

MATERIALS RESEARCH FURNACES, INC

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Large Bell Jar Arc Melt Furnace MODEL ABJ-900

Arc melt furnaces provide a cost saving alternative to resistance or inductance heating furnaces for many applications. Rather than heaters or induction coils, an electric arc is used to heat up and/or melt parts. Our Large Bell Jar Furnace can instantly reach temperatures over 3500°C, and will cool down to room temperature in minutes. The ABJ-900 arc melt furnace is a large version of our ABJ-338 system. It comes with a larger chamber, larger hearth plate, larger power supply, and can be equipped with three stingers. It is simple to operate, extremely reliable and is economical to run. MRF will provide custom melt cavities in the hearth plate at the customer's request. The many available options such as load locks, splat rod, crystal growing kit, high vacuum systems, and more make this furnace versatile and adaptable.

MRF Model ABJ-900 Bell Jar Arc Melting Vacuum Furnace specifications:



- Operating temperature over 3500°C (6332 F).
- Large Bell Jar, top loading configuration.
- 100% 304L grade stainless steel vacuum chamber.
- Copper stinger with tungsten electrode.
- Custom copper hearth plate 9.0" diameter (229 mm).
- Sight window with 4" diameter (104 mm) viewport and separate port with halogen light.
- Power Supply: 500 Amp @ 80% Duty Cycle, 22 kVA.
- Water-cooled with safety interlock.
- Power cables 1.8 meters long, water-cooled.
- Inert gas system with relief valve.
- Pumping system with roughing pump, vacuum gauge and valve.

Common Applications:

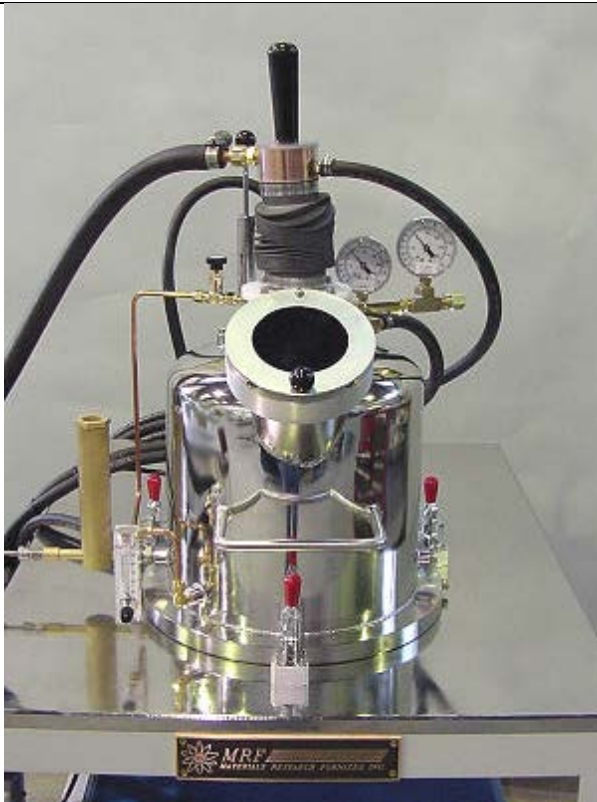
- Powder melting
- Creating alloys
- Metallic buttons
- Arc Casting
- Annealing
- Crucible welding
- Material densification
- Vacuum Casting

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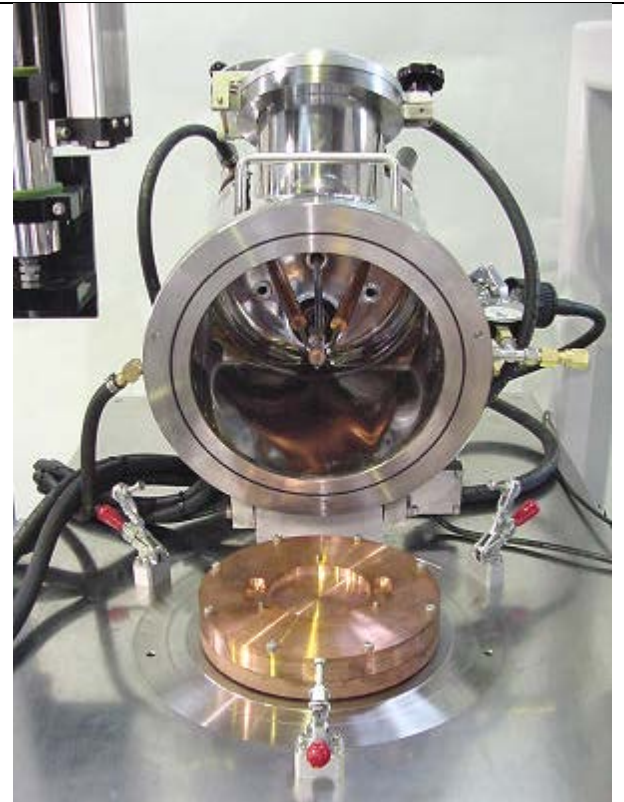
Major system Components:

1. Furnace Chamber:

- The chamber is all 304L grade stainless steel and electro-polished.
- The chamber is double-walled for water-cooling to maintain a chamber temperature below 50°C (120°F) during normal use.
- The chamber is rated for vacuum to 10^{-6} Torr (mbar)
- Access to the furnace for loading and unloading is through the hinged bell jar cover.
- One illumination port with halogen light is provided.
- The port for a pumping system is located on the bottom of the chamber.
- Clamps are provided to seal the chamber and isolate the chamber atmosphere.



Bell jar chamber in closed position. This system houses a load lock, splat rod and single stinger.



Bell jar chamber in open position. The system shown here has three stingers, a custom hearth and a crystal growing kit.

2. Electrode stingers:

- The copper water-cooled stinger(s) (cathode) with replaceable tungsten electrode provides the melting tip.
- A water-cooled power cable supplies power to the stinger.
- A ball joint allows the stinger to move easily around the chamber.
- The stinger is sealed and electrically isolated from the operator.
- Thoriated tungsten arc starter tips, 0.25" (6.4 mm) dia. are provided for easy arc starting

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3. **Hearth Plate:**

- The hearth plate is copper and water-cooled.
- Dimensions: 9.0" (229mm) diameter x .50 inches (13mm) nominal thick
- Custom cavities in the hearth plate are provided at no charge.

4. **Inert Gas System**

- This furnace system was designed to operate in argon, nitrogen, or non-flammable forming gas.
- A pump-out followed by a gas backfill provides a fast way to remove all oxygen from the chamber.
- The standard positive pressure for operation is .14 kg/cm sq (2 PSIG).
- A relief valve and a 30/30 compound gauge (30 PSIG x 30 in. Hg) are located on the chamber.

5. **Vacuum System:**

- A 4 CFM (112 LPM) evacuation pump is offered standard with a manual vacuum valve.
- A back-to-atmosphere valve and vibration isolators are provided.
- A vacuum level in the 10^{-1} Torr (mbar) range can easily be attained.
- Optional diffusion or turbo pumping systems available.

6. **Power Supply:**

- Power Supply: 500 Amp @ 80% Duty Cycle, 22 kVA, Universal voltage input.
- Foot control provided for modulating power.
- Power cables, 6 feet (1.8 meters long), water-cooled.
- Water flow interlock for power supply.

7. **Water Cooling System:**

- Supplies cooling water to the various parts of the furnace including the main chamber, power cables, chamber base, etc.
- Water inlet and outlet manifold provided with water strainer.
- Water flow switch provided to interrupt power in case of no water flow.

8. **Performance:**

- Maximum attainable temperature of arc is above 3500 °C (6332 °F).
- Operating pressure: 2 PSI (.14kg/cm²) to 10^{-6} Torr (mbar) vacuum.
- Outer shell temperature: less than 50°C.

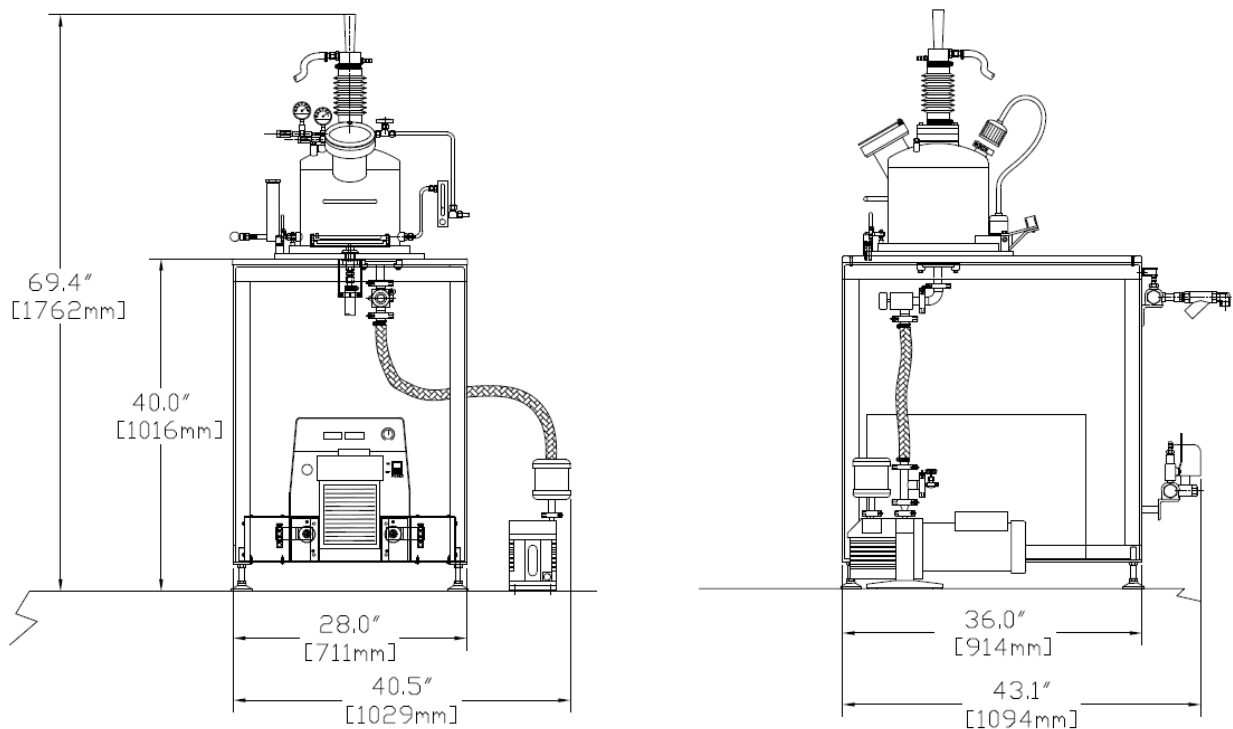
9. **Testing:** All equipment is fully tested prior to shipment. The customer is invited to inspect the equipment, witness pre-delivery inspection testing and receive training.

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10. **Documentation:** Two sets of Installation and Operating Instructions, Component Manuals and Assembly Drawings are included with the equipment - one hardcopy, one copy on CD or USB drive.

11. **Options & Accessories**

- Load Lock
- Splat Rod
- Crystal Growing Kit
- Diffusion or Turbo Vacuum System
- Tri-arc (three stingers)
- Vacuum Suction Casting



Utilities

- **Electricity:** 23 kVA, 230/240/380/460V, three phase, 50-60 Hz.
- **Water:** 5 GPM flow, inlet temperature (68°F) 20°C at 40 PSI (3.5 kg/cm²).
- **Gas:** argon, nitrogen or non-flammable forming gas, plant or bottle supply @ 40 PSI (3.5 kg/cm²).

* **NOTE:** Some voltages may not be available with 50 Hz and CE conformity. Please check with MRF before ordering.

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