



CYLINDER VALVE GUIDELINES

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1. INTRODUCTION

Across the Middle East, there are no clear standards or regulations for the selection of cylinder valves for different gases. There are several reasons for this.

Historically, much of the equipment that gases are supplied for has been imported, so that customers have asked for cylinder valves in accordance with the equipment they are using, or the systems they are familiar with from their home countries.

As well, some gases and gas mixtures were, and still are being, imported from overseas and are been supplied in accordance with the regulations of their country of origin.

Lastly, there are transitory cylinders , such as cylinders on board of ships or used by the military, that come into and go out of the Middle East, but may require refilling while in the Middle East.

There are potential hazards associated with filling a product into cylinders with an inappropriate valve connections, including loss of production, property damage and injury to personnel.

2. SCOPE & PURPOSE

2.1. Scope

The scope of this document is to outline the minimum standards to be followed for Industrial and Medical gases in cylinders.

2.2. Purpose

The purpose of this document is to provide guidance to all gas cylinder fillers and suppliers for the selection and use of cylinder valve outlets.

3. TERMS & DEFINITIONS

For the purposes of this document, the following terms and definitions apply:

3.1. Medical Gas

Any gas or mixture of gases intended to be administered to patients for therapeutic, diagnostic or prophylactic purposes, with or without pharmacological action, or to be used for surgical tools, and covers both medicinal and medical gases, and included in the European or US Pharmacopeia standards.

3.2. Industrial Gas

Gas or gas mixtures used in wide range of industrial applications and general usage.

3.3. ISO

International Standards Organization

3.4. Specialty Gas

Specialty Gases include rare gases, chemical gases, gases of high purity and high precision mixture gases.

4. CYLINDER VALVE SELECTION PRINCIPLES

4.1. International Standards

There are numerous valve standards published and in use around the world. The three major standards used in the Middle East are BS (British Standard, United Kingdom), CGA (Compressed Gas Association , USA and Canada) and DIN (Deutsche Industrie Norm, German Institute for Standardization) .

Other countries, including Argentina, Australia, Brazil, France, Italy and the Netherlands, to name some major ones, also have their own standards.

4.2. Valve standards commonly used in the Middle East

4.2.1. Industrial Gases

The standard most commonly used for industrial gases in most countries of the Middle East is BS, except in Saudi Arabia, where, for historical reasons, the CGA standard is used.

4.2.2. Medical Gases

The standard most commonly used standard for medical gases in the Middle East is BS, except in Saudi Arabia, where, for historical reasons, the CGA standard is used. The one exception are small medical cylinders, for which all countries utilize CGA pin-indexed connections and yoke style regulators.

4.2.3. Specialty Gases

The standard most commonly used for specialty gases in the Middle East is BS, except in Saudi Arabia, where, for historical reasons, the CGA standard is used. The DIN standard is also used with some frequency.

4.2.4. List of standard connections

Below, for reference, are the most common connection valve connection outlet standards for the three most commonly used standards.

BS 341 (British Standard)

Connector type	Connector description	Generic gas property	Example gases or mixtures components
BS 341 No. 3	G 5/8" INT	Inert	Argon, Nitrogen, Inert Mixes
BS 341 No. 3	G 5/8" INT	Oxidiser	Oxygen, Air
BS 341 No. 4	G 5/8" LH INT	Flammable	Acetylene, Hydrogen
BS 341 No. 4	G 5/8" LH INT	Flammable	Carbon Monoxide, Methane, Natural Gas
BS 341 No. 6	G 5/8"	Toxic	Chlorine, Hydrogen Chloride
BS 341 No. 7	G 5/8" LH	Flammable Refrigerants	Flammable Refrigerants
BS 341 No. 8	W 0.860" x 14 TPI	Non Flammable	Carbon Dioxide
BS 341 No. 10	G 1/2"	Toxic	Ammonia
BS 341 No. 12	G 1/2"	Toxic	Sulphur Dioxide
BS 341 No. 13	W 11/16" - 20 TPI	Oxidiser	Nitrous Oxide
BS 341 No. 14	G 3/8"	Toxic	Hydrogen Cyanide, Nitric Oxide
BS 341 No. 15	G 3/8" LH	Toxic	Carbonyl Sulphide, Hydrogen Sulphide

North American Standard

Connector type	Connector description	Generic gas property	Example gases or mixtures components
CGA 240	3/8" - 18 NPT	Toxic	Ammonia
CGA 296	0.803" - 14 UNS INT	Oxidising Mixtures	Oxygen Mix > 23%
CGA 320	0.825" - 14 NGO	Non Flammable	Carbon Dioxide
CGA 326	0.825" - 14 NGO	Oxidiser	Nitrous Oxide
CGA 330	0.825" - 14 NGO LH	Toxic	Hydrogen Sulphide
CGA 346	0.825" - 14 NGO	Oxidiser	Air , Breathing and Industrial Grades
CGA 350	0.825" - 14 NGO LH	Flammable	Hydrogen, Methane
CGA 510	0.825" - 14 NGO LH INT	Flammable	Propane
CGA 540	0.903" - 14 NGO	Oxidiser	Oxygen
CGA 580	0.965" - 14 NGO INT	Inert	Argon, Nitrogen, Inert Mixes
CGA 590	0.965" - 14 NGO LM INT	Oxidiser	Air, Specialty Gas Grades
CGA 660	1.030" - 14 NGO	Toxic	Nitric Oxide, Phosgene
CGA 680	1.030" - 14 NGO LH	High Pressure > 3000 psig	Nitrogen, Argon, Inert Mixes
CGA 705	1.125" - 14 UNS LH	Toxic	Ammonia

DIN 477 (Deutsche Industrie Norm)

Connector type	Connector description	Generic gas property	Example gases or mixtures components
DIN 477 No. 1	W 21.8 x 1/14" LH	Flammable	Hydrogen, Propane
DIN 477 No. 2	W 21.8" x 1/14" LH	Flammable	Propane
DIN 477 No. 3	Yoke	Flammable	Acetylene
DIN 477 No. 3.1	M 24 x 2" LH	Flammable	Acetylene
DIN 477 No. 5	W 1" x 1/8" LH	Toxic	Carbon Monoxide
DIN 477 No. 6	W 21.8 x 1/14"	Various	Argon, Helium, Carbon Dioxide
DIN 477 No. 7	G 5/8"	Toxic	Sulphur Dioxide
DIN 477 No. 8	W 1" x 1/8"	Toxic	Boron Trichloride
DIN 477 No. 9	G 3/4"	Oxidiser	Oxygen
DIN 477 No. 10	W 24.32 x 1/14" RH	Inerts	Nitrogen
DIN 477 No. 11	G 3/8"	Oxidiser	Nitrous Oxide (>3 l size)
DIN 477 No. 12	G 3/4" INT	Oxidiser	Nitrous Oxide (<3 l size)
DIN 477 No. 13	G 5/8" INT	Non Flammable	Air
DIN 477 No. 14	M 19 x 1.5 LH	Various	Mixtures

COMMON PIN - INDEXED MEDICAL CYLINDER VALVE YOKE CONNECTIONS

CGA Outlet

870	Oxygen
880	Carbon Dioxide & Oxygen Mixtures (CO ₂ not over 7.5%)
890	Helium & Oxygen Mixtures (Helium not over 80.5%)
910	Nitrous Oxide
930	Helium/Helium & Oxygen Mixtures (Helium over 80.5%)
940	Carbon Dioxide/Carbon Dioxide & Oxygen Mixtures (CO ₂ over 7.5%)
950	Medical Air - Up to 3000 PSI
960	Nitrogen - Up to 3000 PSI
965	Nitrous Oxide & Oxygen Mixture (N ₂ O 47.5% to 52.5%)

NOTE : the above lists show only the most common assigned connections. ALWAYS consult the original document for proper selection, or for gases and gas mixtures not included.

4.2.5. Safety Guidelines

MEGA recommends the following safety guidelines to be followed

1. Encourage the use of the outlet standards that are normally and widely used in the country in which the customer will use the gas. For example, CGA standards for Saudi Arabia, BS standards in other countries.
2. If asked for a specific outlet on a specific gas or gas mixture, consult the original technical regulations to confirm that it is the appropriate one. Customers may ask for a connection outlet that is inappropriate for the gas or gas mixture that they will use.

Remember: it is the gas supplier's responsibility as "expert" to verify that only the correct valve is used.

3. Discourage the use of adaptors. Where this is unavoidable, check for material compatibility, pressure range and appropriate outlets.
4. Be sure to follow ALL recommendations applicable within a given standard.
Example 1: if asked for a CGA valve that requires a Safety Device to be on it, be sure to use the proper valve/safety device combination. Pressure relief devices should be marked with their activation pressure.
Example 2: for pin-indexed valves, use only yoke connections with the proper pins in place. Never use yokes from which the pins have been removed.
Example 3A: if asked for a high pressure gas with CGA valves, be sure that the valve standard is authorized for the pressure in question. A good example would be that the CGA 580 outlet is authorized for pressures up to 3000 psig, whereas a CGA 680 valve is required for the same gas(es) between 3000 and 4500 psig, and yet another valve outlet, CGA 677, is required for pressures above 4500 psig.
5. Example 3B : if asked for a high pressure gas with BS valves, be sure that the valve is rated and stamped for the requested pressure. A good example would be that a BS3 valve installed on a cylinder rated for 300 bar service should also be rated for and marked for 300 bar. Do not use a valve stamped "200 bar", for example, on a 300 bar cylinder.
6. Lubricants of any kind, including PTFE tape, are not to be used on cylinder valve outlets.
7. Where a valve specifications requires a 'washer' to be used, be sure that a washer, of the proper material for the intended gas service, is used.

5. REFERENCES

1. **European Pharmacopeia**
2. **US Pharmacopeia**
3. **German Institute for Standardization (DIN)**
4. **CGA standards V-1 and V-7**
5. **BS standard for Cylinder Valve Outlets & Connectors**