2.1 Unpacking the Equipment

2.1.1 Un-banding and Verification

Remove the banding from the shipping container and carefully disassemble. Refer to the Equipment List in this manual and verify the model of your furnace system and good receipt of all options, accessories, and special configurations, which were ordered according to the original purchase order or specification. If any item listed is unaccounted for, immediately notify the carrier and Technical Support.

2.2 Location & Initial Installation Work

2.2.1 Machine Inspection

Remove the upper and lower side covers from both sides of the machine. Inspect all lamp connections for soundness and for loose hardware that may have become dislodged during shipment. Inspect the lower electrical compartment for shipping damage, loose connections, or components. Finally, inspect the furnace interior, checking for broken lamps, foreign objects, or any components that may have come loose during shipment. Report any shipping damage immediately to the LCI Furnaces or FurnacePros Technical Support Department.

2.2.2 Machine Label

The furnace label generally appears as in **Figure 2-1 Name Plate** and indicates the maximum power and current draw. Actual operating values are much lower and can be found in Section 12 Specifications.

This label will normally be located near the Power Input either on the side or rear of the Control Enclosure.

Figure 2-1 Name Plate

2.2.3 Machine Location

Furnace Environment Considerations. Location of the machine is important. The furnace environment should be clean and dry, especially if the furnace is to be used for to create a low oxygen or other controlled environment. The lower the moisture levels in the room where the furnace is located, the easier it will be to achieve low oxygen and moisture levels in the furnace. Locate furnace away from fans, blowers or other equipment or drafts that can influence atmospheric conditions inside the furnace.

Installing Through a Wall. If installing the furnace through a wall between two rooms, make sure that the room pressures are equalized to avoid influencing the furnace atmosphere.

2.2.4 Lifting and Machine Placement

Locate the machine on an unyielding floor in the final installation position so that the access panels along the length of the furnace can be removed for calibration, servicing and maintenance. Lift the machine at the approximate locations shown on the installation drawing, and slide the shipment skid out from under the machine. Do not attempt to lift the machine at one point or at points other than recommended; failure to follow these instructions invites frame damage and will void the warranty.

NOTE: The lifting device must extend under the machine and support both sides of the frame structure. Ref. drawing 803-091306 Furnace Arrangement for location.

2.2.5 Machine Adjustment

The base covers are removed and the leveling screws adjusted to level the frame within 0.06 inch overall. Each of the leveling screws should support an equal amount of weight.

After the frame is level, the chamber leveling screws are adjusted to 0.06 inch overall.

Figure 2-2 Leveling Feet

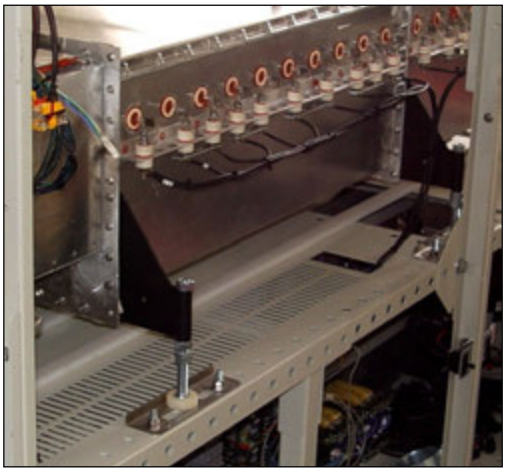

Figure 2-3 Leveling Chamber Supports

2.2.6 Removal of Shipping Restraint Screws

Large furnaces operating at high temperatures experience considerable growth from thermal expansion. All models are equipped with support slides which allow stress free expansion to take place. To secure the process chamber during shipment, restraining brackets (labeled SHIPPING BRACKET) attach directly between the chamber and frame.

Before operating the furnace first remove the top hex nuts and washers which secure each bracket to the frame. Then remove the bracket and discard.

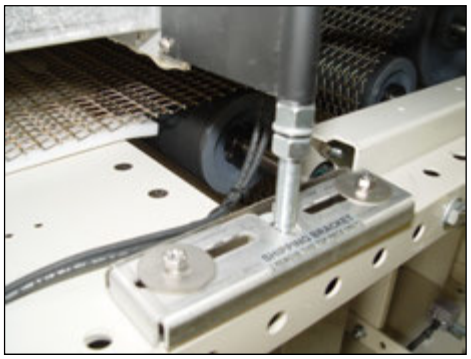

Figure 2-4 Shipping Brackets

WARNING: Failure to remove the top bracket invites structural damage and will void the warranty.

2.2.7 Installation of the Transport Belt

LA-306 furnaces are usually shipped with the belt in place. However, if the shipment is expected to be exposed to rough handling or irregular terrain during shipment, a portion of the transport belt which goes through the furnace chamber may have been intentionally left uninstalled to protect the furnace interior. When installing the belt, it will be helpful to have an assistant available to help guide the belt into the furnace entrance.

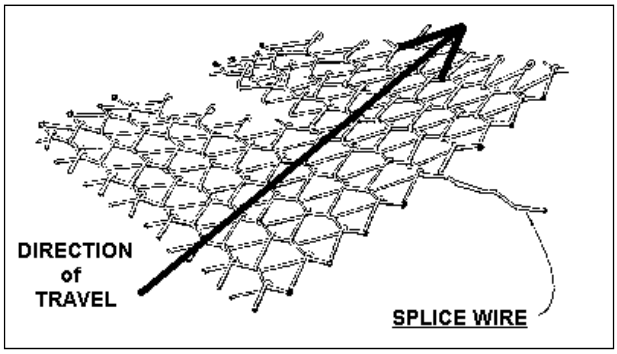

Figure 2-5 Belt Splice

The portion of the belt which goes through the furnace is rolled up and secured at the entrance end of the furnace. Unroll the belt and attach it securely to the pull wire that was left in the furnace chamber. Pull the belt through the chamber from the exit end of the furnace, while an assistant guides the belt into the entrance. Once the belt has been pulled completely through the chamber, remove and discard the pull wire. Splice as shown in Figure 2-5 Belt Splice.

2.2.8 Unpacking and Installation of Belt Weight

Remove one of lower side panel near the furnace exit (below Control Panel enclosure) using a flat screw driver turn the two latches to release and pull off the panel. This panel can be rotated and hung from the upper panel.

Figure 2-6 Lower Access Panel

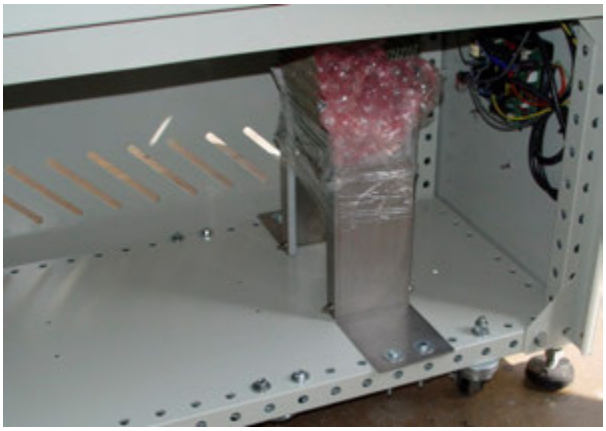

Figure 2-7 Belt Weight with packing

Figure 2-8 Belt Weight in Place

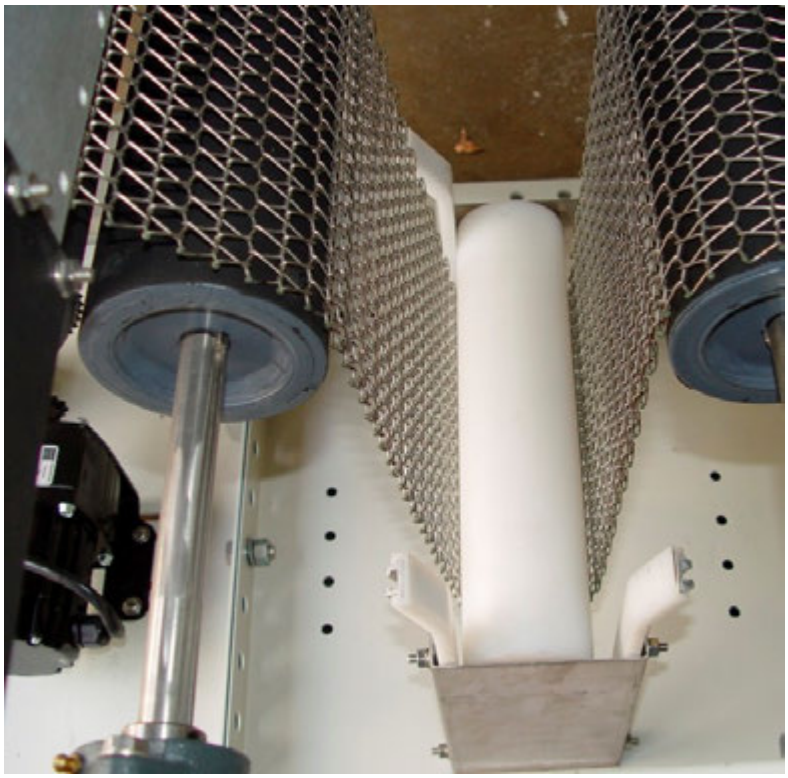

Figure 2-9 Proper Alignment of Belt Weight

Locate the belt weight as shown in Figure 2-7. Unwrap and remove packing. Reinsert belt weight as shown in Figure 2-8. Belt weight should be allowed to move freely as shown in Figure 2-9.

2.3 Providing Power

The furnaces are shipped wired for the voltage specified on the nameplate. Electrical power, matching the specifications on the nameplate shall be connected to terminal block TB1 via the access panel on the Control Enclosure. Unscrew top fastener using a Philips head screwdriver to open access panel. Connect single phase power to terminal block through Power Input port on back the Control Enclosure.

For a 1-phase 208-240 Vac power source:

1. Connect the power source LINE to TB1-01 terminal; and
2. Connect the NEUTRAL to TB1-02 terminal; and
3. Connect the Earth ground to the TB1-GND (yellow/green) terminal.

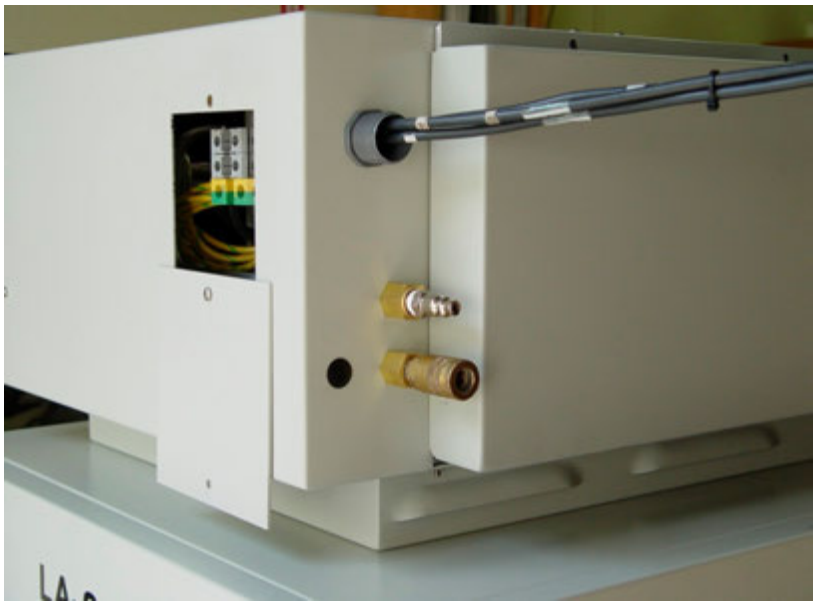

Figure 2-10 Standard Back Entry Power Port

2.3.1 Circuit Breaker (option □)

A single-phase circuit breaker, if supplied, will be mounted in the control enclosure on top of the furnace at the location shown on the Furnace Arrangement drawing. See example in Figure 2-11. Wire supply power to the terminal block TB1 as instructed in section 2.3. All city and local codes should be followed when wiring this system for power. See Facilities drawing 803-091306 and Engineering and Specifications sections of this manual for power requirements.

Figure 2-11 Circuit Breaker (option)

2.3.2 Sample Port (option □)

In this option, sample port(s) at the furnace chamber are piped to the control enclosure. A oxygen, moisture or other gas analyzer with sample pump can be connected to the port for continuous monitoring of the atmosphere inside the chamber.

A typical port opening can be seen blanked off in Figure 2-12. See Facilities drawing 803-091306 and Engineering for connection requirements.

2.4 Providing Process Gas

Oil-free dry process gas at a maximum recommended dew point of 15°C (59°F), shall be brought to the machine through a customer supplied lines with a minimum inside diameter of 3/4 inch. Initial supply pressure shall not exceed 70 psig (except if optional supply gas Mixing System in included. In addition to a supply line filters and condensate traps, and regulators to reduce supply pressure to 70 psig must be installed on the supply line before entering the furnace.

WARNING: The flowmeters on these furnaces are rated at 70 psi maximum. Operating above 70 psi exposes the operator to possible injury

The supply temperature of any gas including air should be above the dew point of the room air to prevent condensation from forming on the feed lines and dripping into the furnace.

See 803-091306 Furnace Arrangement drawing for location of process connections. An example of typical process air connection is shown in Figure 2-12.

Figure 2-12 Process Gas Connections

2.4.1 Single Gas Furnaces

On single gas furnaces, Gas 1 is a ¼ inch female pipe connection for connecting CDA (clean dry compressed air) or nitrogen or other process gas to supply all furnace flowmeters on the front of the control console.

Figure 2-13 Process Gas Flowmeters

2.4.2 Dual Gas Furnaces (option □)

On Dual Gas furnaces (optional), Gas 1 is the primary gas connection for CDA or nitrogen to all furnace auxiliaries including inlet and transition tunnel baffles, entrance exhaust stack eductor, lamp seals and CACT cooling chamber.

Gas 2 is a ¼ female pipe connection for nitrogen or forming gas supply to the furnace heating chambers.

DANGER: Except for furnaces specifically equipped with the hydrogen option, combustible gas should NOT be connect to the furnace. Forming gas or other gas mixtures which have a combustible gas component can be safely introduced into furnace provided the delivered concentration is below its lower flammable limit (LFL) in air.

2.4.3 Supply Gas Mixing System (option □)

Figure 2-14 Supply Gas Mixing System

An option on Dual Gas furnaces, the Supply Gas Mixing System facilitates connection of two process gases which can then be alternatively selected or mixed while the furnace is operating.. In addition, the system includes two pressure regulators that can accept supply line pressures of from 100 psi – 3500 psi (6.5-240 bar). Pressure gauges in both lines allow the user to adjust the pressure on both lines to the pressure the furnace requires: 70 psig (4.8 bar).

Gas 1 is the primary gas connection for nitrogen to all furnace auxiliaries including inlet and transition tunnel baffles, entrance exhaust stack eductor, lamp seals and CACT cooling chamber. In addition, this port feeds the N2 (Nitrogen) supply pressure gauge and flowmeter located on the side of the control console.

Gas 2 port is a ¼ female pipe connection for premixed FG (forming gas) supply. This port feeds the FG (N2/H2) premix supply pressure gauge and flowmeter on the side of the control console.

2.1 Exhaust Requirements

2.1.1 Cabinet Gas Exhaust Requirements

A 4-inch round duct with 8x12 inch rectangular hood can be installed above the 10-inch diameter cabinet cooling exhaust fan to reduce the additional heat load the furnace can add to its environment. The duct generally does not need to be insulated. As the cabinet fan only cools the cabinet interior, if the furnace is installed in an adequately ventilated room, this exhaust duct may not be required.

See 803-091306 Facility Arrangement for suggested duct and hood location.

2.1.2 Non-combustible Process Gas Exhaust Requirements

In most applications, process exhaust and heat is vented to the outside atmosphere. It is the customer's responsibility to review the process, local laws, and facility in deciding on an exhaust system. Insulated exhaust tubing and a collector hood , is routinely used for non-combustible process gas. Do not make any direct connections to the furnace exhaust stacks. A minimum 2.0 inch clearance between the 3-inch diameter exhaust stacks and venting hood or device is required. We recommend a 4-inch diameter insulated exhaust duct with an 8-inch diameter insulated hood.

Figure 2-15 Exhaust Connection and Figure 2-16 Exhaust Connection Detail show typical exhaust connections.

See 803-091306 Facility Arrangement for suggested duct and hood location.

Figure 2-15 Exhaust Connection

Figure 2-16 Exhaust Connection Detail

2.1.3 Combustible Process Gas Exhaust Requirements (hydrogen option only □)

In most applications, process exhaust and heat must be vented to the outside atmosphere. It is the user's responsibility to review the process, local laws, and facility in deciding on an exhaust system. If combustible gases are present, a wide collector hood suitable for 300°C operation with a 30-inch inside diameter, or larger, is routinely used. The hoods are typically located a minimum of 24 inches above each igniter stack. See Furnace Arrangement drawing for suggested sizes and locations.

Do not make any direct connections to any chamber exhaust stack. Clearance between the exhaust stacks and venting device is required. See Figure 2-17 for example of a typical hydrogen furnace exhaust connection.

Figure 2-17 Typical Hydrogen Furnace Process Gas Exhaust Connection

2.2 Water and Drain Connections

2.2.1 Water Supply and Drain Connections for UCD (option □)

Furnaces equipped with an ultrasonic cleaner dryer (UCD) system will require the customer to connect clean water supply lines to the connections provided.

Pipe water supply connection through rectangular opening in lower panel similar as shown in Figure 2-. Supply pressure shall not exceed 100 psig. The furnace shall include a water pressure regulator to reduce water pressure to a maximum of 30 psig.

Drains. For UCD systems a drain line capable of intermittent flows of 40 gpm at 40 psi (5-10 minute durations) must be connected to the water drain connection. . See Furnace Arrangement drawing 803-091306 for connection locations, sizes and maximum and typical flow rates.

Figure 2-18 UCD Water Connections with Air Purge

2.2.2 Water Supply and Drain Connections for CAWC (option □)

Optional Controlled Atmosphere Water Cooling (CAWC) systems require clean water supply supplied to the connections provided. Water cooling systems generally operate best when connected to a recirculating deionized water (DI) cooling system. Pipe water connection through rectangular opening in lower panel similar to Figure 2- . Supply pressure shall not exceed 100 psig. Furnace includes dual pressure regulators to reduce water pressure to a maximum of 25 psig. . See Furnace Arrangement drawing 803-091306 for connection locations, sizes and maximum and typical flow rates.

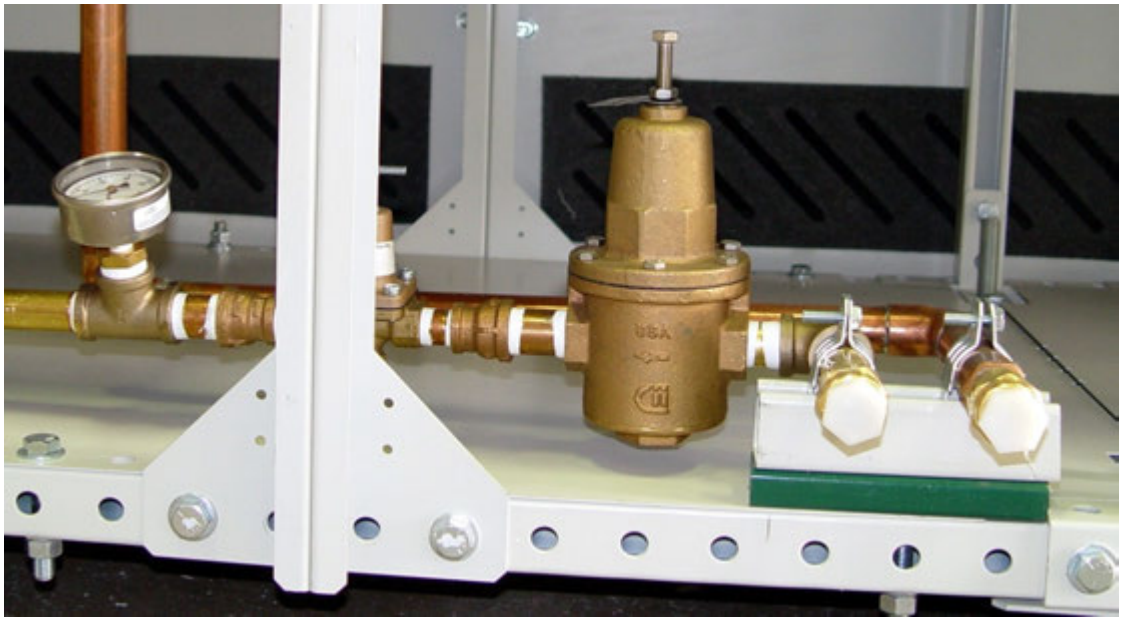

Figure 2-19 CAWC Water Supply & Drain Connections

2.2.3 Process Gas Reservoir (option □)

If a CDA reservoir tank is supplied, it may be desirable to connect a drain line to the purge valve to accommodate low pressure discharges of water. See Figure 2-18 for air purge connection example.