MESSER
Gases for Life

High Purity Gases

From Argon to Xenon - Messer's extensive product portfolio of high purity gases

From "A" for argon to "X" for xenon, Messer offers an extensive range of high purity gases. The product portfolio comprises the "air gases" (nitrogen, oxygen and argon), carbon dioxide, carbon monoxide, hydrogen and the rare gases (helium, neon, krypton and xenon), the most important organic (e.g. methane, ethane, ethylene, acetylene, etc.) and inorganic gases (e.g. ammonia, chlorine, sulfur dioxide, etc).

Messer offers most high purity gases in several, graded qualities. Based on a strict quality management in the manufacturing of high purity gases, Messer ensures a reliable quality of the high purity gas products.

All necessary information on specification of gases and the available container sizes are listed in the relevant product data sheets. We will be glad to support you in finding the optimal product for your specific application.

Filling station for high-purity gases

Product specification

The individual application defines the quality requirement of the gas. Due to the extreme variety of applications and corresponding specifications of gas purity as well as the type and maximum quantity of disturbing impurities, Messer provides high purity gases in several quality grades.

The point notation system has become generally established for easy identification of product purity. This indicates the purity based upon two numbers: the number before the point is the number of „nines" of the gas purity expressed in volume percentage, and the number after the point is the final number, which is not a nine. For example: a purity of 99,9996 % is abbreviated as 5.6 with a maximum sum of 4 ppmv for the specified impurities.

The type of impurities contained in a particular pure gas largely depends on the production and purification process. For the user, however, the specification of the impurities interfering in their process is much more important. The selection of specified impurities is, therefore, based on the impurities interfering in the typical applications of the gases. In most cases these are moisture, air components (oxygen and/or nitrogen), hydrocarbons or carbon monoxide and carbon dioxide.

Quality of high purity gases

The reliable product quality according to the product specification is the most important property of high purity gases.

In general, the final quality of high purity gases in cylinders critically depends on:
- the primary production or extraction process of the gas
- possibly additional purification processes
- the quality and pretreatment of the gas cylinders and
- the filling equipment and the filling processes

Strict quality management is essential. We accurately monitor the quality of the raw materials, control all production steps and verify compliance of the final products with the specifications. Depending on the type of gas, the filling process and quality specification, the control measurements range from batch to individual cylinder analysis.

Compressed gas cylinders

The table below contains typical data for dimensions and contents of some standard cylinders. The designation of the cylinder provides information on the:

- Type (F: cylinder, B12: bundle of 12 cylinders)
- Geometric volume (in liters)
- Material (no indication: steel, Alu: aluminum)
- Filling pressure (e.g. 200 bar)

For example: "F50 200 bar" means a steel cylinder with a geometric volume of 50 l and a filling pressure of 200 bar. In addition, depending on the type of gas, there are numerous special containers, e.g. cylinders with filling material (for acetylene) or drums for some organic and inorganic gases.

Duplex bundle

Many installations at customer´s sites are designed for the 200 bar-technology. However, in order to benefit from the 300 bar supply option, Messer offers duplex systems. Such 300 bar bundles are equipped with an integrated pressure regulator so that a safe use for 200 bar approved installations is possible without any additional measure.

Cylinder	Gas Content	Outside Diameter	Length	Empty Weight
	m^3	mm	mm	kg
F 2 200 bar	0,4	100	350	2,5
F 5 200 bar	1	140	440	5,5
F 10 200 bar	2	140	810	12
F 20 200 bar	4	204	790	25
F 20 300 bar	6	204	815	39
F 33 300 bar	10	229	1150	50
F 50 200 bar	10	229	1500	57
F 50 300 bar	15	229	1488	71
F 2 Alu 200 bar	0,4	102	390	2,6
F 5 Alu 200 bar	1,0	140	525	6,5
F 10 Alu 200 bar	2	140	995	11
F 20 Alu 200 bar	4	204	940	23,4
F 40 Alu 200 bar	8	229	1455	46
F 50 Alu 200 bar	10	250	1530	57,5
B 12 x F 50 200 bar	120	L 990 / B 750 / H 1838		920
B 12 x F 50 300 bar	180	L 990 / B 750 / H 1838		1.100
MegaPack 4 (B4 x F 150 200 bar)	120	L 870 / B 880 / H 2.260		1.020
MegaPack 4 (B4 x F 150 300 bar)	180	L 870 / B 880 / H 2.260		1.020
MegaPack 6 (B6 x F 150 200 bar)	180	L 1.240 / B 880 / H 2.260		1.530
MegaPack 6 (B6 x P 150 300 bar)	270	L 1.240 / B 880 / H 2.260		1.530
MegaPack C4 (B4 x F 150 200 bar)	120	L 920 / B 930 / H 1.950		1.100
MegaPack C4 (B4 x F 150 300 bar)	180	L 920 / B 930 / H 1.950		1.100
MegaPack C6 (B6 x F 150 200 bar)	180	L 920 / B 1.330 / H 1.950		1.600
MegaPack C6 (B6 x P 150 300 bar)	270	L 920 / B 1.330 / H 1.950		1.600

Typical data of compressed-gas cylinders

Identification of the properties and hazards of gases in cylinders

The marks on the shoulder of compressed gas containers contain the specific cylinder number as well as information about approval for gas species, test dates, materials, owner, etc.
It is important to note that the marks of the approval for gas species is no indication of the actual content; this is solely specified on the label of the cylinder.

Labelling

Labels attached to the cylinder shoulder or body serve for identification of the gas in the cylinder. In accordance with ADR/RID (European transport regulations) and CLP (European regulation on Classification, Labelling and Packaging of substances and mixtures) the labels contain the name of the gas, the UN number, the ADR symbols and CLP pictograms, as well as safety information for transportation and advice on the safe handling of the gas (hazard and precautionary statements). The labels and the Safety Data sheets should be read carefully before using the gas.

Hazardous goods label

Shoulder color

The color coding of the cylinder shoulders is defined in EN 1089-3. A distinction is made according to four possible hazards: inert, flammable, oxidizing and toxic/corrosive. In addition, special colors are explicitly defined for some gases.

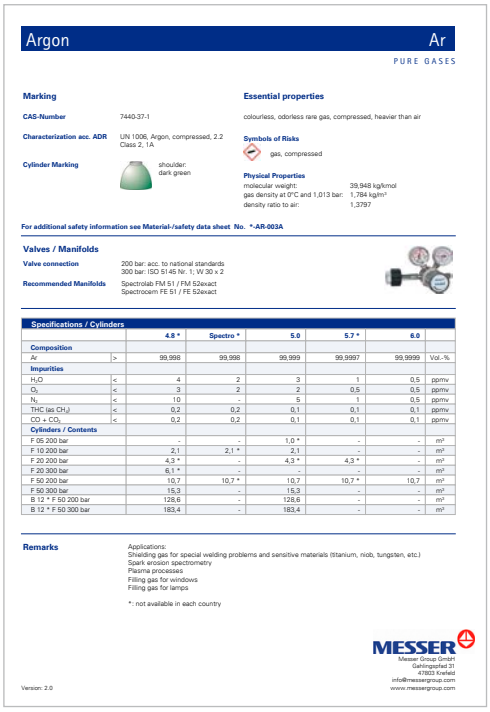
Properties	Shoulder color	Examples
Toxic and/or corrosive [1]	Yellow	Ammonia, arsine, chlorine, fluorine, carbon monoxide, nitric oxide, sulfur dioxide
Flammable [2]	Red	Hydrogen, methane, ethylene, forming gas,(nitrogen/hydrogen mixture)
Oxidizing [3]	Light blue	Oxygen mixtures, nitrous oxide mixtures
inert	Bright green	Krypton, xenon, neon, shielding gas mixtures, compressed air

Colour coding of the cylinder shoulder according to EN 1089-3

[1] See ADR/RID for definition of toxic/non-toxic and corrosive/non-corrosive. In this case, corrosive means causing burns to human tissue
[2] See ADR/RID for definition of flammable/non-flammable
[3] See ADR/RID for definition of oxidizing/non-oxidizing

Gas	Shoulder color
Acetylene	Maroon
Oxygen	White
Nitrous oxide	Blue
Argon	Dark green
Nitrogen	black
Carbon dioxide	Gray
Helium	Brown

Colour coding for specific gases



Argon Ar

PURE GASES

Marking

CAS-Number 7440-37-1

Characterization acc. ADR UN 1006, Argon, compressed, 2.2 Class 2, 1A

Cylinder Marking shoulder: dark green

Essential properties

colourless, odorless rare gas, compressed, heavier than air

Symbols of Risks

gas, compressed

Physical Properties

molecular weight: 39,948 kg/kmol
gas density at 0°C and 1,013 bar: 1,784 kg/m³
density ratio to air: 1,3797

For additional safety information see Material-/safety data sheet No. *-AR-003A

Valves / Manifolds

Valve connection 200 bar: acc. to national standards
300 bar: ISO 5145 Nr. 1; W 30 x 2

Recommended Manifolds Spectrolab FM 51 / FM 52exact
Spectrocem FE 51 / FE 52exact

Specifications / Cylinders

		4.8 *	Spectro *	5.0	5.7 *	6.0	
Composition							
Ar	>	99,998	99,998	99,999	99,9997	99,9999	Vol.-%
Impurities							
H_2O	<	4	2	3	1	0,5	ppmv
O_2	<	3	2	2	0,5	0,5	ppmv
N_2	<	10	-	5	1	0,5	ppmv
THC (as CH_4)	<	0,2	0,2	0,1	0,1	0,1	ppmv
CO + CO_2	<	0,2	0,2	0,1	0,1	0,1	ppmv
Cylinders / Contents							
F 05 200 bar		-	-	1,0 *	-	-	m³
F 10 200 bar		2,1	2,1 *	2,1	-	-	m³
F 20 200 bar		4,3 *	-	4,3 *	4,3 *	-	m³
F 20 300 bar		6,1 *	-	-	-	-	m³
F 50 200 bar		10,7	10,7 *	10,7	10,7 *	10,7	m³
F 50 300 bar		15,3	-	15,3	-	-	m³
B 12 * F 50 200 bar		128,6	-	128,6	-	-	m³
B 12 * F 50 300 bar		183,4	-	183,4	-	-	m³

Remarks

Applications:
Shielding gas for special welding problems and sensitive materials (titanium, niob, tungsten, etc.)
Spark erosion spectrometry
Plasma processes
Filling gas for windows
Filling gas for lamps

*: not available in each country

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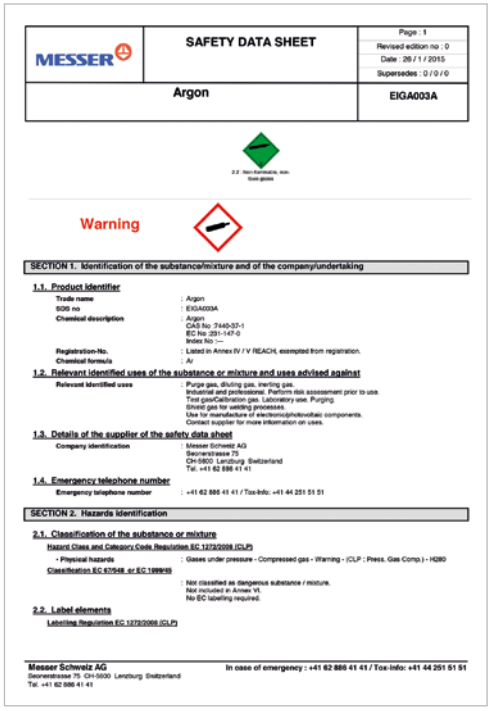
Version: 2.0

Product data sheets

Comprehensive information on our products, such as the specifications and the standard cylinder sizes are stated on the relevant product data sheet. Messer offers high purity gases in various cylinder sizes to meet the requirements of every application. This comprises high purity gases in 1 l pressure cans up to cylinder bundles. Based on the information of the product data sheet you can easily choose the optimal solution for your specific application. A list of the physical properties of the respective gas and information about the required withdrawal equipment are provided as well.

Safety data sheets

Safety data sheets are particularly important for the safe use of pure gases and gas mixtures. These documents provide information on the properties, hazards, as well as instructions for the handling, disposal and transport according to the REACH and GHS/CLP regulations. Moreover, safety data sheets include the relevant actions for firefighting, and recommendations to limit and monitor exposure.



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Argon | EIGA003A

Warning

SECTION 1. Identification of the substance/mixture and of the company/undertaking

1.1. Product identifier
Trade name : Argon
SDS no : EIGA003A
Chemical description : Argon
CAS No: 7440-37-1
EC No: 231-147-0
Index No: ---
Registration-No. : Listed in Annex IV / V REACH, exempted from registration.
Chemical formula : Ar

1.2. Relevant identified uses of the substance or mixture and uses advised against
Relevant identified uses : Purge gas, diluting gas, inerting gas.
Industrial and professional. Perform risk assessment prior to use.
Test gas/Calibration gas. Laboratory use. Purging.
Shield gas for welding processes.
Use for manufacture of electronic/photovoltaic components.
Contact supplier for more information on uses.

1.3. Details of the supplier of the safety data sheet
Company identification : Messer Schweiz AG
Seonerstrasse 75
CH-5600 Lenzburg Switzerland
Tel. +41 62 886 41 41

1.4. Emergency telephone number
Emergency telephone number : +41 62 886 41 41 / Tox-Info: +41 44 251 51 51

SECTION 2. Hazards identification

2.1. Classification of the substance or mixture
Hazard Class and Category Code Regulation EC 1272/2008 (CLP)
• Physical hazards : Gases under pressure - Compressed gas - Warning - (CLP : Press. Gas Comp.) - H280
Classification EC 67/548 or EC 1999/45 : Not classified as dangerous substance / mixture.
Not included in Annex VI.
No EC labelling required.

2.2. Label elements
Labelling Regulation EC 1272/2008 (CLP)

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Seonerstrasse 75 CH-5600 Lenzburg Switzerland
Tel. +41 62 886 41 41
In case of emergency : +41 62 886 41 41 / Tox-Info: +41 44 251 51 51

Argon Ar

PURE GASES

Marking

CAS-Number 7440-37-1

Characterization acc. ADR UN 1006, Argon, compressed, 2.2 Class 2, 1A

Cylinder Marking shoulder: dark green

Essential properties

colourless, odorless rare gas, compressed, heavier than air

Symbols of Risks

gas, compressed

For additional safety information see Material-/safety data sheet No. *-AR-003A

Description

Rare gas, colorless, odorless, heavier than air. In closed rooms the breathing air is displaced, no warning symptoms (danger of asphyxiation!).

Materials

Cylinders and Valves: any usual materials
Seals: PTFE, PCTFE, PVDF, PA, PP, IIR, NBR, CR, FKM, Q, EPDM

Physical Properties

molecular weight	39,948 kg/kmol	**vapour pressure at 20°C**	
Critical Point		**gas density at 0°C and 1,013 bar**	1,784 kg/m³
temperature	150,86 K	**density ratio to air**	1,3797
Pressure	48,98 bar	**gas density at 15°C and 1 bar**	1,669 kg/m³
density	0,5357 kg/l	**Conversion Factor**	
Triple Point		liquid at Ts to m³ gas (15°C, 1 bar)	0,8352
temperature	83,80 K	**Virial Coefficient**	
Pressure	0,6891 bar	Bn at 0°C	-0,96*10⁻³ bar⁻¹
Boiling Point		B30 at 30°C	-0,61*10⁻³ bar⁻¹
temperature	87,280 K; -186 °C	**Gaseous State at 25°C and 1 bar**	
liquid density	1,3940 kg/l	specific heat capacity cp	0,5216 kJ/kg K
evaporation heat	161,3 kJ/kg	thermal conductivity	178,21*10⁻³ W/m K
		dynam. viscosity	22,8*10⁻⁶ Ns/m²

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Technical data sheets

Further information on high purity gases can be found in the technical data sheets, which contain tables listing the properties, the main physical data as well as the compatibility of materials for each gas.

The physical properties of the most frequently used gases are also compiled in our mobile "Gasprops"- App, which is available for iOS and Android.

Cylinder connection and equipment

The valve outlet connections of gas cylinders comply with the relevant national standards. These standards define the valve outlet connections depending on the type of gas. Only the outlet connections of 300 bar cylinders are defined EU-wide in the ISO 5145:2004. The appropriate connection is specified on the product data sheet.

Appropriate equipment is needed for the safe withdrawal of the gas. A cylinder pressure regulator can be used if only one application has to be supplied with gas and the cylinder can be placed right next to the point of use. With a central gas supply system, consisting of pressure control panels, pipelines and tapping points at the various points of use, the gas cylinders are safely stored outside of workplaces.

Service and support

We will be glad to support you in choosing the suitable gas quality and gas supply equipment for your specific requirements.

MESSER
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Messer SE & Co. KGaA
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