

## **MATERIALS RESEARCH FURNACES, INC**

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### **Small Bell Jar Arc Melt Furnace**

#### **MODEL ABJ-338**

Our small bell jar arc melt furnace is a compact turn-key system and provides a cost saving alternative to resistance and induction furnaces. It is simple to operate, extremely reliable and has a low acquisition and operating cost. The furnace can instantly reach temperatures over 3500°C, and will cool down to room temperature in minutes. MRF provides 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, etc, make this furnace versatile and adaptable.

MRF Model ABJ-338 Bell Jar Arc Melting Vacuum Furnace specifications:



- Operating temperature: over 3500°C.
- Small Bell Jar hinged loading configuration.
- 100% 304L grade stainless steel vacuum chamber construction.
- Copper stinger with tungsten electrode.
- Custom copper hearth plate 3.38" dia. (85mm dia.) arrangement.
- Sight window with 2.75" dia. viewport.  
One illumination port with halogen light.
- Power supply: 350 Amp @ 60% Duty Cycle, 14 kVA.
- Power cables 1.8 meters long, water-cooled.
- Pressure relief port.
- Water safety interlock.
- Inert gas system.
- Pumping system with roughing pump, vacuum gauge and valve.

#### **Common Applications:**

Powder melting  
alloys  
Metallic buttons  
Arc Casting

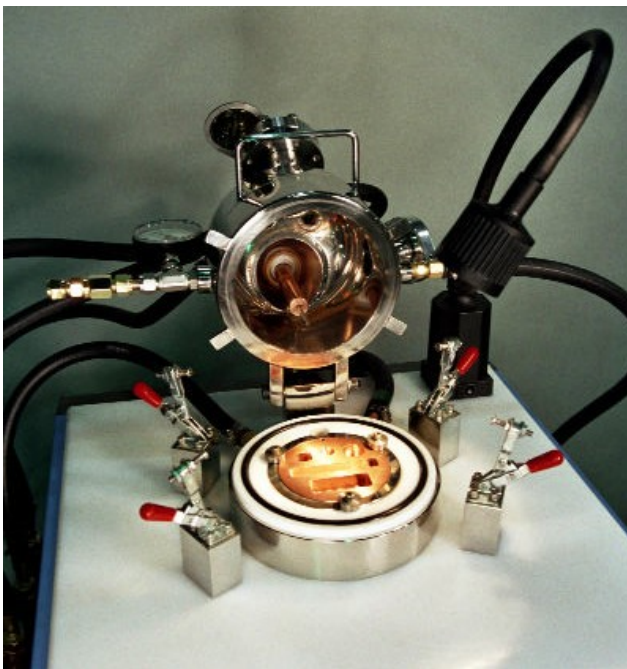
Annealing Creating  
Crucible welding  
Material densification

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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 open position. The chamber houses the stinger in the top of the chamber, as well as the view and illumination port. The bottom houses the copper hearth plate with custom cavities.*



*Bell jar chamber in closed position. Observe the view port with eye protection shield, illumination port and the stinger with bellows and handle.*

### 2. Electro 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.
- The stinger tip(s) consists of a 0.25" (6.4 mm) dia. thoriated tungsten rod, these stinger tip allow for easy arc starting

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### 3. **Hearth Plate:**

- The hearth plate is copper and water-cooled.
- Dimensions: 3.375" (84mm) diameter x .62" (16mm) 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:**

- 350 Ampere Power Supply @ 60% Duty Cycle, 14 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/cm<sup>2</sup>) 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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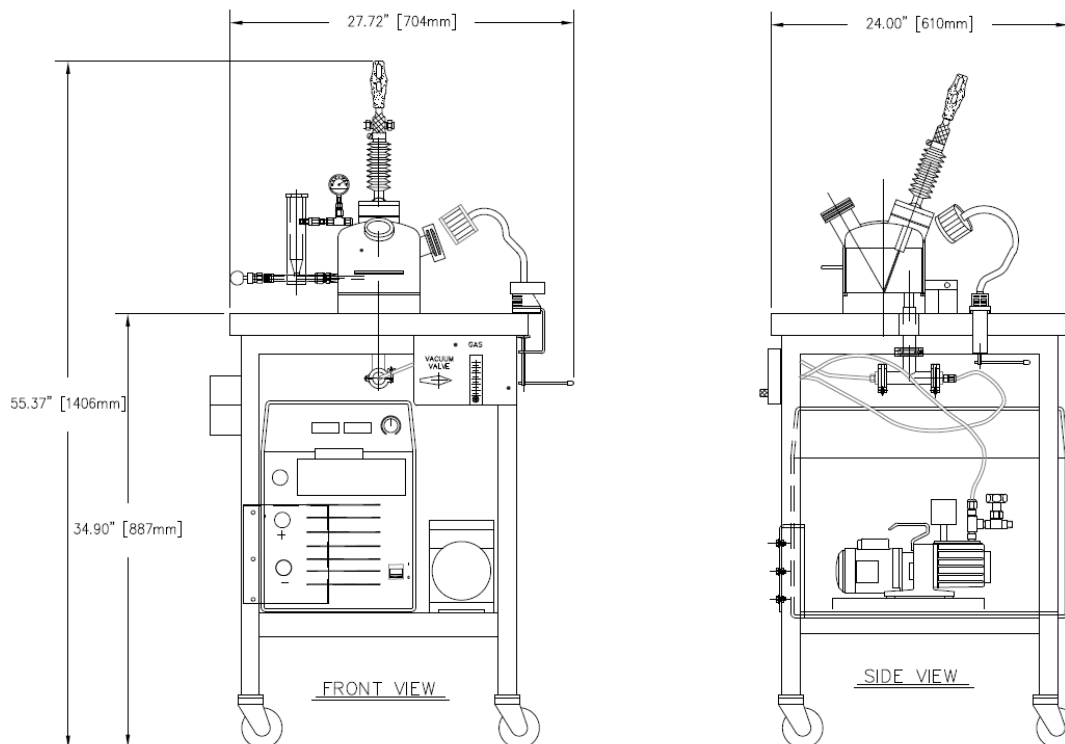


10. **Documentation:** Two sets of Installation and Operating Instructions, Component Manuals and Assembly Drawings are included with the equipment - one hardcopy, one copy on CD or USB drive.

11. **Options & Accessories**

Load Lock  
Splat Rod  
Crystal Growing Kit

Diffusion or Turbo Vacuum System  
Rotating Hearth  
Suction Casting



**Utilities**

- ⌚ **Electricity:** 15 kVA, 230/240/380/460V\*, three phase, 50-60 Hz.
- ⌚ **Water:** 3 GPM flow, inlet temperature (68°F) 20°C at 40 PSI (3.5 kg/cm<sup>2</sup>).
- ⌚ **Gas:** argon, nitrogen or non-flammable forming gas, plant or bottle supply @ 40 PSI (3.5 kg/cm<sup>2</sup>).

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

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