

**INSTALLATION PROCEDURES
VACUUM TUMBLE DRYER
FORMULATOR**



GEMCO®

GEMCO
301 Smalley Avenue
Middlesex, NJ 08846
Phone (732) 752-7900
Fax (732) 752-5857

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INSTALLATION PROCEDURES

VACUUM TUMBLE DRYER

FORMULATOR

1. INSTALLATION VESSEL AND SUPPORTS

- (A) To assure continued performance in operation carefully follow Aligning and Leveling instructions provided when installing vessel at your plant location prior to start-up and rotation.
- (B) Follow all installation and wiring instructions. Connect main electric source to control panels.



(Fig.2-A)

2. VACUUM SYSTEM

- (A) When provided with a GEMCO Vacuum System it has been engineered, tested and mounted as a complete package on a freestanding base. Installation can be made at any convenient location of your choice within close proximity of the Dryer Vessel. (Fig.2-A)



(Fig.3-A)

3. LEVEL BASE OF PACKAGE TO ASSURE GOOD PERFORMANCE

- (A) Since vacuum package location cannot be determined by GEMCO prior to installation you must provide the interconnecting piping between package and dryer vessel. (Fig.3-A)
- (B) Check drawings for inlet connection and size on vacuum package and outlet connection on dryer vacuum tube assembly. Normally the Vacuum System Package inlet is a flanged connection. Dryer vacuum tube connection mounted and secured by hose clamps to vacuum tube.



(Fig.3-B)

CAUTION

Vacuum Tube Assembly mounted in dryer must be allowed to float on its own axis during rotation of vessel. Do not use rigid connection at this point. (Fig.3-B)

Connect main electric power to dryer control panel terminal block in order to operate vacuum pump On/Off push button station mounted in control panel.

If water sealed liquid ring vacuum pump provided, connect water line to seal water line connection before starting pump. 60 degrees F seal water required at GPM designated for pump size used. (Fig.3-C)



(Fig.3-C)

4. HEATING SYSTEM

- (A) When provided with a GEMCO Heating System it has been engineered, tested and mounted as a complete package in a free standing cabinet. Installation can be made at any convenient location of your choice within close proximity of the Dryer Vessel (Fig.4-A)
- (B) Level cabinet to assure good performance. Follow operating and maintenance instructions covering Heating System Package provided by manufacturer.
- (C) Since Heating Package location cannot be determined by GEMCO prior to installation you must provide the interconnecting piping (both inlet and outlet) between Package and Dryer Vessel. (Fig.4-B)
- (D) Check drawings to determine type of connection and pipe sizes. Inlet pipe is normally smaller than outlet pipe. Threaded connections usually require piping to be connected to Rotary Union mounted to drive side of Dryer Vessel from Heating System Package.
- (E) Heating System Package is self contained. Attach main electrical power line to control panel mounted on Hearing Package Cabinet.
- (F) If heating system supplied with electric immersion heaters, power supplied to heater control panel will interface heater.



(Fig. 4-A)



(Fig. 4-B)

NOTE

If Heating System Package is furnished with Heat Exchanger for controlled steam heating of hot water, connect steam supply to inlet piping of exchanger and condensate return line located within heater cabinet as shown in Heating Package Drawing.

TESTING

1. FILLING HOT WATER HEATING SYSTEMS

- (A) The Dryer Jacket has been hydrostatically tested to ASME code, prior to shipment. To assure uninterrupted circulation, of hot water throughout the Heating System Package and Dryer Vessel Jacket all air must be eliminated from the complete system to prevent developing Hot Spots on the vessel walls when unit is in operation.

USE THE FOLLOWING PROCEDURE

- (A) Locate plugged bleed coupling on Dryer Vessel Jacket.

- 1 Double Cone and Slant Cone Vessels - Bleed coupling located in center of cylindrical portion of vessel. (Fig. 5-A)
- 2 V-Shaped-Vessel—Two bleed couplings located at top of each leg of Vee Jacket.

- (B) Double Cone and Slant Cone Vessel

- 1 Locate plugged bleed coupling in Cylindrical Jacketed section. Remove plug.
- 2 Rotate Dryer Vessel until bleed coupling is at top “Up” location, 180 degrees from floor, at its highest point. (Discharge valve and access cover will be 90 degrees from floor).

- (C) V-Shaped Vessels

Bleed couplings (2) to be positioned at Up position. (Discharge valve at 0 degree bottom center. Access covers (2) in Up position, 180 degrees of floor).

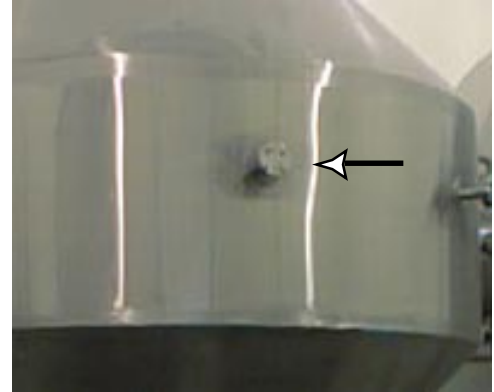
- (D) Both vessels positioned so that bleed coupling in Up position at highest elevation.

- (E) If provided with Heating Package, add water through Heating System fill breather cap at top of cabinet (Fig. 5-B) to Dryer Vessel until air is exhausted through bleed coupling and water-only seeps out of coupling located on Dryer Vessel Continue filling until all air bubbles are depleted. Screw plug into coupling. It is recommended that you use demineralized water if possible when filling system, However, city water will become demineralized upon continued use of package.

- (F) Begin rotating Dryer Vessel. Turn on Heating System circulation at lowest temperature setting on Indicating Temperature Controller. Allow time for complete circulation through Dryer Jacket. Stop vessel with bleed coupling in “up” position. Stop heat system circulation.

- (G) Unscrew coupling plug. Check for air or air bubbles. Add additional water through coupling if necessary. Re-plug coupling.

- (H) Heating package includes air vent mechanism to remove slight amounts of air that may become trapped during continued operation.



(Fig. 5-A)



(Fig.5 -B)

2. HEATING SYSTEM READY FOR OPERATION

- (A) If provided, follow manufacturer's instructions for proper filling.

3. VACUUM SYSTEM PACKAGES

- (A) If your Vacuum package has been supplied as a full solvent recovery system it is provided with a filter or entrainer, a 2-pass condenser, a vacuum condensate receiver and a vacuum pump with interconnecting piping, gauges and component equipment assembled to a free standing base, to achieve full recovery of all vapors from the Dryer Vessel (Figs. 6-A)
- (B) If your Vacuum Package has been supplied with a condenser only and Vacuum Pump (Fig. 6-B) you will have to provide a sump or receiver tank to accept the saturated vapors removed during the drying operation.
- (C) After interconnection the Vacuum line from Dryer to Vacuum Package the completed system should be tested for leakage.
- (D) The standard Dryer Vessel has been inspected and vacuum checked at the factory prior to shipment. Leakage rates of 3-5 torr are normally determined on vessel sizes from 20 cubic foot and larger; 5-10 torr on smaller sizes because of their lower internal volumes. Special Ultra-tight vessels, when provided for drying to low moisture levels (below 1%) have leakage rates in a range of 3 torr using special component equipment and extra leak detection labor applied.



(Fig. 6-A)



(Fig.6-B)

SOLVENT RECOVERY SYSTEM PACKAGE

1. FILTER OR SOLIDS ENTRAINER

- (A) If provided, it is located before condenser. This is a safety feature to prevent plugging the condenser should internal vessel filter breakdown allowing solids to enter vacuum line. (Fig. 7-A)



(Fig. 7-A)

2. CONDENSER

- (A) Normally 2-pass design to allow most vapors to saturate in the first pass and allow superheated vapors more surface area in the second pass to saturate. Condenser angled to allow all saturates to flow into condensate vacuum receiver. Chilled water must be furnished to condenser jacket inlet and outlet connections at 40 degrees Fahrenheit to assure a Delta 'T' (Temp. Difference) great enough to achieve quick saturation of vapors and prevent vapors getting to vacuum pump. (Fig.8-A)



(Fig. 8-A)

3. CONDENSATE RECEIVER

- (A) Mounted below condenser to accept and recover saturated vapors. Liquid level glass indicates degree of fill. Equalization line to condenser provided. Vacuum valves provided to isolate receiver from system for emptying saturates while keeping dryer and condenser under vacuum and continue the drying cycle. (Fig. 9-A)



(Fig. 9-A)

4. VACUUM PUMP

- (A) Your vacuum package may contain an oil sealed gas ballast rotary vacuum pump or a liquid-ring water sealant vacuum pump.(Fig. 10-A) Check Vacuum Package Drawings.

OIL SEALED GAS BALLAST VACUUM PUMP

Single or compound stages, has high volumetric efficiency over wide pressure range, air cooled and adaptable for water decanting and achieve ultimate vacuum from 2 to 10 microns depending on number of stages.

CAUTION

Be sure pump reservoir is filled with a hydrocarbon type vacuum oil prior to start-up.

NOTE

Vacuum pump must be checked on a periodic basis for detection should entrained condensate vapors enter pump. Vapors entering pump will dilute oil and ruin pump mechanism with vacuum loss. Decant saturate immediately or change oil as necessary. See pump manufacturer operating instructions.



(Fig. 10-A)

LIQUID RING VACUUM PUMP

The liquid ring pump has a decided advantage in vacuum systems that liberate appreciable quantities of condensable vapors. The pump uses its vacuum producing medium. When vapors entrained in the gas flow contact this liquid, condensing action takes place without impairing pumping action or mechanism. Pump will achieve vacuum to 28"hg (30-50 Torr)

CAUTION

60 degree F sealing water is required. Connect water lines to inlet and outlet connections. Do not operate with out water flow through pump. See operating instructions for required GPM through pump.

AIREJECTOR

If mounted to liquid-ring pump. Used to achieve higher vacuum over 28" hg. That pump only can achieve. Larger pump required with extra CFM due to ambient air compression requirements. Can achieve vacuum to 3 torr. Ambient atmospheric air used. Do not pressurize or attach air line.

SEALANT SYSTEMS

Your liquid-ring vacuum pump may have one of three basic types of sealant systems incorporated with the pump.

ONCE THROUGH, NO RECOVERY SYSTEM

Includes separator tank, piping, ball valve, strainer, check valve, flow control, solenoid valve and temperature gauge. Used where adequate sealant flow is available from outside water flow source or water main. Constant outside water flow of approximately 1/2 to 1 GPM per brake horsepower required. Too little water; Unit will not pump at full capacity at higher vacuums. Too much water; Horsepower will be too high in low vacuum range. No recirculation of water once through out to drain. Connect outside water to pump inlet and outlet drain on separator tank.

PARTIAL SEALANT RECOVERY SYSTEM

Includes same components as Once Through System. Used to conserve sealant water. Sealant makeup and cooling provided by connection to outside source or water main. Partial circulation is provided from separator tank. Incoming flow rate average 1/4 GPM per brake horsepower with balance made up of recirculated sealant from separator tank. Connect outside makeup water to separator tank. Sealant drain from tank to sump.

FULL SEALANT RECOVER SYSTEM

Includes same components of Once Through and Partial Systems plus a compound pressure gauge and heat exchanger. Used to conserve sealant water where suitable sealant not available from an outside source. Periodic sealant make up may be required. Full circulation of sealant water is provided from separator to tank. Cooling provided by running recirculated sealant water through heat exchanger. Separate chilled water hook up required to heat exchanger jacket. Sealant makeup connected to separator tank. Sealant drain from separator tank.

TESTING FOR VACUUM TIGHTNESS

After all inter piping and connections have been made to interface the complete system, begin test:

- ◆ Turn all vacuum valves to open position.
- ◆ Close off receiver discharge valve and blow-back valve.
- ◆ With liquid ring pump provided begin water flow through pump.
- ◆ Turn on chilled water inlet and outlet to condenser and cooling exchanger in full recovery sealant system if provided with liquid ring pump.
- ◆ Check to be sure access cover and discharge valve on vessel are sealed in close position. (Fig. 11 and 12 A)
- ◆ Before testing complete system, blank off vacuum pump. Turn pump on. Check performance. Vacuum gauge should show highest vacuum that pump is designed for. **Be sure oil seal pump has oil; liquid ring pump has water flowing.**
- ◆ Draw vacuum to its highest level.
- ◆ Check vacuum gauges at inlet side of vacuum pump and condenser. Readings should be similar.
- ◆ If not, begin checking for leakage at all connections on vacuum system. Tighten all fittings. Recheck access cover and discharge valve on vessel. Be sure discharge valve completely closed. Reset if necessary by opening and closing.

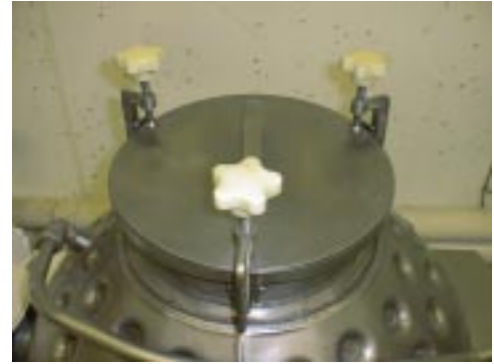
NOTE

Use foaming agent, (i.e., Aerosol shave cream foam) around fittings and rim of cover, external vacuum tube and valve should leaks continue to persist. Holes in foam indicate a leak.

- ◆ Should leakage be detected at vacuum tube outlet from vessel, tighten stuffing box gland nuts. If not corrected, exhaust vacuum in dryer vessel by shutting access cover and retighten internal packing gland seals.

NOTE

To assure minimum leakage of vacuum system fittings, you can apply a sealant such as “Glyptol” around each fitting, periodically rebrushing each fitting to assure continued seal.



(Fig.11-A)



(Fig.12-A)

FORMULATOR

◆All GEMCO Formulators have an internal agitator assembly mounted into the vacuum tube assembly. (Fig.25).

FOLLOW AGITATOR OPERATING AND MAINTENANCE INSTRUCTIONS PRIOR TO OPERATING

- ◆Be sure to connect water lines to external double mechanical seal assemble.
- ◆Agitator On/Off push button station and timer has been inter connected in main control panel.
- ◆Run in agitator shaft seals. Follow operating instructions to insure tight seal assembly.
- ◆Turn on agitator.

NOTE

GEMCO provides an isolation tube between vacuum tube assembly and agitator shaft to isolate vacuum from shaft. Seals in cartridge assembly must be tight enough to prevent vacuum drawing along shaft line.

◆All formulators incorporate a vari speed main motor to operate vessel at a blend (high) output speed and low speed during drying operation (Fig.27), initial ingredient blending, liquid addition and or granulating.

◆When drying operation is initiated change vessel drive speed to low RPM output during drying cycle by turning manual control (Fig.28) (standard) attached to vari speed motor **while vessel is still rotating**.

NOTE

Electrical remote control can be provided to permit instant changes to drive speed at any convenient location with push button (hi-low) or dial control ease.



(Fig.23)



(Fig.24)

VACUUM DRYER/FORMULATOR INSTALLATION CHECK LIST

ALIGNMENT AND LEVELING

Dryer Vessel aligned, leveled and anchored per installation manual.

Vacuum System leveled and anchored.

Heating System leveled and anchored.

Heating system and vessel loop filled with water-air exhausted. Bleed plug screwed into vessel jacket coupling.

Heating systems on. No leaks at connections.

Temperature checked with controller. Range settings OK. Circulation OK.

ELECTRICAL CONNECTIONS

Main electric source connected to main control panel.

Main electric source connected to Heating System Control Panel.

Vacuum Pump motor wired to terminal in main control panel.

Seal water line solenoid (For liquid ring vacuum pump only) wired to pump motor terminal in main control panel.

Agitator motor (formulator) wired to terminal in main control panel.

Mechanical seal solenoid valve wired.

VACUUM SYSTEM

Vacuum interconnecting piping installed and connected from Vacuum Package to flex-sleeve on Dryer Vacuum Tube.

Chilled water lines connected to condenser jacket.

For oil sealed gas ballast Vacuum Pump - filled with vacuum oil.

For liquid ring Vacuum Pump water inlet/outlet lines connected.

For Sealant Systems to liquid ring pump-loop filled with water circulation OK.

Complete system checked for leakage.

Vacuum System Package checked. No leakage detected.

HEATING SYSTEM

Water inlet and outlet piping installed and connected from heat package to rotary union flex-lines on dryer.

DRYER VESSEL

- Rotation checked OK.
- Vacuum leakage checked OK.
- Seal assemblies tightened OK.
- Access Cover on. No leaks.
- Discharge valve closed. No leaks.

FORMULATOR

- Water lines connected to mechanical seal in/out.
- Mechanical seal water on.
- Agitator shaft rotated 5 minutes.
- Internal shaft seal packing gland check for tightness.
- Vari-speed motor Hi-Lo speeds checked **with motor on.**
- Vacuum leakage re-checked. (If necessary)

The above checklist should be completely executed
(Except those items which were not supplied by GEMCO)
The following signatures are required to validate your warrantee.

Date _____

Authorized Signature of Purchaser

Authorized Signature of GEMCO Representative

If no GEMCO Representative can be present, please send a signed copy to: GEMCO Middlesex, NJ, for confirmation