

# 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 in Lenzburg

## 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 <sup>3</sup>	mm	mm	kg
<b>F 2 200 bar</b>	0.4	100	350	2.5
<b>F 5 200 bar</b>	1	140	440	5.5
<b>F 10 200 bar</b>	2	140	810	12
<b>F 20 200 bar</b>	4	204	790	25
<b>F 20 300 bar</b>	6	204	815	39
<b>F 33 300 bar</b>	10	229	1'150	50
<b>F 50 200 bar</b>	10	229	1'500	57
<b>F 50 300 bar</b>	15	229	1'488	71
<b>F 2 Alu 200 bar</b>	0.4	102	390	2.6
<b>F 5 Alu 200 bar</b>	1.0	140	525	6.5
<b>F 10 Alu 200 bar</b>	2	140	995	11
<b>F 20 Alu 200 bar</b>	4	204	940	23.4
<b>F 40 Alu 200 bar</b>	8	229	1'455	46
<b>F 50 Alu 200 bar</b>	10	250	1'530	57.5
<b>B 12 x F 50 200 bar</b>	120	L 990 / B 750 / H 1'838		920
<b>B 12 x F 50 300 bar</b>	180	L 990 / B 750 / H 1'838		1'100
<b>MegaPack 4 (B4 x F 150 200 bar)</b>	120	L 870 / B 880 / H 2'260		1'020
<b>MegaPack 4 (B4 x F 150 300 bar)</b>	180	L 870 / B 880 / H 2'260		1'020
<b>MegaPack C4 (B4 x F 150 200 bar)</b>	120	L 920 / B 930 / H 1'950		1'100
<b>MegaPack C4 (B4 x F 150 300 bar)</b>	180	L 920 / B 930 / H 1'950		1'100

*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 or SDR (European and Swiss 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
Inert	 <b>Bright green</b> (RAL 6018)	Krypton, xenon, neon, shielding gas mixtures, compressed air
Flammable <sup>(1)</sup>	 <b>Red</b> (RAL 3000)	Hydrogen, methane, ethylene, forming gas, nitrogen / hydrogen mixture
Oxidizing <sup>(2)</sup>	 <b>Light blue</b> (RAL 5012)	Oxygen mixtures, nitrous oxide mixtures
Toxic and/or corrosive <sup>(3)</sup>	 <b>Yellow</b> (RAL 1018)	Ammonia, arsine, chlorine, fluorine, carbon monoxide, nitric oxide, sulfur dioxide

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

<sup>1)</sup> See ADR/RID for definition of flammable / non-flammable.

<sup>2)</sup> See ADR/RID for definition of oxidizing / non-oxidizing.

<sup>3)</sup> See ADR/RID for definition of toxic / non-toxic and corrosive / non-corrosive. In this case, corrosive means causing burns to human tissue.

Gas	Schulterfarbe
Nitrogen (N <sub>2</sub> )	 <b>Black</b> (RAL 9005)
Oxygen (O <sub>2</sub> )	 <b>White</b> (RAL 9010)
Argon (Ar)	 <b>Dark green</b> (RAL 6001)
Acetylene (C <sub>2</sub> H <sub>2</sub> )	 <b>Oxide red</b> (RAL 3009)
Nitrous oxide (N <sub>2</sub> O)	 <b>Blue</b> (RAL 5010)
Carbon dioxide (CO <sub>2</sub> )	 <b>Grey</b> (RAL 7037)
Helium (He)	 <b>Brown</b> (RAL 8008)

Colour coding for specific gases

**Marking**  
 CAS Characterization acc. ADR: 1945-21-5  
 UN 1010 ARGON, COMPRESSED, 2.2, (H)

**Cylinder Marking**  
 Shoulder color: dark green

**Essential properties**  
 compressed gas, colorless, odorless, heavier than air

**Symbols of risks**

**Physical Properties**  
 density ratio to air: 1.3791  
 gas density at 0°C and 1.013 bar: 1.784 kg/m³

**Valves / Manifolds**  
 Valve connection: 200 bar acc. to national regulations  
 300 bar: ISO 1542 No. 1, W 20 x 2

**Recommended manifolds**  
 Spectrabid PR 31 / PR 35 (acc. to Spectrabid PR 31, PR 35 manual)

Specification / Characteristics		Argon 4.0	Argon 5.0	Argon 6.0	
Composition		99.999	99.999	99.999	Vol.-%
Impurities					
humidity	x	3	3	3.5	ppmv
H <sub>2</sub> (in O <sub>2</sub> )	x	0.2	0.5	0.5	ppmv
CO + CO <sub>2</sub>	x	0.2	0.5	0.5	ppmv
oxygen	x	3	3	3.5	ppmv
nitrogen	x	20	5	0.5	ppmv
<b>Cylinder / Contents</b>					
CAN Gas			0.812		m³
F 2 200 bar				0.828	m³
F 3 200 bar	1.817				m³
F 20 200 bar		2.343		2.343	m³
F 20 200 bar	4.286				m³
F 50 200 bar		58.715		59.715	m³
F 50 200 bar		55.585			m³
F 50* 2.2 200 bar				128.383	m³
F 50* 2.2 300 bar Dwyler			101.42		m³
MegaPack (4 200 bar Dwyler)			101.42		m³

**Remarks**  
 Applications:

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 Sonnenstrasse 75  
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## 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.

### Argon med. Messer

**Marking**  
 Characterization acc. ADR: UN 1010 ARGON, COMPRESSED, 2.2, (H)

**Cylinder Marking**  
 Shoulder color: Emerald green

**Essential properties**  
 compressed gas, colorless, odorless, heavier than air

**Symbols of risks**

For additional safety information see safety data sheet

#### Description

Rare gas, colorless, odorless, heavier than air. Air displaced from the breathing air is displaced, no warning symptoms (danger of asphyxiation).

#### Materials

Cylinders and valves: any usual materials  
 Seals: PTFE, PCTFE, PEEK, PA, PE, BK, 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	130.80 K	density ratio to air	1.3791
Pressure	48.94 bar	gas density at 25°C and 1 bar	1.669 kg/m³
density	0.0177 kg/l	conversion factor	
triple point		liquid at 15 to 16° gas (15°C, 1 bar)	0.8352
temperature	87.30 K	viscosity coefficient	
Pressure	0.681 bar	Re at 20°C	-0.80*10 <sup>-7</sup> bar <sup>-1</sup>
boiling point		Re at 30°C	-6.61*10 <sup>-7</sup> bar <sup>-1</sup>
temperature	87.280 K; 188 °C	gas-water ratio at 20°C and 1 bar	
liquid density	1.2445 kg/l	specific heat capacity cp	0.0218 kJ/kg K
evaporation heat	161.3 kJ/kg	thermal conductivity	176.2*10 <sup>-6</sup> W/m K
dynamic viscosity	22.8*10 <sup>-6</sup> kg/m s		

## 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.

**MESSE**  
**Safety Data Sheet**  
 Argon  
 according to the REACH Regulation (EC) 1907/2006 amended by Regulation (EU) 2020/873  
 SDS Reference Number: CH-AR-003A  
 Issue date: 25/03/2023, Revised date: 01/10/2024, Supersedes version of: 5/17/2015, Version: 1.1

**Warning**

**SECTION 1: Identification of the substance/mixture and of the company/undertaking**

**1.1 Product identifier**  
 Trade name: Argon  
 SDS no: CH-AR-003A  
 Argon  
 CAS-No.: 7445-21-5  
 EC-No.: 223-147-0  
 EC Index-No.: ---

REACH 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: No additional information available  
 Uses advised against: Consumer use.  
 Users other than those listed above are not supported, contact your supplier for more information on other uses.  
 Attention: These products must not be applied to humans or animals unless they are expressly designated as medical or medicinal gases!

**1.3 Details of the issuer of the safety data sheet**  
 Messer Schweiz AG  
 Sonnenstrasse 75  
 CH 8000 Lenzburg  
 Switzerland  
 T: 0041 (0) 800 41 41, F: 0041 (0) 22 886 41 00  
 info@messec.ch, www.messec.ch

**1.4 Emergency telephone number**  
 Emergency telephone number: 0041 62 886 41 41 / Toll-free: 0041 44 251 51 51

**SECTION 2: Hazards identification**

**2.1 Classification of the substance or mixture**  
 Classification according to Regulation (EC) No. 1272/2008 (CLP):  
 Physical hazards: Gases under pressure - Compressed gas  
 H280

**2.2 Label elements**  
 Labelling according to Regulation (EC) No. 1272/2008 (CLP):  
 Hazard pictograms (GHS):  
  
 CH280

Messer Schweiz AG  
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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 technical data sheets can be found on page 2 of the corresponding product data sheets.

## 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.



## Further information

**Special brochures are also available on the following topics:**

- Specialty Gases
- Gas Mixtures
- Helium
- Balloon Helium
- CANGas
- Specialty Gas Equipment
- Process Gases for Analytical Applications
- Environmental Analysis
- myLab.

For further information please also visit the specialty gases - website of the Messer Group.

You can easily reach the website via the link in the address or with the QR code shown here.



[gasesforlife.de](https://gasesforlife.de)

Reine Gase: 03 / 2025



## 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**   
Gases for Life

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