M-402-21
Beginning with Serial Number M5255

Maintenance Distributor

Operation Maintenance and Safety Manual

E.D. ETNYRE & CO. – 1333 S. Daysville Road – Oregon, Illinois 61061
Phone: 815-732-2116 or 800-995-2116 – Fax: 800-521-1107 – www.etnyre.com

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WARRANTY

E. D. Etnyre & Co. warrants to the original Purchaser, its new product to be free from defects in material and workmanship for a period of twelve (12) months after date of delivery to original Purchaser. The obligation of the Company is limited to repairing or replacing any defective part returned to the Company and will not be responsible for consequential damages or any further loss by reason of such defect.

The company excludes all implied warranties of merchantability and fitness for a particular purpose. There are no warranties, express or implied, which extend beyond the description of the goods contained in this contract.

This warranty does not obligate the Company to bear the cost of machine transportation in connection with the replacement or repair of defective parts, nor does it guarantee repair or replacement of any parts on which unauthorized repairs or alterations have been made or for components not manufactured by the Company except to the extent of the warranty given by the original Manufacturer.

This warranty does not apply to:

(1) Normal start-up services, normal maintenance services or adjustments usually performed by the selling dealer, factory service representative or customer personnel.

(2) Any product manufactured by E. D. Etnyre & Co. purchased or subjected to rental use.

(3) Any product or part thereof which shows improper operation, improper maintenance, abuse, neglect, damage or modification after shipment from factory.

(4) Any product or part thereof damaged or lost in shipment. Inspection for damage should be made before acceptance or signing any delivery documents releasing responsibility of the delivering carrier.

This warranty and foregoing obligations are in lieu of all other obligations and liabilities including negligence and all warranties of merchantability or otherwise, express or implied in fact or by law.

E. D. ETNYRE & CO., OREGON, ILLINOIS 61061-9778

1333 South Daysville Road Phone: 815-732-2116 Fax: 815-732-7400 www.etnyre.com

WARNING

Do not use this machine for any operation which is not described in this manual.

If you have any questions about operation of this machine, contact the Etnyre Service Department at 1-800-995-2116 or 1-815-732-2116

Operations that are not approved could cause serious injury or death.

CALIFORNIA

Proposition 65 WARNING

WARNING: This product can expose you to chemicals including Lead, which is known to the State of California to cause cancer, birth defects or other reproductive harm. For more information, go to: www.P65Warnings.ca.gov

6322159

Please note this warning and remember -

Always start and operate the engine in a well ventilated area;

If in an enclosed area, vent the exhaust to the outside;

Do not modify or tamper with the exhaust system.

CAUTION

Before breaking the seal on all hydraulic fittings, plugs, fill caps, etc. be sure to clean around the connection. Failure to do so may cause contaminants to enter the hydraulic system causing damage to pumps, motors, etc.

WARNING

Fluoroelastomer Handling

Some O-rings and seals used in this vehicle are made from fluoroelastomers, When used under design conditions, fluoroelastomers do not require special handling. However, when fluoroelastomers are heated to temperatures beyond their design temperature (around 600º Fahrenheit), decomposition may occur with the formation of hydrofluoric acid. Hydrofluoric acid can be extremely corrosive to human tissue if not handled properly.

A degraded seal may appear as a charred or black sticky mass, Do not touch either the seal or the surrounding equipment without wearing neoprene or PVC gloves if degradation is suspected. Wash parts and equipment with 10% lime water (calcium hydroxide solution) to neutralize any hydrofluoric acid.

If contact with the skin occurs, wash the affected areas immediately with water. Then rub a 2.5 calcium gluconate gel into the skin until there is no further irritation, while seeking prompt medical attention.

Note to Physicians: For advice or treatment of HF burns, call the DuPont Medical Emergency number, 1-800-441-3637

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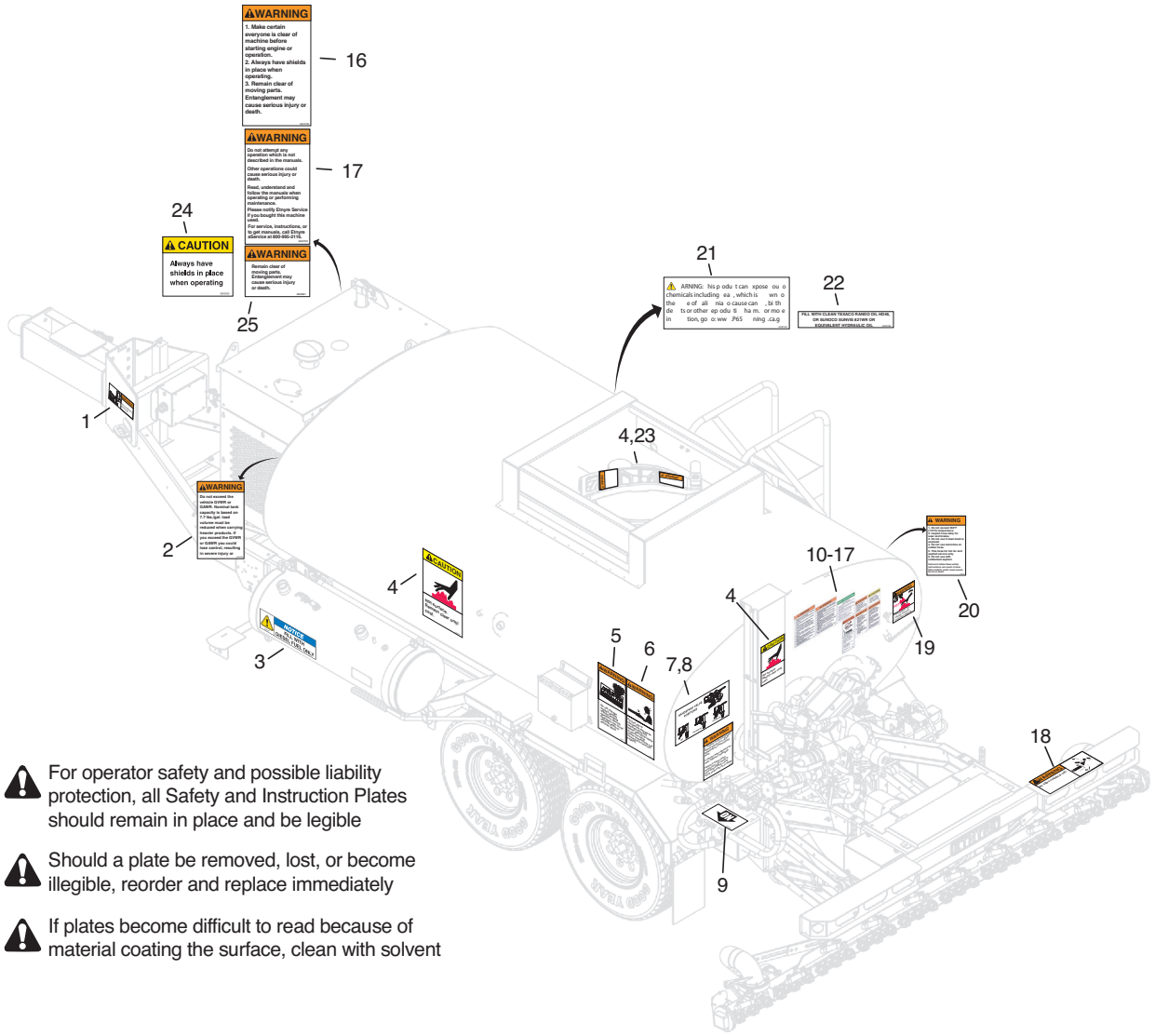
List Of Illustrations

Warning And Instruction Plates



For operator safety and possible liability protection, all Safety and Instruction Plates should remain in place and be legible

Should a plate be removed, lost, or become illegible, reorder and replace immediately

If plates become difficult to read because of material coating the surface, clean with solvent

REF	PART NO.	QTY	DESCRIPTION
1	3830529	2	Decal-Warning Safety Chain
2	6320790	1	Decal-Warning, Do Not Exceed GVWR
3	3390725	1	Decal-Notice, Fill with Diesel Fuel Only
4	6320797	3	Decal-Caution, Hot Surface
5	6320789	1	Decal-Warning, Do Not Change Grades
6	6320795	1	Decal-Warning, Fill Line Cap
7	2660246	1	Decal-Handspray Valve Positions
8	3390732	1	Decal-Warning,Product Must Not Exceed
9	2690385	1	Decal-ON
10	6320799	1	Decal-Warning, Always Have Dry Chem.
11	6320798	1	Decal-Warning, If Moisture Is Present
12	6320955	1	Decal-Safety Instructions, Fuel Oil Burn.
13	3390681	1	Decal-Warning, Remain Clear
14	3390683	1	Decal-Caution, Always Have Shields
15	3390636	1	Plate-Warning, Do Not Light Burners
16	6320796	2	Decal-Warning, Make Certain Everyone
17	6320793	2	Decal-Warning, Do Not Attempt
18	6320804	1	Decal-Warning, No Riders
19	6320784	1	Decal-Warning, HOT Surfaces, Liquids
20	6320802	1	Decal-Warning, Do Not Exceed 350°F
21	6322159	1	Decal-Proposition 65
22	6320786	1	Decal-Fill With Clean Texaco Rando Oil
23	3390679	1	Decal-Warning, Manhole
24	3390683	1	Decal-Caution, Always Have Shields
25	3390681	1	Decal-Warning, Remain Clear of Moving

General Safety Instructions

The operation of a bituminous distributor normally requires handling of liquid products at elevated temperatures. Additionally, these liquids may be of a volatile nature. A heating system is supplied to raise or maintain the product temperature, and these systems use highly combustible fuels. As with any type of construction equipment, there are certain hazards associated with improper or careless operation.

Safety warnings have been provided to call attention to any potentially hazardous situation that may cause property damage, personal injury or death to the operator or bystanders. These safety warnings are identified by the following warning symbols.

DANGER The DANGER symbol alerts you to immediate hazards which **WILL** result in severe personal injury or death.

WARNING The WARNING symbol alerts you to hazards which **MAY** cause severe personal injury or death.

You will also find **CAUTIONS** and **NOTES** throughout the manual.

CAUTION CAUTION alerts you to procedures that may result in damage to the equipment if not followed properly.

• A **NOTE** provides general information that the operator should be aware of when performing an operation.

DANGER

To avoid an extreme fire hazard or explosion, NEVER use gasoline as fuel in low pressure or generating burners

WARNING

A fully charged dry chemical type fire extinguisher must be within easy reach whenever the burners are operating or there is an open flame near the distributor. The minimum capacity of the fire extinguisher should be 10 pounds.

To prevent an explosion or fire hazard: Position the unit broadside to the wind to prevent volatile fumes from drifting toward the burners.

To prevent an explosion or fire hazard: Do not operate the burners if the tank is damaged or leaking

WARNING

To prevent an explosion or fire hazard: Ensure that the burners are extinguished before removing any material from the tank in any manner. Liquid petroleum (LP) burners can support a flame for several minutes after the fuel supply is turned off.

To prevent an explosion: Do not operate the burners when the vehicle is unattended, when the vehicle is in motion, or with the vehicle in a confined area.

To prevent an explosion or fire hazard: When the burners go out, shut off the fuel supply to both burners and allow the flues to ventilate for at least 3 minutes before re-lighting the burners.

General Safety Instructions

WARNING

To prevent an explosion or fire hazard: Do not heat the material beyond the manufacturer's recommended temperature.

To prevent an explosion or fire hazard: Keep burning cigarettes or other sources of combustion away from manholes and overflow vents.

To prevent an explosion or fire hazard: Check the tank vent to insure that it is free from obstruction before lighting the burners.

To prevent an explosion or fire hazard: Do not operate the burners with the manhole open or open the manhole while the burners are in operation.

To prevent an explosion or fire hazard: Keep area free of all sources of combustion when spraying.

To prevent an explosion or fire hazard: Eliminate sparks from engine exhaust.

To prevent possible fire hazards, burns or falls: Keep the unit clean for safe operation.

To prevent possible hand or facial burns: Always light the inside burner first. Do not reach across a lit burner to light or re-light the inside burner. Shut off the outside burner before lighting the inside burner.

To prevent possible burns: Always use a torch to light the burners. Never attempt to light the burners using a match or pocket lighter.

To prevent possible burns to operators or bystanders, or possible equipment damage, do not start any operation if any control settings are unknown.

To prevent possible burns from leaking material: Be sure all pipe, cap and hose connections are secure before opening valves.

To prevent possible burns from hot asphalt spray: Do not stand, or allow anyone to stand, where accidental opening of a valve may cause contact with hot asphalt.

WARNING

To prevent possible burns from foaming or violent eruption, do not load tank with material temperature over 200ºF if water or condensation is present in tank, or if emulsion was used in the previous load. Do not heat material over 200ºF if moisture or emulsion is present in tank.

To prevent burns from hot asphalt when handspraying: Hold the handspray gun in proper position and watch for other people.

To prevent burns: Always wear insulated gloves when handling spray bar sections or hoses.

To prevent possible burns from material overflow: Allow sufficient space in the tank for expansion of the material when heating.

To prevent possible burns: Use extreme caution when using a torch to heat the pump. Asphalt accumulated around the pump may ignite when heating the pump with a torch.

To prevent severe injury from becoming entangled in machinery: Stand clear of rotating drives.

To prevent possible injury: Always open the manhole cover slowly. Pressure build up in the tank may cause the cover to burst open.

Before removing the fill line cap, make certain that the asphalt pump is turning and the suction valve is closed.

To prevent possible personal injury: Do not load the vehicle beyond the GVWAR or GVWR. The maximum load volume must be calculated based on material density.

Allowing the burners to operate for a long period of time without circulating can damage the product and create explosive fumes. If product cannot be circulated after fifteen minutes of heating without circulation, the burners should be extinguished for 20 - 30 minutes before re-lighting the burners.

INTRODUCTION

Your Etnyre Maintenance Unit is designed to give you many years of accurate, dependable, and economic service. The following instructions will enable you to receive the maximum performance from your Maintenance Unit

The Maintenance Unit controls are designed for simple operation. They require a minimum of training for proficient usage. The exclusive Etnyre circulating system is designed and built for handling all grades of bituminous materials efficiently.

This manual is provided as a tool to aid personnel in the operation of the Etnyre Maintenance Unit in a safe and efficient manner, As with any type of construction equipment, there are certain hazards associated with improper or careless operation. The ability to read and understand the instructions in this manual should be a required qualification to become an operator. There are also functions that require a certain amount of physical strength to accomplish. Persons lacking the required strength may not only place themselves in jeopardy, but also others in the vicinity.

This manual covers standard features and options for trailer mounted units without spraybar only. If your unit is equipped with a spray bar, please refer to Operation manual number M-402-99 or later. If your unit incorporates custom features, some of the information contained in this manual may not apply. If you have any questions regarding this manual or your unit, contact your Etnyre dealer or the E. D. Etnyre Service Department at 1-800-995-2116.

Reporting Safety Defects

If you believe that your vehicle has a defect which could cause a crash, or could cause injury or death, you should immediately inform the National Highway Traffic Safety Administration (NHTSA) in addition to notifying E. D. Etnyre & Co.

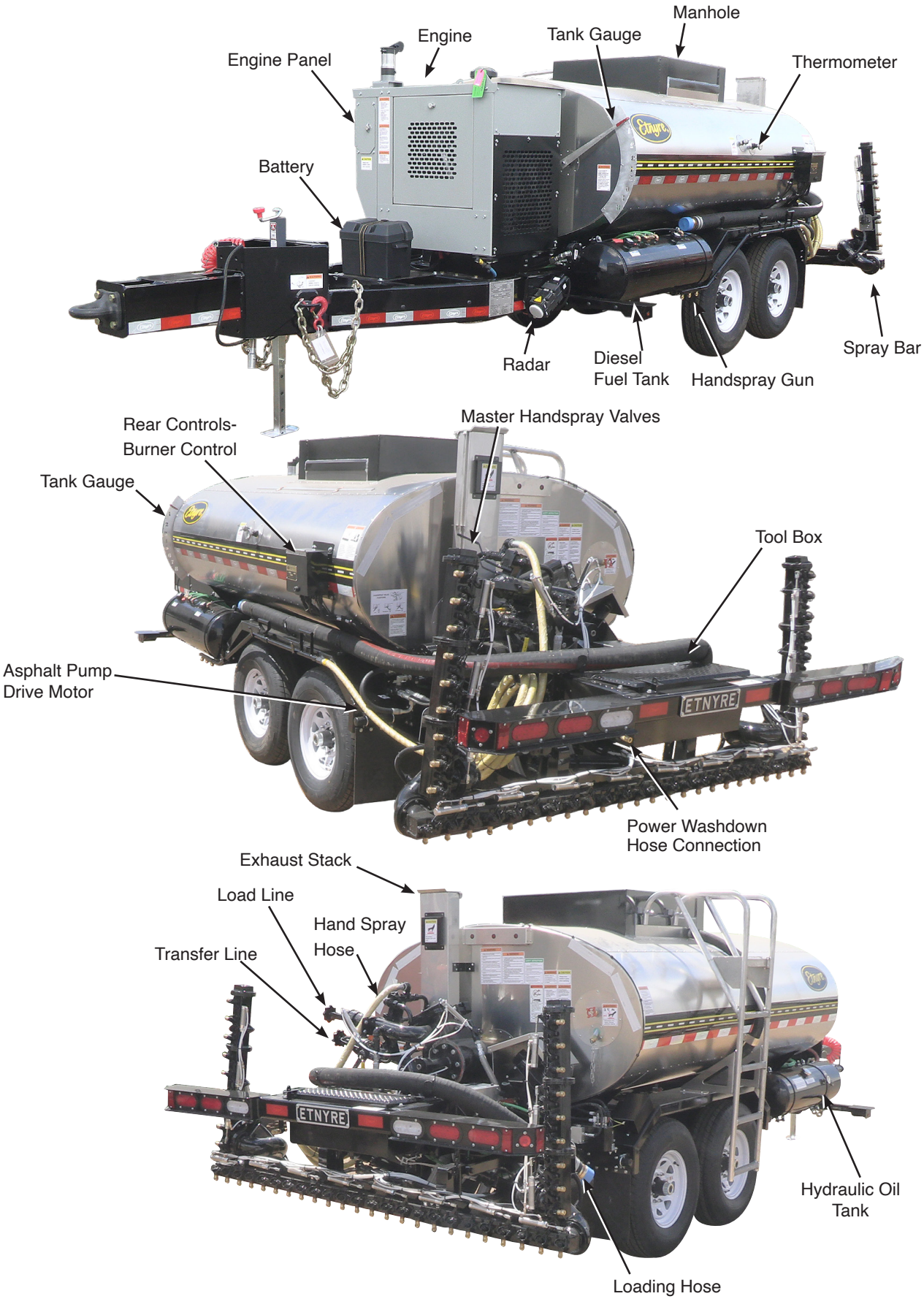
If NHTSA receives similar complaints, it may open an investigation; and, if it finds that a safety defect exists in a group of vehicles, it may order a recall and remedy campaign. However, NHTSA cannot become involved in individual problems between you, your dealer, or E. D. Etnyre & Co.

To contact NHTSA, you may either call the Auto Safety Hotline toll free at 1-800-424-9393 (or 336-0123 in the Washington, D.C. area). or write to NHTSA, U.S. Department of Transportation, Washington, DC, 20696. You can also obtain other information about motor vehicle safety from the hotline.

CAUTION

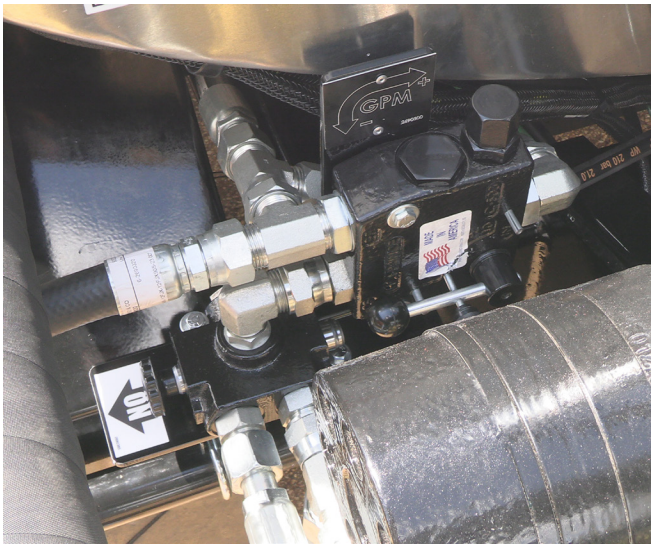
Unusually strong electromagnetic interference could cause the electronic controls on this equipment to temporarily malfunction. Test the effect of two way radios and similar equipment while operating in a safe area.

Component Location And Identification

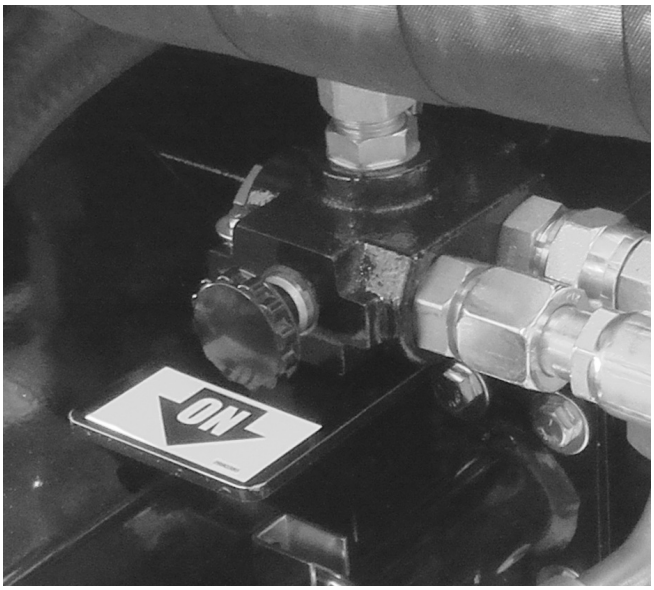


Engine Panel

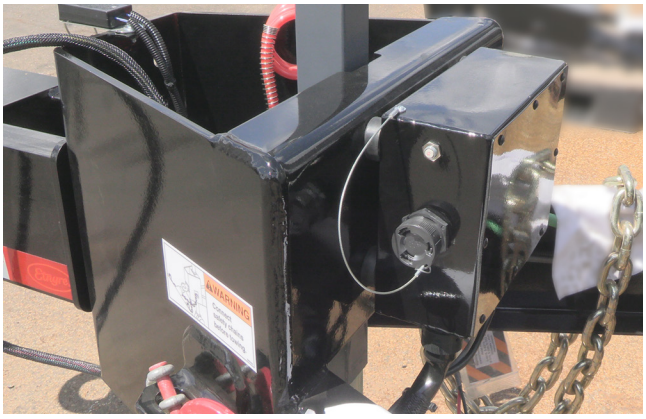
Rear Controls & Heat Control



Pump Speed Hydraulic Flow Control Valve



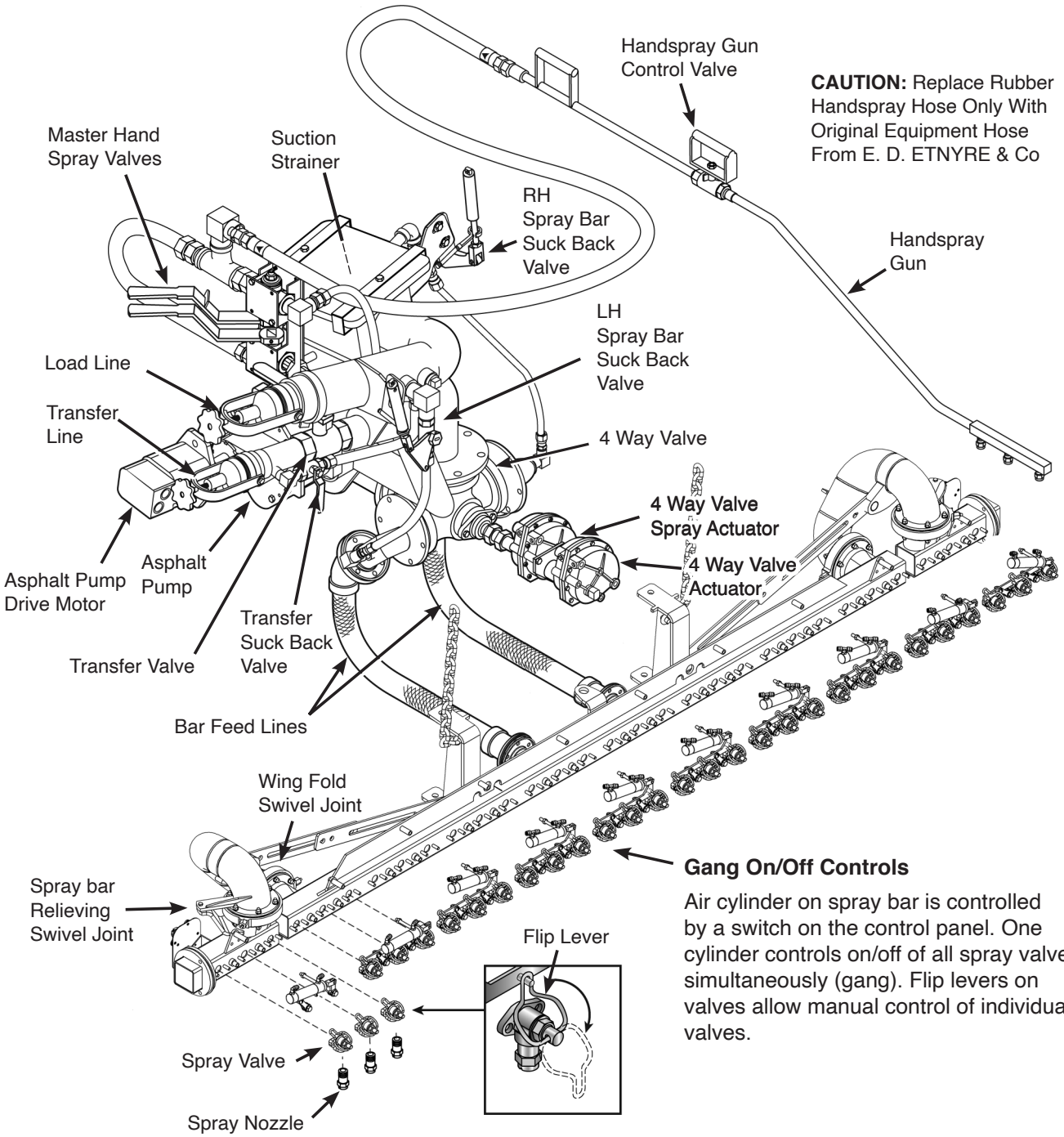
Pump On/Off Control Valve



Junction Box

Component Identification

Spray Bar and Piping System

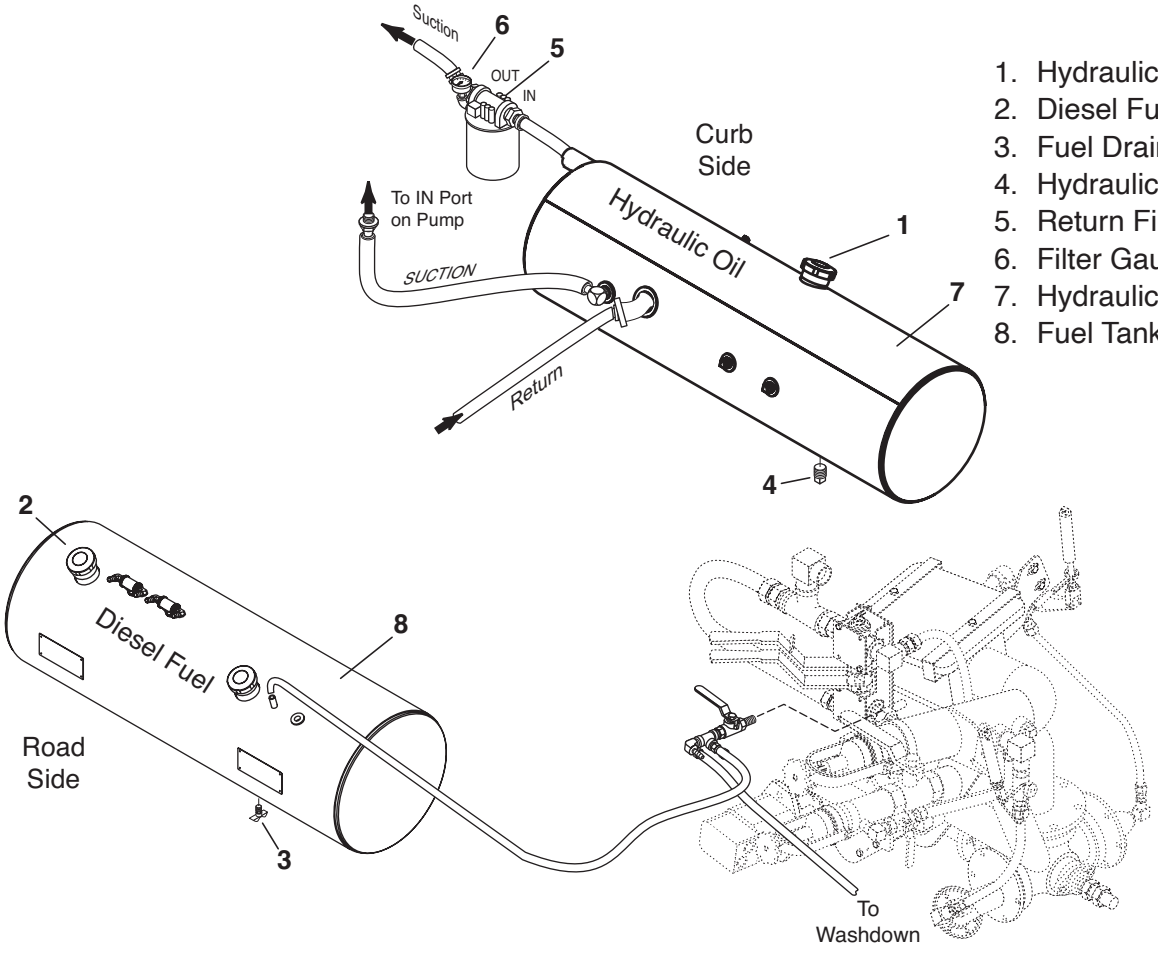


Gang On/Off Controls

Air cylinder on spray bar is controlled by a switch on the control panel. One cylinder controls on/off of all spray valves simultaneously (gang). Flip levers on valves allow manual control of individual valves.

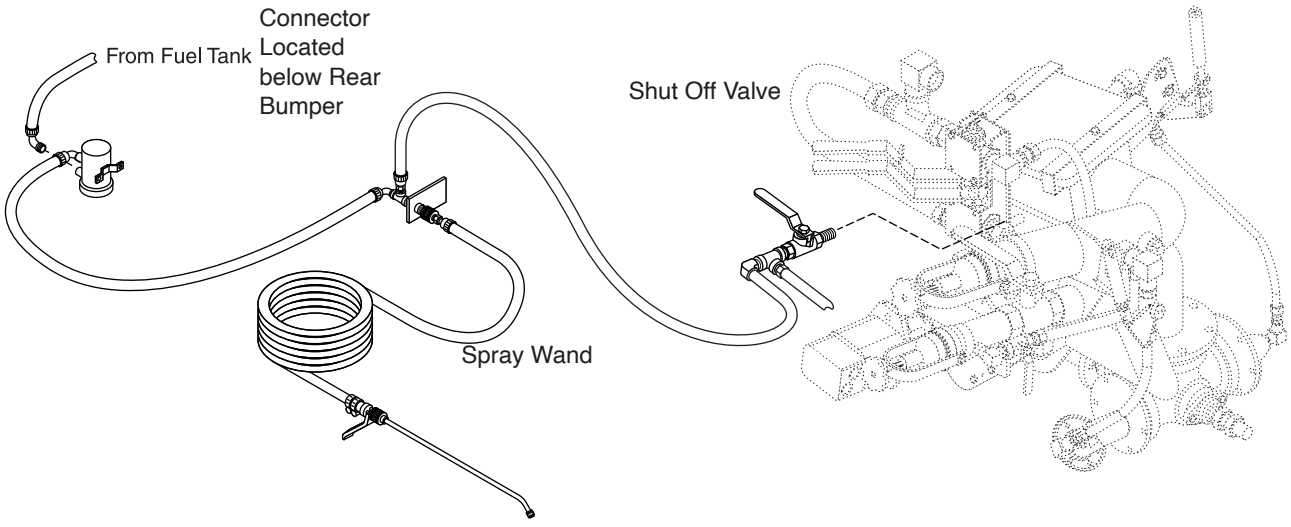
Component Identification

Hydraulic Oil and Fuel Tank



1. Hydraulic Oil Fill
2. Diesel Fuel Fill
3. Fuel Drain
4. Hydraulic Oil Drain
5. Return Filter - Hydraulic Oil
6. Filter Gauge
7. Hydraulic Tank
8. Fuel Tank

Power Wash Down



PREPARING FOR OPERATION

Always refer to the engine owner's manual for engine maintenance information.

The following procedures apply to new or rebuilt units.

1. Inspect the unit for damage that may have occurred during transporting.

2. Check and tighten all fasteners, body tie-down bolts, pipe and circulating line connections, etc. that may have loosened in transit.

3. Check the fluid level in the hydraulic reservoir. The fluid must always be visible in the sight glass.

Establishing Flow Rate/Ground Speed Ratio

If equipped with radar, use the Etnyre Computator to determine the correct ground speed (feet per minute), the required pump flow rate (gallons per minute) for the desired spray bar length (feet) and the application rate (gallons per square yard).

Using the Etnyre Computator

1. To determine the proper speed and pump discharge, use the Etnyre Computator. On the top scale, find the spray bar length to be used.

2. At the right end of the Computator, grasp the slide in the thumb recess and move the slide until the desired application rate is directly below the spray bar length.

3. Below the desired speed, you will find the necessary pump discharge rate.

Let's do a sample calculation for 12 feet of spray bar at an application rate of 0.3 gallons per sq yd. and a truck speed of 250 fpm. Move the slide to set the *.3* directly under the *12 ft.* Now you can see that directly below the *250 fpm* distributer speed is the required asphalt pump rate of *100 gpm*. The reverse side of the computator presents the information in metric units.

4. Select a transmission gear that will provide 250 fpm at 1200 to 1600 rpm of the truck engine.

5. Set the 2 speed motor to the LO position.

WARNING

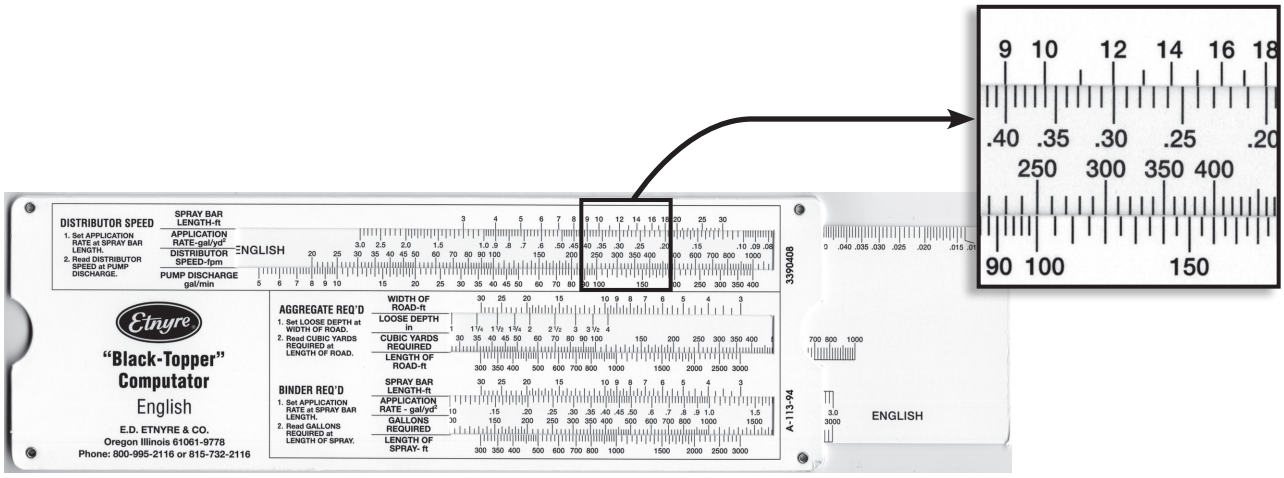
To prevent becoming entangled in machinery remain clear of rotating drives.

To prevent severe injury from becoming entangled in machinery: Stand clear of rotating drives

To prevent possible burns to operators or bystanders, or possible equipment damage, do not start any operation if any control settings are unknown.

CAUTION

To prevent damage to the asphalt pump, do not run pump for more than 5 minutes without bitumen to supply lubrication.



Etnyre Computator

FILLING INSTRUCTIONS

General

The Etnyre Maintenance distributor tank has a built in air space, or expansion space, above the "Tank Full" level. This air space is designed to minimize the chance that the tank will overflow if the material in the tank expands due to heating or foaming. The air space should not be used to carry product, The "Tank Full" level is based on the vehicle GVWAR, GVWR and a material density of 7.7 lb./gal. A lower "Tank Full" level must be calculated if a material with a density greater than 7.7 lb./gal is loaded.

WARNING

To prevent possible burns to operators or bystanders, or possible equipment damage, do not start any operation if any control settings are unknown.

To prevent possible burns from hot asphalt spray: Do not stand or allow anyone to stand, where accidental opening of a valve may cause contact with hot asphalt.

Before removing the fill line cap, make certain that the asphalt pump is turning and the suction valve is closed.

To prevent possible personal injury, do not load the vehicle beyond the GVWAR or GVWR. The maximum load volume must be calculated based on material density.

To prevent possible burns from leaking material, be sure all pipe, cap, and hose connections are secure before opening valves.

To prevent an explosion or fire hazard: Keep burning cigarettes or other sources of combustion away from manholes and overflow vents.

To prevent possible burns from foaming or violent eruption, do not load tank with material temperature over 200°F if water or condensation is present in tank, or if emulsion was used in the previous load. Do not heat material over 200°F if moisture or emulsion is present in tank.

To prevent possible burns from material overflow, allow sufficient space in the tank for expansion of the material when heating.

Foaming

If you suspect there may be moisture or emulsion in the tank, Dow-Corning DC-200 additive can be used to reduce foaming if a product being pumped is at a temperature in excess of 200°F. Additional DC-200 additive may be obtained from E. D. Etnyre & Co. or your Etnyre dealer.

Mixing Dow-Corning DC-200 Anti Foam Agent

Mix the contents of one can (16 oz.) with one (1) gallon of diesel fuel or kerosene. Add one (1) ounce of this diluted mixture to each 1000 gallons of asphalt. The correct amount may be poured through the manhole. This will assist in reducing foaming, particularly if moisture is present or if an emulsified asphalt was used in a previous load.

If you suspect that there may be moisture in the spray bar or circulating system, the filling operation should be stopped when the tank is no more than 25% full. The product should then be circulated from the tank through the spray bar for a minimum of 2 minutes at a rate of 80 to 110 GPM before continuing the filling operation. After circulating product in the spray bar, suck back the material from the bar and then return to the loading configuration and continue loading.

If foaming does occur, continue circulating until the foaming stops, and then suck back the product from the spray bar into the tank before continuing the loading operation.

WARNING

To prevent possible burns, always wear insulated gloves when handling spray bar sections or hoses.

Loading through the Load Line

Set or confirm the following switch/valve positions: (Refer to Figure 1)

- *Tank Valve* switch (control panel) **closed.**
- *Tank Return* switch (control panel) **open.**
- Bar *Suck Back* switch (control panel) **off** and valves **closed.**
- Master Hand Spray valves **closed.**
- Transfer line Suck Back valve **closed.**
- Transfer line valve **closed.**
- *Wash Down* switch (control panel) **off/closed.**
- *Upper Burner/Lower Burner* switches (control panel) **off.**
- Load and transfer line caps are in place and secured.

To begin loading:

1. Place the *Circ In Bar* switch (control panel) to **Circ in Tank** position
2. Push the knob on the selector valve to the **IN/OFF** position
3. Place the Pump Speed Hydraulic Valve lever to **SLOW** position
4. Start the engine
5. Turn the Main *Power* switch (control panel) **ON.**
6. Pull the knob on the selector valve to the **OUT/ON** position.
7. Increase the circulation rate by moving the Pump Speed Hydraulic Valve lever from slow to fast. A pump rate of 75 GPM is recommended to begin the loading operation. This pump rate can be increased at any time after loading has begun.
7. Remove the load line cap
8. Connect the load line to the supply tank through an asphalt hose.
9. Open the tank valve on the supply tank.
10. When the desired amount of product is in the maintenance unit tank, close the supply tank valve
11. At the supply tank, carefully open the bleeder valve or break the hose connection until a strong vacuum is heard. It may be necessary to reduce the pump speed in order to overcome pump vacuum when breaking the hose connection. Elevating the hose above the load line connection will allow maximum drainage of the hose.
12. Disconnect the hose from the load line.
13. Replace the load line cap and secure
14. If no other operation will be performed, it may be necessary to flush the pump before stopping the pump in the next step. Otherwise go to the instructions for the desired operation.
15. To stop the pump, push the knob on the selector valve to the **IN/OFF** position.

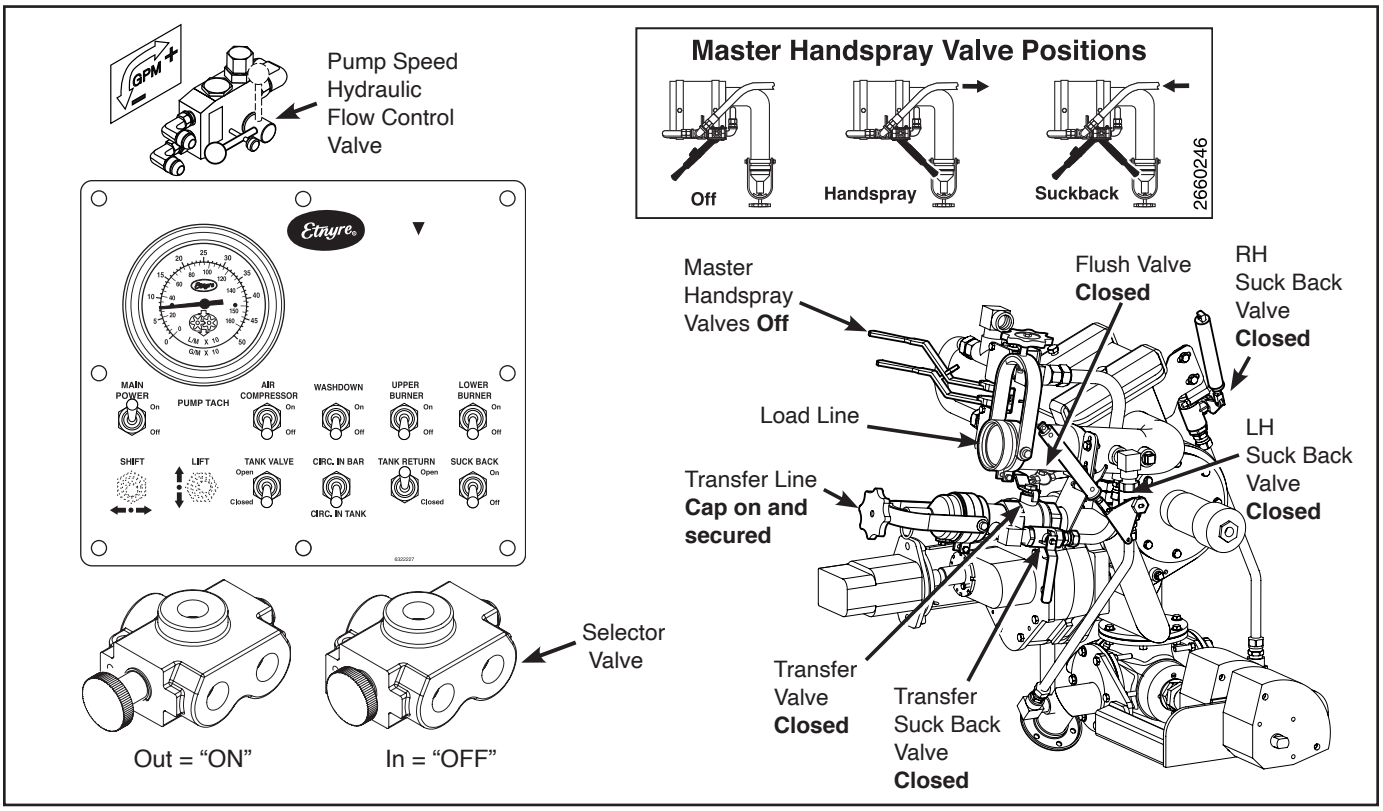


Figure 1. Valve Positions for Filling

Depending on material viscosity, as the loading rate is increased, the asphalt pump may cavitate. When this happens, the pump will make a distinctive sound, easily recognized with experience. Short periods of operation while the pump is cavitating will not damage the pump but you should not operate the pump in this condition for extended periods.

Higher pump speeds will not load thicker materials faster. Lighter materials, or heavy materials which are already at spraying temperature, may be loaded at faster rates.

WARNING

To prevent possible burns from material overflow, allow sufficient space in the tank for expansion of the material when heating.

To prevent an explosion or fire hazard, keep burning cigarettes or other sources of combustion away from manholes and overflow vents.

To prevent burns, always wear insulated gloves when handling spray bar sections or hoses.

Before removing the fill line cap, make certain that the tank valve is closed.

Filling through the Manhole

1. Turn the *Power* switch **Off** to prevent accidents.

   Note: Ensure that all connections are tight to prevent asphalt leaks.

2. Open the valve at the supply source and monitor the tank gage.
3. When the tank gage indicates full, close the supply valve.

WARNING

To prevent possible injury, always open the manhole cover slowly. Pressure build up in the tank may cause the cover to burst open.

CAUTION

To prevent damage to equipment, always use a manhole strainer when filling through the manhole.

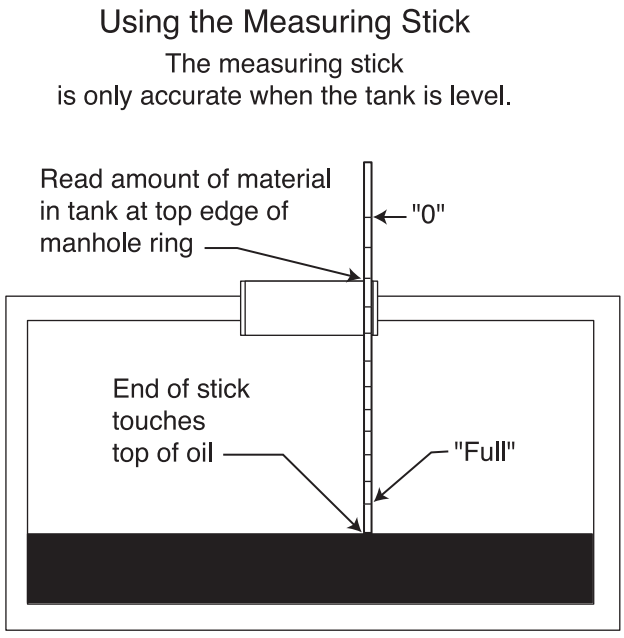


Figure 2. Using the Measuring Stick

CIRCULATING INSTRUCTIONS

WARNING

To prevent an explosion or fire hazard: Keep burning cigarettes or other sources of combustion away from manholes and overflow vents.

To prevent an explosion: Do not operate the burners when the vehicle is unattended, when the vehicle is in motion, or with the vehicle in a confined area.

To prevent an explosion or fire hazard, when the burners go out, shut off the fuel supply to both burners and allow the flues to ventilate for at least 3 minutes before re-lighting the burners.

To prevent possible burns to operators or bystanders, or possible equipment damage, do not start any operation if any control settings are unknown

To prevent possible burns from leaking material, be sure all pipe, cap, and hose connections are secure before opening valves.

WARNING

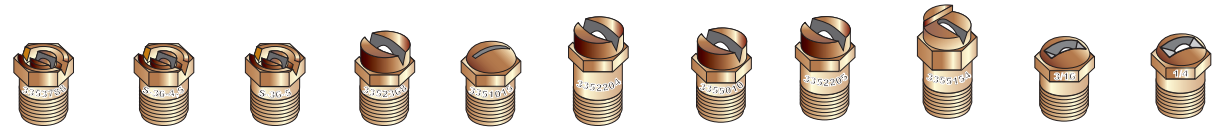
To prevent possible burns from hot asphalt spray: Do not stand or allow anyone to stand, where accidental opening of a valve make cause contact with hot asphalt.

To prevent possible burns, use extreme caution when using a torch to heat the pump. Asphalt accumulated on and around the pump may ignite when heating the pump with a torch.

To prevent possible burns from material overflow, allow sufficient space in the tank for expansion of the material when heating.

Allowing the flue burners to operate for a long period of time without circulating can damage the product and create explosive fumes. If product cannot be circulated after fifteen minutes of heating without circulation, the burners should be extinguished for 20-30 minutes before re-lighting the burners.

Etnyre Spraybar Nozzles



1	2	3	4	5	6	8	9	7,10	11	12
3353788	3351008	3351009	3352368	3351015	3352204	3355010	3352205	3352210 3355154	3351014	3351010

Ref.	Part No.	Description	Application Gallons Per Square Yard	Application (Metric) Liters Per Square Meter	US Flow Gallons Per Minute Per Foot
1	3353788	V Slot Tack Nozzle 1/8" Rifle Bored	.05 – .20	.23 – 0.91	3.0 – 4.5
	3351013*	V Slot Tack Nozzle 1/16" Coin Slot	.05 – .20	.23 – 0.91	3.0 – 4.5
	3354904	V Slot Tack Nozzle 1/8" Counterbored	.05 – .20	.23 – 0.91	3.0 – 4.5
2	3351008	S36-4 V Slot	.10 – .35	.45 – 1.58	4.0 to 7.5
3	3351009	S36-5 V Slot	.18 – .45	.81 – 2.04	7.0 to 10.0
4	3352368	Multi-Material V Slot	.15 – .40	.68 – 1.81	6.0 to 9.0
5	3351015	3/32" Coin Slot	.15 – .40	.68 – 1.81	6.0 to 9.0
6	3352204	Multi-Material V Slot	.35 – .95	1.58 – 4.30	12.0 to 21.0
7	3355154	**End Nozzle** (use with 3352204 nozzle)	.35 – .95	1.58 – 4.30	12.0 to 21.0
8	3355010	Multi-Material V Slot	.29 – .72	1.31 – 3.26	10.0 – 16.5
9	3352205	Multi-Material V Slot	.20 – .55	.91 – 2.49	7.5 to 12.0
10	3352210	**End Nozzle** (use with 3352205 nozzle)	.20 – .55	.91 – 2.49	7.5 to 12.0
11	3351014	3/16" Coin Slot	.35 – .95	1.58 – 4.30	12.0 to 21.0
12	3351010	1/4" Coin Slot	.40 – 1.10	1.81 – 4.98	15.0 to 24.0

* Special Order

Table 1. Etnyre Spray Bar Nozzles

Circulating in the Tank

Set or confirm the following switch/valve positions (see Figure 3).

- *Tank Return* switch **open**.
- Bar *Suck Back* switch (control panel) **off** and valves **closed.**
- Master Hand Spray valves **closed**.
- Transfer line Suck Back valve **closed**.
- Transfer line **closed**.
- *Wash Down* switch (control panel) **off/closed**.
- Load and transfer line caps are in place and secured.

To begin circulating:

1. Place the *Circ In Bar* switch to **Circ in Tank** position.
2. Push the knob on the selector valve to the **IN/OFF** position.
3. Place the Pump Speed Hydraulic Valve lever to **SLOW** position.
4. Start the engine.
5. Turn the Main *Power* switch **ON**.
6. Place the *Tank Valve* switch (control panel) in the **OPEN** position.
7. Pull the knob on the selector valve to the **OUT/ON** position.

Increase the circulation rate by moving the Pump Speed Hydraulic Valve lever from slow to fast. A pump rate of 100 to 150 GPM is recommended for heating operations.

8. If no other operation will be performed, go to the next step. Otherwise go to the instructions for the desired operation.
9. Place the *Tank Valve* Switch (control panel) to the **CLOSE** position before stopping the pump.
10. To stop the pump, push the knob on the selector valve to the **IN/OFF** position.
11. Flush the pump if necessary before quitting.

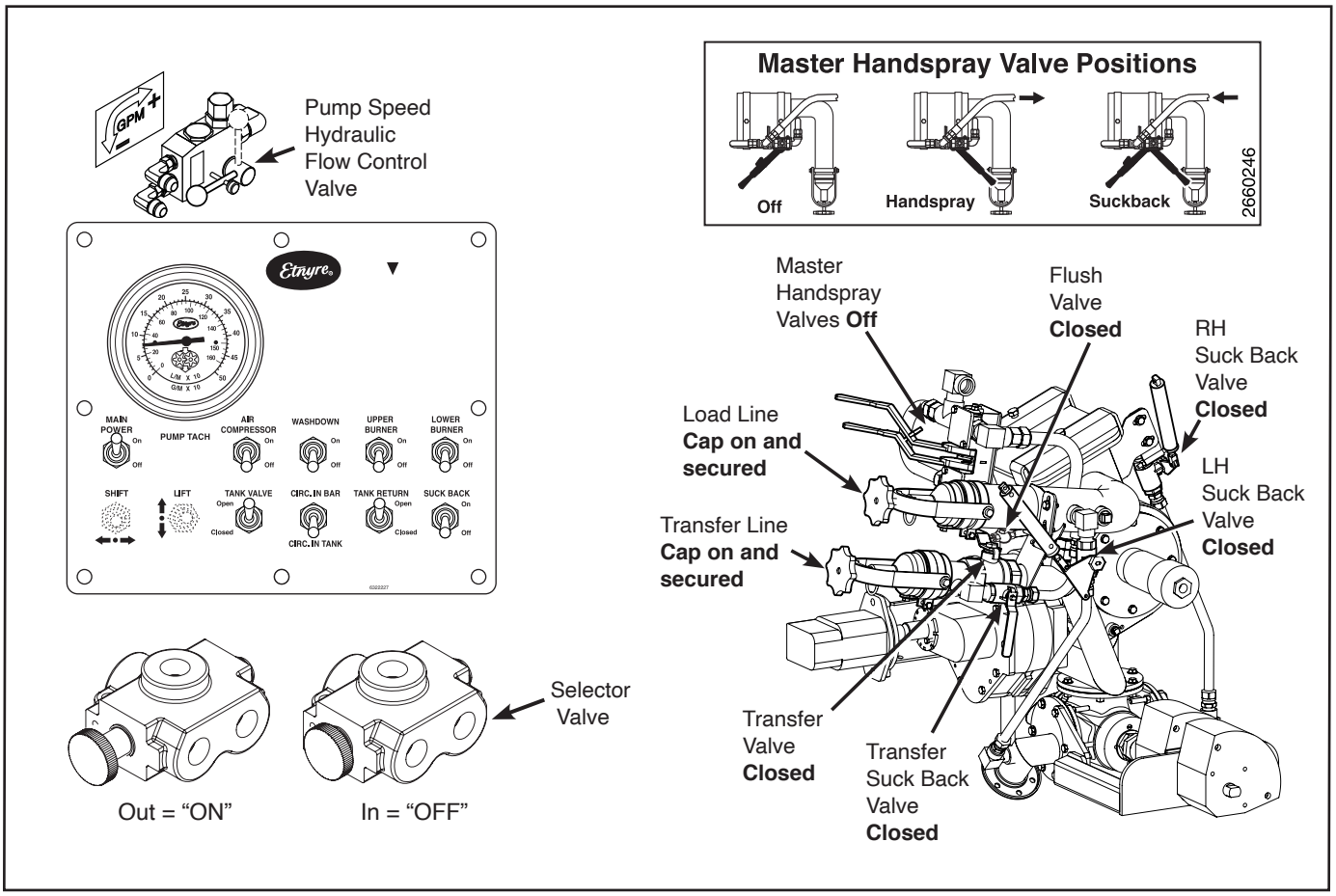


Figure 3. Valve Positions for Circulating in the Tank

Circulating Product in the Bar

• Insure Spray switch is placed in the **OFF** position.

Perform the procedure for Circulating in the Tank first, then place the *Circ in Bar* switch (control panel) to **CIRC IN BAR** Position. Circulate product long enough to ensure removal of all air from the bar and to heat the spray bar valves sufficiently (See Figure 4).

Material will circulate in the bar ends whether the wings are folded or extended.

WARNING

To prevent possible burns, allow the bar feed hose to warm to asphalt spraying temperature, Hardened asphalt in corrugations can cause the hose to fail.

CAUTION

To prevent excessive pressure in the spray bar, the asphalt pump speed should not exceed 160 GPM while circulating in the spray bar.

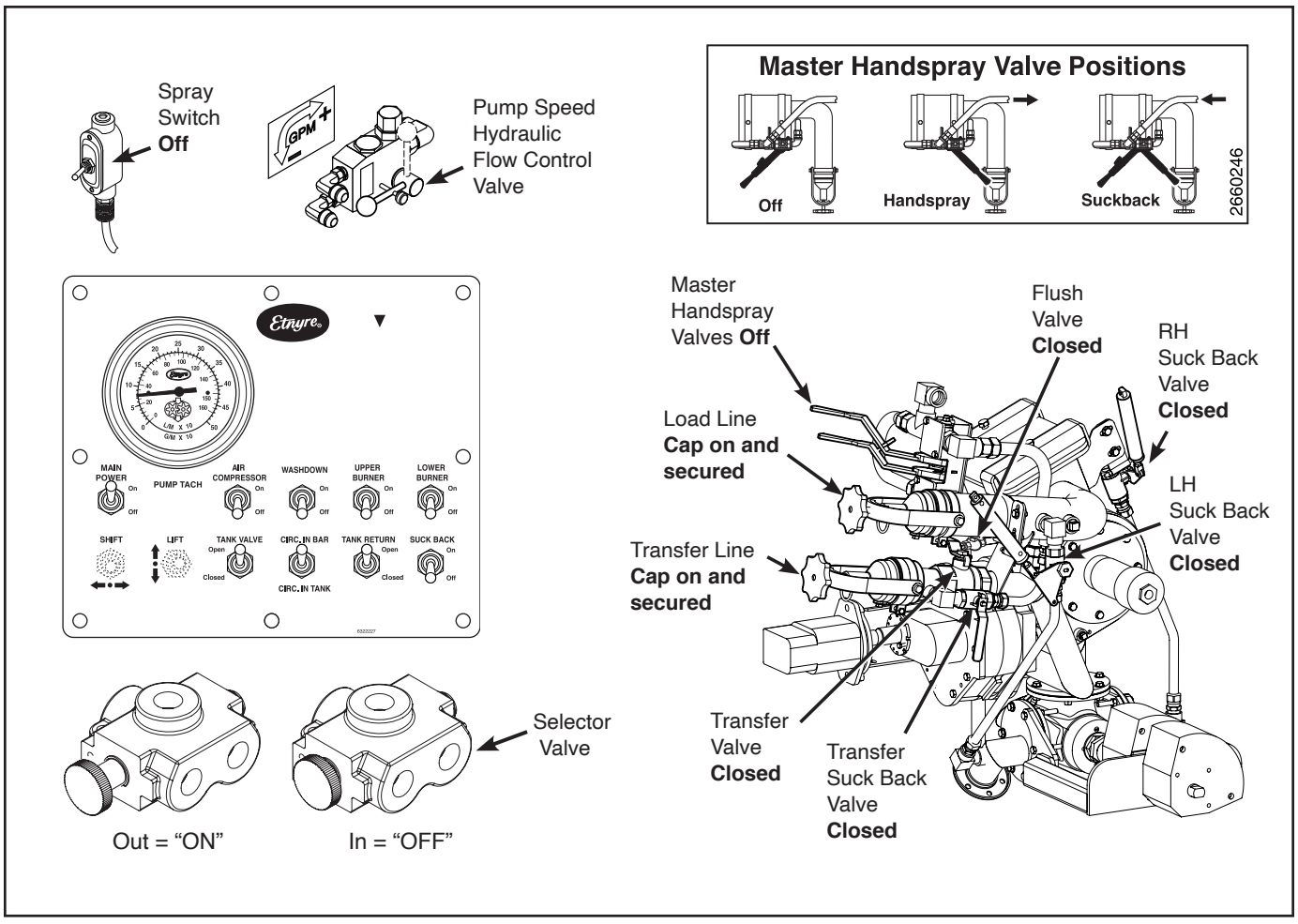


Figure 4. Valve Positions for Circulating in the Bar

SPRAYING INSTRUCTIONS

WARNING

To prevent an explosion or fire hazard: Keep area free of all sources of combustion when spraying.

To prevent an explosion or fire hazard: Ensure that burners are extinguished before removing any material from tank in any manner. Liquid petroleum (LP.) burners can support a flame for several minutes after the fuel supply is turned off.

To prevent an explosion or fire hazard: Eliminate sparks from the engine exhaust.

To prevent an explosion or fire hazard: Keep burning cigarettes or other sources of combustion away from manholes and overflow vents.

To prevent possible burns to operators or bystanders, or possible equipment damage, do not start any operation if any control settings are not known.

To prevent possible burns, always wear insulated gloves when handling spray bar sections or hoses.

To prevent possible burns from leaking material, be sure all pipe, cap, and hose connections are secure before opening valves.

To prevent possible burns from hot asphalt spray, do not stand, or allow anyone to stand, where accidental opening of a valve may cause contact with hot asphalt.

To prevent possible burns from hot asphalt when handspraying, hold the handspray wand in proper position and watch for people.

CAUTION

Do not run pump above rated capacity, damage to equipment may result.

Spraying Operations

A correct spray pattern cannot be obtained unless the product is heated to its proper spraying temperature. Cold product will not provide sharp spray edges, and will cause streaking. If heating of the product is required, refer to "Heating Product" for instruction on operation of your particular type of burners.

Spray bar nozzles have a limited flow range at which optimal performance will be achieved. Flow rates greater than this optimal range will cause excessive fogging. Rates that are too low will cause the fan to sag and cause heavy edges. Refer to the nozzle selection chart to select the nozzles appropriate for your conditions (see Table 1).

Adjusting the Spray Bar Nozzle Angle

Adjust the nozzles to obtain an angle of approximately 30° with the spray bar centerline (see figure 5). Every nozzle should be at the same angle. A nozzle adjustment wrench is supplied in the tool box of each new unit.

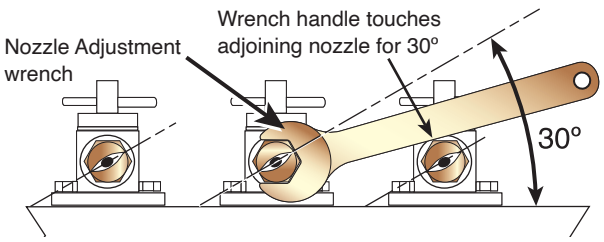


Figure 5. Spraybar Nozzle Angle Adjustment

Adjusting the Spray Bar Height

Lower the spray bar so that the nozzles are approximately 12" above the road when the tank is empty. At this height, the spray fans from the nozzles will overlap to provide triple lap coverage of material on the ground. This is the normal spraying height.

Note: under heavy wind conditions, it may be necessary to lower the spraying height.

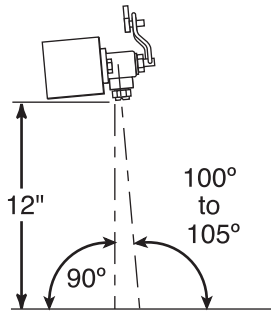


Figure 6. Spray bar Height Adjustment

Spraying Through the Spray Bar

1. Unlatch the bar carrying mechanism.
2. Perform the procedure for Circulating in the Bar, and continue circulating.
3. Select the spray bar feet to spray by connecting the flip levers for the bar sections to be used.
4. Select the desired application rate and adjust the circulation rate accordingly.
5. Set the desired application rate by adjusting the engine speed/pump speed hydraulic valve. Refer to "Establishing Flow Rate/Ground Speed Ratio" under Preparing for Operation on page 12.

Place the vehicle rear axle in the proper position for the shot. If equipped, place the *Auto/Count* switch in the *Auto* position. This will accumulate the distance traveled while spraying. Start the vehicle moving, and at the start of the shot, move the *Spray* switch to the **On** position. While spraying, the speed must remain constant to accurately maintain the application rate. When the end of the shot is reached, turn the *Spray* switch **Off**.

During the periods between shots, material should be circulated in the spray bar to keep the bar warm and prevent material set up in the bar. When finished spraying, suck back the spray bar.

WARNING

To prevent possible burns from hot asphalt spray, do not stand, or allow anyone to stand, where accidental opening of a valve may cause contact with hot asphalt.

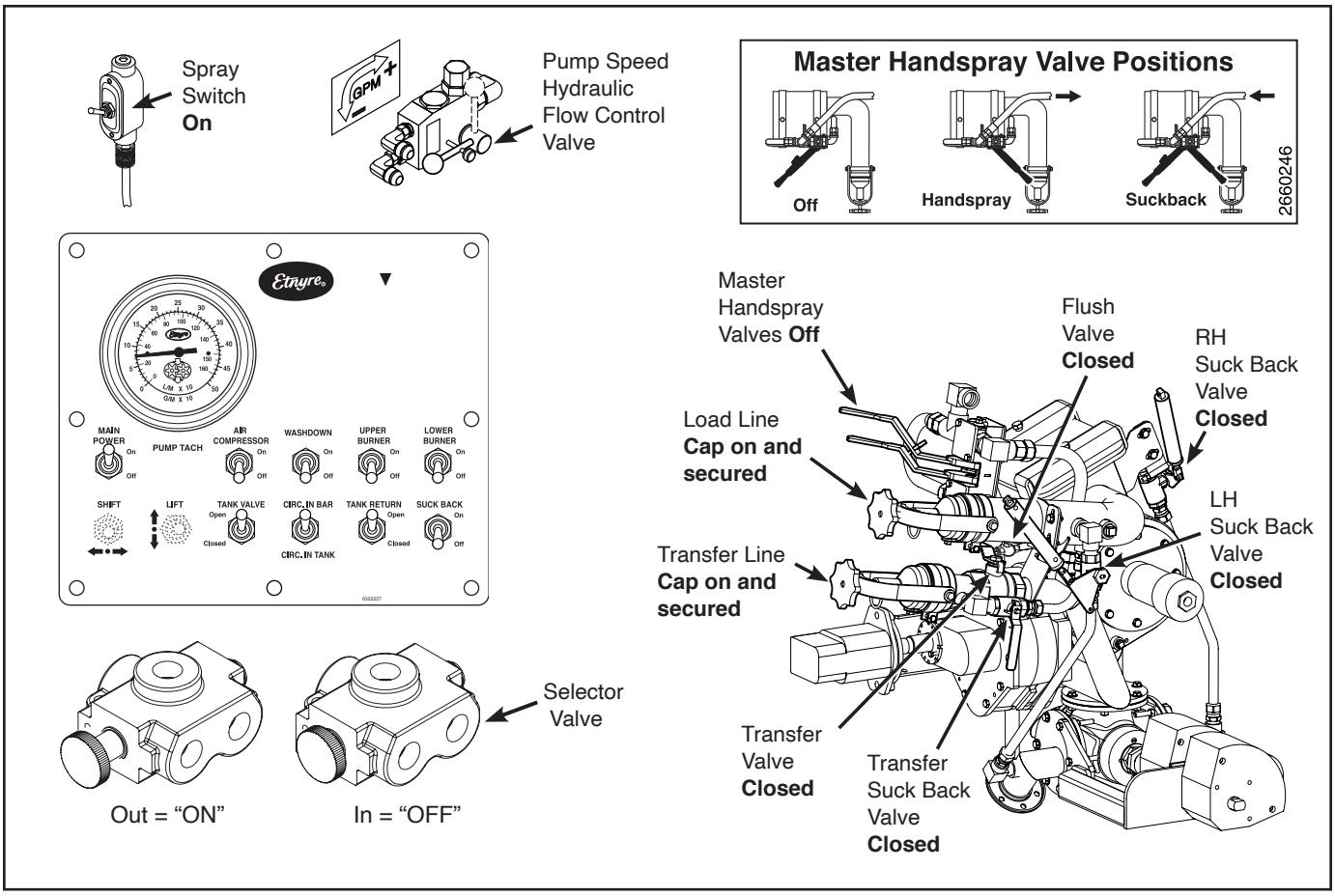


Figure 7. Valve Positions for Spraying Through the Spraybar

Suckback for the Spray Bar

1. Place *Tank Valve* switch (control panel) in the **CLOSE** position.
2. Place the *Circ in Bar* switch (control panel) to **CIRC IN TANK** position.
3. Place the *Suck Back* switch (control panel) to the **ON** position.
4. Raise the spray bar and fold the wings up.
5. Set the Circulation Rate to 200 GPM using the Pump Speed Hydraulic Flow Control valve.
6. Open the end valves on the spray bar momentarily to let air into the system, if desired. After approximately 2 minutes, place the *Suck Back* switch to **OFF** position, place *Circ in Bar* switch to **CIRC IN TANK** position.

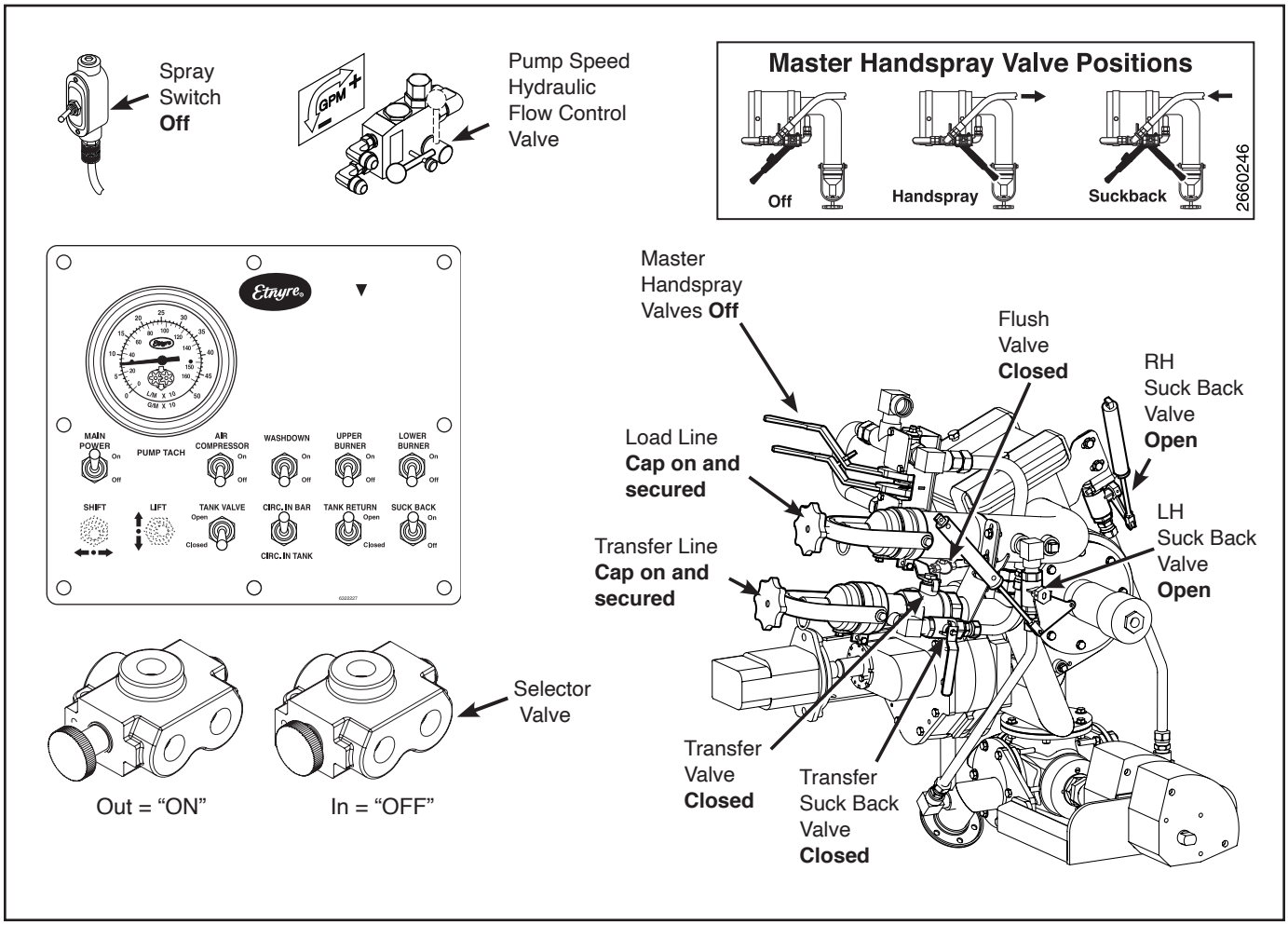


Figure 8. Valve Positions for Suck Back the Spraybar

Handspraying

Set or confirm the following switch/valve positions: (Refer to Figure 9).

- *Main Power* switch (control panel) **On**.
- *Tank Valve* switch (control panel) **Open**.
- Tank Return Switch (control panel) **Closed**.
- Master Hand Spray valves **Closed**.
- Transfer line Suck Back valve **Closed**.
- Transfer line valve **Closed**.
- Bar *Suck Back* switch (control panel) **Off**. Bar Suck Back valves will be closed
- Flush valve **Closed**.
- Load and transfer line caps are in place and secured.
- *Wash Down* & *Suck Back* switches (control panel) **Off**.
- *Circ in Bar* switch (control panel) to **CIRC IN TANK** Position.

1. With the engine at full throttle adjust asphalt rate to 150 GPM using Hydraulic Flow Control valve.
2. Open the Hand Spray Valve on the hand spray wand.
3. Gradually increase the asphalt pump speed to increase hand spray pressure
4. Continue hand spraying by opening and closing the hand spray valve on the wand as needed
5. When finished, close the Hand Spray Valve on the wand.

WARNING

To prevent possible burns from hot asphalt when handspraying, hold the handspray wand in proper position and watch for people.

To prevent burns, always wear eye protection, long sleeve shirt, insulated gloves, boots, and long pants outside the boots when handling spray bar sections or hoses.

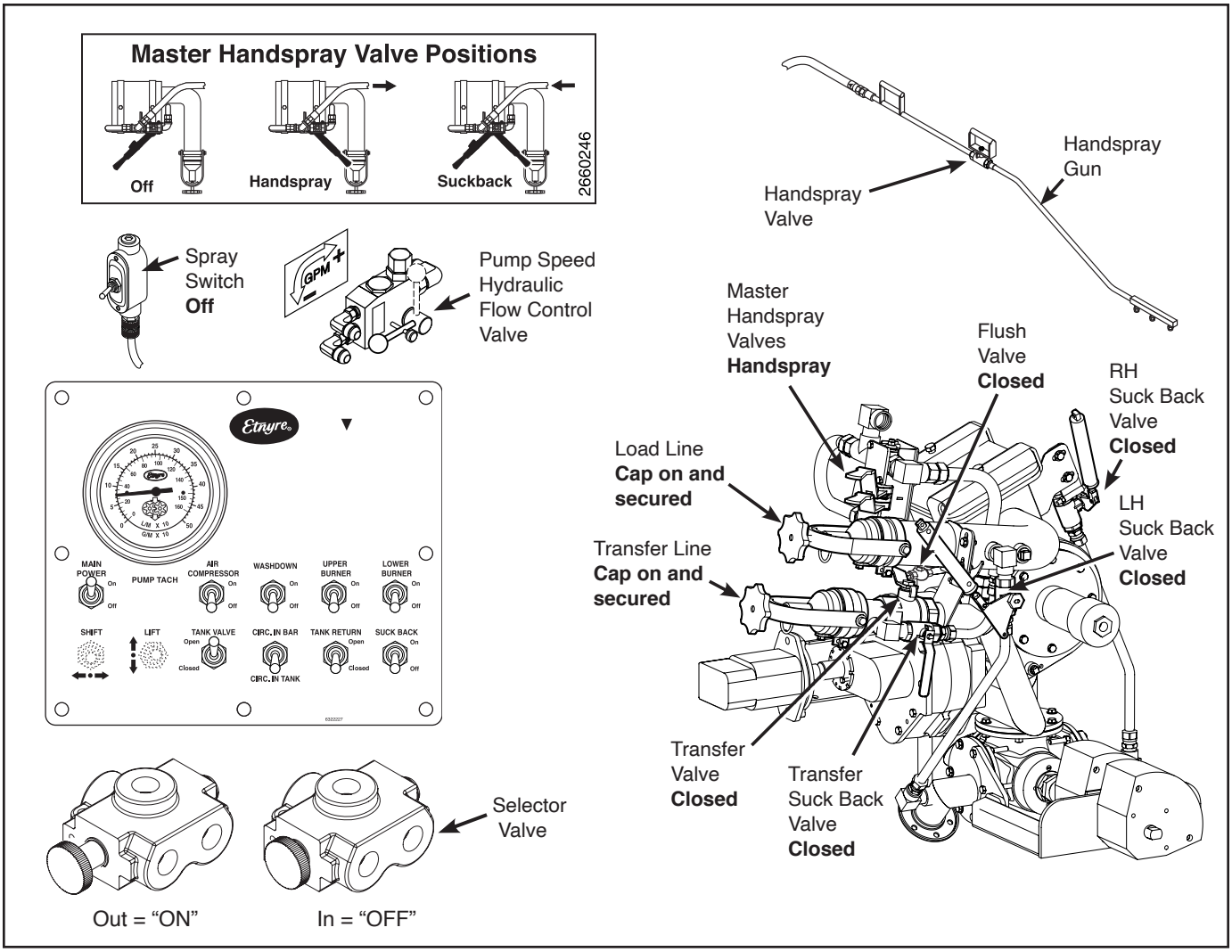


Figure 9. Valve Positions for Handspray

Handspray Suckback

Set or confirm the following switch/valve positions: (Refer to Figure 10).

- *Main Power* switch (control panel) **On**.
- *Tank Valve* switch (control panel) **Closed**.
- Tank Return Switch (control Panel) **Open**.
- Master hand spray valves **Suckback**.
- Transfer line suck back valve **Closed**.
- Transfer line valve **Closed**.
- Flush valve **Closed**.
- *Suck Back* switch (control panel) **On**. Bar Suck Back valves will be Open.
- Load and transfer line caps are in place and secured.
- *Wash Down* Switch (control panel) **Off**.
- *Circ in Bar* switch (control panel) to **CIRC IN TANK** Position.

1. Set the circulation rate to 200 GPM
2. Move the Master Hand Spray valve into the Suck Back position
3. Open the hand spray wand valve (should hear suction sounds).
4. Suck back for approximately 2 minutes
5. Flush the pump if necessary before quitting. Close the hand spray wand valve.

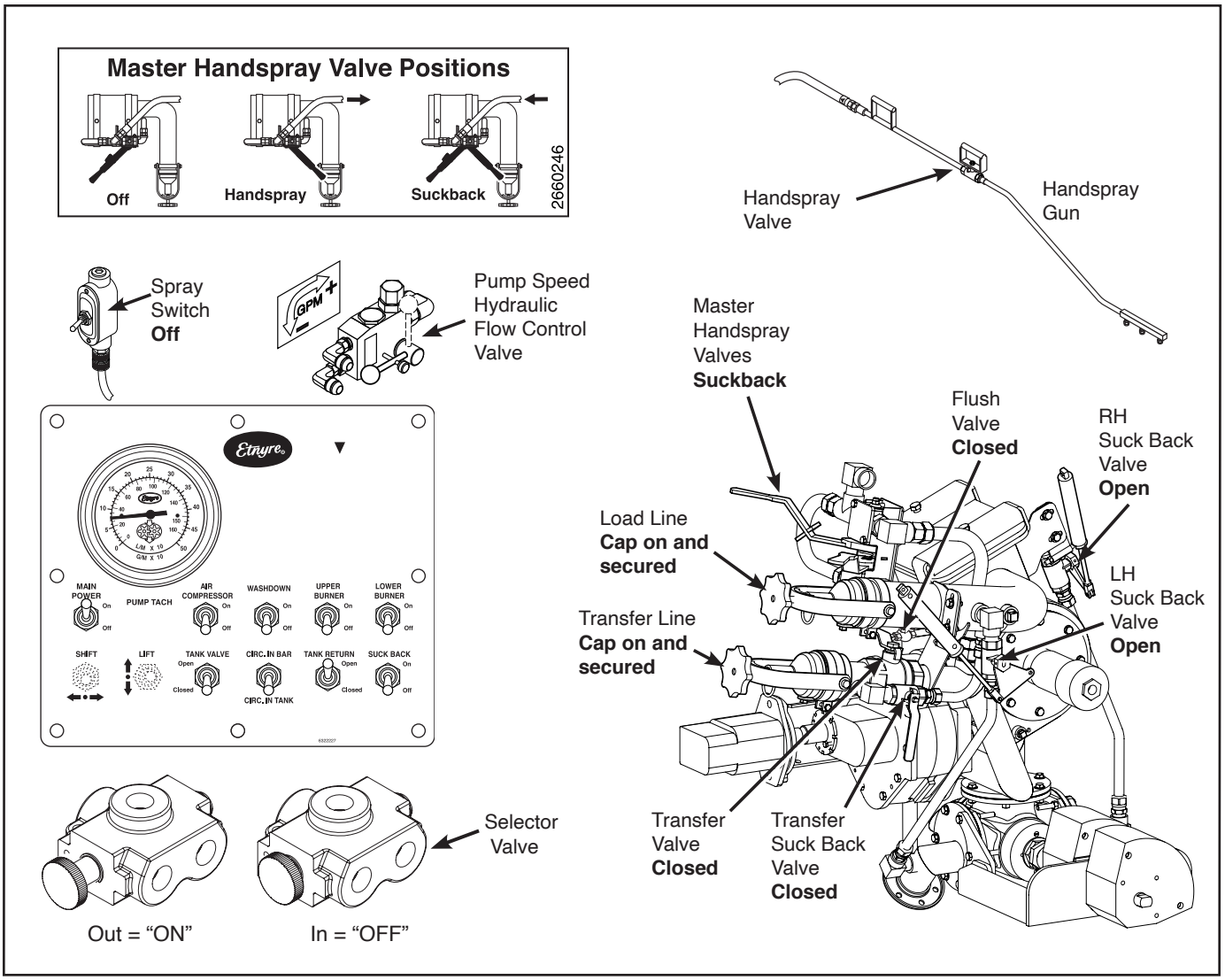


Figure 10. Valve Positions for Handspray Suckback

UNLOAD INSTRUCTIONS

WARNING

To prevent possible burns to operators or bystanders, or possible equipment damage, do not start any operation if any control settings are not known.

To prevent possible burns, always wear insulated gloves when handling spray bar sections or hoses.

To prevent possible burns from leaking material, be sure all pipe, cap, and hose connections are secure before opening valves.

To prevent possible burns from hot asphalt spray, do not stand, or allow anyone to stand, where accidental opening of a valve may cause contact with hot asphalt.

To prevent explosion or fire hazard: Ensure that the burners are extinguished before removing any material from the tank in any manner. Liquid petroleum (LP) burners can support a flame for several minutes after the fuel supply is turned off.

Unload Operations

Set or confirm the following switch/valve positions: (Refer to Figure 11).

- *Main Power* switch (control panel) **On**.
- *Tank Valve* switch (control panel) **Open**.
- *Tank Return* Switch (control panel) **Closed**.
- Master Hand Spray valves **Off**.
- Transfer line suck back valve **Closed**.
- Transfer line valve **Closed**.
- Flush valve **Closed**.
- *Suck Back* switch (control panel) **Off**. Bar Suck Back valves are closed.
- Load line cap in place and secured.
- *Wash Down* switch (control panel) **Off**.
- Hand spray wand valve **Closed**.
- *Circ in Bar* switch (control panel) to **CIRC IN TANK** Position.

1. Connect the transfer line to the storage tank with asphalt hose.
2. Open the transfer valve.
3. Open any valves on the storage tank between asphalt hose and tank.
4. Engage the pump and bring to approximately 150 GPM.
5. When pump off is complete, stop pump and then close the valve at the storage tank and the transfer valve.

To suck back product remaining in transfer hose:

1. Tank Valve CLOSED.
2. Tank Return valve OPEN.
3. Transfer Line suck back valve OPEN.
4. Engage pump to approximately 50 GPM.
5. At the storage tank, carefully open the bleeder valve or break the hose connection until a strong vacuum is heard. It may be necessary to reduce the pump speed in order to overcome the pump vacuum when breaking the hose connection. Elevating the hose above the storage tank connection will allow maximum drainage of the hose.
6. When complete, close Transfer Line Suck Back valve and then stop the pump.
7. Disconnect the hose from the transfer line.
8. Replace the transfer line cap and secure.
9. Flush the pump before quitting.

NOTE: The pump can be stopped and the automatic tank valve can be closed immediately at any time during operation by turning the EMERGENCY STOP switch OFF. Before turning the EMERGENCY STOP switch back ON, turn the Pump valve off to prevent the pump from turning.

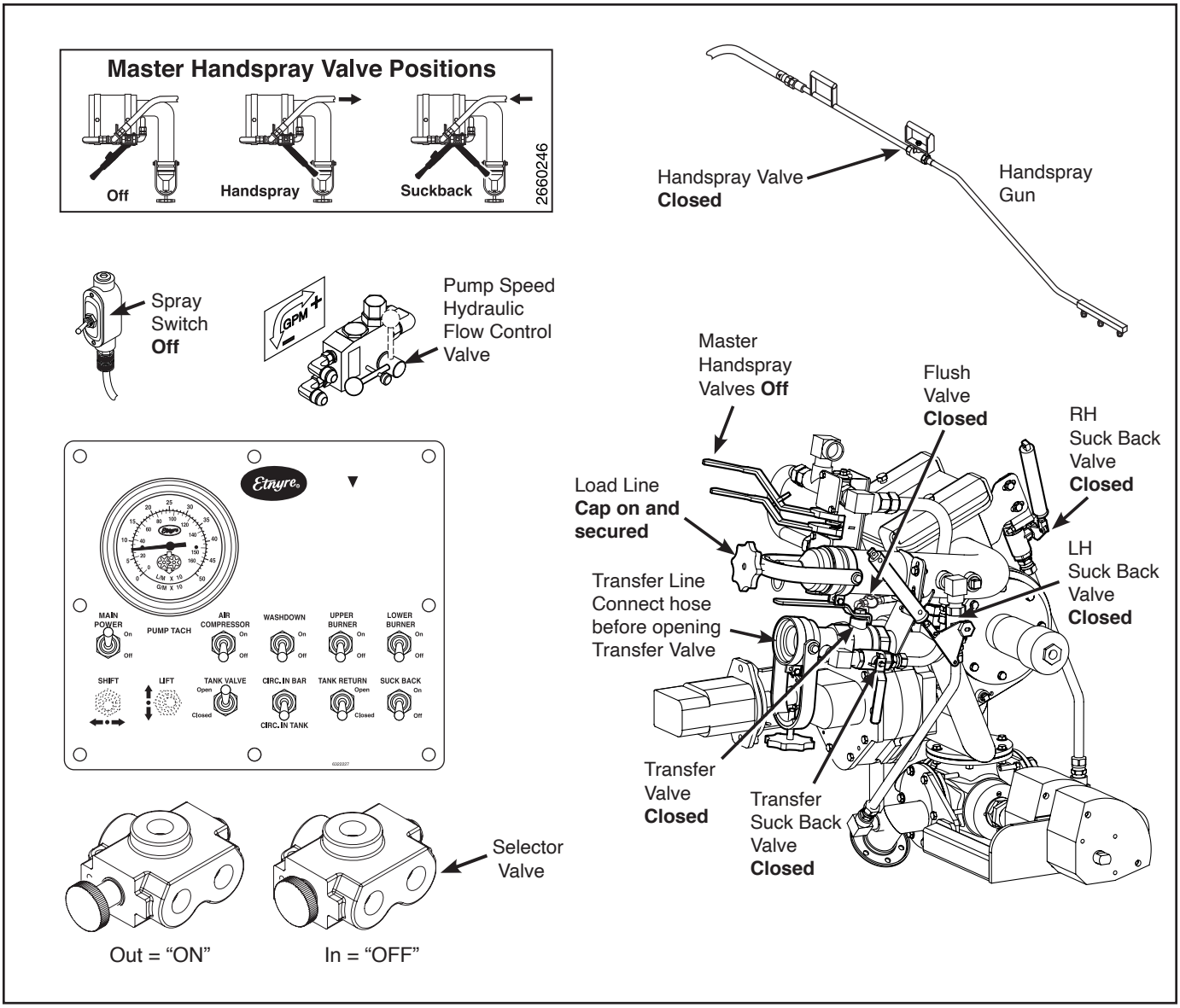


Figure 11. Valve Positions for Unload

TRANSFER INSTRUCTIONS

WARNING

To prevent possible burns to operators or bystanders, or possible equipment damage, do not start any operation if any control settings are not known.

To prevent possible burns, always wear insulated gloves when handling spray bar sections or hoses.

To prevent possible burns from hot asphalt spray, do not stand, or allow anyone to stand, where accidental opening of a valve may cause contact with hot asphalt.

To prevent possible burns from leaking material, be sure all pipe, cap, and hose connections are secure before opening valves.

Transfer Operations

Set or confirm the following switch/valve positions: (Refer to Figure 12).

- *Main Power* (control panel) **On**.
- *Tank Valve* (control panel) **Closed**.
- *Tank Return* Switch (control panel) **Closed**.
- Master Hand Spray valve **Off**.
- Transfer line Suck Back valve **Closed**.
- Transfer line valve **Closed**.
- Flush valve **Closed**.
- *Suck Back* switch (control panel) **Off**. Bar Suck Back valves are closed.
- Load line and transfer cap in place and secured.
- *Wash Down* switch (control panel) **Off**.
- Hand spray wand valve **Closed**.
- *Circ in Bar* switch (control panel) to **CIRC IN TANK** Position.

1. Remove the transfer cap.
2. Connect the transfer line to the storage tank through an asphalt hose.
3. Open the transfer valve.
4. Engage pump at a slow speed 50 GPM or less.
5. Remove the load line cap.
6. Connect the load line to the supply tank with an asphalt hose.
7. Open any valves on the storage tank between the asphalt hose and the tank.
8. Open the tank valve on the supply tank.
9. Increase pump speed to 150 GPM.
10. Close the tank valve on the supply tank when the desired amount of product is in the storage tank.
11. At the supply tank, carefully open the bleeder valve or break the hose connection until a strong vacuum is heard. It may be necessary to reduce the pump speed in order to overcome the pump vacuum when breaking the hose connection. Elevating the hose above the load line connection will allow maximum drainage of the hose.
12. Disconnect the hose from the load line.
13. Replace the load line cap and secure.
14. Stop the pump.
15. Close the valve at the storage tank.
16. Close the Transfer Valve.
17. Open the Transfer Suck Back valve.
18. Engage pump to a slow speed 50-100 GPM.
19. At the storage tank, carefully open the bleeder valve or break the hose connection until a strong vacuum is heard. It may be necessary to reduce the pump speed in order to overcome the pump vacuum when breaking the hose connection. Elevating the hose above the load line connection will allow maximum drainage of the hose.
20. Disconnect the hose from the transfer line.
21. Replace transfer line cap and secure.
22. Close the Transfer Line Suck Back valve.
23. Stop the pump.
24. It may be necessary to flush the pump when finished.

NOTE: The pump can be stopped and the automatic tank valve can be closed immediately at any time during operation by turning the EMERGENCY STOP switch OFF. Before turning the EMERGENCY STOP switch back ON, turn the Pump valve

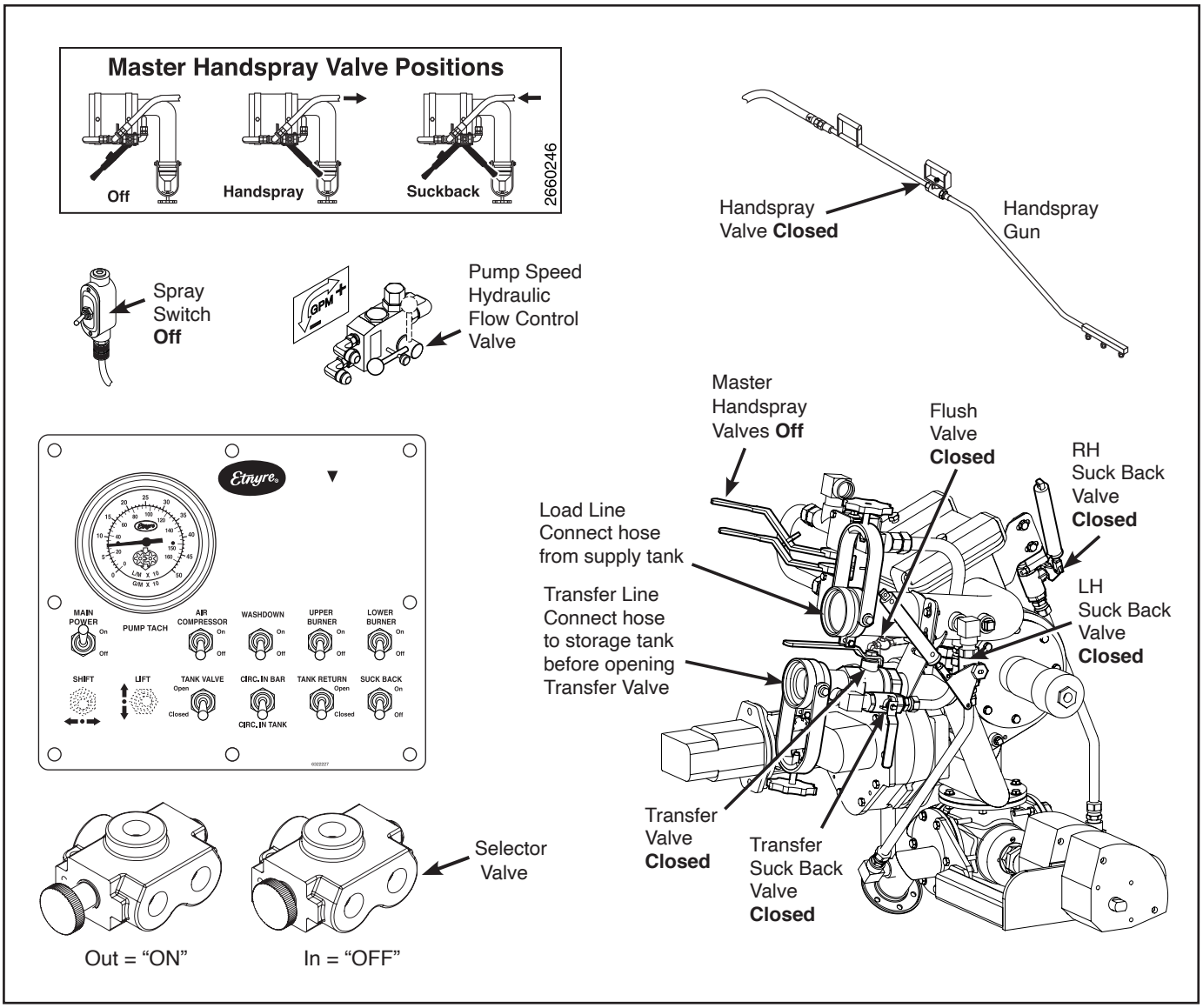


Figure 12. Valve Positions for Transfer Operation

FLUSHING INSTRUCTIONS

WARNING

To prevent possible burns to operators or bystanders, or possible equipment damage, do not start any operation if any control settings are not known.

Before removing the fill line cap, make certain that the asphalt pump is turning and the suction valve is closed.

Flushing Operations

Normally the suckback procedure will remove sufficient material from the circulating system to negate the need for draining the circulating system and spray bar before proceeding with the wash out operation. The flushing operation requires only three quarts of flushing solvent. This small amount is not sufficient to fill the lines to the tank, thus preventing solvent from being forced into the tank.

A common practice following completion of the flushing procedure and subsequent shutdown is to pour one to two quarts of solvent into the fill line. This softens or dissolves the residual asphalt in the pump. Allow these solvents to remain in the system until the next use.

Flushing - AUTO

- *Power* switch (control panel) **On**.
- *Tank Valve* switch (control panel) **Closed**.
- *Tank Return* Switch (control Panel) **Open**.
- Master Hand Spray valves **Off**.
- Transfer Line Suck Back valve **Closed**.
- Transfer Line valve **Closed**.
- Flush valve **Open**.
- *Suck Back* switch (control panel) **Off**. Bar Suck Back vales will be closed.
- Load line and transfer cap in place and secured.
- *Wash Down* switch (control panel) **Off**.
- Hand spray wand valve **Closed**.
- *Circ in Bar* (control panel) **Selected**.

1. Engage to pump to approximately 100 GPM
2. After 2 minutes close the flush valve and stop the pump.

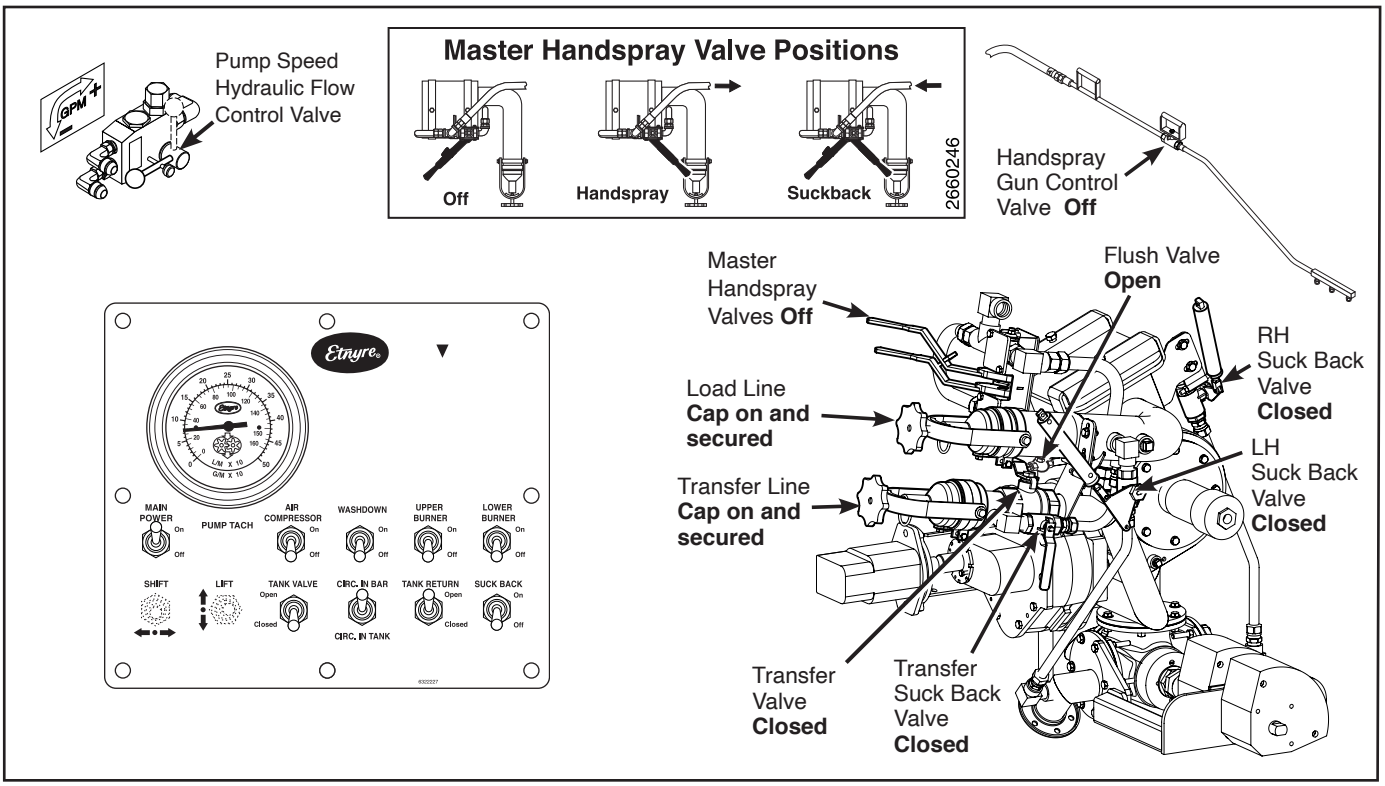


Figure 13. Valve Positions for Flushing Operations - Auto

Flushing - MANUAL

- *Power* switch (control panel) **On**.
- *Tank Valve* switch (control panel) **Closed**.
- *Tank Return* Switch (control panel) **Open**.
- Master Hand Spray valves **Off**.
- Transfer Line Suck Back valve **Closed**.
- Transfer Line valve **Closed**.
- Flush valve **Closed**.
- *Suck Back* switch (control panel) **On**. Bar Suck Back vales will be open.
- Load line and transfer cap in place and secured.
- *Wash Down* switch (control panel) **Off**.
- Hand spray wand valve **Closed**.
- *Circ in Bar* (control panel) **Selected**.

1. Engage the pump to approximately 150 GPM
2. Open the bleeder valve on the left wing. After a strong vacuum is heard, add 1 quart of solvent through the valve and then close the valve.
3. Open the bleeder valve on the right wing. After a strong vacuum is heard, add 1 quart of solvent through the valve and then close the valve.
4. Stop the pump.

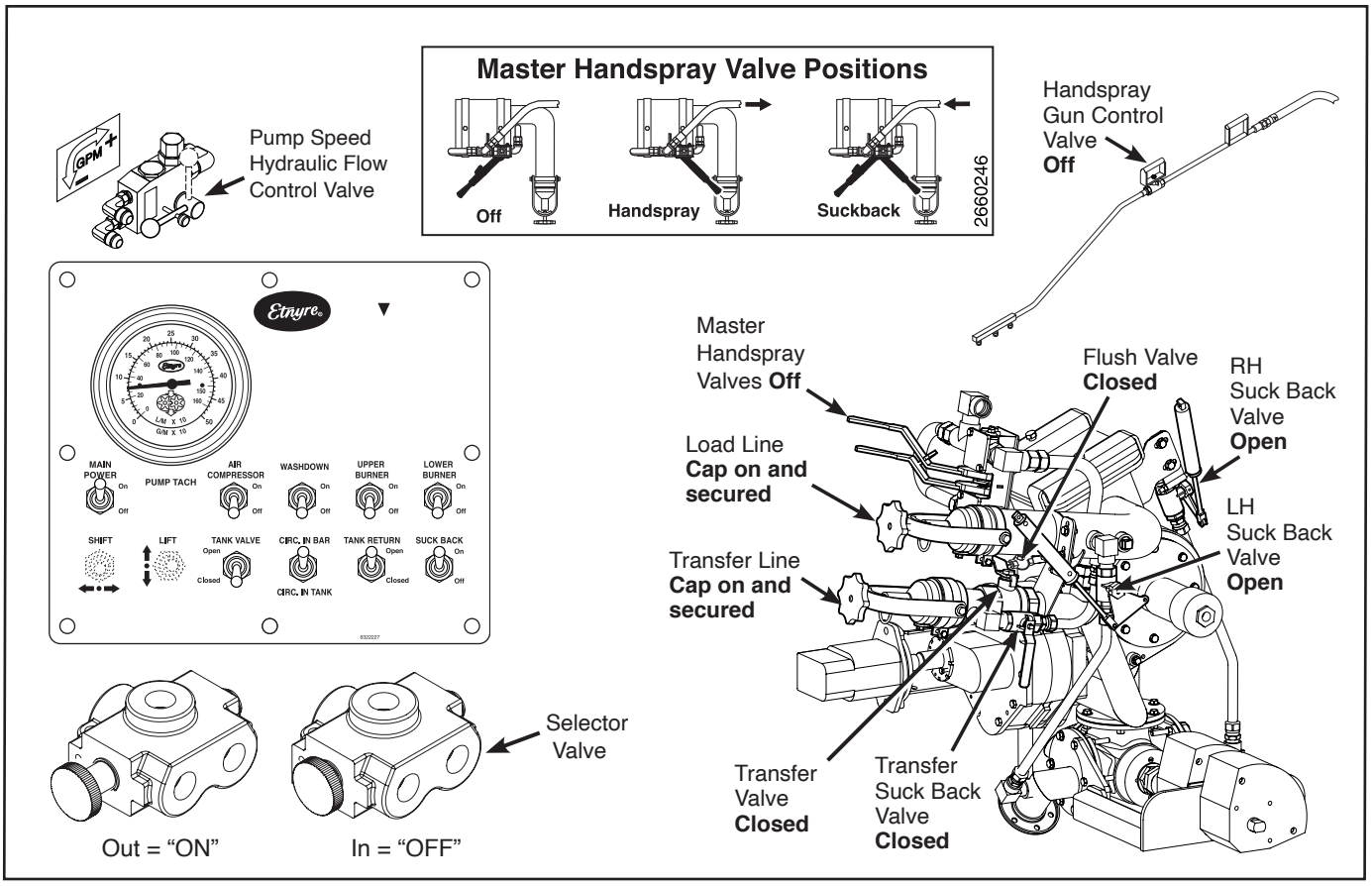


Figure 14. Valve Positions for Flushing Operations - Manual

Flushing - PUMP FLUSH

- *Power* switch (control panel) **On**.
- *Tank Valve* switch (control panel) **Closed**.
- *Tank Return* Switch (control panel) **Open**.
- Master Hand Spray valves **Off**.
- Transfer Line Suck Back valve **Closed**.
- Transfer Line valve **Closed**.
- Flush valve **Open**.
- *Suck Back* switch (control panel) **Off**. Bar Suck Back valves are Closed.
- Load line and transfer cap in place and secured.
- *Wash Down* switch (control panel) **Off**.
- Hand spray wand valve **Closed**.
- *CIRC IN TANK* (control panel) **Selected**.

1. Engage to pump to approximately 100 GPM
2. After 1 minute close the flush valve and stop the pump.

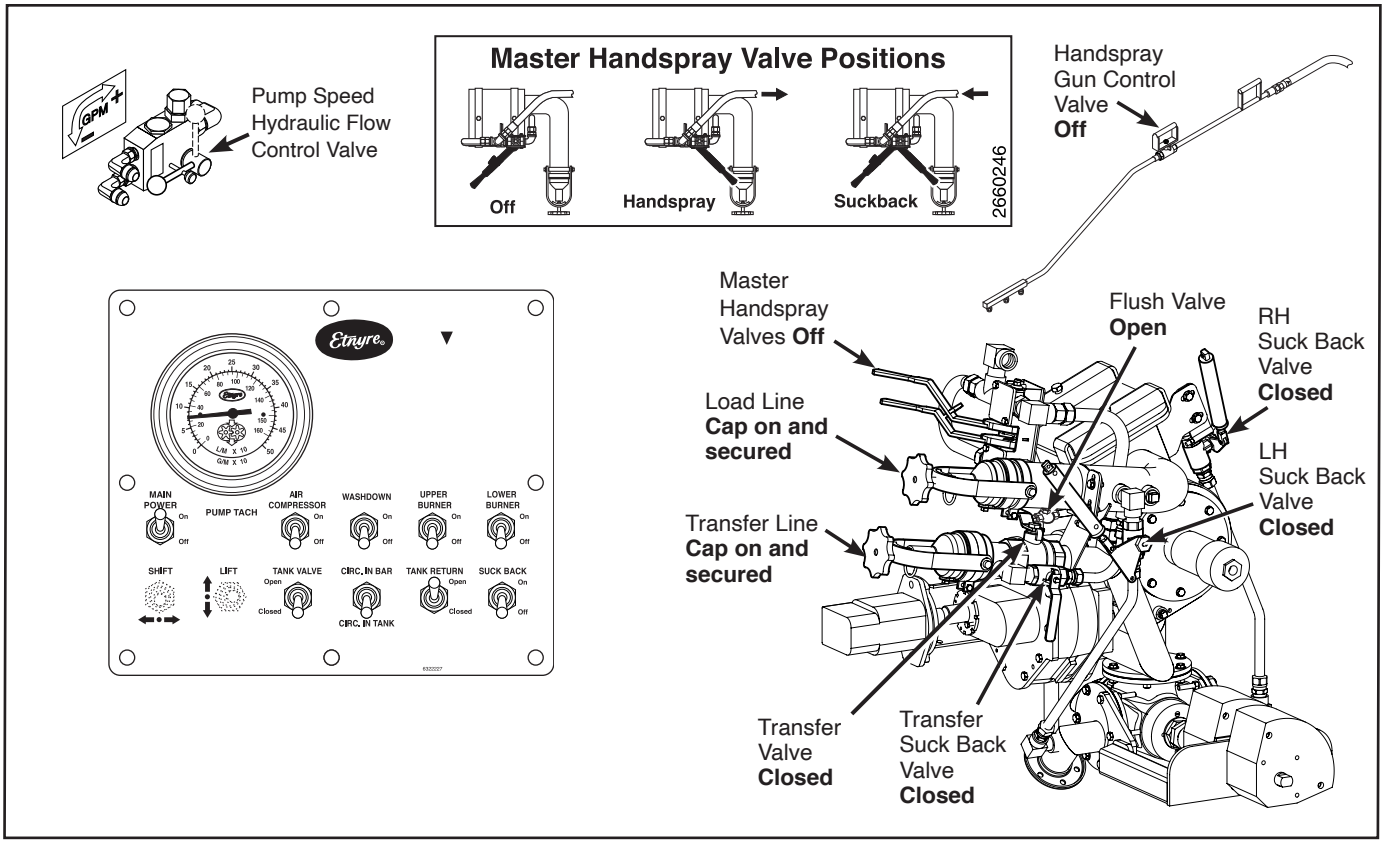


Figure 15. Valve Positions for Flushing Operations - Pump Flush

Heating Asphalt with Liquid Propane Gas (LPG) Burners

LPG Supply Tank Requirements

Use only liquid withdrawal type supply tanks for your LPG burners.

Two types of LPG supply tanks are available: tanks for liquid type burners and tanks for vapor type burners. The LPG burners on your Etnyre distributor require a supply tank for liquid type burners. Liquid type burners will operate from a vapor withdrawal tank, however the amount of heat delivered will be dramatically reduced, and the life of the burner will be shortened.

There are three different types of LPG burners: manual control burners, burners with outfire control, and burners with automatic ignition and temperature limiting control.

Manual Control Burners

There are four valves associated with operation of the manual control burners: one at the supply tank, and three in the burner piping (see Figure 16).

The two smaller valves (one at each burner) are bleeder type valves with a small hole drilled through the valve case. Propane liquid is supplied to the lower burner bleeder valve directly from the main shutoff valve. Because of the bleeder hole in this valve, it is NOT possible to shut off all of the fuel to the lower burner by shutting the upper burner shutoff valve. The upper burner shutoff valve will only shut off the upper burner. The lower burner must be shut off using the main shutoff valve.

The upper burner shutoff valve is a positive cut off valve that allows all fuel to be cut off to the upper burner.

DANGER

To avoid an extreme fire hazard or explosion: NEVER use gasoline as fuel in low pressure or generating burners.

WARNING

A fully charged dry chemical type fire extinguisher must be within easy reach whenever the burners are operating or there is an open flame near the distributor. Minimum dry chemical capacity of the fire extinguisher should be 10 pounds.

To prevent an explosion: Do not operate the burners when the vehicle is unattended, when the vehicle is in motion, or with the vehicle in a confined area.

To prevent an explosion or fire hazard: Position the unit broadside to the wind to prevent volatile fumes from drifting toward the burners

To prevent an explosion or fire hazard: Do not operate the burners if the tank is damaged or leaking.

To prevent an explosion or fire hazard: When the burners go out, shut off the fuel supply to both burners and allow the fumes to ventilate for at least 3 minutes before re-lighting the burners.

To prevent an explosion or fire hazard: Do not heat the material beyond the manufacturer's recommended temperature.

To prevent an explosion or fire hazard: Keep burning cigarettes or other sources of combustion away from manholes and overflow vents

IMPORTANT

Circulating the asphalt in the tank while heating is recommended for faster heating and reduced carbon formation on the flues. Only when the asphalt pump is "Frozen" is it acceptable to operate the burners without circulating asphalt in the tank. However, if the asphalt pump is frozen, carefully apply heat to the pump and start circulating the material as soon as possible.

WARNING

To prevent an explosion or fire hazard: Eliminate sparks from engine exhaust.

To prevent possible burns to operators or bystanders, or possible equipment damage, do not start any operation if any control settings are unknown

To prevent an explosion or fire hazard: Check the tank vent to insure that it is free from obstruction before lighting the burners.

To prevent possible hand or facial burns: Always light the inside burner first. Do not reach across a lit burner to light or re-light the inside burner. Shut the outside burner off before lighting the inside burner.

To prevent an explosion or fire hazard: Do not operate the burners with the manhole open or open the manhole while the burners are in operation.

To prevent possible burns: Always use a torch to light the burners. Never attempt to light the burners with a match or a pocket lighter.

Burner Operation

Note: It is recommended that two persons be involved in lighting the burners.

1. Be sure that the main shutoff valve and the upper burner shutoff valve are fully closed and the bleeder valves are turned fully clockwise before starting.
2. Open the dampers in the exhaust stacks.

   Circulate the asphalt in the tank before lighting the burners. If the asphalt is too cold to pump, start circulating the material in the tank as soon as possible after lighting the burner.
3. Open the main shutoff valve and light the lower burner. As soon as the burner lights, open the bleeder valve fully. No preheating is necessary.

Burners With Outfire Controls

Equipment Design

The burner and the burner control valves are identical to the manual operated burner system. However, burners with outfire controls are equipped with an outfire control box. The outfire controls consist of two thermocouples, a push button start switch, an electric fuel solenoid valve, a pressure regulator and a pressure gage. (See Figure 17.)

The heat sensing thermocouples are positioned in each burner. If either burner loses its flame, the thermocouple senses the drop in temperature, and deactivates the fuel solenoid, and the fuel to both burners is shut off.

The only operational differences between the manual burners and burners with the optional outfire controls is the start up and shut down procedures. Unlike the manual burners, when the burners are equipped with outfire controls, no fuel flows to the burners when the solenoid valve is closed.

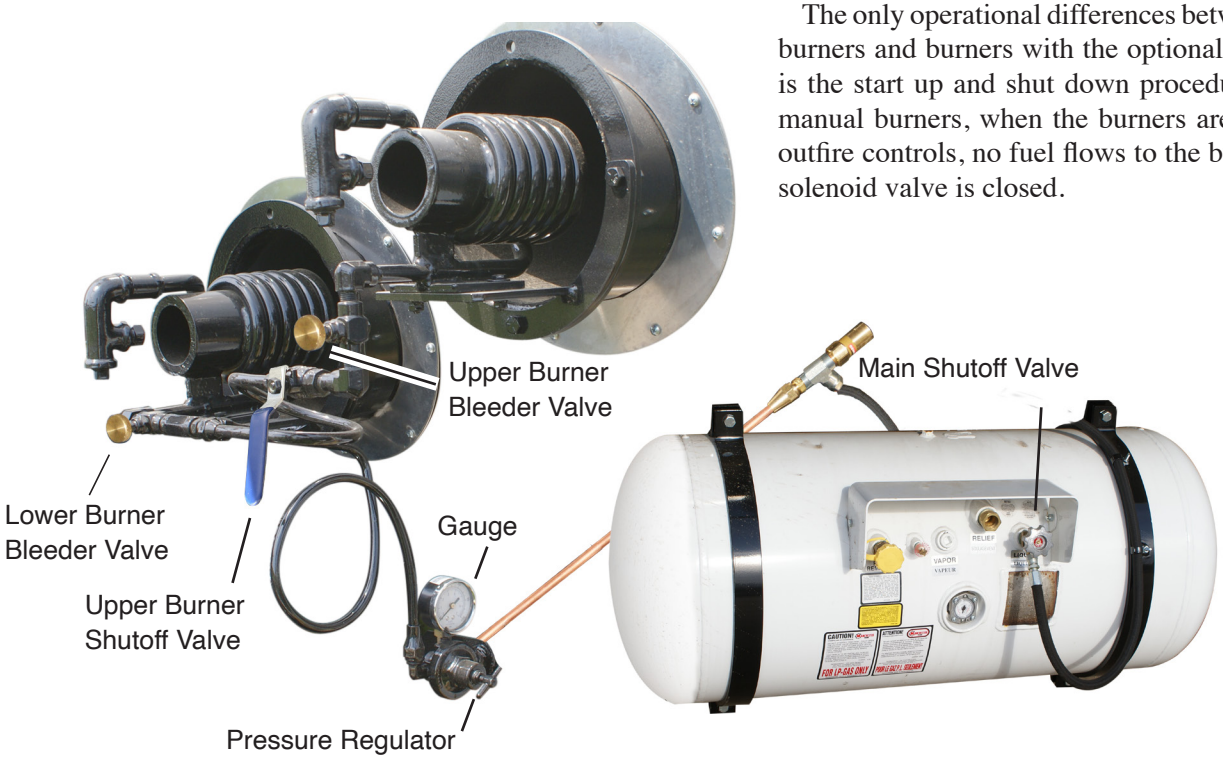


Figure 16. Manual Control Burners

WARNING

A fully charged dry chemical type fire extinguisher must be within easy reach whenever the burners are operating or there is an open flame near the distributor. Minimum dry chemical capacity of the fire extinguisher should be 10 pounds.

To prevent an explosion or fire hazard: Position the unit broadside to the wind to prevent volatile fumes from drifting toward the burners

To prevent an explosion or fire hazard: Do not operate the burners if the tank is damaged or leaking.

To prevent an explosion: Do not operate the burners when the vehicle is unattended, when the vehicle is in motion, or with the vehicle in a confined area.

To prevent an explosion or fire hazard: When the burners go out, shut off the fuel supply to both burners and allow the fumes to ventilate for at least 3 minutes before re-lighting the burners.

To prevent an explosion or fire hazard: Do not heat the material beyond the manufacturer's recommended temperature.

To prevent an explosion or fire hazard: Keep burning cigarettes or other sources of combustion away from manholes and overflow vents.

Burner Operation with Outfire Controls

1. Open the dampers in the exhaust stacks.

   Circulate the asphalt in the tank before lighting the burners. If the asphalt is too cold to pump, start circulating the material in the tank as soon as possible after lighting the burner.

2. Ensure that the upper burner shutoff valve is closed and that the bleeder valves for both burners are turned fully clockwise.

3. Open the main shutoff valve at the tank. No fuel will be flowing at this point.

4. Place the ignition torch at the inside burner nozzle and depress the pushbutton in the outfire control box. Continue to hold the pushbutton in until both burners are lit.

IMPORTANT

Both burners must be lit on low flame even if only one burner will be used for heating

5. As soon as low fire is established at the lower burner, open the upper burner shutoff valve and light the upper burner on low fire.

6. If both burners are to be used for heating, you can now open both bleeder valves fully. If only the lower burner is to be used for heating, open the bleeder valve on the lower burner and allow the upper burner to remain burning on low flame so the thermocouple will be heated. Remember, if either burner flame goes out, the outfire control will shut the solenoid valve cutting the fuel off to both burners.

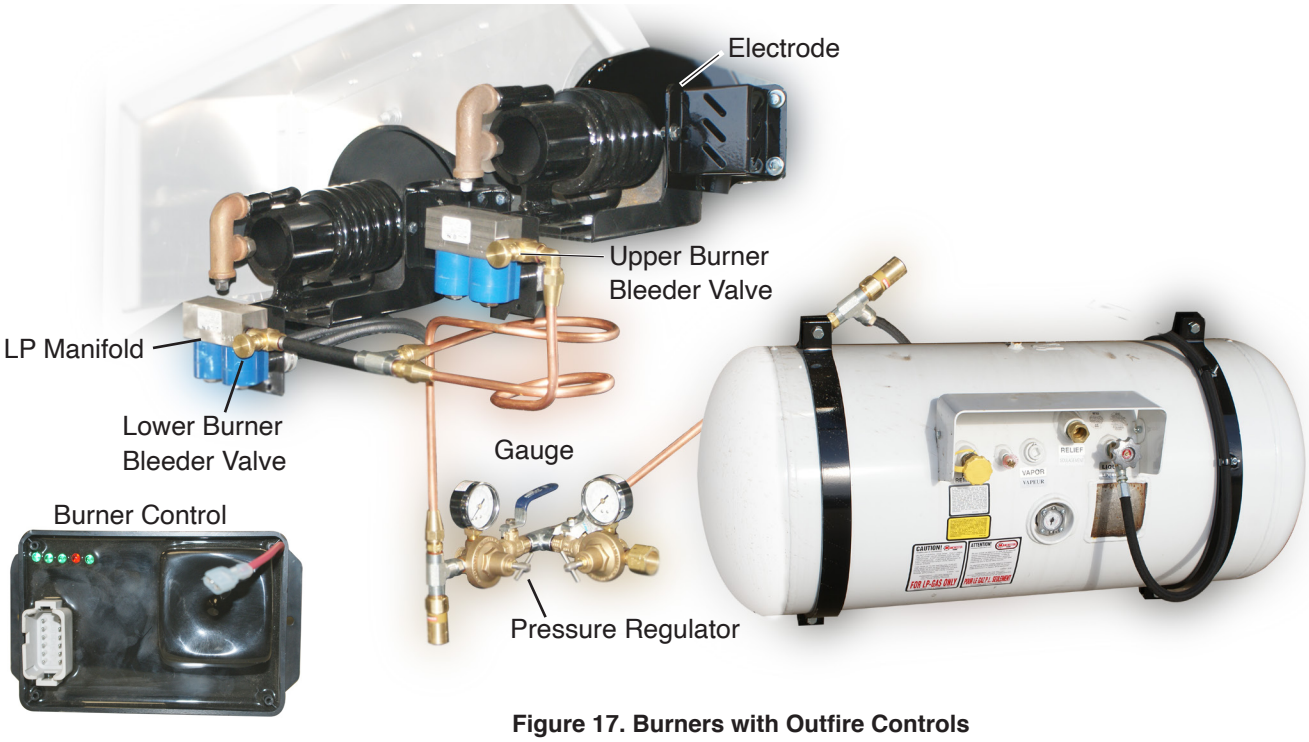


Figure 17. Burners with Outfire Controls

7. After 30 to 40 seconds, release the pushbutton and observe the pressure gage. If the pressure starts to drop rapidly, depress the pushbutton and hold it in for another 30 seconds. It may require a slight increase in fuel to the upper burner to adequately heat the thermocouple. Once both of the thermocouples are heated the pushbutton can be released.

   When the LPG burners are operating, the outside of the fuel line up to the first coil of the burner should frost over. If no frost forms it is an indication that the burners are operating on vapor instead of liquid. This condition must be corrected immediately to prevent damage to the burners.

   If after the lines frost over, the flame starts to die down and the frost melts off the fuel line, it is likely that there is moisture in the fuel supply tank. When the moisture passes through the frost covered lines it forms ice crystals that stop the fuel flow. This can be overcome by adding 1 pint of 99.85% pure Genuine Anhydrous Methanol when the fuel tank is full. See your local LPG supplier for details. Keeping the tank valve closed when the tank is empty will keep moisture from entering the tank.

8. When the desired product temperature is reached:

a. Close the main shutoff valve.

b. Depress the pushbutton in the outfire control box and hold it until all the fuel is burned and there is no flame at either burner.

c. Close both bleeder valves and the upper burner shutoff off valve.

d. Close the exhaust stack damper to prevent heat loss.

Burners with Automatic Ignition and Temperature Limiting Control

Equipment Description

The temperature limiting control box contains the temperature limiting control components as well as the automatic ignition circuitry. (See Figure 18)

The automatic ignition circuit consists of two 12V coils, two spark plugs, a pair of thermocouples, (one at each burner), and a momentary pushbutton switch. The 12V coils send high voltage to the spark plugs that causes sparks to arc intermittently at each pilot burner whenever there is fuel pressure in the line from the main supply tank. The thermocouples provide a signal that indicates when there is a flame at the pilot burners. The momentary pushbutton switch on the control box is used to fire the main burners once the pilot burners have ignited and the thermocouples have been heated sufficiently.

The temperature limiting control circuit consists of a temperature probe in the distributor tank that senses the asphalt temperature, a thermostatic switch in the control box and a temperature adjustment dial on the face of the control box. When the temperature of the asphalt in the distributor is heated to the temperature selected with the temperature adjustment dial, the thermostatic switch shuts down the burners.

Burner Operation

with Auto Ignition & Temp Control

1. Open the dampers in the exhaust stacks

   Circulate the asphalt in the tank before lighting the burners. If the asphalt is too cold to pump, start circulating the material in the tank as soon as possible after lighting the burner.

2. Open the main shutoff valve. The spark plugs will begin to arc and will ignite the pilot burners. With this type of control, the lower burner may be operated without opening the upper burner shut off valve. If both burners are to be used, the upper burner shutoff valve should be opened.

3. Set the thermostat to the desired temperature.

4. Allow the pilot burners to heat the thermocouple probes for at least 2 minutes. When the pilot burners have heated the thermocouples sufficiently the sparker will stop. Press the momentary pushbutton to fire the main burners. The bleeder valves may then be fully opened.

On new or rebuilt units, monitor the product thermometer to make certain that the burners shut down when the desired temperature is reached. (as set on the temperature adjustment dial). If the burners do not shut down at the correct temperature, refer to "Calibrating the Thermostat".

To shut the system down:

1. Close the main shutoff valve.
2. Increase the thermostat setting 50 to 75ºF higher and push the start button. This will bring on the main burners and quickly burn off all of the fuel in the line between the tank and the control box. The pilot burners may continue to burn for a short time after the main burners cut off. Do not draw material from the tank as long as there is a flame present.
3. Close the exhaust stack dampers.

Calibrating the Thermostat

If the desired temperature is reached and the burners have not shutdown, remove the thermostat dial. Using a small screwdriver, slowly turn the screw in the center of the thermostat shaft counterclockwise until the main burners shut down.

If the main burners shut down before the desired temperature is reached, remove the dial and rotate the screw clockwise half a turn and push the start button. Monitor the thermometer and make further adjustments if needed to calibrate the thermostat.

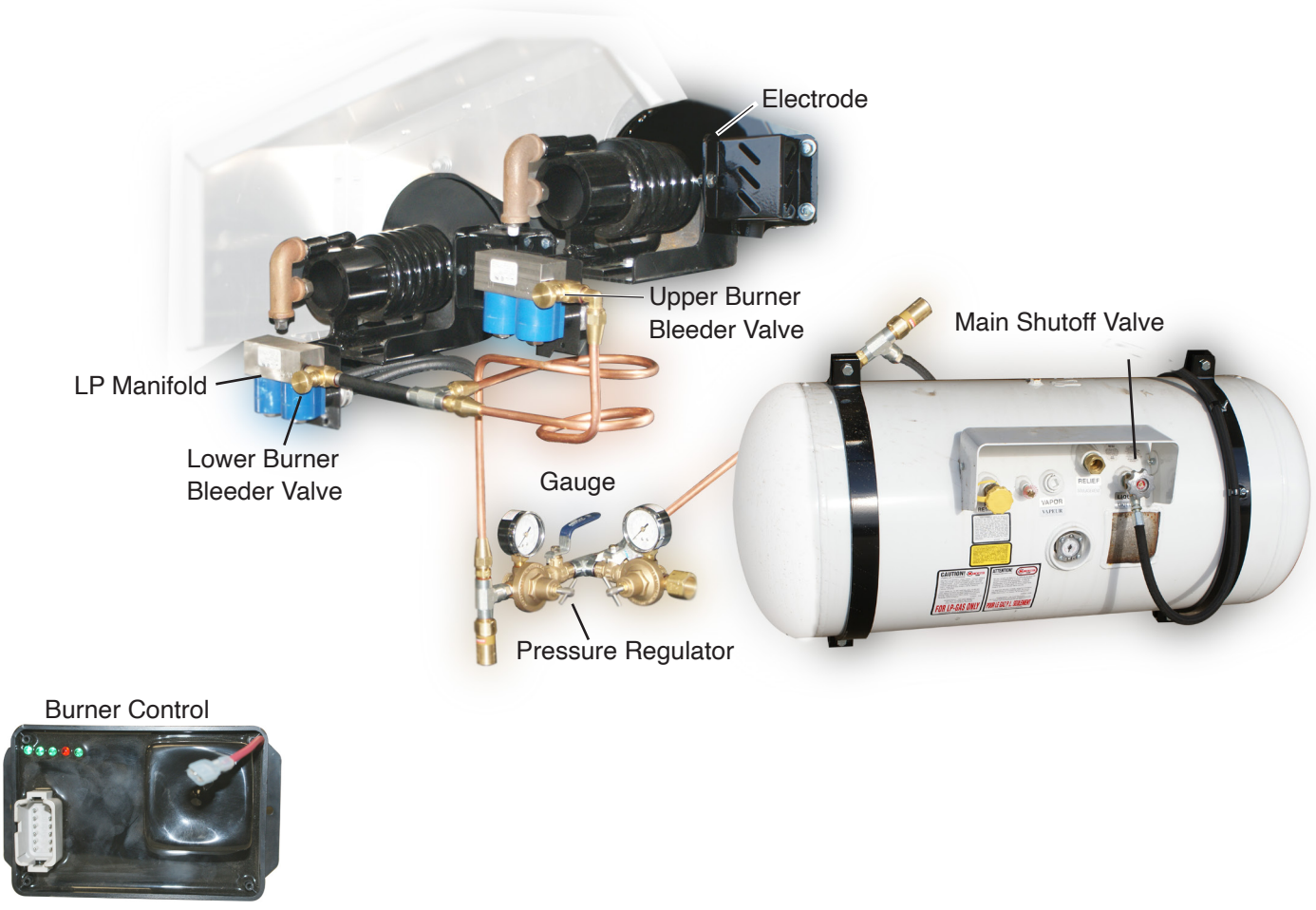


Figure 18. Burners with Automatic Ignition and Temperature Controls

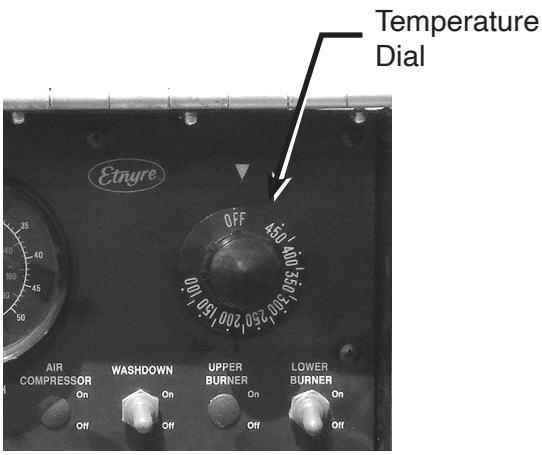
Fuel Oil Burner Operation

Ignition and Out Fire Control

(See Figure 19)

The air inlet screen on the burner needs to be kept clean and free of debris in order for efficient operation.

If the Power switch is turned off during burner operation the burner(s) will turn off and will not turn back on without cycling the burner switch(s).



Burner Control

1. Ensure that there is at least 6 inches (152mm) of material covering the flue that will be used for heating before proceeding.
2. Open the exhaust stack damper or cover.
3. Circulate material in the tank at 150 GPM (568 LPM).
4. Set the desired temperature using temperature dial then turn the burner switch on that will be used for heating.
5. Do not heat the material higher than the material supplier's recommendation.
6. To shut down, turn the burner switch off.
7. When the burner is off, close the exhaust stack damper or cover to prevent heat loss.

DANGER

To avoid an extreme fire hazard or explosion: NEVER use gasoline as fuel in low pressure or generating burners.

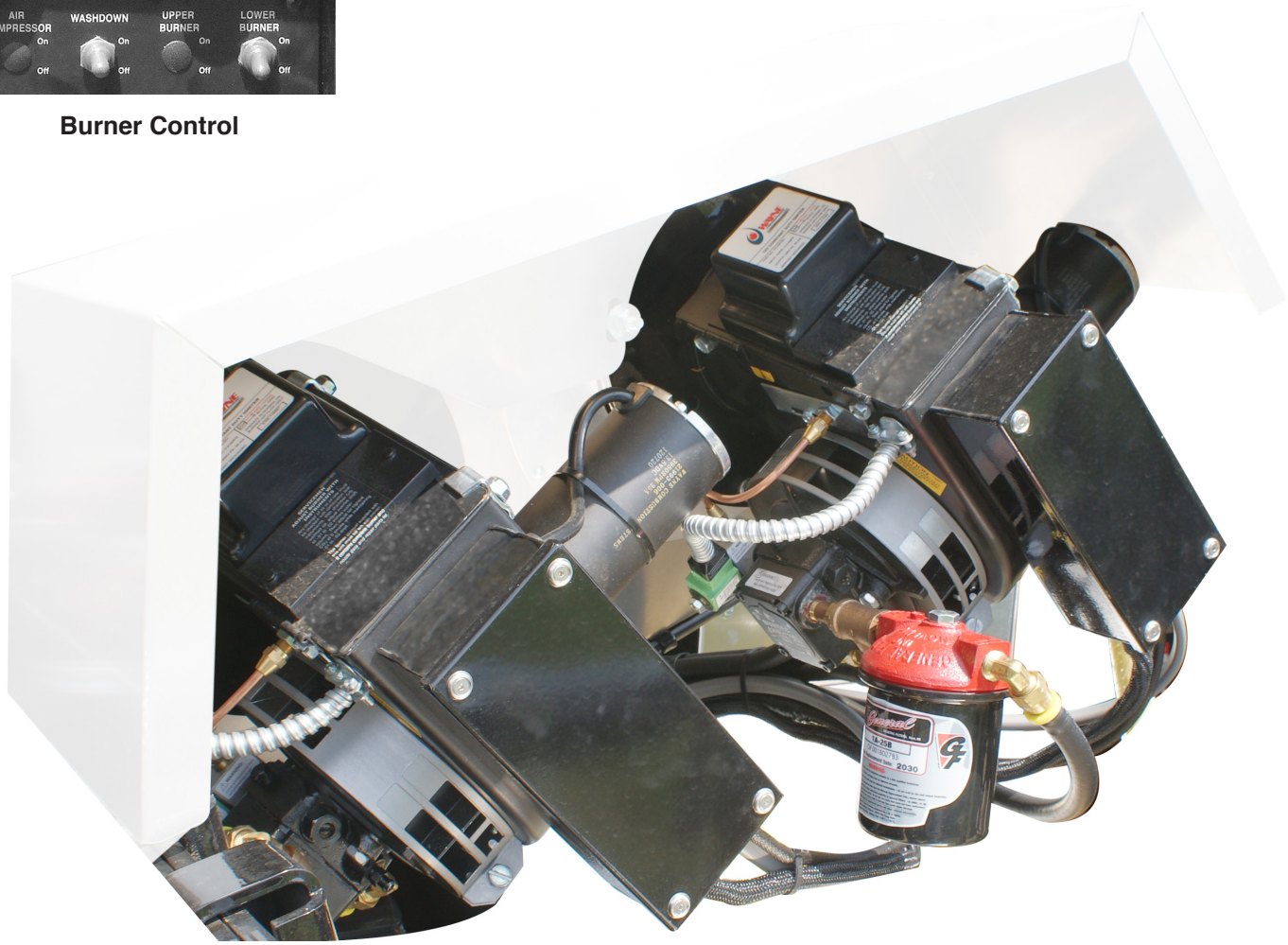
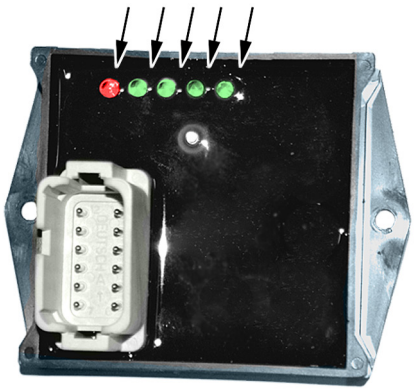


Figure 19. Fuel Oil Burner System

Fuel Oil Burner Operation

Controller LED Fault



Order of LEDs

FLAME (RED) = ON WHEN COMMAND APPLIED, NO FAULTS AND FLAME DETECTED BY CAD CELL

POWER (GREEN) = ON WHEN POWER APPLIED TO CONTROL

MOTOR (GREEN) = ON WHEN MOTOR OUTPUT ON

VALVE (GREEN) = ON WHEN VALVE OUTPUT ON

IGNITOR (GREEN) = ON WHEN IGNITOR OUTPUT ON

Fault flash patterns of Red LED

(1/2 SECOND FLASH, 2 SECOND PAUSE BETWEEN MULTIPLE FAULTS)

1 FLASH = CAD > 20K ON POWER UP

2 FLASHES = IGNITOR OUTPUT SHORTED TO 12V

3 FLASHES = VALVE OUTPUT SHORTED TO 12V

4 FLASHES = MOTOR OUTPUT SHORTED TO 12V

5 FLASHES = NO IGNITION DETECTED AFTER 15 S SECONDS THROUGH CAD CELL

6 FLASHES = VALVE OUTPUT OVER CURRENT OR SHORTED TO GND

7 FLASHES = IGNITOR OUTPUT OVER CURRENT OR SHORTED TO GND

8 FLASHES = MOTOR OUTPUT OVER CURRENT OR SHORTED TO GND

FAULTS CLEARED WITH COMMAND INPUT

NOTE

1. Read and understand the detailed instructions in the operation manual.
2. Ensure that there is at least 6 inches (152 mm) of material covering the flue that will be used for heating before proceeding.
3. Open the exhaust stack damper or cover.
4. Circulate material in the tank at 150 GPM (568 LPM).
5. Turn the burner switch on that will be used for heating.
6. Do not heat the material higher than material supplier's recommendation.
7. To shut down, turn the burner switch off
8. When the burner is off, close the exhaust stack damper or cover to prevent heat loss.

LUBRICATION CHART

Interval	Point	Identification	Lubricant	Quantity
DAILY	1	Pump Suction Strainer	Clean	
	2	Hydraulic Reservoir	HO	Fill to gage
WEEKLY	3	Manhole Cover	EO	Sparingly
WHEN SERVICED	4	Pump Shaft	AS	Sparingly

HO: Hydraulic oil with nominal ASTM viscosity Grade 46 (such as Rando Oil HD 46)

EO: Engine oil 10W MIL-L-2104-F

AS: Anti-Seize MIL-T-5544

MPG: Multi Purpose Grease MIL-G-18458B-SH

NOTE: Daily wipe cylinder rods clean and lightly oil. Check hydraulic filter and replace if vacuum gage is in the red arc.

NOTE: If the Hydraulic oil filter gage is in the red area, replace the filter canister.

TROUBLESHOOTING

Trouble	Cause	Remedy
Spray Fogs	Pump speed too fast for size oĺ nozzle	Lower pump speed or change nozzles. See “Establishing Flow Rate/Ground Speed Ratio.”
Spray Streaks Flow	Pump speed too slow.	Increase pump speed. See “Establishing Flow Rate/Ground Speed Ratio.”
	Nozzles not at proper angle.	Adjust angle of nozzles.
	Spray bar at improper height above ground.	Adjust spray bar height.
	Material temperature too low.	Heat material to correct temperature.
Spray Lacks Pressure	Pump speed too slow.	Adjust pump speed.
	One or more control valves in incorrect position, not fully opened or closed, or leaking.	Check position of all control valves. Be sure all valves are fully opened or closed. Repair leaking valves as necessary.
	Suction strainer plugged.	Clean suction strainer.
All Nozzles Do Not Cut Off Spray	Spray bar linkages not adjusted correctly.	Adjust linkage.
Pump Will Not Turn, or Turns Slowly.	Material in tank or pump below pumping temperature.	Heat material to proper pump temperature
	Air leak in suction line from reservoir to filter to inlet of charge pump.	Locate and repair leak.
	Hydraulic system pressure low.	Raise pressure
	Low oil in hydraulic reservoir.	Add hydraulic oil to correct level.
	Spray bar valves set improperly.	Correct spray bar valve settings.
	Defective Hyd. motor.	Check for excessive case drain in motor. Repair or replace defective components.
Hydraulic Oil Overheats.	Material in tank or pump below pumping temperature.	Heat material to proper pump temperature.
	Air leak in suction line from reservoir to filter to inlet of charge pump.	Locate and repair leak.

Trouble	Cause	Remedy
Hydraulic Oil Overheats.	Low oil in hydraulic reservoir. Spray bar valves set improperly.	Add hydraulic oil to correct level. Correct spray bar valve settings.
Application Rate Varies	Quantity of material in tank not being measured accurately. Suction strainer plugged. Hydrostatic controls not firmly positioned. Suck back valves not fully closed	Use Etnyre measuring stick for accurate readings. Be sure tank is level when measuring. Clean suction strainer regularly. Ensure that all controls are firmly locked in place.

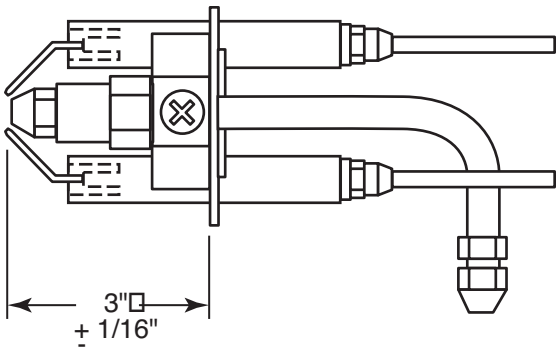
MAINTENANCE

Electrode Assembly Adjustments

1. Adjust electrode assembly per Figure 18.

NOTE: *Before installing electrode assembly, check that blower wheel turns freely and that all set screws are tightened securely.*

2. Install electrode assembly into air tube unit. Use escutcheon plate for mounting (see Figure 21).



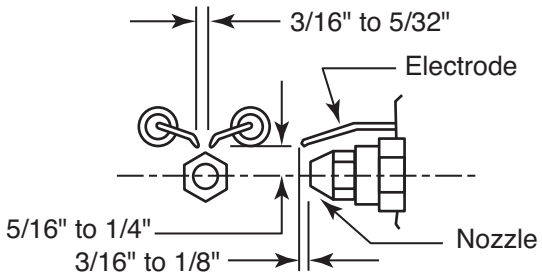


Figure 20. Burner Electrode Adjustments

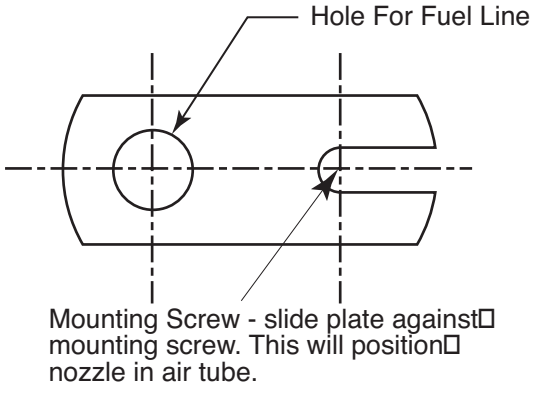


Figure 21. Electrode Assembly Installation

Gun Assembly

NOTE: Before installing gun assembly, check that blower wheel turns freely and that all set screws are tightened securely.

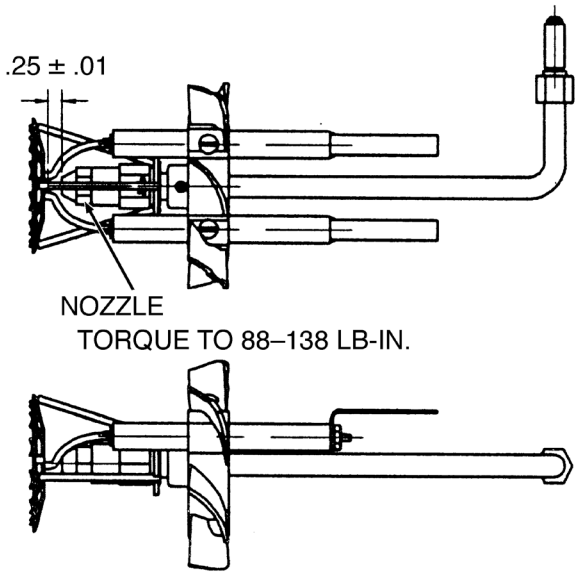


Figure 22 Gun Assembly

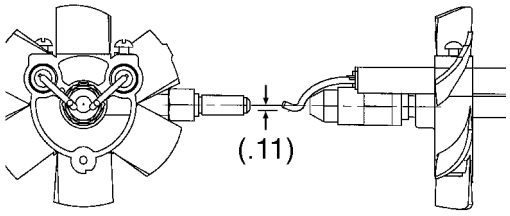


Figure 23. Right Hand / Left Hand Electrodes

Electrode Settings

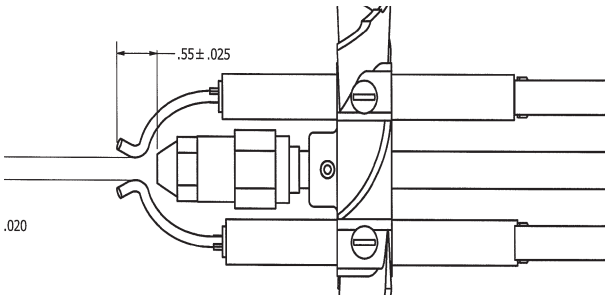


Figure 24. Electrode Setting

WARNING

To prevent an explosion or fire hazard: Keep area free of sparks or open flames when testing burners.

Check Ignition Transformer Spark

1. Turn on master power switch in rear control box.
2. Turn on Burner Power switch.
3. Hold an insulated screwdriver approximately 1 to 1-1/2 inches above the two wire springs on the transformer and hold the ignition switch down. It should be possible to jump a spark across the 1 to 1-1/2 inch gap between the springs and the screwdriver. If unable to generate a spark, check the voltage at terminal spades of the 12 volt ignition control box. Voltage must be 110 volts AC minimum. If voltage is incorrect or not present, check ground wiring.
4. Reposition ignition transformer and secure to burner housing.

Fire Burners

1. Ensure that fuel oil pressure is 150 PSIG.
2. Turn the burner switch on.
3. Run burner for 15 seconds maximum, then shut down.

WARNING

To prevent an explosion or fire hazard: Flues must be covered by minimum 6 inches of material when burners are in operation. When testing burners, do not run burners for more than 15 seconds if tank is empty.

Adjusting Spray Bar Nozzle Angle

Adjust nozzles to obtain an angle of approximately 30° with bar centerline (see Figure 25). Every nozzle should be at the same angle.

NOTE: *A nozzle adjustment wrench is supplied in the tool box of each new unit.*

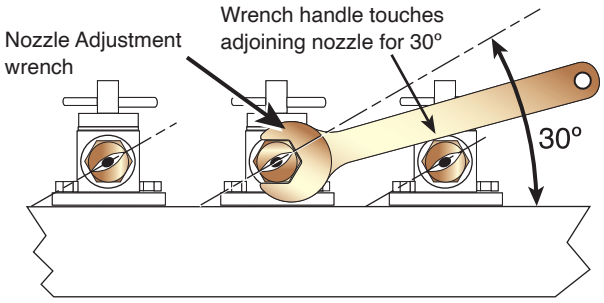


Figure 25 Nozzle Angle Adjustment

Replacing Speed Pickup

1. Loosen locknut and remove old speed pickup.
2. Turn in the new speed pickup clockwise by hand until the bottom end gently touches the internal speed ring.
3. Back it out counter clockwise 1/2 to 3/4 turn.
4. Using a 1/2 inch wrench to hold the speed pickup, torque the locknut to 10 lb-ft (13 Nm) with an 11/16 inch wrench.

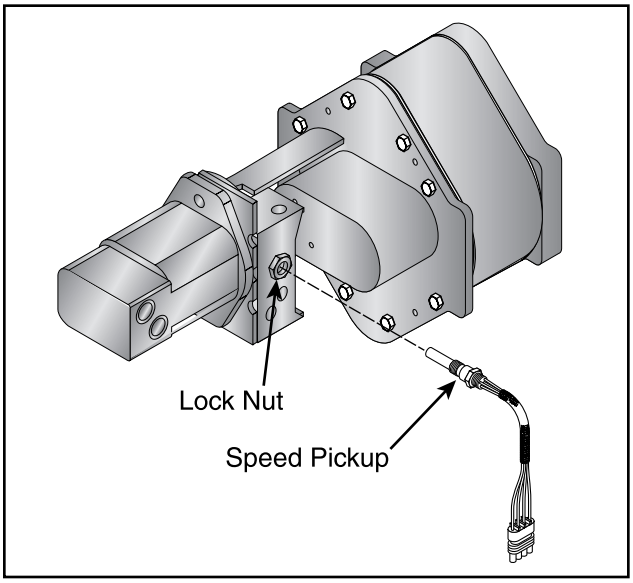


Figure 26. Hydraulic Motor Speed Pickup

Servicing the Etnyre P-15 Pump

Vacuum Check

1. Flush pump with 3 quarts of diesel fuel through fill line.
2. Set controls for loading operation.
3. Install vacuum gauge in fill line cap.
4. Operate pump at 140 GPM on pump tachometer. A vacuum reading of less than 5 inches Hg. (inches of mercury) after 2 minutes of operation indicates a vacuum leak or a worn pump.

Pump Disassembly And Inspection

1. Remove 20 capscrews from perimeter of pump end plate (see Figure 27).
2. Install two capscrews in the threaded holed near the outer edge of the end plate at approximately the 5 o'clock and 11 o'clock positions. Tighten the capscrews evenly to force the endplate away from the pump body.
3. Remove the endplate, impeller shafts and impellers (gears) as an assembly.
4. Clean the interior of the pump case. Slide your fingers across the interior surfaces of the case. If a narrow raised area can be felt midway between the front and the rear of the case, the entire pump should be replaced.
5. If there is no raised area, measure the bore of the case at its widest point horizontally (side-to-side). This measurement must not exceed 9.910 inches.
6. Next, measure the case bore vertically at a point 2.8 inches from each side. The vertical measurement must not exceed 5.660 inches. If any bore measurements exceed these limits, the entire pump must be replaced.
7. If inspection indicates the pump case is acceptable, measure the outside diameter of the impeller gears. Measure the impeller gears from tooth point to tooth point on teeth directly opposite each other. The minimum outside diameter of the gears should be 5.635 inches. The minimum length of the gears should be 3.628 inches.
8. If any impeller gear is undersize, the entire four-gear set must be replaced.
9. End plate gasket thickness should be 0.014 to 0.016 inches.
10. Divider plate thickness should be 0.127 to 0.128 inches.

Impeller Installation And Pump Assembly

Each impeller gear set uses a series of dots on the gear faces to indicate position of the gears within the pump. Refer to Figure 27 for proper positioning of the gears. The dots must face away from the divider plate (towards the ends of the pump). Install the impellers in numerical order.

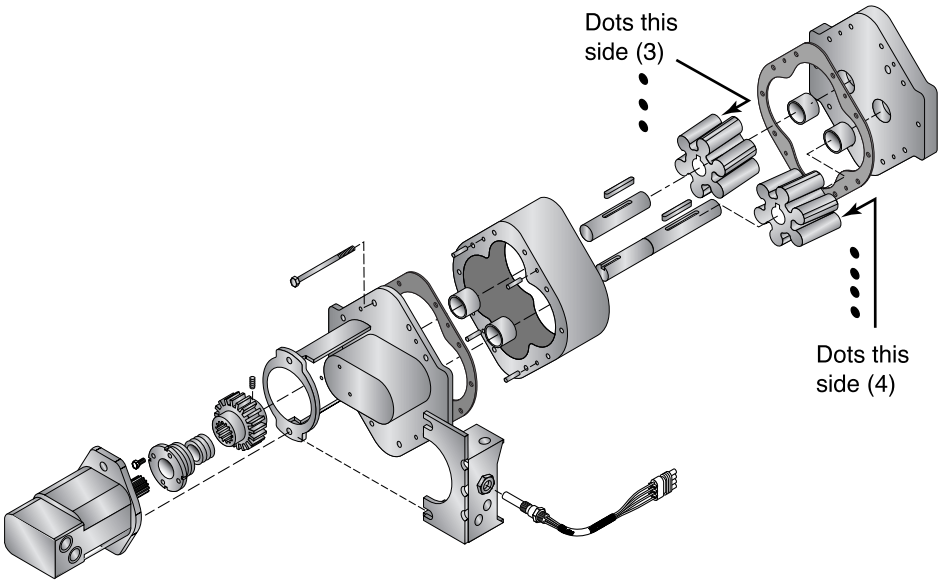


Figure 27. Etnyre Asphalt Pump

General Fuel Data and Heating Terminology

Fuel Data

Fuel	Weight Per Gallon	BTU Content
#2 Fuel Oil	7.49 lbs	144,300 per gallon
Propane	4.20 lbs.	91,500 per gallon

Approximate Burner Fuel Consumption

Fuel Oil

429,000 BTU

2.97 GPH per burner

(144,300 BTU per gallon)

Propane

1,130,000 BTU @ 40 PSI

12.34 GPH per burner

(91,500 BTU per gallon)

Heating Terminology

Flash Point (Open Cup)

The temperature at which a flammable liquid in an open container emits vapor that will flash when exposed to a direct flame. This temperature is lower than required for the liquid mass to ignite.

Closed Flash Point

The temperature at which a flammable liquid in a closed container emits a vapor that will flash when exposed to a direct flame. This temperature is lower than required for the liquid mass to ignite. The closed flash point is generally 30º F lower than the open cup flash point.

Fire Point

The temperature at which a flammable liquid emits a vapor at a rate that will continue to burn after it has flashed.

Ignition Temperature (Kindling Temperature)

The lowest temperature at which a combustible material will continue to burn once ignited.

Convection

Heat transfer by a flow of a liquid or gas over a solid material. Example: Flues in asphalt tank are heated from hot gases passing through them, or, heat transfer coils in tank are heated from steam or hot oil passing through them.

Conduction

Heat transfer through a solid mass by direct molecular contact. Example: Heat applied only to one end of a metal rod will be transferred throughout the entire body by molecular transfer.

Hydraulic Fluid Requirements

General Information

The ability of a hydrostatic transmission to maintain desired performance for the expected life depends on the quality of fluid being circulated in the units. Fluid quality can be measured in three generalcategories: lubricity, contaminants, and temperature. Obtaining satisfactory values in these three areas depends on the fluid and the circuit in which it is used.

Etnyre field service experience indicates that most transmission failures result from a breakdown of fluid quality. Primary causes are solid particle contamination and overheating. Water or oil in the fluids are also significant contributors. These problems are usually the result of poor maintenance. Sometimes fluid selection can lessen the impact of unusual environmental factors.

Hydraulic Fluid Requirements

The catalog ratings and performance data are based on operating with good quality petroleum based fluids. Premium hydraulic fluids containing high quality rust, oxidation and foam inhibitors are required. These include premium turbine oils, API CD engine oils per SAE J183, M2C33F or G automatic transmission fluid (Type F), power shift transmission fluids meeting Allison© C-3 or Caterpillar© TO-2, and certain specialty agricultural tractor fluids.

Although fluids containing anti-wear additives are not necessary for satisfactory performance, when used, the fluids must possess good thermal and hydrolytic stability to prevent wear, erosion and corrosion of the internal components.

Where water contamination is likely due to condensation, operation in a damp environment or frequent splashing, a fluid with outstanding hydrolytic stability is recommended. Consult the Etnyre Service Department for recommendations for these fluids. Avoiding the use of Dexron© II transmission fluids which *do not* meet Allison C-3 specification is recommended.

Viscosity & Temperature Requirements

The fluid must have sufficient viscosity to maintain an oil film at the bearing surfaces. This depends on fluid selection and on operating temperature. Recommended viscosity for best life and efficiency, and minimum for intermittent and continuous operation is listed below.

Fluid Viscosity Limits For Petroleum Based Fluids	
Maximum Continuous SUS (cSt)	500 (110)
Optimum Viscosity SUS (cSt)	70 (13)
Minimum Continuous SUS (cSt)	55 (9.0)
Minimum Intermittent SUS (cSt)	47 (6.4)

Viscosity index improved (multi-viscosity) fluids may noticeably shear down in service when used in hydrostatic transmissions. This will lower the operating viscosity below the originally specified value. The lowest expected viscosity must be used when selecting fluids. Consult your fluid supplier for details on viscosity sheardown.

Fluid temperature affects the viscosity of the fluid and resulting lubricity and film thickness. High temperatures can also limit seal life, as most nonmetallic seals are adversely affected by use at elevated temperatures. Also, fluids may break down or oxidize at high temperatures, reducing their lubricity and the resulting life of the unit. Cavitation is more likely at high temperature. Recommended limits for operating temperatures are tabulated below.

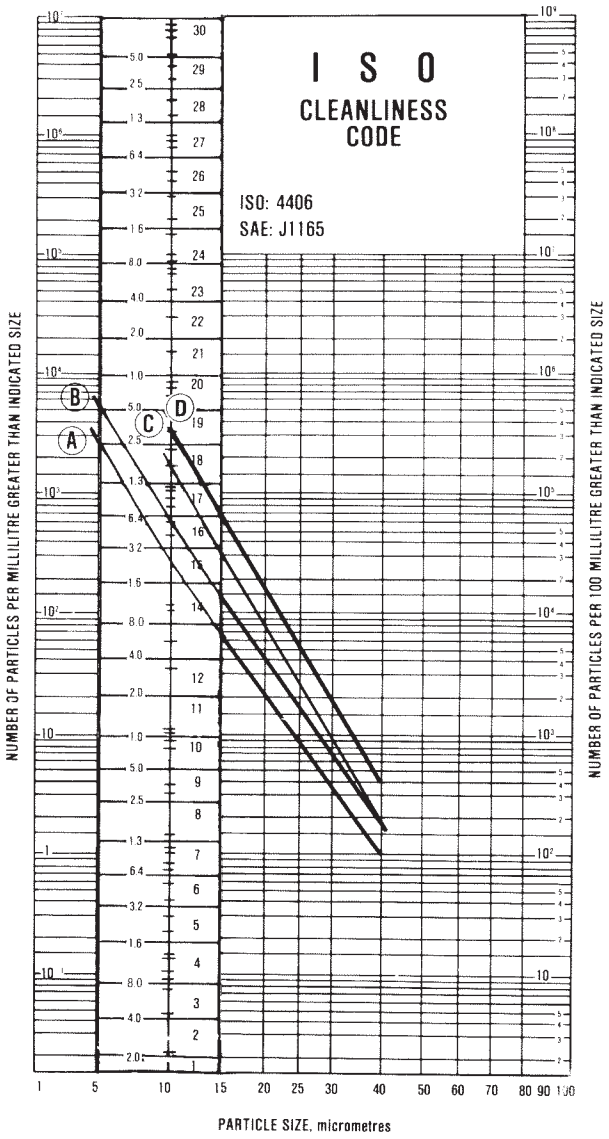
Fluid Temperature Limits For Petroleum Based Fluids	
Continuous Limit	180°F
Intermittent Limit	220°F

These temperature limits apply at the hottest point in the transmission, which is normally the motor case drain.

Heat problems sometimes occur because of problems with one of the circuit components. A partially stuck relief valve will heat up the oil rapidly. Circuit components that have developed high internal leakage rates will contribute to heat generation.

Contamination Levels

Clean fluid implies the absence of impurities such as solid particles, water and air. Contamination control includes proper design, installation, and maintenance of hydraulic components.



Curve A	Curve C
Desired limit for longer life (3500 PSI continuous system pressure)	Limit at machine ship and new fluid added to transmission
Curve B	**Curve D**
Continuous operating limit (2000 PSI continuous pressure) system	Limit at machine start up

Figure 28. Fluid Cleanliness Chart

The reservoir is designed to limit entry of contamination during servicing and operation. A sealed reservoir with a low pressure relief valve reduces the introduction of contaminants while maintaining inlet and case drain pressures below the maximum recommended.

The purpose of the filter in a system is to clean the oil at initial start up and to maintain acceptable levels of particle contaminants as they are ingested or generated during operation of the system. Filtration is a matter of controlling the particle sizes and their respective quantities to appropriate levels so as to avoid degradation of the system components and thereby assure the desired life.

Fluid contaminant profile requirements for Etnyre hydraulic units have been determined empirically based on measuring fluid quality in successful application, and in laboratory tests designed to evaluate hydraulic unit contaminant sensitivity. General contaminant levels have been developed based on this experience and are shown in Figure 28.

Acceptable contamination levels at machine start up for the system loop should be equal to or better than Curve D. The machine may be exercised to 500 psi but should not be worked (pressure over 500 psi) until the oil cleanliness meets or exceeds Curve C.

The machine should clean up during a relatively short period of normal operation to meet the oil cleanliness level of Curve A or Curve B. A system that meets Curve A will provide the user with a longer trouble-free operating life than one that meets Curve B. The Curve A cleanliness level should be met in systems exceeding the continuous pressure limit for 1000 hours/years machine use.

Some control valves may require better contamination limits than specified in Figure 28. Controls with small area screens or low force level values may be susceptible to malfunction from contamination.

The contamination sensitivity of components generally increases with higher pressure, temperature or speed. A better fluid contaminant profile may be required for systems which operate near the extremes of their ratings. Short life or infrequent operation requirements may increase allowable contaminants.

The selection of a filter depends on a number of factors including the contaminant ingression rate, the generation of contaminants in the system, the required fluid cleanliness, and the desired maintenance interval. Filters are selected to meet the above requirements using rating parameters of efficiency and capacity.

Filter efficiency may be measured with a Beta ratio. For simple closed circuit transmissions with controlled reservoir ingression, a filter with a Beta ratio of 1.5 to 2 has been found to be satisfactory. For some open circuit systems, and closed systems with cylinders being supplied from the same reservoir, a considerably higher filter efficiency is recommended. This applies to systems with gears or clutches using a common reservoir. For these systems, Beta ratios of 10 or 20 are typically required.

The filter capacity required depends on the amount of contaminants ingressed and retained in the filter and the desired maintenance interval. As a rough guide, a capacity in grams equal to twice the charge flow in GPM has been found to be satisfactory for our systems.

Since each system is unique, the filtration requirements for that system will be unique and must be determined by test in each case. It is essential that monitoring be the final criteria for judging the adequacy of the filtration system.

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If you find inaccurate or confusing information in this manual, or just have a suggestion for improvement, please let us know.

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