Pressure unit: 1 in Hg = 0.491098 psi = 25.4 Torr

760 Torr = 30 in Hg

5 psi = 258 Torr

VI. Furnace Operation

SAFETY CONSIDERATIONS:

IT IS THE RESPONSIBILITY OF THE USER TO MAINTAIN SAFE OPERATING CONDITIONS AT ALL TIMES WHEN USING THIS EQUIPMENT. MATERIALS RESEARCH FURNACES HAS NO CONTROL OVER THE USE OF THIS EQUIPMENT AND IS NOT RESPONSIBLE FOR PERSONAL INJURY OR DAMAGE RESULTING FROM OPERATION OR SERVICE OF THIS EQUIPMENT.

Safe Operating Conditions of this system is as follows:

A. Internal pressure of this vessel should not exceed 5 P.S.I.G. MAXIMUM.
B. Vessel wall temperature should not exceed 150°F .

If, for any reason one or more of the above occurs, the system should be shut-down, and the cause for the shut-down should be investigated.

FAILURE to observe the SAFE OPERATING CONDITIONS can cause serious injury, or death, and/or damage to the equipment. The procedures in this manual are provided to help users and qualified persons to operate and service the unit safely.

OBSERVE ALL WARNINGS AND CAUTIONS TO MINIMIZE THE SERIOUS HAZARDS INVOLVED.

Precautions:

1. When connecting gas to the system make sure all gas lines are properly purged prior to operation. This will avoid allowing air to enter the hot zone and oxidizing the zone. This should be done especially after changing gas supplies.

2. Do not operate the furnace if any exterior surface temperature exceeds 150°F refer to Maintenance section of this manual if this occurs.

3. Do not open the furnace after operation until the sample and electrode have cooled completely.

A. START-UP PROCEDURES:

Before you begin it is important that all the following switches and valves are in the proper position.

On the Welder Control Panel (refer to figure 4-1 on page 14 of the Welders Owner's Manual found in Component section of this manual);

-- POWER switch is in the OFF position.
-- ARC FORCE (Dig) CONTROL knob is reduced to 0.
-- HOT START switch is OFF.
-- OUTPUT switch is set to REMOTE.
-- REMOTE AMPERAGE CONTROL switch is set to REMOTE.
-- ADJUST (amperage setting) is set to the desired maximum setting for your application.

Check the following;

-- the VACUUM VALVE is in the CLOSED position, turned completely clockwise.
-- the flowmeter flow control valve is closed, turned completely clockwise.
-- the main inlet ball valve on the WATER INLET manifold is closed, handle perpendicular to the body.

With all of the above switches and valves in the appropriate positions, you may now do the following;

-- Open your main water supply.
-- Open your main gas supply.
-- Turn ON your main power.

Open the bell jar and load it with your samples. When complete make sure to close the bell jar and secure the two hold down clamps.

B. ATMOSPHERE PREPARATION:

1. Inert Gas

1. All that is necessary is to open and close the flow control valve on the GAS flowmeter, to maintain the pressure desired as indicated on the compound gauge in the chamber.

2. Vacuum

1. Turn ON the vacuum pump, by pressing the "VACUUM PUMP" ON pushbutton.
   -- The pump will start, light will illuminate.

2. OPEN the vacuum valve to pump down the bell jar, and CLOSE it to stop pumping.
   -- When pumping the pressure in the bell jar will rapidly decrease to 30" hg.

C. OPERATION:

1. Turn on the main POWER switch on the welder power supply.

-- Switch will illuminate.

2. Turn ON the vacuum pump.

3. Open the vacuum valve.

-- Pressure in the bell jar will decrease to 30" hg.

4. Allow vacuum pump to evacuate for about 15 seconds.

5. Close the vacuum valve.

6. Open the gas flow control valve on the flowmeter.

-- The pressure in the bell jar will increase.

7. Allow gas to flow until the pressure reaches 0.

8. Evacuate a second time as described in 3 -5 above.

9. Back-fill with gas a second time as described in 6-7 above.

10. Evacuate a third time.

11. Back-fill with gas a third time.

12. Now continue with either atmosphere you wish to operate in, vacuum, gas or you may run in partial pressure if desired.

13. Open the gate valve on the water inlet manifold.

-- The "WATER ON" light will illuminate.

14. Look inside the view port and adjust the electrode so it is approximately 1/4" away from the 1/8" dia. thoriated tungsten striker button.

15. Adjust the amperage control on the welder front control panel.

16. Swing the welding glass shutter over the view port.

17. Depress the foot control completely.

18. Move the electrode towards the striker button until the arc starts. When arc has started immediately back-off the foot control to about 1/4.

19. After the arc has begun, move the stinger over to the sample to melt. You may or may not need to increase or decrease as necessary the position of the foot pedal.

20. When the melt is complete, remove your foot from the foot control to stop melting.

21. Turn OFF the welder, and move the stinger rod at least 1" from the work.

22. When the samples are cool you open the furnace.

23. If you were in vacuum you will need to back fill with gas to atmosphere prior to opening.

After you have completed your use of the furnace, the following should be done to shut down and secure the furnace.

24. Allow the water and inert gas flowing (or vacuum system to run) until the furnace is cooled completely.

25. When the furnace is cooled the water and gas (or vacuum system) may be turned off and the furnace can now be opened and unloaded.

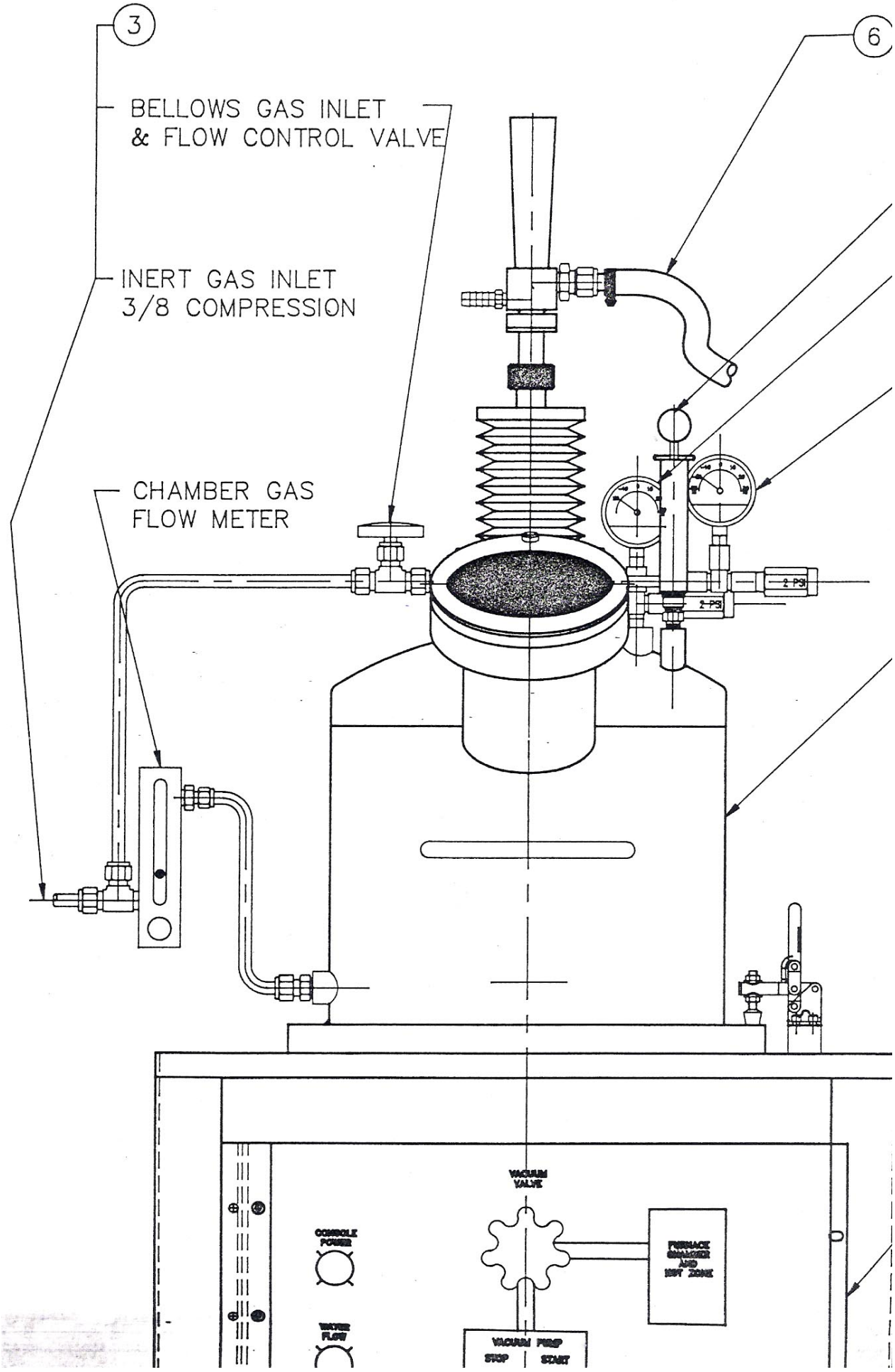
26. Unload the furnace.

27. After unloading, close the cover and leave closed until your next run. We suggest if possible evacuate your furnace in rough vacuum for approximately 25 minutes to attain a pretty satisfactory vacuum level inside, then isolate it (close the vacuum valve and turn off the pump in that order). Doing this, you will be removing any moisture that may have entered when it was opened, being able make it easier to evacuate in the future. Also, you could possibly check the rate of rise at the same time..

28. You may turn off the water supply.

29. You may wish to switch off the main power.

30. This furnace system is now secure.


3
BELLOWS GAS INLET
& FLOW CONTROL VALVE
INERT GAS INLET
3/8 COMPRESSION
CHAMBER GAS
FLOW METER
6
2-P3
2-P3
VACUUM
VALVE
CONSOLE
POWER
WATER
FLOW
VACUUM PUMP
STOP
START