



ALJET BURNER
Gas fuel version

INSTALLATION, ASSEMBLY,
AND MAINTENANCE PROCEDURES



1 - INTRODUCTION	3
2 - DESCRIPTION OF THE ALJET BURNER	3
3 - INSTALLATION OF THE BURNER	5
3.1 Preparation of the burner parts	5
3.2 Installation of the gas fuel lance on the burner body	5
3.3 Installation of the ALJET burner on the furnace	5
3.4 Installation of the ALJET burner and oxygen lance on a door of a rotary furnace	6
4 - BURNER MAINTENANCE	8
4.1 Inspection of the injectors	8
4.2 Inspection of the burner body	8
4.3 Unmounting the burner	9
5 - SAFETY WITH OXY - COMBUSTION	10
6 - APPENDIX	11
6.1 Burner specifications: capacity ranges of the ALJET burners	
6.2 Burner dimensions	

1 - INTRODUCTION

The ALJET burner is a water-cooled oxy-fuel burner especially designed for batch melting furnaces. It is adapted for operation under severe working conditions (confined or overheated enclosures).

This burner is particularly dedicated to iron melting in rotary furnaces. It can operate at temperatures up to 1600 °C and resists to FeO slag attack.

An ignition pilot burner and a flame supervision cell can be integrated into the burner body.

The configuration of this burner is of pipe-in-pipe type; the fuel pipe is located inside the oxygen pipe. The fuel and the oxygen mix at the burner outlet and the flame develops in the furnace.

The ALJET burner is composed of:

- a metallic burner body inserted in the furnace wall or door which ensures the oxygen distribution.
- a fuel injection system.

The metallic burner body is cooled by the water flow. Experimental and modeling studies have been carried out to design the shape of the burner body in order to ensure efficient cooling.

The alloy steels employed for the metallic parts (stainless steel 316L type for the burner body and the lances, Inconel 600 type for the gas fuel injectors) offer good resistance to corrosion for the burner's "cold part" and good resistance to temperature and oxidation for the "hot part".

The ALJET burner can operate with natural gas.

The ALJET burner produces a low momentum flame which minimizes dust emission and prevents any refractory wear.

The pipe-in-pipe system delivers an axi-symmetric luminous flame. The flame shape is of cylindrical type.

The ALJET burner can operate from 30 % to 120 % of its nominal firing rate.

2 - DESCRIPTION OF THE ALJET BURNER

The ALJET range consists of six standard models defined according to their nominal firing rate (expressed in kW).

Models list: ALJET 1500
ALJET 2000
ALJET 2500
ALJET 3000
ALJET 5000
ALJET 6000

The ALJET gas fuel versions comprise three components (see figure 1):

- (1) a burner body
- (3) a gas fuel lance with its injectors and its gas feeder
- (2) a gasket positioned between the gas feeder and the burner body

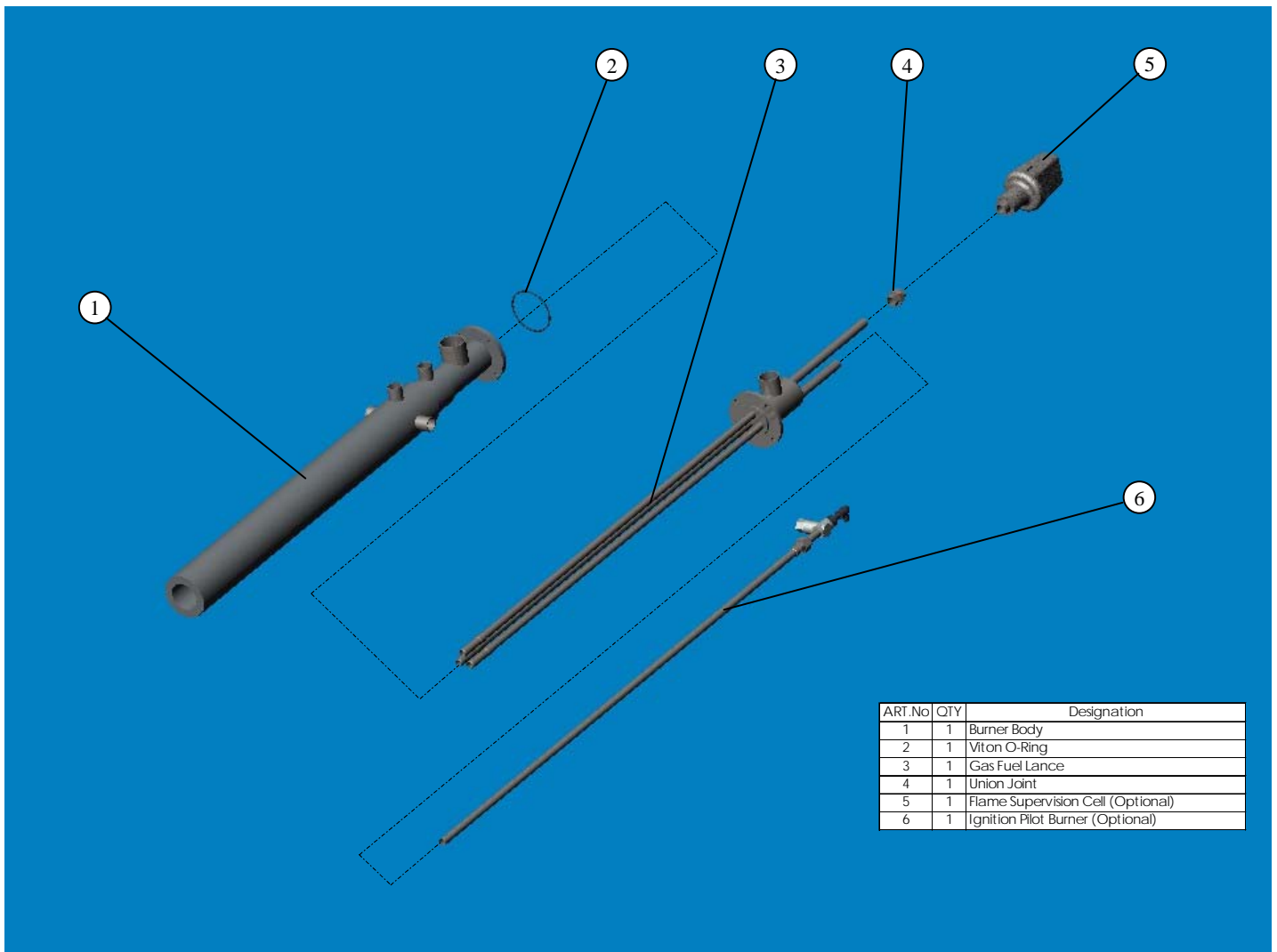


Figure 1

As standard, the burner body can incorporate an ignition pilot burner and a flame supervision cell.

3 - INSTALLATION OF THE BURNER

3.1- PREPARATION OF THE BURNER PARTS

The burner is delivered "oxygen clean". Before assembling the burner, make sure that all parts have not been contaminated by grease, oil or particulates. If it has been contaminated, all metallic parts of the burner must be cleaned one by one in order to eliminate all traces of oil or grease and particulates. Use only oxygen compatible products for this operation.

In case of doubt on what product to use and procedure, contact an Air Liquide representative.

3.2- INSTALLATION OF THE GAS FUEL LANCE ON THE BURNER BODY

The assembly procedure is as follows:

- Please make sure that Viton O-ring is set in the flange of the burner body.
- Place the gas fuel lance in the burner body.
- Adjust the flange of the gas fuel lance to the flange of the burner body
- Fix the gas fuel lance on the burner body by using bolts and nuts.
- Place the ignition pilot burner if present.
- Install the flame supervision cell if present.

3.3 - INSTALLATION OF THE ALJET BURNER ON THE FURNACE

Before installing the ALJET burner, check that the support is horizontal or inclined no more than 2 ° toward the surface of the load, to make sure that the flame is not oriented towards the crown of the furnace.

- ◆ Place the burner in the dedicated furnace opening.
- ◆ Ensure a proper tightness around the burner body with a heat resistant material.
- ◆ Connect the flexible oxygen hose to the burner.
- ◆ Connect the flexible fuel gas hose to the burner.

- ◆ Connect the flexible water hoses to the burner.
- Check that cooling water is supplied at the burner (Water pressure at burner inlet: 3 bar g. / Cooling water flow rate: 4 Nm³/h).

Note concerning the cooling water: in order to avoid scaling, the cooling water must comply with the following criteria: total hardness 7 to 15, hardness as calcium carbonate 2 to 4, pH 7 to 8, matter in suspension < 10 ppm and a maximum content of dissolved salts of 400 ppm including chlorides 50 ppm and nitrates 0.5 mg/l. To protect against freezing, it is necessary to use an antifreeze which guarantees protection to -20 °C (temperature to be adapted according to the country).

- Connect the ignition pilot burner and flame supervision cell if present.
- The burner may be ignited, according to the procedure described in the operation manual of combustion control system.

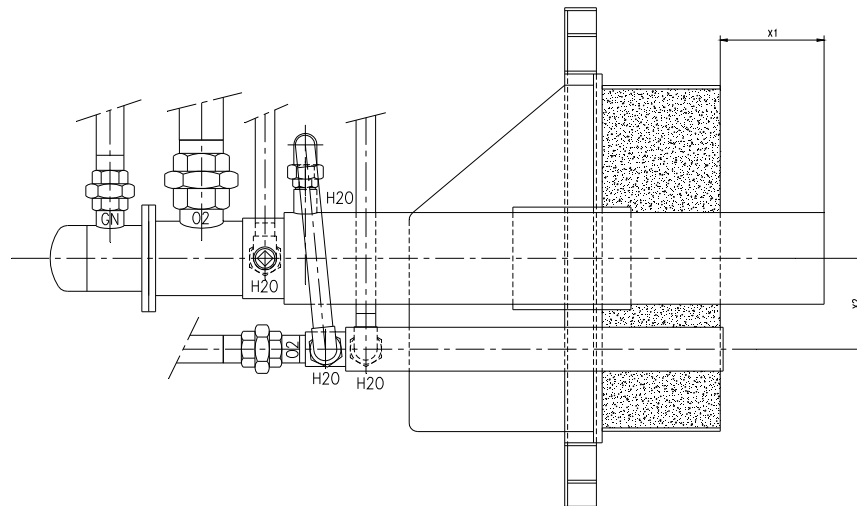
3.4 - INSTALLATION OF THE ALJET BURNER AND OXYGEN LANCE ON A DOOR OF A ROTARY FURNACE

Mounting the burner and lance:

- Position the end of the burner at 180 mm from the inner side of the door (dimension X1 on the figure below)
- Position the end of the oxygen lance at 10 mm from the inner side of the door
- With the door in closed position, place the burner and oxygen lance horizontally, tilted slightly forward (maximum 3°) and with a distance of 150 mm (dimension X2 on the figure below) between the burner and oxygen lance axes
- Fix the burner and the oxygen lance in position
- Connect the flexible water hoses between the burner and oxygen lance according to the figure below

Points to be checked at the end of assembly:

- Check the burner and oxygen lance positioning
- Check the correct mounting of the flexible water hoses



Note:

- Water goes into the burner through the side
- Water comes out of the burner through the top
- The water outlet of the burner is connected to the water inlet of the oxygen lance
- Water goes into the oxygen lance through the back connection
- Water comes out of the oxygen lance through the front connection

4 - BURNER MAINTENANCE

It may be necessary to remove the burner for regular maintenance inspections, or when the burner will not be used for a long period of time.

4.1- INSPECTION OF THE INJECTORS

- Turn the burner off.
- Disconnect the flexible fuel gas hose.
- Remove the gas fuel lance from the burner body.
- Check the injectors and the inside of the burner body.

Note: the inspection consists of checking the external and internal appearance of the injectors (signs of corrosion, cracks...) and welds.

This inspection must be performed by a person qualified in boilermaking and welding.

- Replace the gas fuel lance if necessary (check that the new lance is free of traces of oil and grease, and clean if necessary).
- Re-install the gas fuel lance (use a new Viton O-ring).
- Connect the flexible fuel gas hose.

4.2- INSPECTION OF THE BURNER BODY

- Turn the burner off.
- Disconnect the flexible fuel gas, oxygen and cooling water hoses.
- Remove the burner from the furnace opening.
- Check the burner body and especially the tip of the burner.

Note: the inspection consists of checking the external and internal appearance of the tubes (signs of corrosion, cracks...) and welds.

This inspection must be performed by a person qualified in boilermaking and welding.

- Replace the burner body if necessary (check that the new body is free of traces of oil and grease, and clean if necessary).
- Re-install the burner.
- Connect the flexible fuel gas, oxygen and cooling water hoses.

The burner is operational and can be firing.

During the first month of operation of the burner, inspection of the injectors and burner body must be carried out every week. During the second month, the period between inspections can be extended to two weeks. Air Liquide recommends that the injectors and burner body are inspected every month.

Note:

No modification of the ALJET burner is allowed without the express agreement of AIR LIQUIDE.

4.3 - UNMOUNTING THE BURNER

When the burner is not going to be used for extended periods of time, the burner should be removed from the furnace.

- Turn the burner off.
- Remove the flexible fuel gas, oxygen and cooling water hoses.
- Remove the burner body from the furnace opening.
- Store the burner in a clean area.

A burner that was previously removed may be re-installed by following the same procedure as described in Chapter 3.

Note: every time a burner is unmounted, a cleaning of the metallic parts that are in contact with pure oxygen by a specific cleaner product for oil and grease is mandatory.

5 - SAFETY WITH OXY-COMBUSTION

Every operator who manipulates the oxy-fuel ALJET burners should be trained on oxygen safety procedures. In particular, operators must be aware of the following safety instructions for oxygen utilisation:

- **Never use oil or grease for oxygen piping, nor assembling burner parts.**
- **Do not use organic materials for tightness components.**
- **Always clean all parts before installing them.**

Failure to respect these instructions may cause ignition in the oxygen circuit, and further propagation along the oxygen piping.

- General instructions for proper working conditions
 - The ALJET burner requires control over the fuel and oxygen, so we recommend the installation of a calibrated flow meter on the fuel and oxygen lines for determining accurate volumetric or mass flow rates.
 - Always supply the burner with cooling water during operation, never turn off the cooling water while the burner is located in the furnace (even if combustion is not taking place, all parts of the burner are heated and can be destroyed by high furnace temperatures).
 - Quick-coupling systems for the oxygen, fuel and water fluid will facilitate disassembly and installation. Quick-coupling systems also make it possible to limit the time for which the burner parts are subjected to furnace temperatures without cooling water flow.
 - Piping needs to be supported in order to avoid stresses on the burner body.
 - Flexible hoses are advised for the burner supply. Flexible hoses can prevent damage to the burner due to stresses and the expansion of the piping.
 - Viewing the flame through observation windows makes burner start-up and adjustments easier.
 - Oxygen and fuel supply piping must be rated for the pressure and flow rate requirements of the burner operating at maximum capacity. Avoid long distances and turns in the piping as these increase the pressure drop.

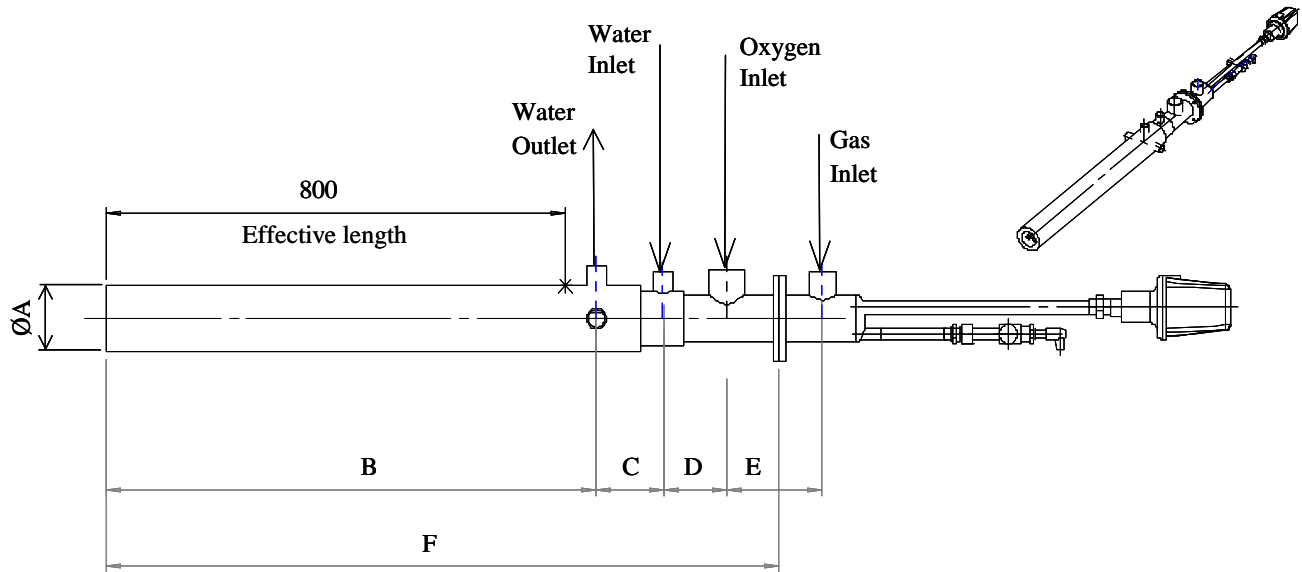
6 - APPENDIX

6.1 BURNER SPECIFICATIONS

- Capacity ranges of the ALJET burners :

Model	Maximum capacity	Nominal capacity	Minimum capacity
ALJET 1500 Gas version	1800 kW	1500 kW	450 kW
ALJET 2000 Gas version	2400 kW	2000 kW	600 kW
ALJET 2500 Gas version	3000 kW	2500 kW	750 kW
ALJET 3000 Gas version	3600 kW	3000 kW	900 kW
ALJET 5000 Gas version	6000 kW	5000 kW	1500 kW
ALJET 6000 Gas version	7200 kW	6000 kW	1800 kW

6.2 BURNER DIMENSIONS



ALJET burner gas version										
Gas Fuel Version	ØA	B	C	D	E	F	Gas Inlet	Oxygen inlet	Water Inlet	Water Outlet
ALJET 1500	108	860	110	110	167	1172	1"1/2	2"	1"	1"
ALJET 2000	108	860	110	110	167	1172	1"1/2	2"	1"	1"
ALJET 2500	108	860	110	110	167	1172	1"1/2	2"	1"	1"
ALJET 3000	159	860	110	110	167	1172	1"1/2	2"	1"	1"
ALJET 5000	159	860	110	110	167	1172	2"	2"1/2	1"	1"
ALJET 6000	219,1	890	80	110	162	1172	2"	2"1/2	1"1/4	1"1/4