Air Liquide	**Operating Instructions** Line Reducers for pure gases	**OP 250** **Version : 0** **Date : June 2022** Owner: NEC Language : EN

Operating Instructions
Line reducers used with pure gases or specialty gases

Brass chromed line reducers	Stainless steel line reducers
BD	BD.S
BS, BS-A, BS.V, BS-LM	BSI
DACC	DACC.S
DACC-FOOD	DACC.S PHARMA
DHP-L	DHPS-L
DLM-L	DIM-L, DIM-GLC-L
HD-L	HD.S-L
LH-L, LH.V-L	IH-L

Warning

To preserve the quality of our product throughout its usage in the best safety conditions, please read this manual carefully and strictly follow the instructions that it contains. Non- compliance with these instructions or modification of the product many results in serious accidents or bodily injuries. Air Liquide shall not be held responsible in case of non approved usage of the product.
Air Liquide reserves the right to make all necessary modifications to the specifications described hereafter without notice.

CONTENTS

1. FIELD OF USAGE AND CHARACTERISTICS

1.1 Functions

The line regulators allow you to:

- reduce a low-pressure stored gas (between 50 and 20 bar at 15°C) (second stage reducing step).
- regulate and maintain stability of outlet pressure.
- preserve the gas purity.

The regulators are designed for implementation of pure gases and mixtures with purity < N60 thus ALPHAGAZ™ 1 and 2.

These low pressure regulators are used on pipelines or panels. Associated with a valve, they can be used as a point of use.

Vacuum treatment possible (except BS 20-0,1-0,5).

WARNING ! These regulators should not be used as shut-off valves.

1.2 Technical characteristics

Operating temperature : - 20°C to + 50°C.
Leakage rate (Internal/External) : ≤ 3 x 10-7 mbar l/ s helium.

1.3 Gas compatibility table

IMPERATIVE : check the gases compatibility of this equipment by referring to the "Gas Compatibility Table.

See in “APPENDIX”.

2. AIR LIQUIDE COMMITMENTS

2.1 Conformity

Air Liquide certifies that this equipment is manufactured, tested and controlled, in accordance with the technical specifications described in the AIR LIQUIDE specifications.

This equipment is subject to specific cleaning procedures (grease & oils removal) to allow use under “oxygen service”.

It is the responsibility of the end user to ensure that such equipment is installed and used in accordance with the current regulations.

Directive 2014/68/EC: Pressurized equipment (PED)

Technical requirements of Article 4§3 indicates that Pressure equipment and assemblies below or equal to the limits set out in points (a), (b) and (c) of paragraph 1 and in paragraph 2 respectively shall be designed and manufactured in accordance with the sound engineering practice of a Member State in order to ensure safe use.

Without prejudice to other applicable Union harmonisation legislation providing for its affixing, such equipment or assemblies shall not bear the CE label referred to in Article 18.
By design, these equipment may integrate pressure relief valves or burst disks. In this case, those ones shall neither be CE marked according to paragraph 2 of annex II.
In all other cases, pressure relief valves and burst disks shall be CE marked.

Directive 2014/34/UE ATEX

The equipment is not in the scope defined in points a), b) et c) of the article of the ATEX Directive: consequently, they shall not bear the CE label.
The equipment are not capable of causing an explosion through their own potential sources of ignition: then, they can be installed in ATEX zone 1 or 2, as far as respecting up to date regulations, rules, operating instructions, in accordance with the sound engineering practice are followed during installation and use.
Reminder: it belongs to the end user to define the ATEX zone.

REACH regulation (EC) n°1907/2006

The line reducers are made of brass parts, essentially the body, which is a copper alloy with a lead content between 1% and 4% w/w.
As requested by art.33 of REACH Regulation (Registration, Evaluation and Authorisation of Chemicals) and with reference to current list of SVHC (substances of very high concern) available on ECHA website, we inform that lead may be present in a concentration above 0,1% w/w in our products made of brass.
Lead inclusion in the SVHC list in June 2018 does not modify the use conditions described in operating instructions.
Lead will not be released to the surrounding environment or the gas used during normal use.
After product end of life, the pressure reducers must be scrapped by an authorized metal recycler.

FOOD regulation (EC) n°1935/2004

The AL equipment enhancing the term “FOOD” in their designation are specifically designed for use with food gases used for food and beverage applications. They are compliant with Regulation EC 1935/2004 which requires that packaging and articles intended to be in contact with foodstuffs are to be manufactured in compliance with good manufacturing practices and standard operating procedures.
Thus, under normal or foreseeable conditions of use, , no transfer of contaminants, eg, metal elements, to food in quantities that could endanger human health, modify food composition or deteriorate organoleptic characteristics is expected.
Nethertheless, the end-user must check the compliance with an eventual national regulation.

Articles for food usage has a Food logo marking. 

For traceability purposes, the batch number is written on each article and AL can perform a batch recall, as requested by its Quality management system.

2.2 Cleaning

Each equipment is subject to a grease removal and a high quality cleaning to preserve the purity of gas in the equipment as well as for use with oxygen for compatible equipment.
A suitable packaging protects the equipment against exterior pollutants during storage and transport.
Take care to avoid polluting the equipment during installation.

2.3 Inspections

Equipment is inspected and has undergone a certified helium leak test prior to packing and dispatch.

2.4 Warranty

The warranty period for equipment supplied by AIR LIQUIDE is **one year**, covering faulty material or workmanship during manufacture. The warranty does not cover packing and return transport costs.
Excluded from warranty: seals and relief valves. These components are submitted to a natural wear.
Warranty is not valid on deterioration resulting from incorrect or improper use, use of spare parts which are not recommended by AIR LIQUIDE or from the none respect of this operating instruction.

For more information, refer to the general sales conditions of Air Liquide.

3. ASSEMBLY-ACTIVATION

3.1 Safety

First of all, it is ESSENTIAL to read and respect the safety instructions described in the document “General Safety Instructions” delivered with the product.

NEVER dismantle a component of the regulator in the High Pressure part, especially the cylinder inlet fitting

3.2 Precautions before assembly

After opening the packaging, check that the equipment is not damaged and that the contents correspond to the accompanying delivery notes.

- During assembly, it is important to take extreme care to ensure cleanliness and avoid contamination.
- The regulators are designed to be directly mounted on pipelines. Ensure that the pipeline is installed on a smooth and level surface. This will prevent risk of falling.
- To install the equipment, select a ventilated area, protected from the effects of bad weather.
- Only qualified personnel can handle an equipment under pressure.

3.3 Assembly

Pipe work set up

Outlet fitting assembly on the regulator outlet port :

- Make sure that the supplied fittings (4) match the application.
- Put in place the seal.
- Screw the fittings on the regulator outlet port (tighten to 35 Nm with a wrench).
- Connect the pipe network and strongly fix it to avoid risks of flapping.
- Install a shut-off valve on the pipe upstream of the point of use.
- Install a relief valve suited to the application on the pipe.

Use the threaded holes (M5) or knurled nut (except with BS 20-0,1-0,5).
Drilling diameter panel: 31.5 mm for BS, BS.V, BS-A and BSI, 41mm for BD. Maximum thickness of the plate: 3mm.

Equip the back entry port with a connector G3/8 BSPP male and filter.

3.4 Assembly of a compression fitting

Check dimensions and respect material compatibility between connection and pipe: Connection and pipe must always be made from the same material, example: Stainless steel connection for stainless steel pipe.

Connector pre-assembled by hand

- After cutting, deburring and blowing on the tube (use preferably a tube cutter), pre-assemble the nut and the ferrules, following the order and the direction indicated in the figure.
- Introduce the tube inside the connector up to the stop limit on the body.
- Clamp the nut completely by hand
- Complete the clamping using a wrench by turning the nut a 1-1/4 turn.

3.5 Activation

Even if the tightness of each regulator is tested in the factory plant, it is necessary to ensure there is no leakage on the connections made during the assembly. Before carrying out this check, make sure that the downstream circuit is closed (towards the application).

Checking of leakage on the upstream circuit:

- Check that the regulator handwheel (3) is loose (counterclockwise)
- Open the gas flow
- If necessary, check the leakage on the upstream circuit (Inlet fitting and gauge (1)) by using an Air Liquide leaks detector.

In case of leakage:

- Stop the gas flow
- Purge the regulator
- Check the seals and, if necessary, change them.
- Make sure that the tube is fully inserted in the fitting.
- Check the ferrules if necessary change them.
- Retighten the compression fitting nut.

Checking of leakage on the downstream circuit :

- Make sure that the valve on the downstream circuit is closed.
- Open the gas flow.
- Turn the handwheel clockwise to read a pressure on the pressure gauge (2).
- Verify that the value indicated on the pressure gauge does not vary over a sufficiently long period.
- If necessary, check the leakage on the downstream circuit (outlet fitting and gauge) by using an AIR LIQUIDE leaks detector.

In case of leakage:

- Close the cylinder valve.
- Purge the regulator.
- Check the seal and if necessary change it.
- Make sure that the tube is fully inserted in the fitting.

- Check the ferrules, if necessary, change them.
- Retighten the compression fitting nut.

Always turn valves GRADUALLY. NEVER retighten a fitting under gas pressure.

4. USAGE

4.1 Use

- Verify that the regulator handwheel (3) is loose (counterclockwise) and the valve upstream circuit is closed.
- Open the cylinder valve
- Read the pressure on the pressure gauge (1).
- Turn the handwheel clockwise until you start feeling resistance. Then continue until you reach the required working pressure.
- Now the regulator is ready to regulate the working pressure.
- Read the outlet pressure on the low pressure gauge (2).
- Open the outlet valve.
- Adjust the outlet pressure if necessary.
- To stop the gas flow, close the cylinder valve or the valve upstream of the regulator.

4.2 After use

When the regulator is no longer used.

- Close the cylinder valve.
- Lower the pressure by the outlet.
- Loosen the handwheel of the regulator (3).
- Close the upstream valve of the regulator.

5. MAINTENANCE

5.1 Troubleshooting

Default	Cause	Remedy
Mounting impossible	Connections cannot be mounted	Verify the compatibility of gases, inlet and outlet. Use the fittings adapted to the dimensions of the orifices.
	Damaged connections	Replace the connection
Insufficient output of gas	Cross section of passage limited by a valve	Open the valve
	Under-dimensional equipment	Contact Air Liquide
	Equipment in output not operational	Replace the equipment
Gas leak	Rupture of gas tightness	Stop the flow of gas and replace the regulator
The outlet pressure increase	Leakage at the main valve of the regulator	
Unstable outlet pressure	Output flow to high	Respect the output of the regulator. Limit the flow by a valve or a calibrated orifice
Vibrations	Output flow to high	Limit the flow by a valve or a calibrated orifice
	Presence of valve with rapid opening on the output pipe	

5.2 Maintenance

Even though the equipment is reliable, it must be checked periodically. Since this task requires some precautions, it must be done exclusively by a qualified technician.

The periodicity of this verification depends essentially on the usage of the equipment (intensive, moderate, occasional).

In case of an operating accident (insufficient output, leakage, opening of the relief valve or accidental damage): replace the equipment.

- Use only original parts and do not modify the equipment.
- Never dismantle any of the equipment's components.

Defective reassembly may cause bursting, malfunctioning and/or an increasing output pressure, which is dangerous for your safety.

6. APPENDIX : Gas compatibility tables

6.1 BS, BD, BS.V, BS-A

Models	Inerts N_2	Argon & Ar/CO_2	CO_2	CO	Air*	O_2	N_2O	H_2	C_2H_2	C_3H_8	C_3H_6	C_2H_4	CH_4
BS 20-0,1-0,5	Y (20 bar)	Y (20 bar)	Y (20 bar)	N	Y (20 bar)	Y (20 bar)	Y (20 bar)	Y (20 bar)	N	N	N	N	N
BD 25-3-2 BD 25-8-5	Y (25 bar)	Y (25 bar)	Y (25 bar)	N	Y (25 bar)	Y (25 bar)	Y (25 bar)	Y (25 bar)	N	N	N	N	N
BS 50-1-2 BS 50-3-2,5 BS 50-10-3,5	Y (50 bar)	Y (50 bar)	Y (50 bar)	N	Y (50 bar)	Y (25 bar)	Y (25 bar)	Y (50 bar)	N	N	N	N	N
BS.V 50-1-2 BS.V 50-3-2,5 BS.V 50-10-3,5	Y (50 bar)	N	N	N	Y (50 bar)	Y (25 bar)	Y (25 bar)	Y (50 bar)	N	Y (10 bar)	Y (10 bar)	Y (50 bar)	Y (50 bar)
BS-A 25-1,5-2	N	N	N	N	N	N	N	N	Y (25 bar)	N	N	N	N

* Air: compressed air not breathable

6.2 BSI

Models	Inerts, N_2 (50 bar)	Argon & Ar/CO_2 (50 bar)	CO_2 (50 bar)	CO (50 bar)	Air* (50 bar)	O_2 (25 bar)	N_2O (25 bar)	H_2 (50 bar)	C_2H_2	C_3H_8	C_3H_6	C_2H_4	CH_4	NH_3 (50 bar)
BSI 50-1-2 BSI 50-10-3,5	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	N	N	Y

* Air: compressed air not breathable

6.3 DACC

Models	Inerts, N_2 (25 bar)	Argon & Ar/CO_2 (25 bar)	CO_2 (25 bar)	CO (25 bar)	Air* (25 bar)	O_2 (25 bar)	N_2O (25 bar)	H_2 (25 bar)	C_2H_2	C_3H_8 (25 bar)	C_3H_6 (25 bar)	C_2H_4 (25 bar)	CH_4 (25 bar)	NH_3
DACC 25-8-12 DACC 25-10-50	Y	Y	N	N	Y	Y	Y	Y	N	Y	Y	Y	Y	N
DACC.S 25-8-12	Y	N	Y	N	Y	Y	N	Y	N	N	N	Y	N	N
DACC.S 25-10-50	Y	N	Y	N	Y	Y	N	Y	N	Y	N	Y	Y	N

DACC.S PHARMA 25-8-12 DACC.S PHARMA 25-10-50	Y	N	Y	Y	Y	Y	Y	Y	N	N	N	N	N	N

* Air: compressed air not breathable

6.4 DHP-L

Models	**Inerts N_2** (200 bar)	**Argon & Ar/CO_2**	**CO_2**	**CO**	**Air*** (200 bar)	**O_2** (200 bar)	**N_2O** (50 bar)	**H_2** (50 bar)	**C_2H_2**	**C_3H_8**	**C_3H_6**	**C_2H_4**	**CH_4**	**NH_3** (50 bar)
DHP-L 200-50-10	Y	N	N	N	Y	Y	Y	N	N	N	N	N	Y	N
DHP-L 200-200-30	Y	N	N	N	Y	N	N	N	N	N	N	N	Y	N
DHPS-L 200-200-30	Y	N	N	N	Y	N	N	Y	N	N	N	N	Y	N

* Air: compressed air not breathable

6.5 DIM-L & DIM GLC-L

Models	**Inerts N_2**	**Argon & Ar/CO_2**	**CO_2**	**CO**	**Air***	**O_2**	**N_2O**	**H_2**	**C_2H_2**	**C_3H_8**	**C_3H_6**	**C_2H_4**	**CH_4**	**NH_3**
DIM-L 200-3-5 DIM-L 200-15-25 DIM-L 200-25-50 DIM-L 200-50-30	Y (200 bar)	N	N	N	Y (200 bar)	N	N	Y (200 bar)	N	N	N	N	Y (200 bar)	N
DIM-GLC-L 25-3-5	Y (25 bar)	N	N	N	Y (25 bar)	N	N	Y (25 bar)	N	Y (10 bar)	Y (10 bar)	Y (25 bar)	Y (25 bar)	N
DIM-GLC-L 70-3-5	Y (70 bar)	N	N	N	Y (70 bar)	N	N	Y (70 bar)	N	Y (10 bar)	Y (10 bar)	Y 70 bar)	Y (70 bar)	N

* Air: compressed air not breathable

6.6 HD-L et HD.S-L

Models	**Inerts N_2** (200 bar)	**Argon & Ar/CO_2**	**CO_2**	**CO**	**Air*** (200 bar)	**O_2**	**N_2O**	**H_2** (200 bar)	**C_2H_2**	**C_3H_8**	**C_3H_6**	**C_2H_4** (70 bar)	**CH_4** (200 bar)	**NH_3**
HD.S-L	Y	N	N	N	Y	N	N	Y	N	N	N	Y	Y	N

200-4-2 HD.S-L 200-8-5														

6.7 LH-L, LH.V-L , IH-L

Models	**Inerts N_2** (200 bar)	**Argon & Ar/CO_2** (200 bar)	**CO_2** (50 bar)	**CO** (200 bar)	**Air*** (200 bar)	**O_2** (200 bar)	**N_2O** (50 bar)	**H_2** (200 bar)	**C_2H_2**	**C_3H_8** (10 bar)	**C_3H_6** (10 bar)	**C_2H_4** (70 bar)	**CH_4** (200 bar)	**NH_3**
LH-L 200-3-2 LH-L 200-10-15	Y	Y	Y	N	Y	Y	Y	Y	N	N	N	N	N	N
LH.V-L 200-10-10	Y	N	N	N	Y	Y	N	Y	N	Y	Y	Y	Y	N
IH-L 200-10-15	Y	Y	Y	Y	Y	N	N	Y	N	N	N	N	N	N

* Air: compressed air not breathable

6.8 DLM-L

Models	**Inerts N_2** (300 bar)	**Argon & Ar/CO_2** (300 bar)	**CO_2** (50 bar)	**CO** (200 bar)	**Air*** (300 bar)	**O_2** (300 bar)	**N_2O** (44 bar)	**H_2** (300 bar)	**C_2H_2**	**C_3H_8** (10 bar)	**C_3H_6** (10 bar)	**C_2H_4** (70 bar)	**CH_4** (200 bar)	**NH_3**
DLM-L 300-50-100 DLM-L 300-15-50	Y	Y	Y	N	Y	Y	Y	Y	N	N	N	N	N	N

* Air: compressed air not breathable

For Breathable oxygen, corrosive gases, other gases and mixtures : please contact Air Liquide.

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