pentafluoroethane (R125)
 Pentafluoroethyl iodide
 Perfluorobutane (FC-3-1-10)
 Perfluoro-2-butene
 1, 1, 1, 2-Tetrachlorodifluoroethane (R112a)
 1, 1, 2, 2-Tetrachlorodifluoroethane (R112)
 1, 1, 2, 2-Tetrafluoro-1-chloroethane
 1, 1, 1, 2-Tetrafluoroethane (R134a)
 (nonautomotive use)
 Tetrafluoroethylene (R1114)
 1, 1, 1-trichlorotrifluoroethane (R113a)
 Trifluoromethyl iodide



VALVE OUTLET			
THREAD	.4375-20UNF-2A-RH-EXT		
MAJOR DIA.	.4362-.4281	(11.079-10.874)	
PITCH DIA.	.4037-.3995	(10.254-10.147)	
MINOR DIA.	.3749 Max.	(9.522) Max.	
BORE DIA.	C .186-.192	(4.73-4.88)	
RELIEF DIA.	D .344 ±.010	(8.74 ±0.25)	
CUTBACK	H .16	(4.1)	
LENGTH	I .50	(12.7)	
UNDERCUT	M NOT PERMITTED		
CHAMFER DIA.	O .219 ±.010	(5.56 ±0.25)	
ANGLE	P 45° ± 1°		
FULL THREAD	W .41 Min.	(10.4) Min.	
TUBE			
FLARE DIA.	F .320	(8.13)	
DIAMETER	J .250 ±.002	(6.35 ±0.05)	
ANGLE	K 90° ±1/2°		
RADIUS	L .015-.031	(0.38-0.79)	

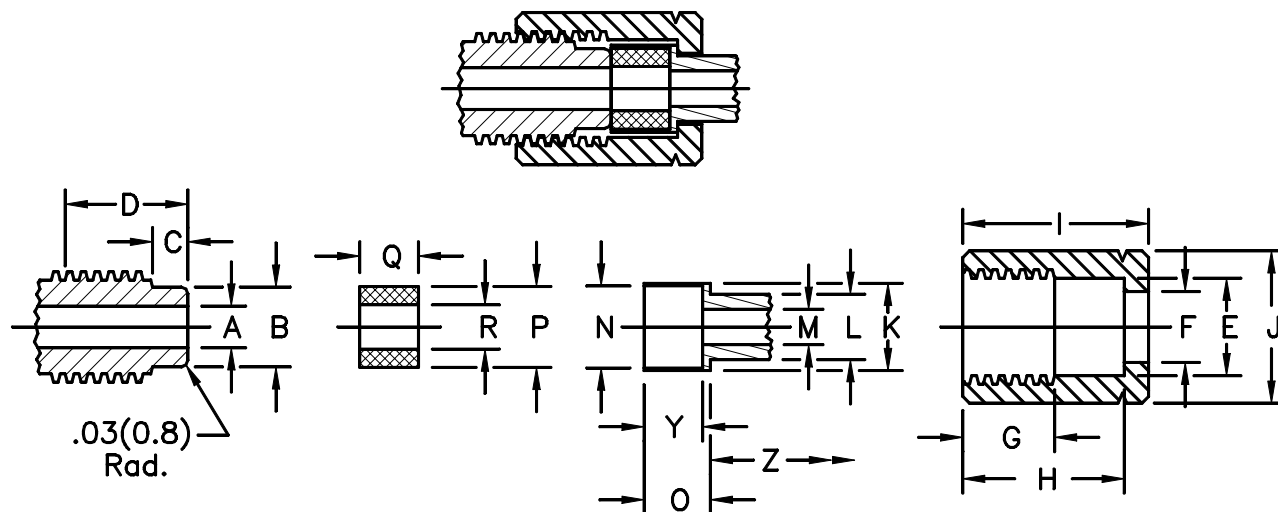
HEXAGON NUT			
THREAD	.4375-20UNF-2A-RH-INT (MOD.)		
MINOR DIA.	.3830-.3916(3B)	(9.729-9.946)	
PITCH DIA.	.4050-.4104	(10.287-10.424)	
MAJOR DIA.	.4375 Min.	(11.113) Min.	
HEX	5/8	(15.9)	
RADIUS	G .047 ±.010	(1.19 ±0.25)	
C'SINK DIA.	N 90° x .45-.47	(11.4-11.9)	
ANGLE	Q 43°-45°		
HOLE DIA.	R .255-.260	(6.48-6.60)	
CHAMFER DIA.	S 45° x .59-.62	(15.0-15.7)	
FULL THREAD	T .27 Min	(6.9) Min.	
DEPTH	U .34	(8.6)	
LENGTH	V .59-.68	(15.0-17.3)	
DIAMETER	Y .47 Min.	(11.9) Min.	
LENGTH	Z .41-.47	(10.4-11.9)	

All dimensions are in inches (millimeters).

- ① Complies with SAE J513 [24].
 ② Limited for use in refrigerant industry, including gas mixtures: see CGA V-7 [22].

.500-16 ACME-2G-LH-EXT

STANDARD CYLINDER VALVE OUTLET CONNECTION FOR PRESSURES UP TO
500 psi (3450 kPa) FOR 2,3,3,3-TETRAFLUORO-1-PROPENE (R-1234yf) AUTOMOTIVE USE

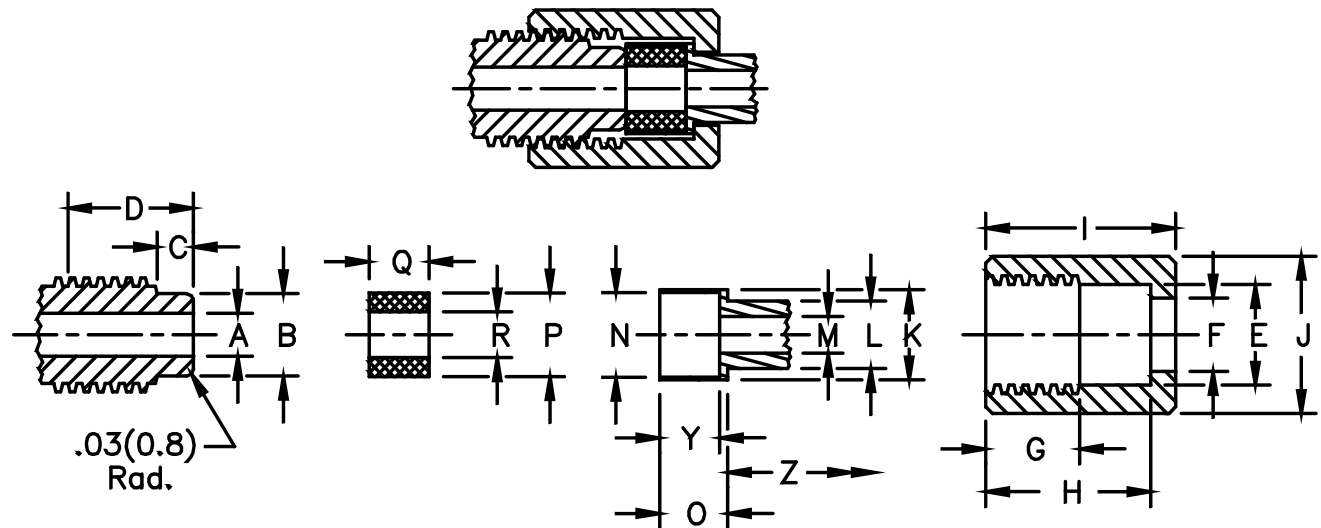


VALVE OUTLET				NUT			
.500-16ACME-2G-LH-EXT				.500-16ACME-2G-LH-INT			
THREAD				THREAD			
MAJOR DIA.		.5000-.4950	(12.700-12.573)	MINOR DIA.		.4375-.4425	(11.113-11.240)
PITCH DIA.		.4631-.4514	(11.762-11.466)	PITCH DIA.		.4688-.4808	(11.908-12.212)
MINOR DIA.		.4275-.4215	(10.858-10.707)	MAJOR DIA.		.5100-.5200	(12.954-13.208)
BORE DIA.	A	.188 ±.002	(4.78 ±0.05)	BORE DIA.	E	.410 ±.010	(10.41 ±0.25)
RELIEF DIA.	B	.360 ±.010	(9.14 ±0.25)	HOLE DIA.	F	.310-.320	(7.87-8.13)
CUTBACK	C	.16	(4.1)	FULL THREAD	G	.400-.420	(10.16-10.67)
FULL THREAD	D	.532 Min.	(13.51) Min.	LENGTH	H	.730	(18.54)
				LENGTH	I	.840	(21.34)
				DIAMETER	J	11/16	(17.5)
							KNURL FINISH
NIPPLE				WASHER			
SHOULDER DIA.	K	.390-.394	(9.91-10.01)	DIAMETER	P	.365 ±.003	(9.27 ±0.08)
SHANK DIA.	L	.295	(7.49)	LENGTH	Q	.265	(6.73)
HOLE DIA.	M	.16	(4.1)				
BORE DIA.	N	.370 ±.002	(9.45 ±0.05)	HOLE DIA.	R	.200	(5.08)
SHOULDER	O	.300 ±.010	(7.62 ±0.25)				
LENGTH							
LENGTH	Y	.265-.270	(6.73-6.86)				
SHANK LENGTH	Z	.20 Min.	(5.1) Min.				

All dimensions are in inches (millimeters).

.500-16 ACME-2G-RH-EXT

STANDARD CYLINDER VALVE OUTLET CONNECTION FOR PRESSURES UP TO
500 psi (3450 kPa) FOR 1,1,1,2-TETRAFLUOROETHANE (R-134a) AUTOMOTIVE USE



VALVE OUTLET			
.500-16ACME-2G-RH-EXT			
THREAD			
MAJOR DIA.	.5000-.4950	(12.700-12.573)	
PITCH DIA.	.4631-.4514	(11.762-11.466)	
MINOR DIA.	.4275-.4215	(10.858-10.707)	
BORE DIA.	A .188 ±.002	(4.78 ±0.05)	
RELIEF DIA.	B .360 ±.010	(9.14 ±0.25)	
CUTBACK	C .16	(4.1)	
FULL THREAD	D .532 Min.	(13.51) Min.	

NIPPLE			
SHOULDER DIA.	K .390-.394	(9.91-10.01)	
SHANK DIA.	L .295	(7.49)	
HOLE DIA.	M .16	(4.1)	
BORE DIA.	N .370 ±.002	(9.45 ±0.05)	
SHOULDER	O .300 ±.010	(7.62 ±0.25)	
LENGTH			
LENGTH	Y .265-.270	(6.73-6.86)	
SHANK LENGTH	Z .20 Min.	(5.1) Min.	

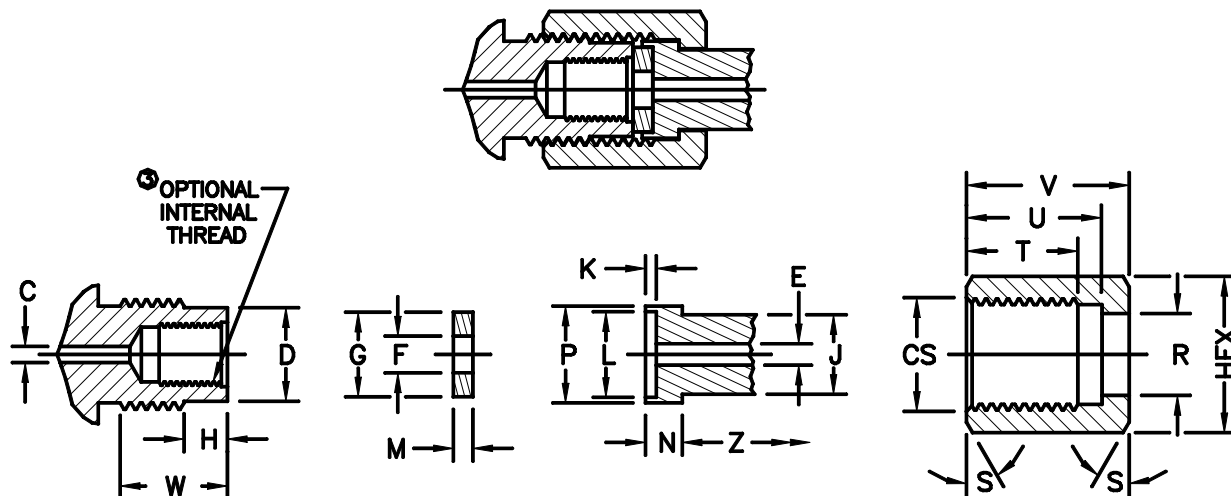
NUT			
.500-16ACME-2G-RH-INT			
THREAD			
MINOR DIA.	.4375-.4425	(11.113-11.240)	
PITCH DIA.	.4688-.4808	(11.908-12.212)	
MAJOR DIA.	.5100-.5200	(12.954-13.208)	
BORE DIA.	E .410 ±.010	(10.41 ±0.25)	
HOLE DIA.	F .310-.320	(7.87-8.13)	
FULL THREAD	G .400-.420	(10.16-10.67)	
LENGTH	H .730	(18.54)	
LENGTH	I .840	(21.34)	
DIAMETER	J 11/16	(17.5)	
	KNURL FINISH		

WASHER			
DIAMETER	P .365 ±.003	(9.27 ±0.08)	
LENGTH	Q .265	(6.73)	
HOLE DIA.	R .200	(5.08)	

All dimensions are in inches (millimeters).

.5625-18UNF-2A-RH-EXT

LIMITED^① STANDARD CYLINDER VALVE OUTLET CONNECTION FOR
NONCORROSIVE GASES^② IN SMALL CYLINDERS
FOR PRESSURES UP TO 3000 psi (20 680 kPa)



VALVE OUTLET		
THREAD	.5625-18UNF-2A-RH-EXT	
MAJOR DIA.	.5611-.5524	(14.251-14.031)
PITCH DIA.	.5250-.5205	(13.335-13.221)
MINOR DIA.	.4929 Max	(12.519) Max.
DRILL DIA.	C .094 ±.015	(2.39 ±0.38)
RELIEF DIA.	D .475	(12.07)
CUTBACK	H .22	(5.6)
FULL THREAD	W .500 Min.	(12.70) Min.

NIPPLE		
DRILL DIA.	E .109 ±.015	(2.77 ±0.38)
SHANK DIA.	J .406-.401	(10.31-10.19)
RECESS DEPTH	K .055	(1.40)
RECESS DIA.	L .430-.435	(10.92-11.05)
SHOULDER LENGTH	N .187-.202	(4.75-5.13)
SHOULDER DIA.	P .495-.490	(12.57-12.45)
SHANK LENGTH	Z .14 Min	(3.6) Min.

NUT		
THREAD	.5625-18UNF-2A-RH-INT (MOD.)	
MINOR DIA.	.5020-.5106 (3B)	(12.751-12.969)
PITCH DIA.	.5264-.5323	(13.317-13.520)
MAJOR DIA.	.5625 Min.	(14.288) Min.
HEX	11/16	(17.5)
HOLE DIA.	R .411-.416	(10.44-10.57)
CHAMFER DIA.	S 30° x .687	(17.45)
FULL THREAD	T .437 Min.	(11.10) Min.
BORE DEPTH	U .687 ±.015	(17.45 ±0.38)
LENGTH	V .812 Min.	(20.62) Min.
C'SINK DIA.	CS 90° x .578	(14.68)

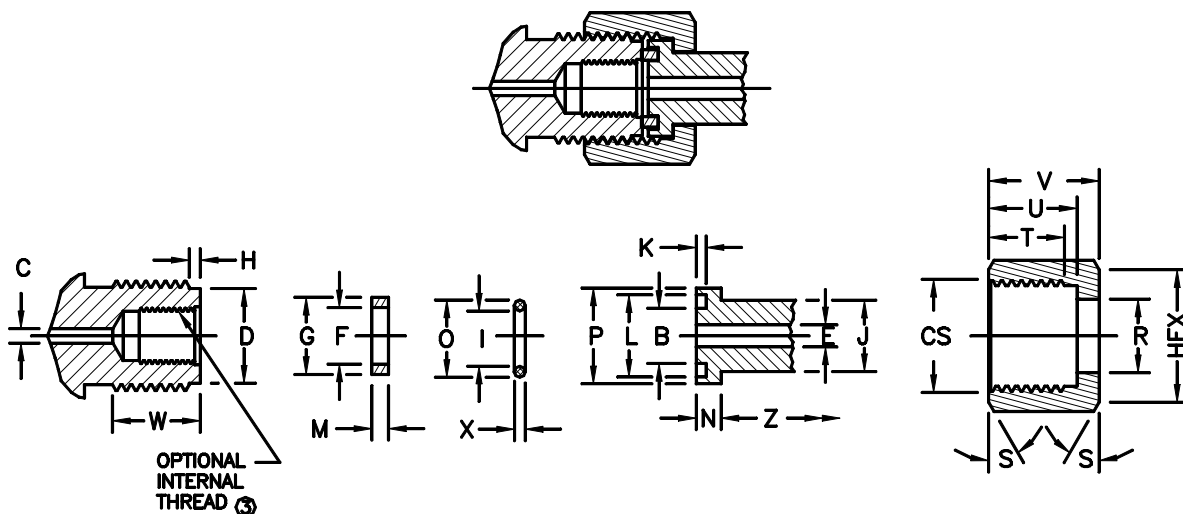
WASHER		
HOLE DIA.	F .187 ±.015	(4.75 ±0.38)
DIAMETER	G .430-.425	(10.92-10.80)
THICKNESS	M .095-.115	(2.41-2.92)

All dimensions are in inches (millimeters).

- ① Limited to small cylinders as defined in 4.10.
 ② Including gas mixtures: see CGA V-7 [22].
 ③ Optional internal thread is permitted. Use dimensions B, D, T, U, of valve outlet 110 to engage no. 110 nipple with washer.
 Otherwise bore .279-.286 dia., (7.09-7.26), .437 ±.015 (11.10 ±0.38) deep.

.625-18UNF-2A-RH-EXT

LIMITED^① STANDARD CYLINDER VALVE OUTLET CONNECTION FOR
ALL GASES^② IN SMALL CYLINDERS
FOR PRESSURES UP TO 3000 psi (20 680 kPa)

**VALVE OUTLET**

THREAD	.625-18UNF-2A-RH-EXT	
MAJOR DIA.	.6236-.6149	(15.839-15.619)
PITCH DIA.	.5875-.5828	(14.922-14.804)
MINOR DIA.	.5554 Max.	(14.107) Max.
DRILL DIA.	C .078 ± .015	(1.98 ± 0.38)
RELIEF DIA.	D .536	(13.61)
CUTBACK	H .062 ± .015	(1.57 ± 0.38)
FULL THREAD	W .437 Min.	(11.10) Min.

NIPPLE

GROOVE I.D.	B .315-.312	(8.00-7.92)
DRILL DIA.	E .125 ± .015	(3.18 ± 0.38)
SHANK DIA.	J .406-.401	(10.31-10.19)
GROOVE DEPTH	K .055-.057	(1.40-1.45)
GROOVE O.D.	L .460-.465	(11.68-11.81)
SHOULDER LENGTH	N .141-.156	(3.58-3.96)
SHOULDER DIA.	P .545-.540	(13.84-13.72)
SHANK LENGTH	Z .14 Min.	(3.6) Min

HEXAGON NUT

THREAD	.625-18UNF-2B-RH-INT (MOD.)	
MINOR DIA.	.5650-.5730 (3B)	(14.351-14.554)
PITCH DIA.	.5889-.5949	(14.959-15.110)
MAJOR DIA.	.6250 Min.	(15.875) Min.
HEX	3/4	(19.1)
HOLE DIA.	R .411-.416	(10.44-10.57)
CHAMFER DIA.	S 30° x .750	(19.05)
FULL THREAD	T .375 Min.	(9.53) Min.
BORE DEPTH	U .500 ± .015	(12.70 ± 0.38)
LENGTH	V .625 Min.	(15.88) Min.
C'SINK DIA.	CS 90° x .656	(16.66)

WASHER^④

HOLE DIA.	F .320	(8.13)
DIAMETER	G .432-.457	(10.97-11.61)
THICKNESS	M .089-.109	(2.26-2.77)

O-RING^④

INSIDE DIA.	I .312	(7.92)	Reference
OUTSIDE DIA.	O .437	(11.10)	manufacturer's
WIDTH	X .062	(1.58)	tolerances

All dimensions are in inches (millimeters).

① Limited to small cylinders as defined in 4.10.

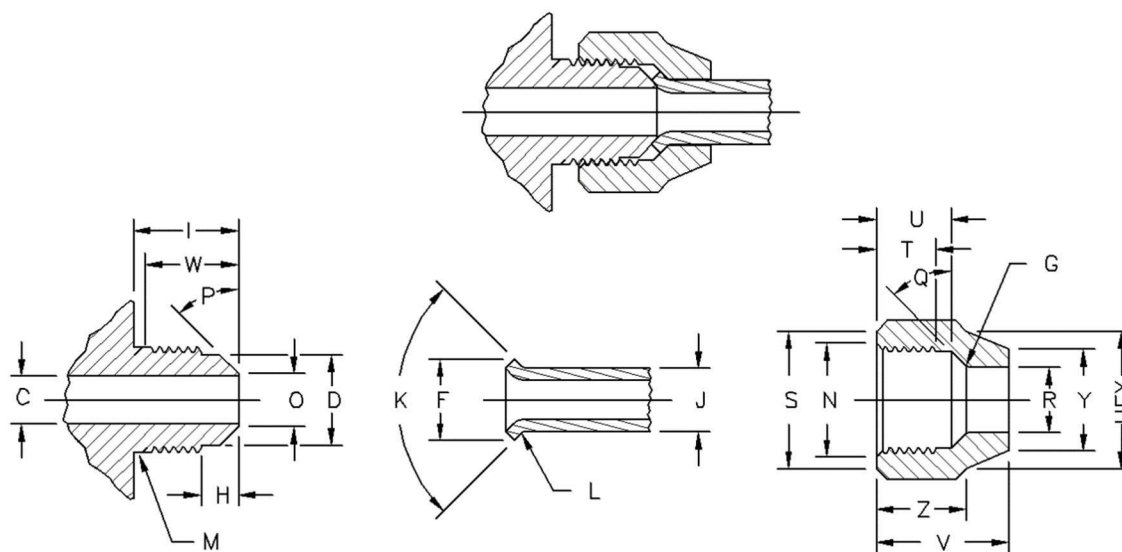
② Including gas mixtures: see V-7 [22].

③ Optional internal thread is permitted. Use dimensions B, D, T, U, of valve outlet 110 to engage no. 110 nipple with washer. Otherwise bore .279-.286 dia., (7.09-7.26), .437 ± .015 (11.10 ± 0.38) deep.

④ Washer or O-ring may be used.

.625-18UNF-2A-RH-EXT (3/8" SAE Flare)^①LIMITED[®] STANDARD CYLINDER VALVE OUTLET CONNECTION FOR
PRESSURES UP TO 500 psi (3450 kPa) FOR

Bromochlorodifluoromethane (R12B1)	Dichlorodifluoromethane (R12)	Pentachlorofluoroethane
Bromochloromethane	1, 2-Dichloroethylene (R1130)	Pentafluoroethane (HFC 125)
Bromotrifluoromethane (R13B1)	Dichlorofluoromethane (R21)	Pentafluoroethyl iodide
Chlorodifluoromethane (R22)	1, 2-Dichlorohexafluorocyclobutane (RC316)	Perfluorobutane (FC-3-1-10)
Chloroheptafluorocyclobutane (RC317)	1, 1-Dichlorotetrafluoroethane (R114a)	Perfluoro-2-butene
Chloropentafluoroethane (R115)	1, 2-Dichlorotetrafluoroethane (R114)	1, 1, 1, 2-Tetrachlorodifluoroethane (R112a)
1-Chloro-1, 2, 2, 2-tetrafluoroethane (R124)	2, 2-Dichloro-1, 1, 1-trifluoroethane (R123)	1, 1, 2, 2-Tetrachlorodifluoroethane (R112)
1-Chloro-2, 2, 2-trifluoroethane (R133a)	Fluoroform (R23)	1, 1, 2, 2-Tetrafluoro-1-chloroethane
Chlorotrifluoromethane (R13)	Hexafluoroethane (R116)	Tetrafluoroethylene (R1114)
Dibromodifluoroethane	Hexafluoropropylene (R1216)	1, 1, 1-Trichlorotrifluoroethane (R113a)
Dibromodifluoromethane (R12B2)	Heptafluoropropane (HFC 227)	Trifluoromethyl iodide
1, 2-Dibromotetrafluoroethane (R114B2)	Octafluorocyclobutane (RC318)	
1,2-Dichlorodifluoroethylene	Octafluoropropane (R218)	

**VALVE OUTLET****.625-18UNF-2A-RH-EXT**

THREAD		
MAJOR DIA.	.6236-.6149	(15.839-15.619)
PITCH DIA.	.5875-.5828	(14.922-14.804)
MINOR DIA.	.5554 Max.	(14.107) Max.
BORE DIA.	C .278-.287	(7.06-7.29)
RELIEF DIA.	D .531 ±.010	(13.49 ±0.25)
CUTBACK	H .22	(5.6)
LENGTH	I .62	(15.7)
UNDERCUT	M	NOT PERMITTED
CHAMFER DIA.	O .312 ±.010	(7.92 ±0.25)
ANGLE	P 45° ±1°	
FULL THREAD	W .54 Min.	(13.7) Min.

TUBE

FLARE DIA.	F .471-.487	(11.96-12.37)
DIAMETER	J .375±.002	(9.53 ±0.05)
ANGLE	K 90° ±1/2°	
RADIUS	L .015-.031	(0.38-0.79)

All dimensions are in inches (millimeters)

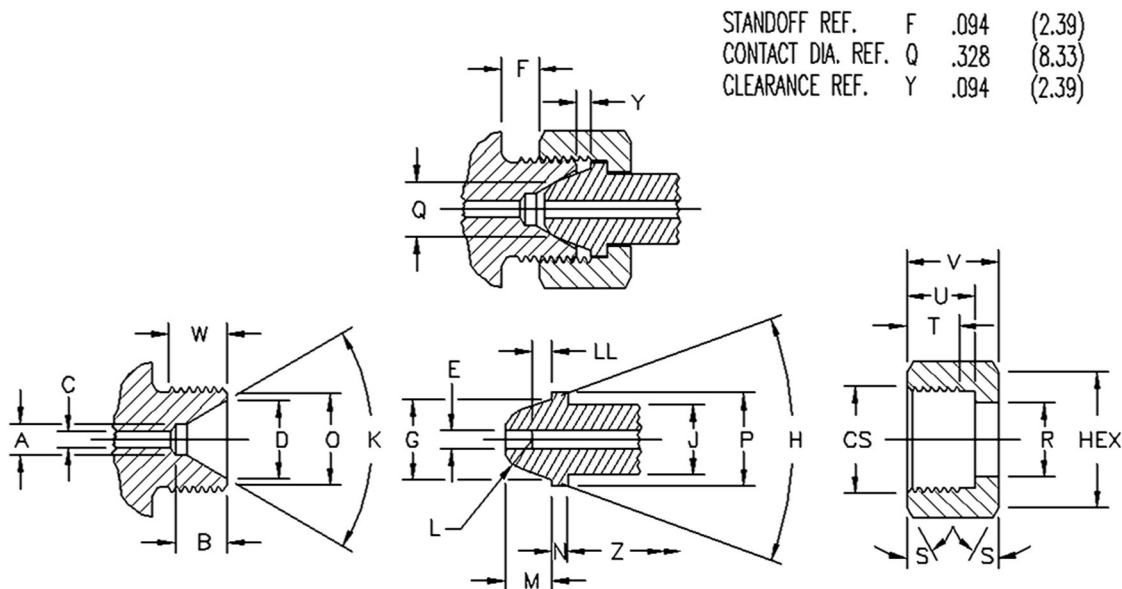
① Complies with SAE J513 [24].

② Limited for use in refrigerant industry, including gas mixtures: see CGA V-7 [22].

HEXAGON NUT**.625-18UNF-2B-RH-INT (MOD.)**

THREAD		
MINOR DIA.	.5650-.5730 (3B)	(14.351-14.554)
PITCH DIA.	.5889-.5949	(14.959-15.110)
MAJOR DIA.	.6250 Min.	(15.875) Min.
HEX	13/16	(20.6)
RADIUS	G .047 ±.010	(1.19±0.25)
C'SINK DIA	N 90° x .64-.67	(16.3-17.0)
ANGLE	Q 43° -45°	
HOLE DIA.	R .380-.385	(9.65-9.78)
CHAMFER DIA.	S 45° x.81-.78	(20.6-19.8)
FULL THREAD	T .344 Min.	(8.74) Min.
DEPTH	U .44	(11.2)
LENGTH	V .78-.69	(19.8-17.5)
DIAMETER	Y .59 Min.	(15.0) Min.
LENGTH	Z .53-.47	(13.5-11.9)

.625-20NGO-RH-EXT (Conical Nipple)
 LIMITED® STANDARD CYLINDER VALVE OUTLET CONNECTION FOR
 PRESSURES UP TO 500 psi (3450 kPa) FOR
 Acetylene® in small cylinders



VALVE OUTLET		
THREAD	<u>.625 -20NGO-RH-EXT</u>	
MAJOR DIA.	.6250 -.6200	(15.875-15.748)
PITCH DIA.	.5925-.5895	(15.049-14.974)
MINOR DIA.	.5637 Max.	(14.317) Max.
C'BORE DIA.	A .187 Max.	(4.75) Max.
C'BORE DEPTH.	B .312 ±.030	(7.92 ±0.76)
DRILL DIA	C .070-.098	(1.78-2.49)
SEAT DIA.	D .469	(11.91)
SEAT ANGLE	K 60°	
CHAMFER DIA.	O 45° x .547	(13.89)
FULL THREAD	W .312 Min.	(7.92) Min.

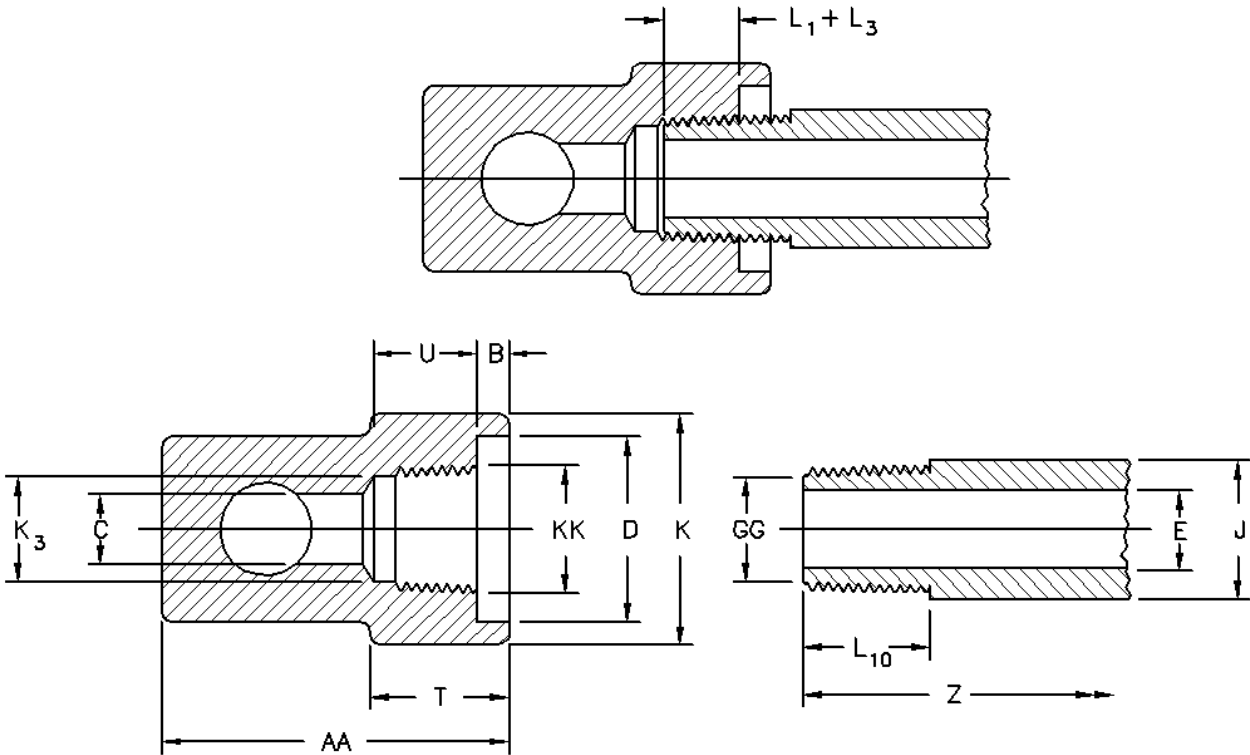
HEXAGON NUT		
THREAD	<u>.625 -20NGO-RH-INT</u>	
MINOR DIA	.5739-.5793	(14.578-14.714)
PITCH DIA.	.5955-.5985	(15.126-15.201)
MAJOR DIA.	.628 Min.	(15.96) Min.
HEX	13/16	(20.6)
HOLE DIA.	R .442	(11.23)
CHAMFER DIA.	S 30° x .812	(20.62)
FULL THREAD	T .312 Min.	(7.92) Min.
BORE DEPTH	U .406 ±.015	(10.31 ±0.38)
LENGTH	V .500 Min.	(12.7) Min.
C'SINK DIA.	CS 90° x .641	(16.28)

NIPPLE		
DRILL DIA.	E .109 ±.015	(2.77 ±0.38)
NOSE DIA.	G .484 ±.010	(12.29 ±0.25)
NOSE ANGLE	H 40°	
SHANK DIA.	J .417	(10.59)
NOSE RADIUS	L .187	(4.75)
NOSE LENGTH	M .281 ±.015	(7.14 ±0.38)
SHOULDER LENGTH	N .094-.109	(2.39-2.77)
SHOULDER DIA.	P .559	(14.20)
SHANK LENGTH	Z .140 Min.	(3.35) Min.
L LOCATION	LL .109-.128	(2.77-3.25)

All dimensions are in inches (millimeters).

3/8-18NGT-RH-INT^{①②}

STANDARD CYLINDER VALVE OUTLET CONNECTION FOR
PRESSURES UP TO 500 psi (3450 kPa) FOR
Ammonia (R717)



VALVE OUTLET			
THREAD	3/8-18NGT-RH-INT		
C'BORE DEPTH	B	.172 ±.015	(4.37 ±0.38)
DRILL DIA	C	.375 ±.015	(9.53 ±0.38)
C'BORE DIA.	D	1.000-1.015	(25.40-25.78)
BOSS DIA.	K	1.250 ±.030	(31.75 ±0.76)
BORE DIA.	K ₃	①	
WRENCH ENGAGEMENT	L ₁ + L ₃	①	
BOSS LENGTH	T	.750 ±.030	(19.05 ±0.76)
BORE DEPTH	U	.531 Min.	(13.49) Min.
OVERALL	AA	1.875 Max.	(47.63) Max.
C'SINK DIA.	KK	①	

NIPPLE			
THREAD	3/8-18NGT-RH-EXT		
BORE	E	.423 Max.	(10.74) Max.
OUTSIDE DIA.	J	.675 Min.	(17.15) Min.
THREAD LENGTH	L ₁₀	①	
LENGTH	Z	OPTIONAL	
CHAMFER	GG	①	

All dimensions are in inches (millimeters).

① For dimensions, see Table 4.

② Valve outlet no. 240 is identical to no. 800