Air Liquide	Operating Instructions for **High pressure non-metallic flexible hoses** And **High pressure metallic flexible hoses**	**OP 1010 and 1050** Owner : NEC Language : EN

Air Liquide	Operating Instructions for **High pressure flexible hoses**	**OP1010** **Version : 0** Owner : NEC

Operating Instructions for **Non metallic industrial flexible hoses**

Type of flexible hoses for emptying

Type	Intern tube material	Application	Models
Non metallic	PTFE	industrial (oxydant or neutral)	Flex PTFE
	Zytel	flammable gases neutral gases	Flex Zytel
	EPDM	acetylene	Acetylene 25

Reading committee: P. Bonnehon - R.Lehner - S.Suys

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. GENERAL INFORMATIONS

1.1 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.

For safety reasons the inlet fitting and the seal of the flexible hose are specific to a gas or a mixture family, they are so designed to avoid any connection mistake. NEVER use the flexible hose for an application or a gas different than the one for which it is intended.

- ❏ During operation, ensure the anti-whip safety cable has been securely fixed at its two extremities (not needed for low pressure Acetylene25).
- ❏ Before connecting the flexible hose to avoid any risk of falling cylinders etc., ensure that:
  - ❏ Cylinders are well attached,
  - ❏ Bundles are well settled on a plane and horizontal surface,
  - ❏ The location of the cylinders is sufficiently well ventilated.

NEVER dismantle a flexible hose if:

- ❏ The cylinder or bundle valve is not closed,
- ❏ The flexible hose is under pressure.

NEVER tighten or loosen a connection under pressure.

NEVER connect two flexible hoses together.

In each case slowly open and close the cylinder valve. Never attempt to repair a flexible hose. In case of problem, close the cylinder valve fully, purge the flexible hose and proceed to replace with a new flexible hose.

1.2 Air Liquide commitments

Conformity

Air Liquide certifies that the equipment is manufactured, tested and controlled, in accordance with the rules of art and design of Air Liquide.

SG flexible hoses are compliant with the ISO16964:2019 and ISO 10380:2012 standards.

REACH regulation (EC) n°1907/2006

The pressure 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.

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.

Inspections

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

1.3 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.

These components are subjected to natural wear. Warranty is not valid on deterioration resulting from incorrect or improper use, use of spare parts which are not marked Air Liquide or from the none respect of this operating instruction.

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

2. Field of use and characteristics

2.1 Functions

Flexible hoses are used for:

- Connection cylinders or bundles to a gas manifold or panel.
- For other applications (in particular for flow rates > 160 Nm^3/h of nitrogen): Please, consult Air Liquide.
- Transfer of gas while maintaining its purity.

2.2 Technical characteristics

Refer to the Product Data Sheet of each model to have the technical characteristics.

Operating temperature : - 20 °C to + 60 °C.

<u>Metallic flexible for pure gases</u>:

MAWP : 200 bar

Inner tube made with convoluted 316L stainless steel.

Guaranteed leak tightness: 10^{-7} mbar.l/ s helium.

DUO200 and THP200 flexible hoses are designed for implementation of pure gases and mixtures with purity <= N60 thus ALPHAGAZ 1 and 2 or industrial gases.

Metallic flexible for pure gases:

MAWP: 300 bar

DUO300

<u>Non metallic flexible for acetylene</u>:

MAWP: 25 bar

The flexible hose is not considered as a high pressure device.

Consequently, the flexible hose is not provided with anti-whipping safety cable.

The flexible is neither provided with an anchor for bundles due to its traction resistance.

Nethertheless, end-users can install a device to prevent any bundle manipulation that could lead to a flexible excessive force.

2.3 Compatibility

The compatibility of the flexible hoses with the implemented gases depends principally on the nature of the seals and connections. Connections are not removable to guarantee the integrity of the equipment and compatibility with the implemented gas.

NEVER attempt to remove the connections of the flexible hoses.

An Air Liquide patented system makes them non removable.
In case of doubt on use or compatibility of the equipment with a gas or a new application, please, consult Air Liquide.

3.ASSEMBLY-ACTIVATION

3.1 Precautions before assembly

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

Flexible hoses are sensitive to various mechanical constraints, before start of use, follow the recommendations of Air Liquide:

- ❏ Act cleanly in order not to pollute,
- ❏ Avoid twisting,
- ❏ Avoid or limit vibration risks,
- ❏ Avoid or limit “water hammer”,
- ❏ Avoid tension and compression stress.
- ❏ Assemble the flexible hose in a ‘U’ shape with the single curve produced by using the right connection (straight or angle) and with appropriate length (1,3 or 2,5 m.).
- ❏ Ensure the assembly of the flexible hose is such that it’s curvature on the bend is higher than the allowed minimum:
  - ➢ R> 140 mm for DN5 and DN6
  - ➢ R> 190 mm for DN10.

3.2 Assembly

It is MANDATORY to fasten the safety cables :

- ❏ outlet connection, gas manifold side:
  - ➢ pass the anti-whip cable through the pre- drilled hole on the manifold back plate.
  - ➢ anchor cable (only for bundles) at an attachment ground point/anchors.

- ❏ inlet connection, cylinder side (with the loop) and bundle side (with the snap clasp):
  - ➢ Connect the two extremities of the flexible hose, one on the cylinder/bundle and the other on the manifold side (panel or change-over).

- ❏ Manifold side:
  - ➢ wrench tightening: 35 Nm

- ❏ Cylinder/ bundle side:

Check that the High Pressure inlet fitting matches the cylinder valve fitting. It must be clean and in perfect condition.

- ➢ Totally screw the nut
- ➢ Hand tightening in case of an over-moulded or knurled nut fitting, equipped with an O-ring,
- ➢ Key tightening in the case of flat or shouldered seal.
- ➢ Hand tightening in the case of O-rings.

For combustible gases, ensure electrical continuity between the different components.

3.3 Activation

❑ Slowly open the cylinder valve and, in two stages:
- ➢ Slowly and partially open the cylinder valve and wait for the balancing of the pressures.
- ➢ Always slowly complete the total opening of the valve.

❑ Close the cylinder valve and check on the high-pressure gauge of the manifold that the pressure does not change.

Slowly open the purge valve on the manifold valve inlet block and de-pressurise the hose leaving a small residual pressure showing on the pressure gauge before closing the purge valve.

➔ Repeat above 4 to 6 times the purge cycle (air / moisture contaminants) from the hose.

➔

➔ Open the cylinder valve again. Proceed slowly to avoid “water hammer”

➔

➔ Check the tightness of the assembly (up-stream circuit closed). The tightness of each flexible hose, being controlled in factory, it remains nevertheless necessary to check the tightness of connections.

➔

➔ On the flexible hose label, indicate the expiry date. Permanently mark the corresponding Month & Year. (See § 5.2).

NEVER tighten a connection under pressure.

4. MARKING

Every flexible hose carries following marking :
ISO reference.
Flexible hose type (example: T2 10a).
Manufacturer Identification.
Tube material.
AL code
Date of manufacture (month/ year).
Nominal Pressure brackets, in bar.
Reference number for the traceability (B/N)

5. MAINTENANCE

5.1 Troubleshooting

Fault	Cause	Remedy
Assembly impossible	Connections do not connect	Verify the compatibility of gas, the inlet and the outlet
	Fittings are damaged	Change the flexible hose
Gas leak	Tightening failure	Close the cylinder valve and change seals

* In the case of hoses with metal/ metal sealing, if there is a leak, change the hose.

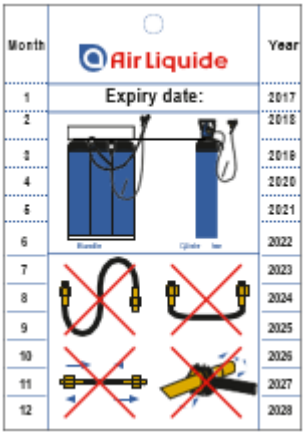
5.2 Maintenance

Flexible hoses require a periodic check.The periodicity of this check depends on flexible hose use conditions (number of cycles, type of gas, environment...).

The maximum flexible hose lifetime is **5 years** from the date of activating.

The flexible is designed to resist 1000 hydraulic pressure cycling : on a bundle/cylinder change basis and taking into account purging cycles, the maximal lifetime is 5 years.

However the date of replacement of the flexible hose should not go over 1000 pressure cycling. The pressure cycles are determined by the conditions of use and the implemented gas. The replacement cycle frequency may be reduced by Air Liquide depending on the use conditions and the gas implemented.



Local regulations may also apply. AL advises to respect the regulations at all times. It is the users responsibility to ensure that this is followed and respected.

When installed this expiry date needs to be clearly pointed out by perforating the label fixed to the flexible hose.

Before pressurization of the flexible hose, the next actions to be done as well:

- Verify the state of the protection sleeve.
- Verify the state of the connection threads.
- Control the corrosion level of the various components.
- Perform a leak test after each change of cylinders or bundles. It is mandatory to change the seals to maintain the tightness.

5.3 Misuse

There are a great number of causes for misuse and damage to flexible hoses.

These include, stretching, kinking, rough handling, mechanical impact, fatigue, abrasion, corrosive atmospheres, accidental exposure to fire and heat.

All can damage the flexible hose and subsequently lead to failure.

An appropriate maintenance regime compatible with the intended service needs to be established and documented. This shall include regular exchange of parts regardless of their service worthiness.

6. DISPOSAL

In accordance with Directive 2008/98/EC on waste, the equipment holder ensures that, where recovery in accordance with Article 10 is not undertaken, waste undergoes safe disposal operations which meet the provisions of Article 13 on the protection of human health and the environment.

The holder shall take measures to promote high quality recycling and, to this end, shall set up separate collections of waste where technically, environmentally and economically practicable and appropriate to meet the necessary quality standards for the relevant recycling sectors.

The AL equipment should be removed and/or recycled in compliance with the current national regulations.
If the equipment is put out of order, its disposal has to follow the safety regulations for people and environment.
The plastic or metallic components must be disassembled and gathered by kind of material.
Materials can be then processed as a waste or recycled.

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Air Liquide	Operating Instructions for **High pressure metallic flexible hoses**	**OP 1050** **Version: 1** **Date: July 2022** Owner : NEC Language : EN

Operating Instructions for **Flexible hoses**

flexible hoses for emptying

Type	Intern tube material	Application
Metallic	stainless steel	pure gases, food gases

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.General information

1.1 Safety

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

For safety reasons the inlet fitting and the seal of the flexible hose are specific to a gas or a mixture family, they are so designed to avoid any connection mistake.

NEVER use the flexible hose for an application or a gas different than the one for which it is intended.

❏ During operation, ensure the anti-whip safety cable has been securely fixed at its two extremities (not needed for low pressure Acetylene25).

❏ Before connecting the flexible hose to avoid any risk of falling cylinders etc., ensure that:

- Cylinders are well attached,
- Bundles are well settled on a plane and horizontal surface,
- The location of the cylinders is sufficiently well ventilated.

NEVER dismantle a flexible hose if:

❏ The cylinder or bundle valve is not closed,

❏ The flexible hose is under pressure.

NEVER tighten or loosen a connection under pressure.

NEVER connect two flexible hoses together.

In each case slowly open and close cylinder valve. Never attempt to repair a flexible hose. In case of problem, close the cylinder valve fully, purge the flexible hose and proceed to replace with a new flexible hose.

1.2 Air Liquide commitments

Conformity

Air Liquide certifies that the equipment is manufactured, tested and controlled, in accordance with the rules of art and design of Air Liquide.

SG flexible hoses are compliant with the ISO16964:2019 and ISO 10380:2012 standards.

REACH regulation (EC) n°1907/2006

The metallic flexible hoses are made of stainless steel parts, except the two nuts, 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.

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.

Inspections

Each equipment is tested individually with a hydraulic pressure test and a leak test.

1.3 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.

These components are subjected to natural wear. Warranty is not valid on deterioration resulting from incorrect or improper use, use of spare parts which are not marked Air Liquide or from the none respect of this operating instruction.

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

2. Field of use and characteristics

2.1 Functions

Flexible hoses are used for:

- Connection cylinders or bundles to a gas manifold or panel.
- Transfer of gas while maintaining its purity.

2.2 Technical characteristics

Refer to the Product Data Sheet of each model to have the technical characteristics.

Operating temperature : - 20 °C to + 60 °C.

<u>Metallic flexible for pure gases</u>:

MAWP: 200 bar

Inner tube made with convoluted 316L stainless steel.

Guaranteed leak tightness: 10^{-7} mbar.l/ s helium.

Metallic flexible hoses are designed for implementation of pure gases and mixtures with purity 6.0 (<N60) thus ALPHAGAZ 1 and 2.

2.3 Compatibility

The compatibility of the flexible hoses with the implemented gases depends principally on the nature of the seals and connections. Connections are not removable to guarantee the integrity of the equipment and compatibility with the implemented gas.
In case of doubt on use or compatibility of the equipment with a gas or a new application, please, consult Air Liquide.

3.Assembly and Activation

3.1 Precautions before assembly

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

Flexible hoses are sensitive to various mechanical constraints, before start of use, follow the recommendations of Air Liquide :

- ❏ Act cleanly in order not to pollute,
- ❏ Avoid twisting,
- ❏ Avoid or limit vibration risks,
- ❏ Avoid or limit “water hammer”,
- ❏ Avoid tension and compression stress.
- ❏ Assemble the flexible hose in a ‘U’ shape with the single curve produced by using the right connection (straight or angle) and with appropriate length (1,3 or 2,5 m.).
- ❏ Ensure the assembly of the flexible hose is such that it’s curvature on the bend is higher than the allowed minimum:
    - ➢ R> 140 mm for DN5 and DN6
    - ➢ R> 190 mm for DN10.

3.2 Assembly

It is MANDATORY to fasten the safety cable :

- ❏ outlet connection, gas manifold side:
  - ➢ pass the anti-whip cable through the pre- drilled hole on the manifold back plate.
  - ➢ anchor cable (only for bundles) at an attachment ground point/anchors.

- ❏ inlet connection, cylinder side (with the loop) and bundle side (with the snap clasp):
  - ➢ Connect the two extremities of the flexible hose, one on the cylinder/bundle and the other on the manifold side (panel or change-over).

- ❏ Manifold side:
  - ➢ wrench tightening: 35 Nm

- ❏ Cylinder/ bundle side:

Check that the High Pressure inlet fitting matches the cylinder valve fitting. It must be clean and in perfect condition.

- ➢ Totally screw the nut
- ➢ Hand tightening in case of an over-moulded or knurled nut fitting, equipped with an O-ring,
- ➢ Key tightening in the case of flat or shouldered seal.
- ➢ Hand tightening in the case of O-rings.

For combustible gases, ensure electrical continuity between the different components.

3.3 Activation

❑ Slowly open the cylinder valve and, in two stages :

➢ Slowly and partially open the cylinder valve and wait for the balancing of the pressures.

➢ Always slowly complete the total opening of the valve.

❑ Close the cylinder valve and check on the high-pressure gauge of the manifold that the pressure does not change.

Slowly open the purge valve on the manifold valve inlet block and de-pressurise the hose leaving a small residual pressure showing on the pressure gauge before closing the purge valve.

➔ Repeat above 4 to 6 times the purge cycle (air / moisture contaminants) from the hose.

➔ Open the cylinder valve again. Proceed slowly to avoid “water hammer”

➔ Check the tightness of the assembly (up-stream circuit closed). The tightness of each flexible hose, being controlled in factory, it remains nevertheless necessary to check the tightness of connections.

➔ On the flexible hose label, indicate the expiry date. Permanently mark the corresponding Month & Year. (See § 5.2).

NEVER tighten a connection under pressure.

4. Marking

Every flexible hose carries following marking :
ISO reference.
Flexible hose type (example: T2 10a).
Manufacturer Identification.
Tube material.
AL code
Date of manufacture (month/ year).
Nominal Pressure brackets, in bar.
Reference number for the traceability (B/N)

5. Maintenance

5.1 Troubleshooting

Fault	Cause	Remedy
Assembly impossible	Connections do not connect	Verify the compatibility of gas, the inlet and the outlet
	Fittings are damaged	Change the flexible hose
Gas leak	Tightening failure	Close the cylinder valve and change seals

* In the case of hoses with metal/ metal sealing, if there is a leak, change the hose.

5.2 Maintenance

Flexible hoses require a periodic check.The periodicity of this check depends on flexible hose use conditions (number of cycles, type of gas, environment...).

The maximum flexible hose lifetime is **5 years** from the date of activating.

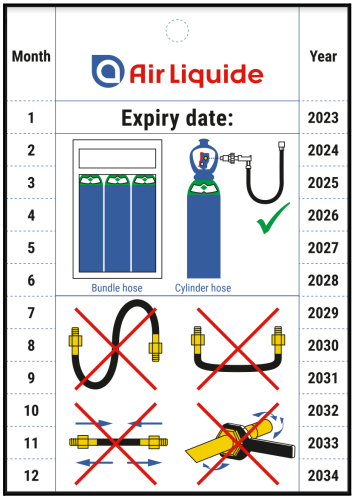
The flexible is designed to resist 1000 hydraulic pressure cycling : on a bundle/cylinder change basis and taking into account purging cycles, the maximal lifetime is 5 years.

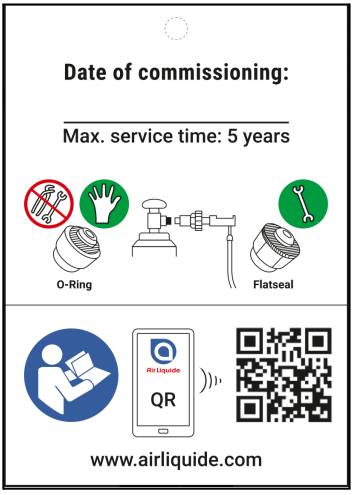
However the date of replacement of the flexible hose should not go over 1000 pressure cycling. The pressure cycles are determined by the conditions of use and the implemented gas. The replacement cycle frequency may be reduced by Air Liquide depending on the use conditions and the gas implemented.

Local regulations may also apply. AL advises to respect the regulations at all times. It is the users responsibility to ensure that this is followed and respected.

When installed this expiry date needs to be clearly pointed out by perforating the label fixed to the flexible hose.

Expiry Date both sides:





Before pressurization of the flexible hose, the next actions to be done as well :

- Verify the state of the protection sleeve.
- Verify the state of the connection threads.
- Control the corrosion level of the various components.
- Perform a leak test after each change of cylinders or bundles. It is mandatory to change the seals to maintain the tightness.

5.3 Misuse

There are a great number of causes for misuse and damage to flexible hoses.

These include, stretching, kinking, rough handling, mechanical impact, fatigue, abrasion, corrosive atmospheres, accidental exposure to fire and heat.

All can damage the flexible hose and subsequently lead to failure.

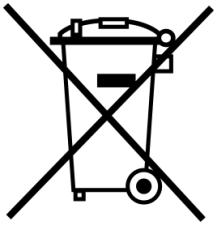
An appropriate maintenance regime compatible with the intended service needs to be established and documented. This shall include regular exchange of parts regardless of their service worthiness.

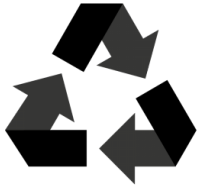
6.Disposal

In accordance with Directive 2008/98/EC on waste, the equipment holder ensures that, where recovery in accordance with Article 10 is not undertaken, waste undergoes safe disposal operations which meet the provisions of Article 13 on the protection of human health and the environment.

The holder shall take measures to promote high quality recycling and, to this end, shall set up separate collections of waste where technically, environmentally and economically practicable and appropriate to meet the necessary quality standards for the relevant recycling sectors.

The AL equipment should be removed and/or recycled in compliance with the current national regulations.
If the equipment is put out of order, its disposal has to follow the safety regulations for people and environment.
The plastic or metallic components must be disassembled and gathered by kind of material.
Materials can be then processed as a waste or recycled.





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