

LASALTM

Rev. 1.0
June 2008

::: Solutions For Laser Applications To Boost Customers' Performances

Volume 1:
Cutting Applications

::: Industrial Merchant WBL



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And with the participation of AL marketing, communication and legal managers in following countries or entities:

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The aim of this catalogue, conceived for internal use, is to help the Air Liquide developers in making a proper and complete offer in terms of gas and equipment according to laser manufacturers' specifications and customer requirements. The objective is finally to create a standard replicable in the same way in every country.



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::: Laser Cutting

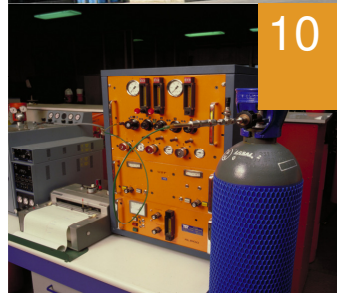
Solutions for Laser Cutting



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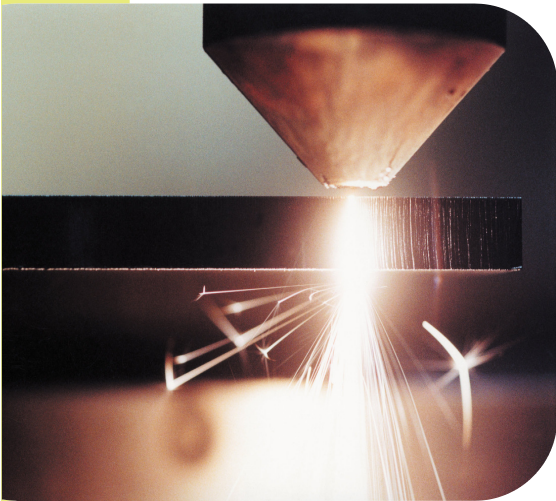
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::: Appendixes

Gas data sheet
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Laser cutting:

Even in a not favorable economical environment for Metal Fabrication, global growth of laser market is still showing a positive trend (+ 7% average over last three years).



In developed economies like Western Europe, increasing metal sheet cost and low cost competition coming from Eastern Europe and China push laser users to invest in more performing machine to obtain higher productivity and lower unit costs of production, keeping a high quality.

In addition the technological replacement of traditional oxy-cutting application by laser cutting pushes the laser market growth.

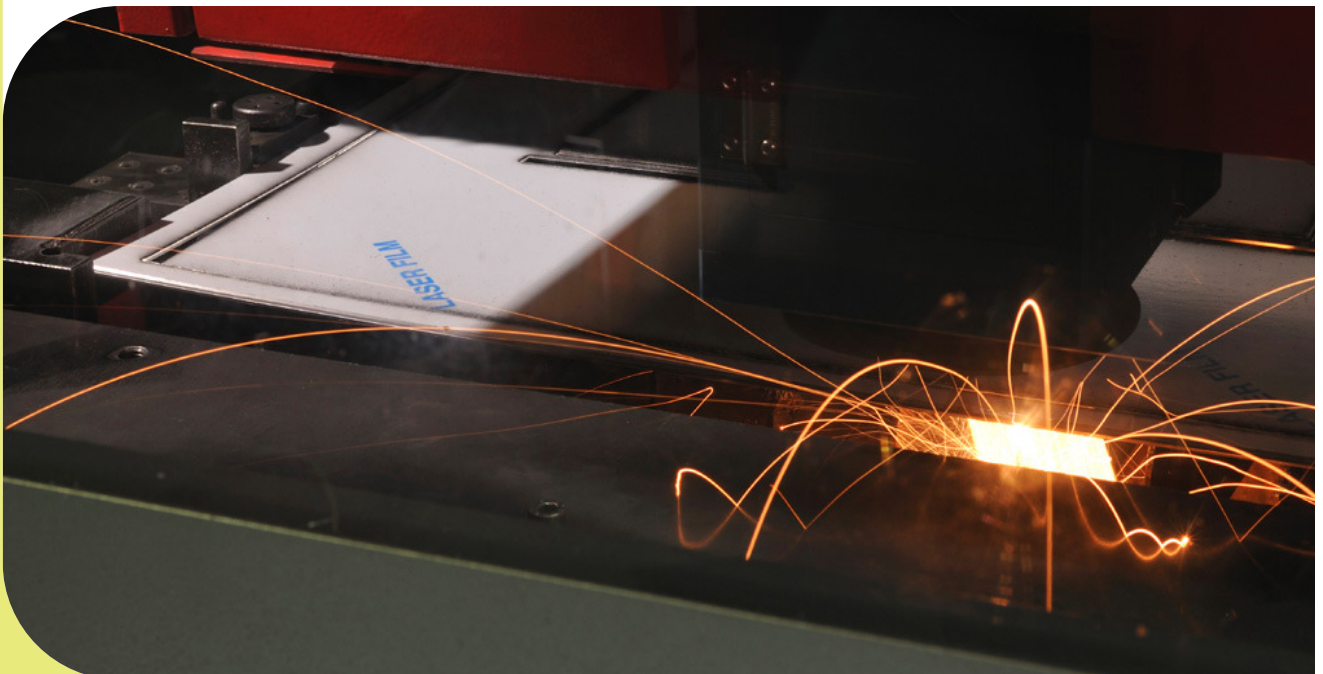
Since 2000, between 1,000 and 1,100 laser cutting units per year have been installed in Western Europe.

Expected sales for next 5 years are still around 1,000 units/year.

That makes the laser cutting market very interesting for all gas suppliers, therefore the competition in gas business is very strong and it is very important to react fast to customer requirements.

Main needs of a customer using a laser are:

- > **Reliability** of the laser system
- > **High quality** of manufactured products
- > **Productivity** in order to optimize operating cost



::: Solutions for Laser cutting:

Air Liquide proposes solutions solely dedicated to laser cutting applications to address all our customers' needs. These solutions are built around three axes:

- > **Technical gases** exclusively dedicated to laser applications, strictly compliant with all specifications required in order to insure quality and reliability.
- > **Specific equipment** for gas distribution for laser processes, in order to insure high gas purity at point of use. The gas distribution equipment is extremely important to insure gas quality and flow rate at point of use as defined by laser manufacturers' specifications.
- > **Associated technical expertise** and know-how to optimize customer's laser performance.



The **LASAL** gas quality developed by Air Liquide insures:

- > Strict control of moisture, hydrocarbons and powders contents.
- > Dedicated cylinders, equipped with a positive pressure valve and non return valve, avoiding any pollution.
- > Traceability label and warranty seal after filling procedures

::: What is the LASAL?

LASAL is the Air Liquide Technology Brand for laser applications. It aims to improve the productivity, the lifetime of the laser and the quality of the work.

LASAL refers to the range of welding gases associated to value-added related equipment (manifold, filters, mixer...), packaged or non in offers with compulsory and optional best in class services, devoted to laser welding and cutting applications.

::: GASES EQUIPMENT

In order to better answer to customer expectations, the proposal for gas distribution equipment has been split in two categories:

- > **Starting Kit Equipment**, whose goal is to be able to propose and deliver in a very short delay basic equipment at customer site when a new laser cutting unit is installed.
- > **LASAL Equipment** with the purpose to supply a complete installation with the best level of efficiency and quality.



LASAL,™

The answer for Total Customer Satisfaction
with Reliability and Transparency



Gas characteristics

Gas purity plays a key role for the achievement of optimal performances in laser cutting process.

The gases are divided into two categories:

- > **LASING GASES**, for the resonator to generate the laser beam in the CO₂ laser type
- > **SHIELDING GASES** (or **PROCESS GASES**), for the optimization of cutting process

Gas specifications are clearly defined by laser manufacturers' constraints. Air Liquide has defined lasing gases for each type of laser source, according to laser manufacturers.

::: Lasing gases for cutting

The quality of the lasing gases is determinant to insure reliability of laser sources, optics lifetime, beam stability and optimization of generated power.

Air Liquide carried out test in his R&D centres with the scope of defining the best purity of lasing gases according to constraints required by laser technology.

Lasing gases are Carbon Dioxide (CO₂), Nitrogen (N₂) and Helium (He). These gases can be supplied either separately or premixed, depending on the laser source used.

In some cases additional gases are used to improve beam stability.



> Effect of impurities:

Two types of impurities can be found in the laser cavity:

- . Impurities coming from the gases used to fill the cavity
- . Impurities coming from chemical and/or physical reactions occurring in the cavity

The effect of several impurities has been tested, with following results:

>> Carbon Monoxide (CO) and Oxygen (O₂):

Carbon Dioxide (CO₂) dissociation during electric discharge produces Carbon Oxide (CO) and Oxygen in a quantity of some thousand ppm. Only few ppm of such impurities are normally contained in lasing gases.

>> Argon:

Any effect, except if it exceeds the one percent.

>> Moisture (H₂O):

Moisture can make the discharge unstable, reducing the output power level and delivering a very low beam quality.

Moreover coatings of mirrors are rather hygroscopic and moisture absorption surely affects negatively their optical properties.

>> Hydrocarbons (C_nH_m):

Depending on type of hydrocarbon, there is a critical content of impurities (varying from some ppm to percents) causing beam instability. They also reduce performances.

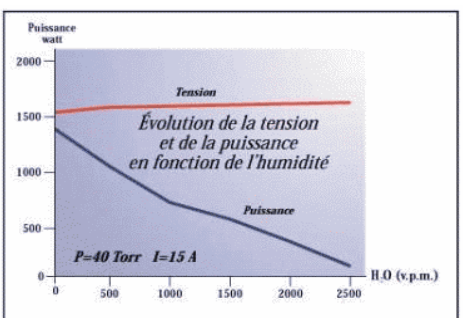
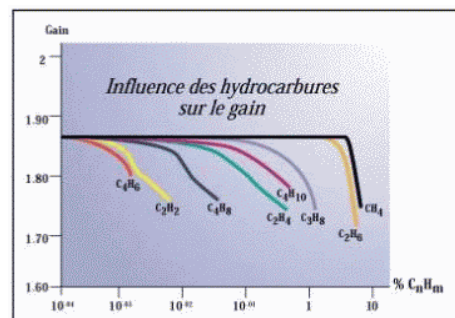
>> Other impurities:

No particular effect on gain has been showed by addition up to 100 ppm of Carbonyl Sulfide (COS) and Sulfur Dioxide (SO₂). These impurities can be present in Carbon Dioxide (CO₂), but in a quantity much less than 100 ppm.

::: WARNING

High concentration of impurities as **Hydrocarbons, H₂O (moisture) or Powders**, can affect the laser with:

- > Reduction of the output power level
- > Laser beam instability
- > Reduced lifetime of optics and electrodes with the high risk of damaging laser resonator.



LASAL and Laser Manufacturers

LASAL Name	% N ₂	% CO ₂	% He	% H ₂	% CO	Laser Manufacturers	Laser Sources
LASAL 1	100	-	-	-	-	Trumpf-Bystronic-Prima	Trumpf-Bystronic-Prima
LASAL 2	-	100	-	-	-	Trumpf-Bystronic-Prima	Trumpf-Bystronic-Prima
LASAL 4	-	-	100	-	-	Trumpf-Bystronic-Prima	Trumpf-Bystronic-Prima
LASAL P51	15.6	3.4	B	-	-	Mazak	Panasonic
LASAL 53	13.5	4.5	B	-	-	Amada-LVD-Mazak	Fanuc
LASAL P61	23.4	1.7	B	-	-	Mazak	Panasonic
LASAL 63	20	6	B	-	-	Lectra System	Lectra System
LASAL 66	35	5	B	-	-	Amada-LVD-Mazak	Fanuc
LASAL 68	29	5	B	-	-	Prima	PRC
LASAL 78	26	4	B	-	-	Cutlite Panta	Cutlite Panta
LASAL 81	15	3.875	B	0.23	-	Feha	Feha
LASAL 82	15	3.875	B	0.315	-	Feha	Feha
LASAL 83	B	5	40	-	-	Amada-LVD-Mazak	Fanuc
LASAL 86	16	8	B	-	-	Amada-LVD-Mazak	Fanuc
LASAL 101	25	5	B	-	-	Lumonics	Lumonics
LASAL 102	16	8	B	-	2	Lumonics	Lumonics
LASAL 105	B	8	28	-	4	Amada	Mitsubishi
LASAL 114	16	8	B	-	4	Lumonics	Lumonics
LASAL 152	18	9	B	0.3	4	Lumonics	Lumonics
LASAL 155	16	8	B	0.5	4	Altec 2	Altec 2
LASAL 201						All Manufacturers who used Rofin Sinar sources	Rofin Sinar Slab Laser

Shielding gases for cutting

Shielding gases are very important to insure optimal performances for laser cutting process.

Shielding gases are very important to insure optimal performances for laser cutting process.

Shielding gases for laser cutting process are Nitrogen and Oxygen. These gases insure:

- > Protection of focusing lenses against fumes and spatters
- > Mechanical action: blow off molten or vaporized metal
- > Chemical action: exothermic reaction (only for Oxygen)



Nitrogen Standard Quality



LASAL 2001

Test on 3 mm thickness Stainless Steel
Controlled impurities are: moisture (H₂O) ≤ 5 ppm

LASAL 2001

N50 Nitrogen quality - 99.999%

Stainless steel can be cut with laser using an inert gas as Nitrogen. It is necessary to use a high quality of Nitrogen, in order to achieve the best quality of cut, without the needs of successive reworks (e.g. before welding).

Air Liquide has set-up the brand **LASAL 2001**, a Nitrogen gas with controlled quality, to be used under high pressure in order to obtain the best quality on stainless steel cutting. As for all gases of **LASAL** brand, the gas quality is maintained through production, filling and delivery.

LASAL 2003

N35 Oxygen quality - 99.95%

Laser cutting of carbon and unalloyed steels is normally performed with Oxygen, taking advantage of the exothermic reaction with iron. Industrial Oxygen can show a variable quality, depending on sourcing. Studies cleared out all fatal impurities for cut quality. Consequently Air Liquide has developed **LASAL 2003**.

Compared to industrial oxygen, **LASAL 2003** allows achieving permanently an increase of cutting speed between 10 and 40 % with a better cut quality. These results can be obtained by monitoring constantly the gas quality

LASAL 2001 purity makes it also usable for PROTECTION OF OPTICAL PATH.

LASAL 2003 allows customer to achieve permanently IMPORTANT SAVINGS.



Test on 4 mm thickness Carbon Steel
Controlled impurities are: moisture (H₂O) ≤ 10 ppm
Argon (Ar) ≤ 500 ppm



Starting Kit Equipment:


The objectives of the starting kits are to propose some equipment in short delay at customer site when Laser machine is installed. These starting kits could be temporarily installed before switching to LASAL equipment.






::: Content of a starting kit:

- > 1 or 3 manifolds system with T purge and output connection 8 mm diameter for lasing gases
- > 1 manifold for Oxygen cutting gas
- > 1 manifold for Nitrogen cutting gas
- > 5 or 10 m of high pressure flexible hose with output connection kit
- > Safety rack
- > Safety data sheet

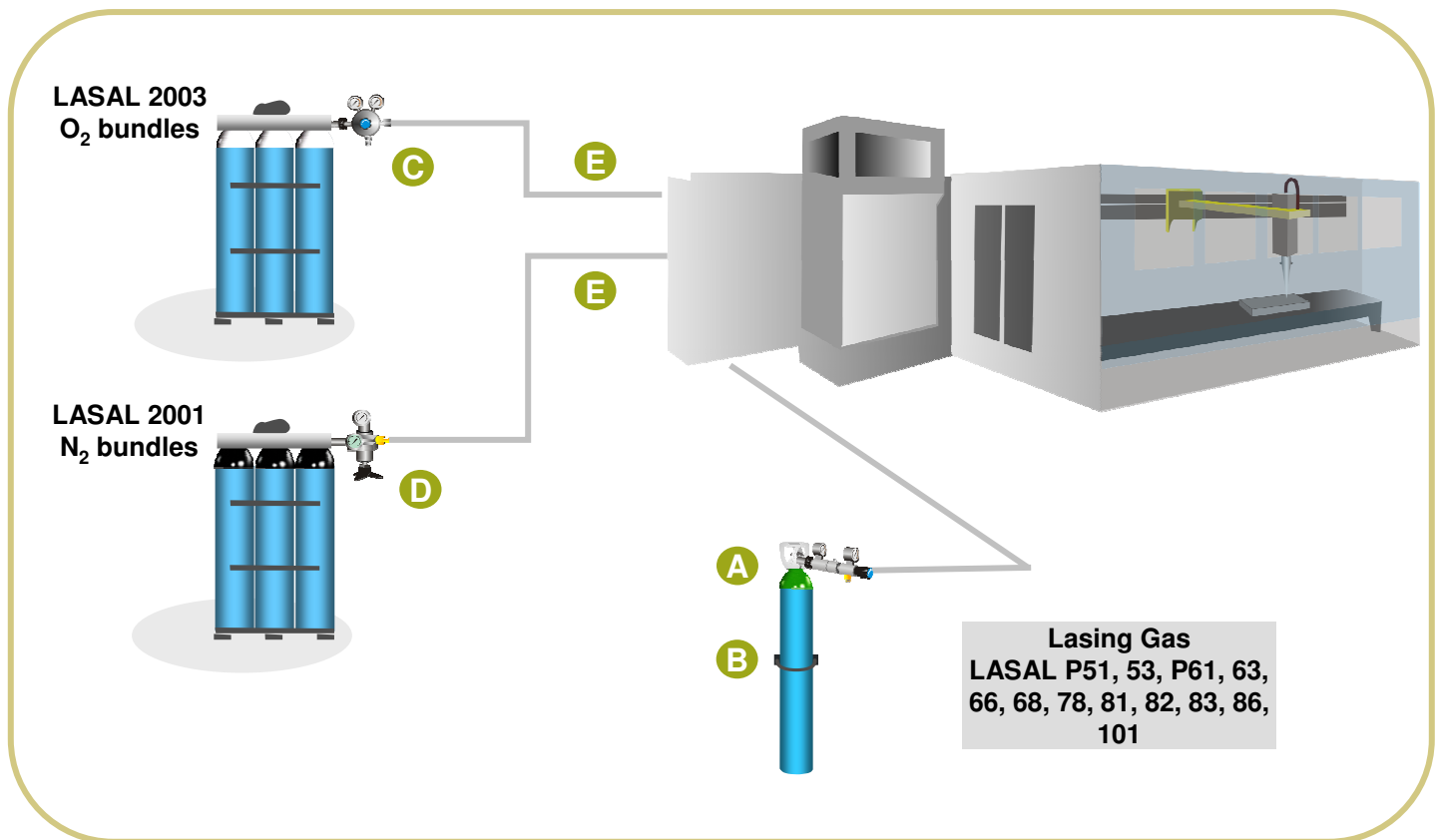
Gas Compatibility for Starting Kit

Lasing Gas Compatibility					
Gas	% N ₂	% CO ₂	% He	% H ₂	Equipment
LASAL 1	100				 HBS 240-8-3
LASAL 2		100			
LASAL 4			100		
LASAL P51	15.6	3.4	B		
LASAL 53	13.5	4.5	B		
LASAL P61	23.4	1.7	B		
LASAL 63	20	6	B		
LASAL 66	35	5	B		
LASAL 68	29	5	B		
LASAL 78	26	4	B		
LASAL 81	15	3.875	B	0.23	
LASAL 82	15	3.875	B	0.315	
LASAL 83	B	5	40		
LASAL 86	16	8	B		
LASAL 101	25	5	B		





Premix Lasing Gas with CO Compatibility						
Gas	% N ₂	% CO ₂	% He	% H ₂	% CO	Equipment
LASAL 102	16	8	B		2	 HBSI 240-8-3.S
LASAL 105	B	8	28		4	
LASAL 114	16	8	B		4	
LASAL 152	18	9	B	0.3	4	
LASAL 155	16	8	B	0.5	4	

ASSIST GAS COMPATIBILITY					
Gas	% O ₂	Equipment	Gas	% N ₂	Equipment
LASAL 2003	100		LASAL 2001	100	
DLM 240-50-100			HEPAL 50 NG		

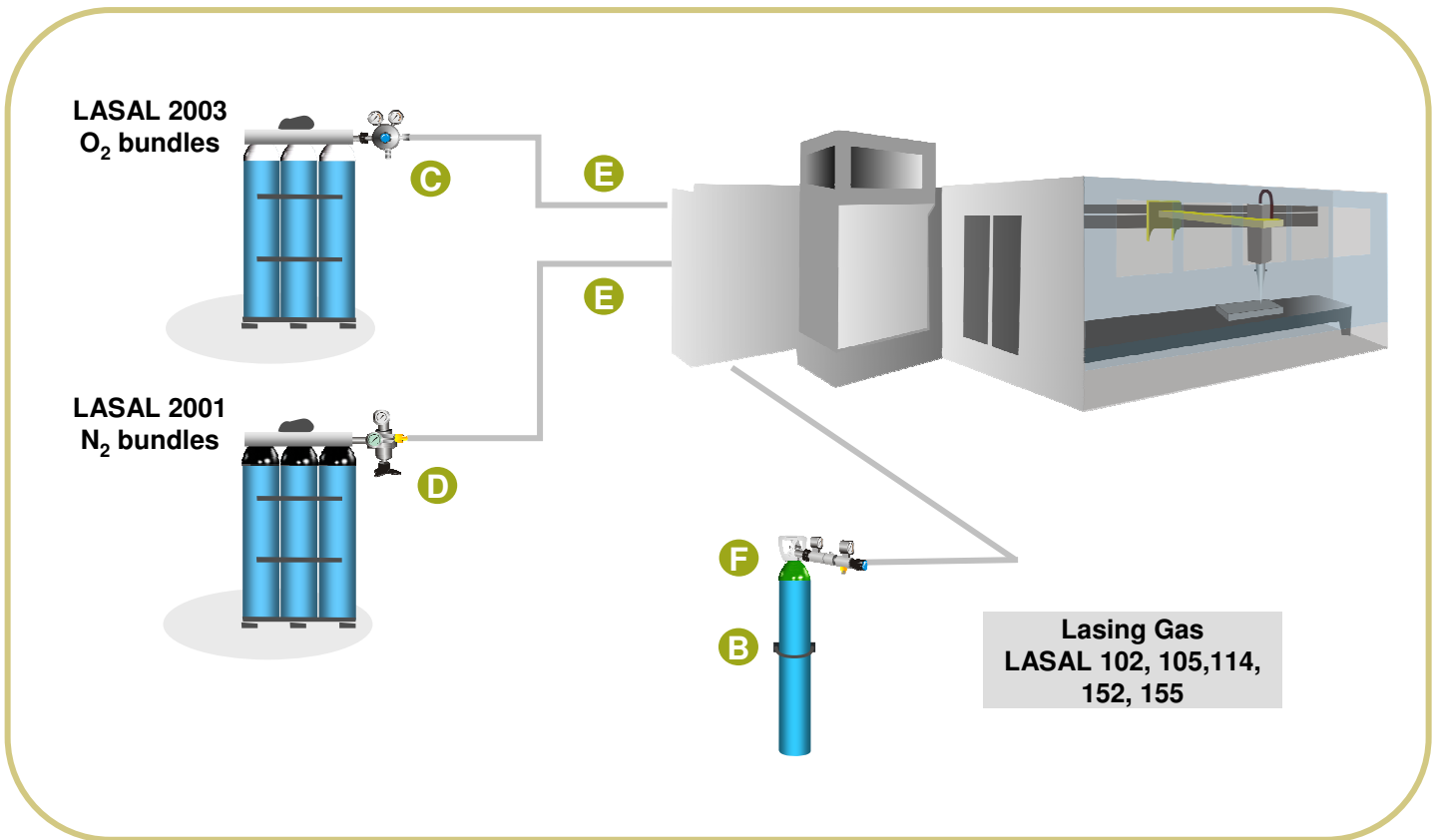
::: Starting Kit for Premix Lasing Gas Model 1



Starting Kit for Premix Lasing Gas

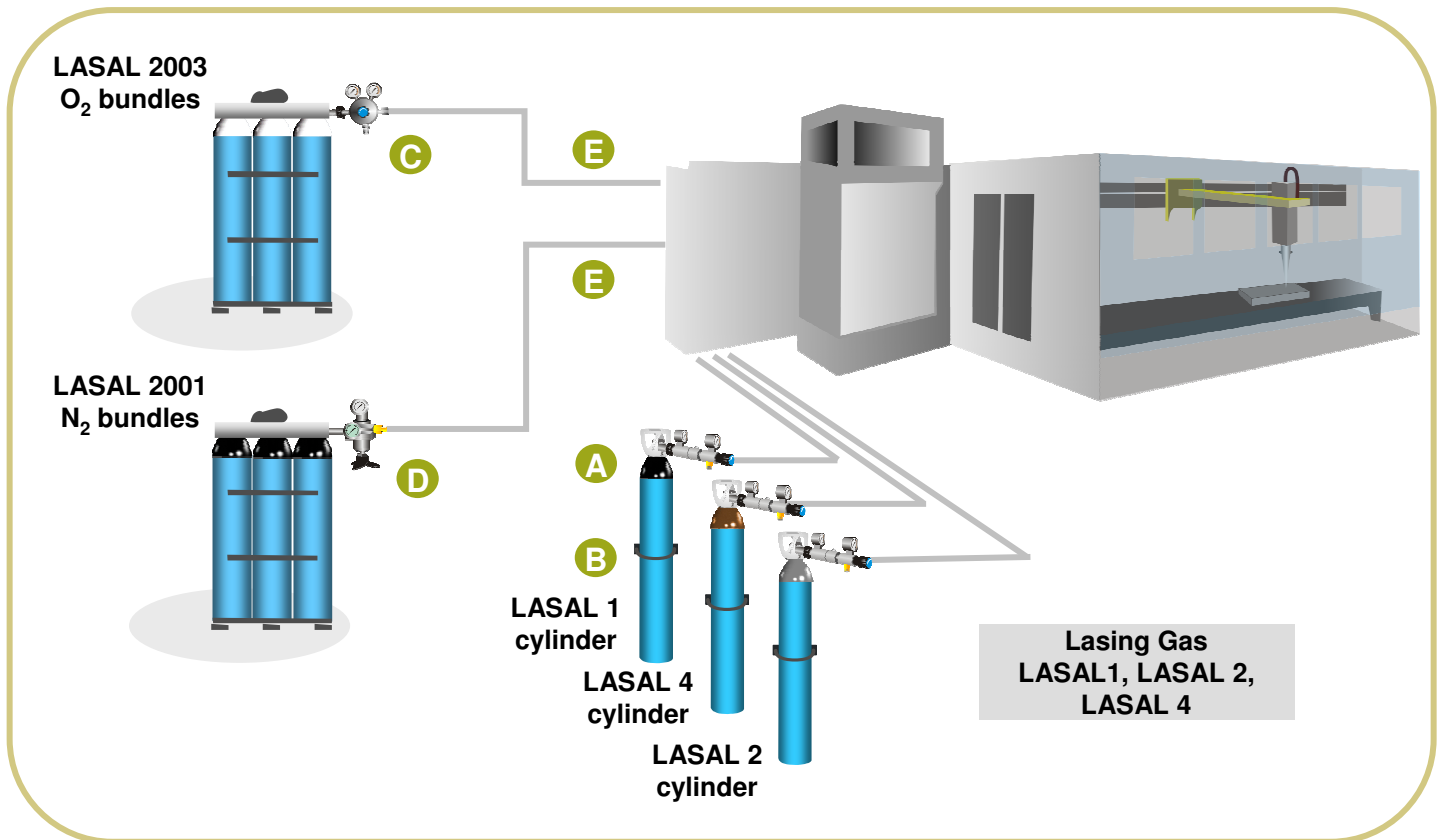
Kit		Model	Nb
A		HBS 240-8-3	1
B		Rack one cylinder	1
Starting Kit for Assist Gas			
C		DLM 240-50-100	1
D		HEPAL 50 NG	1
E		Flexible hose HP 50 bars	2

Starting Kit for Premix Lasing Gas with CO Model 2



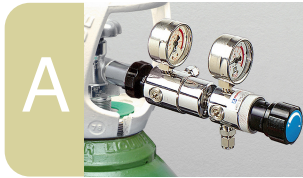
Starting Kit for Premix Lasing Gas			
Kit		Model	Nb
F		HBSI 240-8-3.S	1
B		Rack one cylinder	1
Starting Kit for Assist Gas			
C		DLM 240-50-100	1
D		HEPAL 50 NG	1
E		Flexible hose HP 50 bars	2

Starting Kit for Separate Lasing Gas Model 3



Starting Kit for Premix Lasing Gas			
Kit		Model	Nb
A		HBS 240-8-3	3
B		Rack one cylinder	3
Starting Kit for Assist Gas			
C		DLM 240-50-100	1
D		HEPAL 50 NG	1
E		Flexible hose HP 50 bars	2

Starting Kit Price List...



Starting Kit for Lasing Gas

DDP France Italy Spain Portugal Belux Nordic Germany	DDP Austria Nederland UK	EXW Rest of Europe Maghreb Africa	EXW Rest of the World
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Mode	SAP Code	Designation	PI01 08	ZPH1 08	ZPH1 08	ZPH1 08
ASS	121132	REG HBS 240-8-3 PURGE Type C-B4 / DB 8mm	232.36 €	260.14 €	252.57 €	272.77 €
ASS	121133	REG HBS 240-8-3 PURGE DIN 6 - B5 / DB 8mm	240.46 €	269.21 €	269.36 €	282.27 €
ASS	121134	REG HBS 240-8-3 PURGE DIN 10 / DB 8mm	237.52 €	265.92 €	258.18 €	278.83 €
ASS	121135	REG HBS 240-8-3 PURGE UNI 4406 / DB 8mm	260.90 €	292.10 €	283.59 €	306.28 €
ASS	121136	REG HBS 240-8-3 PURGE UNI 4409 / DB 8mm	258.52 €	289.43 €	281.00 €	303.48 €
ASS	121137	REG HBS 240-8-3 PURGE UNI 4412 / DB 8mm	240.61 €	269.38 €	261.53 €	282.45 €
ASS	121138	REG HBS 240-8-3 PURGE RU 3 / DB 8mm	238.65 €	267.18 €	259.40 €	280.15 €
ASS	121139	REG HBS 240-8-3 PURGE RU 1 / DB 8mm	287.31 €	321.66 €	312.29 €	337.28 €
ASS	121140	REG HBS 240-8-3 PURGE LU 1 / DB 8mm	269.58 €	301.81 €	293.02 €	316.46 €



Starting Kit Option

DDP France Italy Spain Portugal Belux Nordic Germany	DDP Austria Nederland UK	EXW Rest of Europe Maghreb Africa	EXW Rest of the World
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Mode	SAP Code	Designation	PI01 08	ZPH1 08	ZPH1 08	ZPH1 08
ASS	19182	Rack 1 cylinder	9.67 €	10.82 €	10.51 €	11.35 €

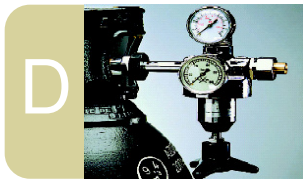
Starting Kit Price List...



Starting Kit for Assist Gas Oxygen

DDP France Italy Spain Portugal Belux Nordic Germany	DDP Austria Nederland UK	EXW Rest of Europe Maghreb Africa	EXW Rest of the World
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Mode	SAP Code	Designation	PI01 08	ZPH1 08	ZPH1 08	ZPH1 08
ASS	121145	REG DLM 240-50-100 Type F / 12mm	154.93 €	173.45 €	168.40 €	181.87 €
ASS	121146	REG DLM 240-50-100 DIN 6 / DB 12 mm	162.09 €	181.47 €	176.18 €	190.27 €
ASS	121147	REG DLM 240-50-100 DIN 9 / DB 12 mm	161.80 €	181.15 €	175.87 €	189.94 €
ASS	121148	REG DLM 240-50-100 UNI 4406 / DB 12 mm	182.53 €	204.36 €	198.40 €	214.28 €
ASS	121149	REG DLM 240-50-100 RI 2 / DB 12 mm	164.19 €	183.82 €	178.47 €	192.74 €



Starting Kit for Assist Gas Nitrogen

DDP France Italy Spain Portugal Belux Nordic Germany	DDP Austria Nederland UK	EXW Rest of Europe Maghreb Africa	EXW Rest of the World
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Mode	SAP Code	Designation	PI01 08	ZPH1 08	ZPH1 08	ZPH1 08
ASS	117593	REG HEPAL 50NG Type C / 12 mm	163.05 €	182.55 €	177.23 €	191.41 €
ASS	121150	REG HEPAL 50NG DIN 10 / 12 mm	172.18 €	192.77 €	187.16 €	202.13 €
ASS	121151	REG HEPAL 50NG UNI 4409 / DB 12 mm	193.18 €	216.28 €	209.98 €	226.78 €
ASS	121152	REG HEPAL 50NG RU 3 / DB 12 mm	174.21 €	195.04 €	189.36 €	204.51 €

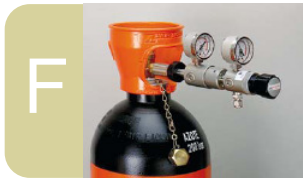
Starting Kit Price List



Starting Kit Option

DDP France Italy Spain Portugal Belux Nordic Germany	DDP Austria Nederland UK	EXW Rest of Europe Maghreb Africa	EXW Rest of the World
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Mode	SAP Code	Designation	PI01 08	ZPH1 08	ZPH1 08	ZPH1 08
		Flexible hose O ₂				
		Flexible hose N ₂				



Starting Kit for Lasing Gas with CO

DDP France Italy Spain Portugal Belux Nordic Germany	DDP Austria Nederland UK	EXW Rest of Europe Maghreb Africa	EXW Rest of the World
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Mode	SAP Code	Designation	PI01 08	ZPH1 08	ZPH1 08	ZPH1 08
ASS	121141	REG HBSI 240-8-3.S PURGE Type C-B4/DB8mm	528.68 €	591.90 €	574.66 €	620.63 €
ASS	121142	REG HBSI 240-8-3.S PURGE DIN 1 / DB 8mm	533.02 €	596.75 €	579.37 €	625.72 €
ASS	121143	REG HBSI 240-8-3.S PURGE DIN 6 / DB 8mm	556.10 €	622.59 €	604.45 €	652.81 €
ASS	121144	REG HBSI 240-8-3.S PURGE LU 4 / DB 8mm	600.69 €	672.51 €	652.92 €	705.16 €

LASAL™ Equipment:


The objectives of LASAL equipment are to propose an equipment in accordance with the laser manufacturers specification with high level of efficiency and quality.


::: Content of LASAL Equipment

- > 1 Gas panel or 1 change over with PDG point of use for lasing gases
- > 1 change-over for Oxygen cutting gas
- > 1 change-over for Nitrogen cutting gas (2 models: 130 m³/h, and up to 250 m³/h)
- > Pigtail or Flexible hose
- > Safety rack
- > Safety data sheet














Gas Compatibility for LASAL Equipment

Premix Lasing Gas Compatibility						
Gas	% N ₂	% CO ₂	% He	% H ₂	% CO	Equipment
LASAL P51	15.6	3.4	B	-	-	 <p>ML1 200-16-8</p> <p>PDG 50-8-3</p>
LASAL 53	13.5	4.5	B	-	-	
LASAL P61	23.4	1.7	B	-	-	
LASAL 63	20	6	B	-	-	
LASAL 66	35	5	B	-	-	
LASAL 68	29	5	B	-	-	
LASAL 78	26	4	B	-	-	
LASAL 81	15	3.875	B	0.23	-	
LASAL 82	15	3.875	B	0.315	-	
LASAL 83	B	5	0.4	-	-	
LASAL 86	16	8	B	-	-	
LASAL 101	25	5	B	-	-	

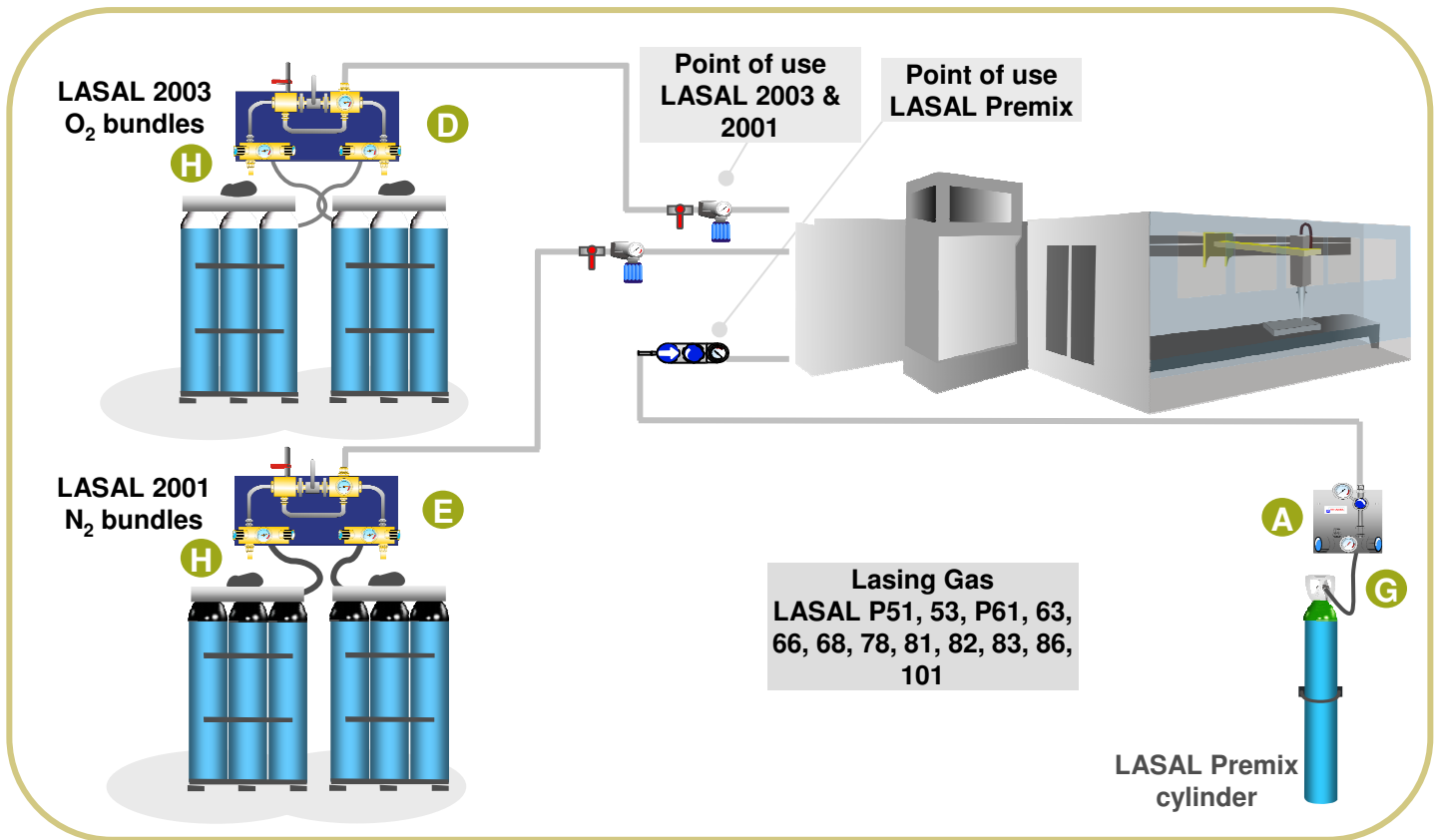
Premix Lasing Gas with CO Compatibility						
Gas	% N ₂	% CO ₂	% He	% H ₂	% CO	Equipment
LASAL 102	16	8	B	-	2	 <p>MI 240-10-10.S</p> <p>PDG 50-8-3.S</p>
LASAL 105	B	8	28	-	4	
LASAL 114	16	8	B	-	4	
LASAL 152	18	9	B	0.3	4	
LASAL 155	16	8	B	0.5	4	

Gas Compatibility for LASAL Equipment

Separate Lasing Gas Compatibility			
Gas	% N ₂	% CO ₂	% He
LASAL 1	100	-	-
LASAL 2	-	100	-
LASAL 4	-	-	100
Equipment			
	ML1 200-16-8 	ML1 200-16-8 	CLSA1 240-10-10 
	 PDG 50-8-3	 PDG 50-8-3	 PDG 50-8-3

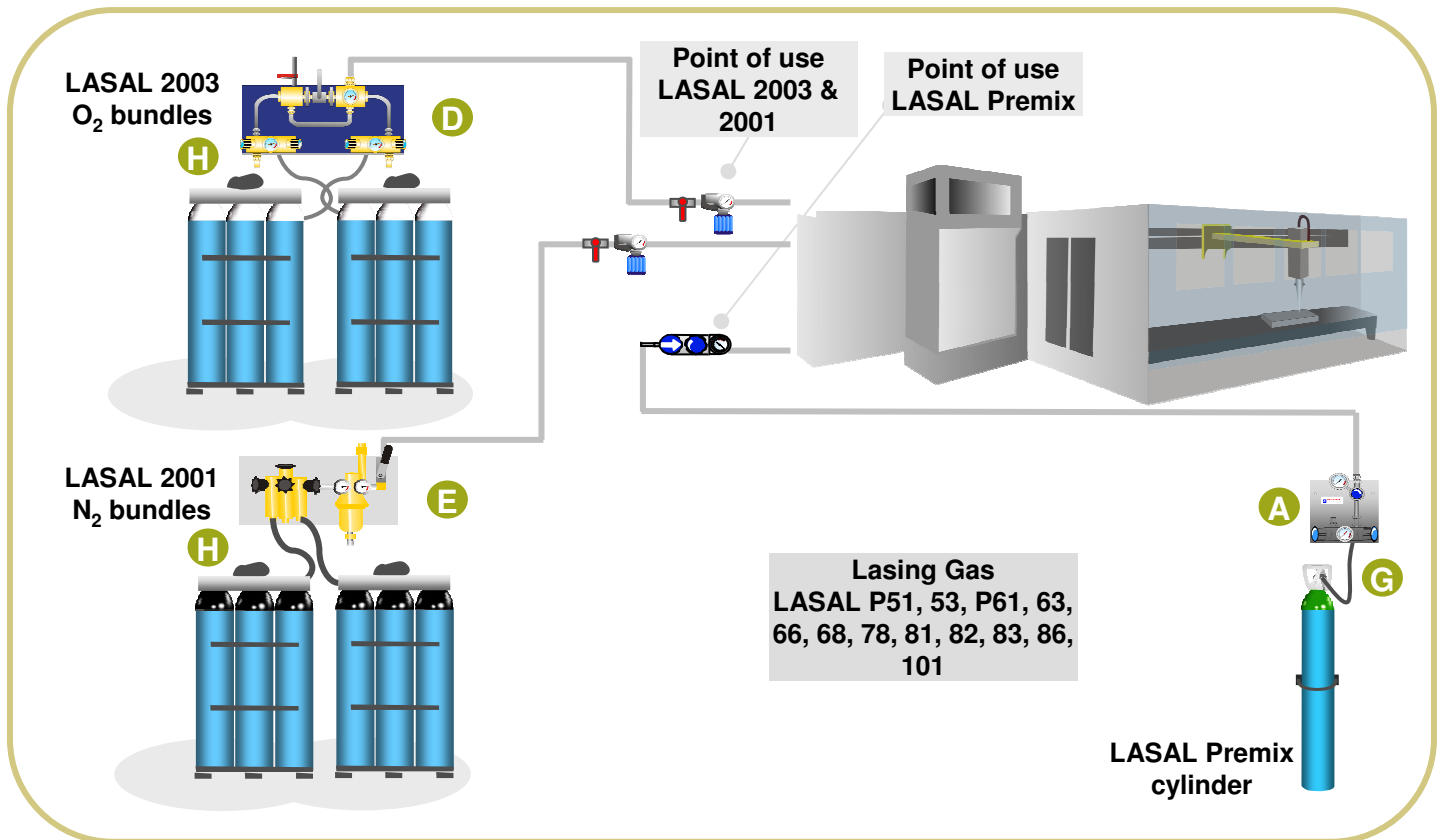
Separate Lasing Gas Compatibility			
Gas	% O ₂	% N ₂	
LASAL 2003	100	-	
LASAL 2001	-	100	
Equipment			
	ECOGAZ 240-30/21-110 	ECOGAZ 240-40/30-130 	ECOGAZ HF 250-N2 
	 DCN 300/4	 DCN 300/4	






LASAL Equipment for Premix Lasing Gas Model 1



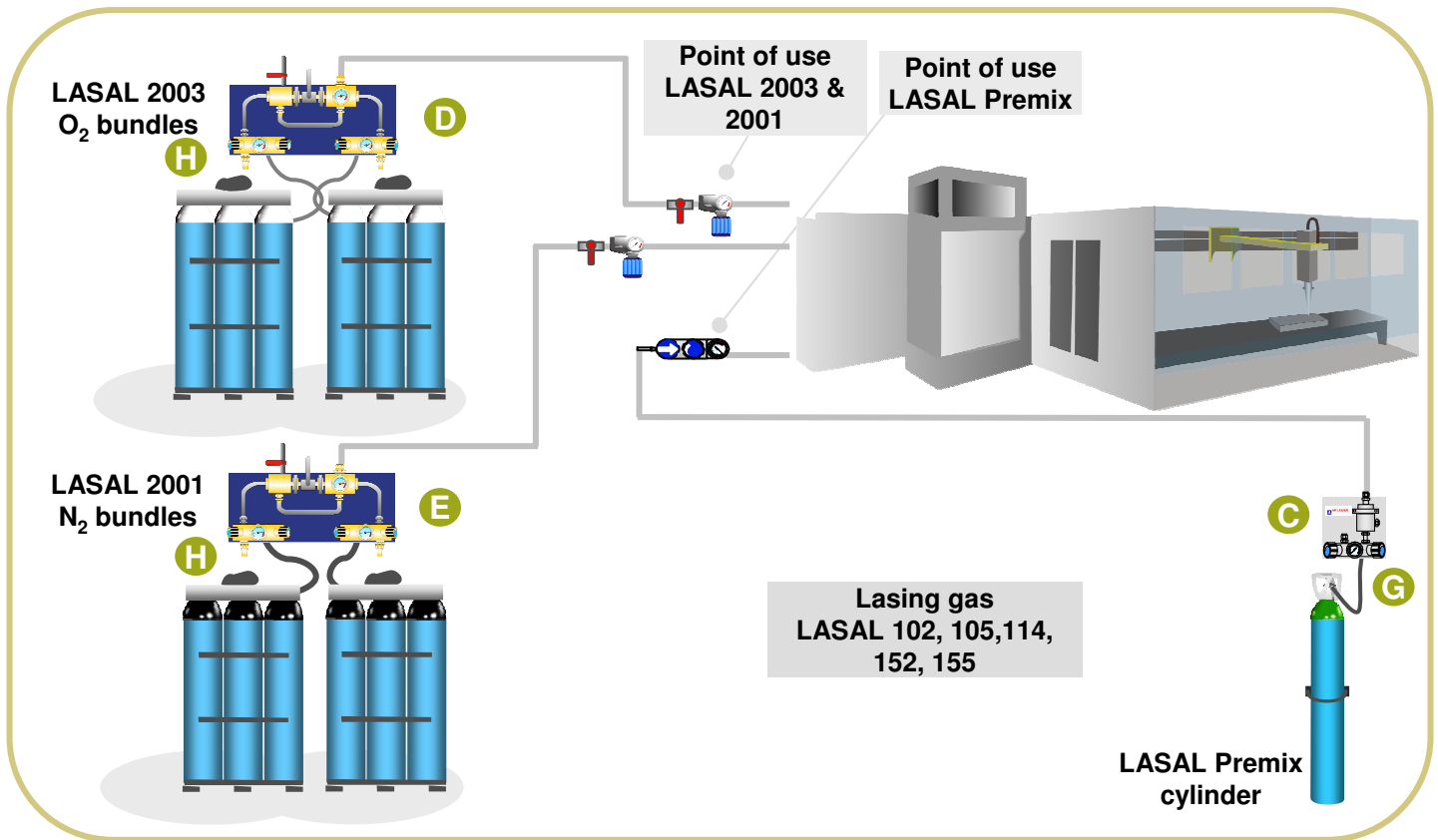
LASAL Equipment for Premix Lasing Gas			
Kit	Model	Nb	
A	Kit gas panel lasing gas ML1 200-16-8	1	
G	Pigtail or flexible hose	1	
LASAL Equipment for Assist Gas			
D	Kit change over assist gas O ₂ ECOGAZ 240-30/21-110	1	
E	Kit change over Assist gas N ₂ 130 m ³ /h ECOGAZ 240-30/30-130	1	
H	Pigtail or flexible hose	4	






::: LASAL Equipment for Premix Lasing Gas Model 2



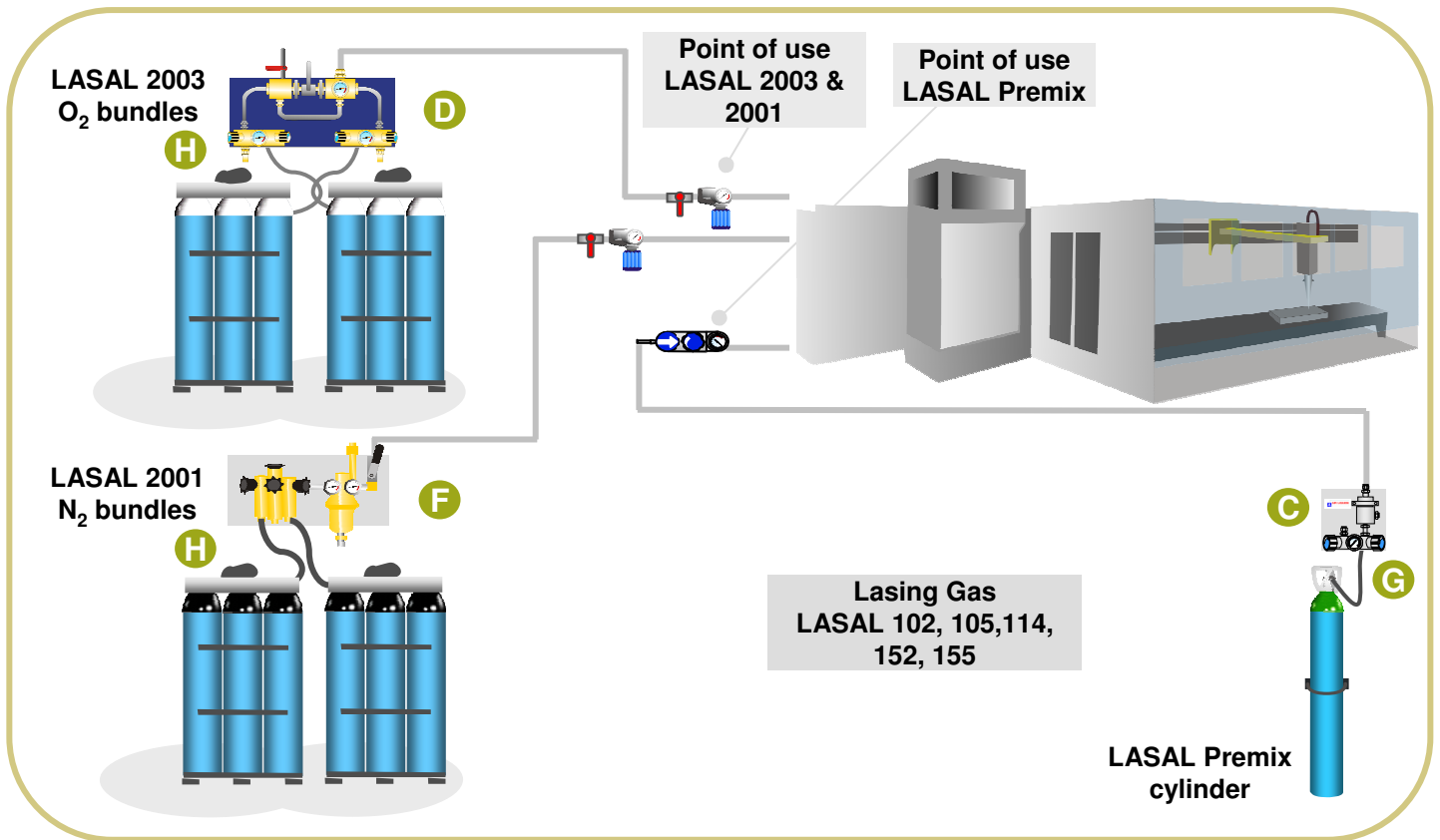
LASAL Equipment for Premix Lasing Gas			
	Kit	Model	Nb
A		Kit gas panel lasing gas ML1 200-16-8	1
G		Pigtail or flexible hose	1
LASAL Equipment for Assist Gas			
D		Kit change over assist gas O ₂ ECOGAZ 240-30/21-110	1
E		Kit change over Assist gas N ₂ 130 m ³ /h ECOGAZ HF 250-N2	1
H		Pigtail or flexible hose	4






LASAL Equipment for Premix Lasing Gas with CO - Model 3



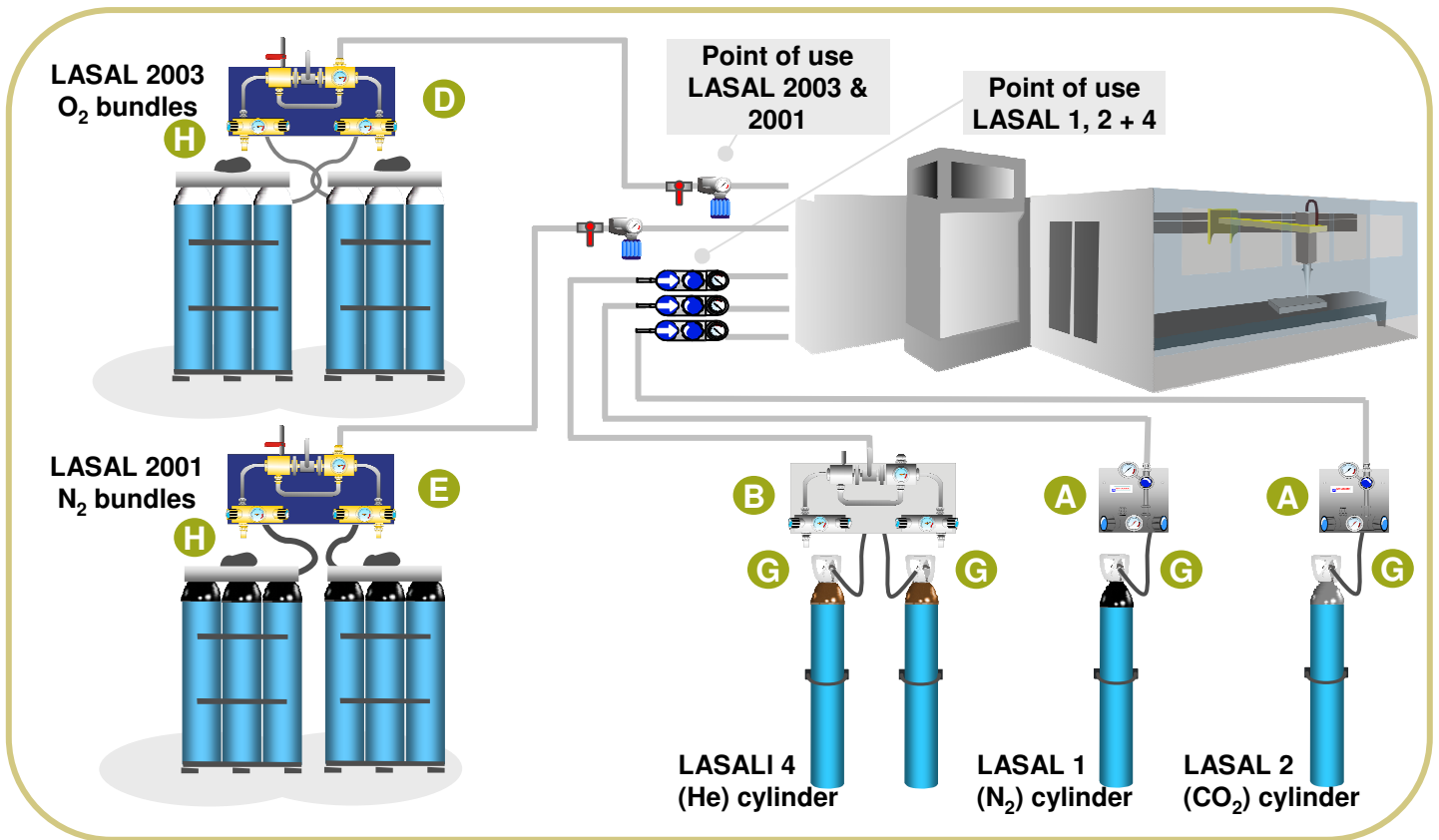
LASAL Equipment for Premix Lasing Gas with CO			
	Kit	Model	Nb
C		Kit gas panel lasing gas MI 240-10-10.S	1
G		Pigtail or flexible hose	1
LASAL Equipment for Assist Gas			
D		Kit change over assist gas O ₂ ECOGAZ 240-30/21-110	1
E		Kit change over Assist gas N ₂ 130 m ³ /h ECOGAZ 240-30/30-130	1
H		Pigtail or flexible hose	4

::: LASAL Equipment for Premix Lasing Gas with CO - Model 4



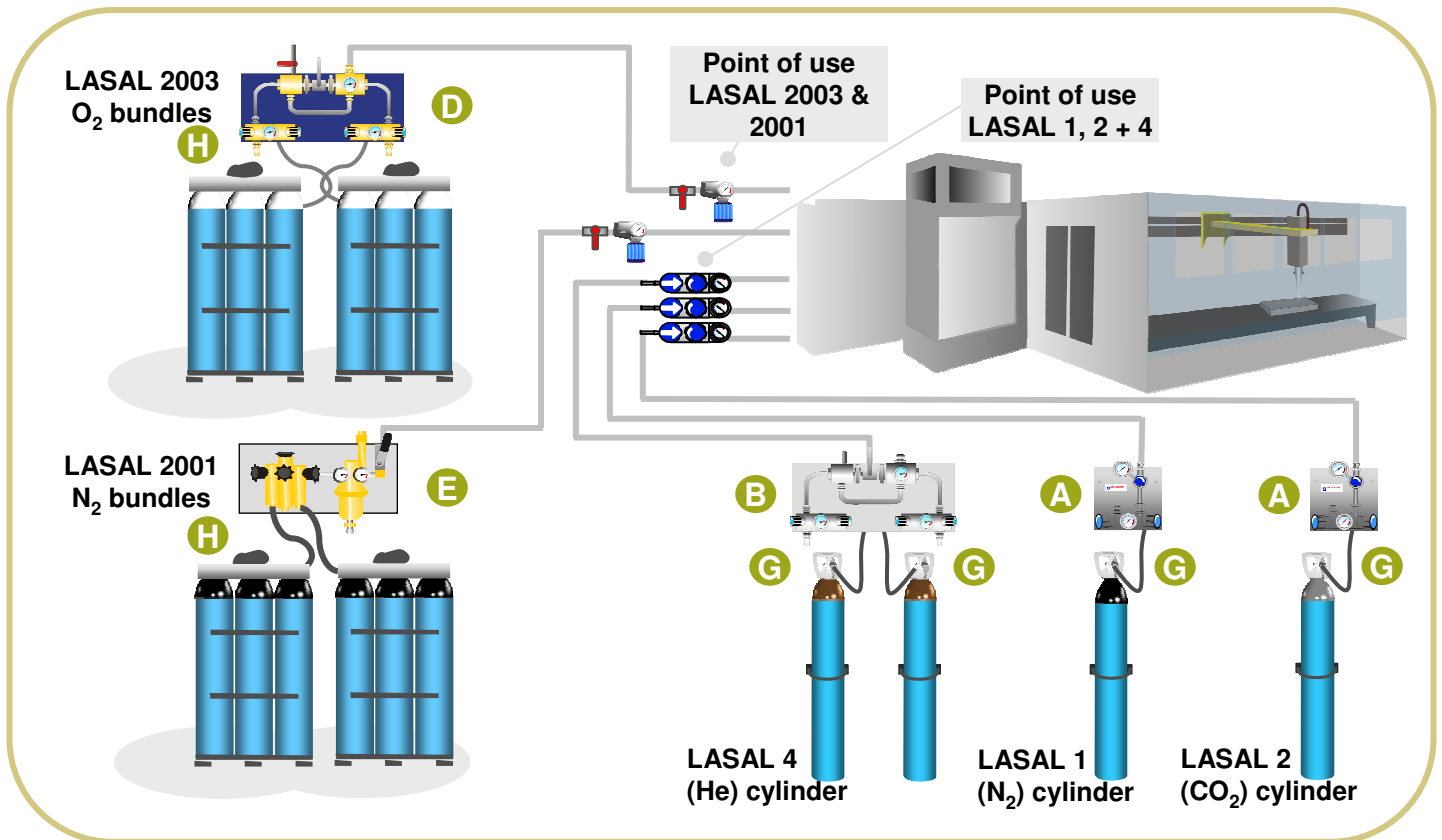
LASAL Equipment for Premix Lasing Gas with CO			
	Kit	Model	Nb
C		Kit gas panel lasing gas MI 240-10-10. S	1
G		Pigtail or flexible hose	1
LASAL Equipment for Assist Gas			
D		Kit change over assist gas O ₂ ECOGAZ 240-30/21-110	1
F		Kit change over assist gas N ₂ 250 m ³ /h ECOGAZ HF 250-N2	1
H		Pigtail or flexible hose	4






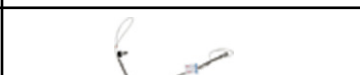
::: LASAL Equipment for Separate Lasing Gas Model 5



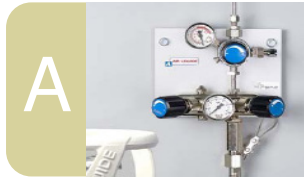
LASAL Equipment for Separate Lasing Gas			
	Kit	Model	Nb
B		Kit change over lasing gas CLSA1 240-10-10	1
A		Kit gas panel lasing gas ML1 200-16-8	2
G		Pigtail or flexible hose	4
LASAL Equipment for Assist Gas			
D		Kit change over assist gas O ₂ ECOGAZ 240-30/21-110	1
E		Kit change-over Assist gas N ₂ 130 m ³ /h ECOGAZ 240-30/30-130	1
H		Pigtail or flexible hose	4

::: LASAL Equipment for Separate Lasing Gas Model 6



LASAL Equipment for Separate Lasing Gas			
Kit	Model	Nb	
B	 Kit change over lasing gas CLSA1 240-10-10	1	
A	 Kit gas panel lasing gas ML1 200-16-8	2	
G	 Pigtail or flexible hose	4	
LASAL Equipment for Assist Gas			
D	 Kit change over assist gas O ₂ ECOGAZ 240-30/21-110	1	
F	 Kit change over assist gas N ₂ 250 m ³ /h ECOGAZ HF 250-N2	1	
H	 Pigtail or flexible hose	4	

... LASAL Equipment Price List



Kit Gas Panel Lasing Gas

DDP France Italy Spain Portugal Belux Nordic Germany	DDP Austria Nederland UK	EXW Rest of Europe Maghreb Africa	EXW Rest of the World
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Mode	SAP Code	Designation	PI01 08	ZPH1 08	ZPH1 08	ZPH1 08
ASS	121153	KIT GAS PANEL LASING GAS	354.41 €	396.79 €	385.23 €	416.05 €



Kit Change-Over Lasing Gas

DDP France Italy Spain Portugal Belux Nordic Germany	DDP Austria Nederland UK	EXW Rest of Europe Maghreb Africa	EXW Rest of the World
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Mode	SAP Code	Designation	PI01 08	ZPH1 08	ZPH1 08	ZPH1 08
ASS	121154	KIT CHANGE OVER LASING GAS	583.71 €	653.51 €	634.47 €	685.23 €



Kit Gas Panel Lasing Gas with CO

DDP France Italy Spain Portugal Belux Nordic Germany	DDP Austria Nederland UK	EXW Rest of Europe Maghreb Africa	EXW Rest of the World
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Mode	SAP Code	Designation	PI01 08	ZPH1 08	ZPH1 08	ZPH1 08
ASS	121155	KIT GAS PANEL LASING GAS with CO	877.95 €	982.93 €	954.30 €	1 030.64 €



Kit Change-Over Assist Gas O₂

DDP France Italy Spain Portugal Belux Nordic Germany	DDP Austria Nederland UK	EXW Rest of Europe Maghreb Africa	EXW Rest of the World
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Mode	SAP Code	Designation	PI01 08	ZPH1 08	ZPH1 08	ZPH1 08
ASS	121156	KIT CHANGE OVER ASSIST GAS O ₂	571.70 €	640.05 €	621.41 €	671.12 €



Kit Change-Over Assist Gas N₂ 130

DDP France Italy Spain Portugal Belux Nordic Germany	DDP Austria Nederland UK	EXW Rest of Europe Maghreb Africa	EXW Rest of the World
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Mode	SAP Code	Designation	PI01 08	ZPH1 08	ZPH1 08	ZPH1 08
ASS	121157	KIT CHANGE OVER ASSIST GAS N ₂ 130	457.51 €	512.21 €	497.29 €	537.07 €

LASAL Equipment Price List

F



Kit Change-Over Assist Gas N₂ 250

DDP France Italy Spain Portugal Belux Nordic Germany	DDP Austria Nederland UK	EXW Rest of Europe Maghreb Africa	EXW Rest of the World
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Mode	SAP Code	Designation	PI01 08	ZPH1 08	ZPH1 08	ZPH1 08
ASS	121158	KIT CHANGE OVER ASSIST GAS N ₂ 250	589.38 €	659.85 €	640.63 €	691.88 €

G



Options for Lasing Gas

DDP France Italy Spain Portugal Belux Nordic Germany	DDP Austria Nederland UK	EXW Rest of Europe Maghreb Africa	EXW Rest of the World
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Mode	SAP Code	Designation	PI01 08	ZPH1 08	ZPH1 08	ZPH1 08
		KIT LASING GAS Flexible hose type C/B4				
		KIT LASING GAS Pigtail type C/B4				
		KIT LASING GAS Flexible hose type DIN 6/B5				
		KIT LASING GAS Pigtail type DIN 6/B5				
		KIT LASING GAS Flexible hose type DIN 10				
		KIT LASING GAS Pigtail type DIN 10				
		KIT LASING GAS Flexible hose type UNI 4406				
		KIT LASING GAS Pigtail type 4406				
		KIT LASING GAS Flexible hose type UNI 4409				
		KIT LASING GAS Pigtail type 4409				
		KIT LASING GAS Flexible hose type RU-3				
		KIT LASING GAS Pigtail type RU-3				
		KIT LASING GAS Flexible hose type RU-1				
		KIT LASING GAS Pigtail type RU-1				

LASAL Equipment Price List



Options for Assist Gas

DDP France Italy Spain Portugal Belux Nordic Germany	DDP Austria Nederland UK	EXW Rest of Europe Maghreb Africa	EXW Rest of the World
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Mode	SAP Code	Designation	PI01 08	ZPH1 08	ZPH1 08	ZPH1 08
		KIT ASSIST GAS Flexible hose O ₂ type F (NF)				
		KIT ASSIST GAS Flexible hose N ₂ type C/B4				
		KIT ASSIST GAS Pigtail O ₂ type F (NF)				
		KIT ASSIST GAS Pigtail N ₂ type C/B4				
		KIT ASSIST GAS Flexible hose O ₂ DIN 6				
		KIT ASSIST GAS Flexible hose O ₂ DIN 9				
		KIT ASSIST GAS Pigtail O ₂ DIN 6				
		KIT ASSIST GAS Pigtail O ₂ DIN 9				
		KIT ASSIST GAS Flexible hose N ₂ DIN 10				
		KIT ASSIST GAS Pigtail N ₂ DIN 10				
		KIT ASSIST GAS Flexible hose O ₂ UNI 4406				
		KIT ASSIST GAS Flexible hose N ₂ UNI 4409				
		KIT ASSIST GAS Pigtail O ₂ UNI 4406				
		KIT ASSIST GAS Pigtail N ₂ UNI 4409				
		KIT ASSIST GAS Pigtail O ₂ RI-2				
		KIT ASSIST GAS Pigtail N ₂ RU-3				

Appendixes

These appendixes group all product sheet of this offer and tool to help to build offer. These documents can be for external use.



::: Product Sheet for LASAL Range

These models are European and available on the EPS portal for each country. You should use your own product sheet according to your language and technical details.

> List of LASAL Gas Product Sheet:

LASAL 1, LASAL 2, LASAL 4, LASAL 53, LASAL 63, LASAL 66, LASAL 68, LASAL 78, LASAL 81, LASAL 82, LASAL 83, LASAL 86, LASAL 101, LASAL 102, LASAL 105, LASAL 152, LASAL 155, LASAL 201, LASAL P51, LASAL P61, LASAL 2001, LASAL 2003.

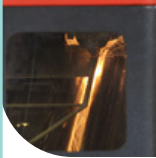


::: Product Sheet for Equipment

These models are European model, for each country you need to use your own product sheet according to your language and technical details.

> List of Equipment Product Sheet:

CLSA1240-10-10, HBS240-8-3, DCN300_4, DLM240-50-100, ECOGAZ240-30_21-110, HBSI240-8-3_S, HEPAL50NG, MI240-10-10_S, ML1200-16-8, PDG50-8-3, PDG50-8-3_S



::: Installation Designs

These documents are available to present the offer and to select, on one scheme, the equipment according to customer needs.

These designs are only a graphic representation of the proposal. They don't represent in anyway any IMS standard for the pipeline at customer site.

LASAL 1



LASAL refers to the premium gases to address laser cutting and laser welding applications by providing solutions with specialized advice to improve productivity, laser lifetime and quality of work.

LASAL 1 corresponds to the state-of-the-art nitrogen quality for such applications.

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AIR LIQUIDE