Diversified Fabricators, Inc.

Owner / Operator Manual

Vacuum Truck

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Griffin, Georgia 30224

1-800-526-6480

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DIVERSIFIED FABRICATORS, INC.

Dear Customer,

Thank you for purchasing a D.F.I. product. With proper operation and maintenance, it will provide you with years of service.

In order to make the best use of your investment; be certain to familiarize yourself with the contents of the entire user manual before attempting to operate your unit.

Included in this manual are details on the operation and maintenance of your water tanker. We custom manufacture quality water tankers, lubrication service trucks, hydraseeders, liquid fertilizer applicators, dry fertilizer spreaders and a variety of equipment. Our Griffin, Georgia plant continues to grow as we are constantly adding inventory and improving equipment to meet our customer's needs.

If you have any questions, please feel free to call one of our representatives at 1-800-526-6480.

Thank you,

Diversified Fabricators, Inc.

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OPERATING GUIDELINES FOR VACUUM TANK TRUCKS

General Guidelines

Inspect the tank and pump assembly prior to starting work. Particular attention should be paid to the integrity of the hatch cover, hose connections, float systems, and pump drive assembly.

Be certain the vacuum tank is compatible with the material being vacuumed and be certain the operator is trained in the proper use of your vacuum unit, including the specific pump being used.

TO ENGAGE THE VACUUM PUMP – Put the transmission in neutral. Start the engine and allow it to warm up and hold at idle. Engage the PTO and adjust the throttle to achieve RPM that is appropriate for the vacuum pump.

For a JUROP PN 84D, the pump rotor speed should be maximum 1300 RPM. Check the oil level to insure lubrication to the pump.

To disengage the vacuum pump, slow the engine speed to idle, disengage the PTO, and shut down the engine.

Be sure to check the pump oil reservoir daily using the dipstick on the pump. The oil level should be topped off before starting the pump. Do not allow the oil level to fall below the recommended level.

LOADING – Connect the vacuum hose to the inlet valve of the tank, placing or coupling the opposite end to the material to be loaded. Bleed off any residual pressure that may be in the tank. Set the valve to the vacuum position and engage the vacuum pump. Open the inlet valve, the float mechanism in the high dome will shut off the flow of air to the pump and loading will cease. Close the inlet valve, bleed the remaining vacuum from the tank, drain and disconnect the hose assembly and disengage the vacuum pump drive.

UNLOADING – connect the discharge hose to the outlet valve and position the hose to the dump site. Gravity discharge by opening the bleeder valve to continually equalize the pressure within the tank. Open the discharge valve and allow material to unload. If pressure is required to unload very viscous material or to unload against head pressure within the vessel, turn the valve to the pressure position, close bleeder valve, open discharge valve and engage the vacuum pressure pump.

The discharge hose may tend to whip under pressure unloading conditions, so be sure it is secure at the discharge end. Also, be sure to be aware of the pressure limitation of all parts of your system, including the hoses and the hose clamps, and the vessel you may be unloading into.

FOAMING MATERIAL – When loading material that foams easily, load through the discharge valve to avoid the agitation that occurs when loading through the riser assembly. Partially open the bleeder valve to help limit the vacuum level in the tank. This also helps to hold the foam away from the primary shut-off valve.

PUMP EXHAUST FUMES – The exhaust from the vacuum pump will contain the vapors of the material is being loaded. It is important to be sure any hazardous vapor is vented to a safe location.

PROBLEMS

The most common cause of pump failure and small spills is pullover. Pullover occurs when the product from the tank is carried through the air system into the pump. Some of the causes of pullover are:

1. Primary or secondary float system is damaged or stuck.
2. The product is foaming.
3. Piping in the shut-off system is too small.
4. Product is sloshing in the tank.
5. Product is surging while the truck is in motion.
6. Product has a very high rate of vaporization.
7. Pump is left engaged after tank is full.

Damage to the shut-off system is the most common reason for pullover. The PRIMARY and SECONDARY SHUT-OFFS are designed to prevent the tank from being overfilled. Float balls and shut-off seats and gaskets should be checked on a regular basis.

FOAMING PRODUCT presents a different problem. Many products have a tendency to foam when agitated. Under vacuum conditions, these products foam much more readily than usual. As the pressure on the surface of the fluid becomes less and less, the fluid gives up its trapped air, which expands and tries to fill the evacuated tank. The foam, Which won't lift a shut-off ball, is carried with the air flow through the vacuum pump, where it is compressed back into a liquid. This can cause damage to the vacuum pump and result in a spill of product from the discharge of the pump.

Several ways to minimize foaming are: Use the least amount of vacuum required to load the product. If 10" Hg. Will do the job, don't use more. Load through the largest valve on the tank. Also, use the largest hose possible. Larger hoses and

tank openings allow a smoother flow of product. Finally, load as slowly as practical. Opening the bleed valve slightly will help limit loading speed, and air entering the tank will help keep the foam away from the float shut-off piping. The use of an internal scrubber in the air system can help knock down small quantities of foam, but can be the source of other problems if not properly maintained.

PRODUCT SLOSHING – Usually occurs when large quantities of air are taken with the product. Load through the largest hose and tank opening possible to avoid undue agitation.

SURGE WHILE ON THE ROAD – The only remedy is to have a valve installed between the tank and the pump, and keep it closed while the unit is moving. The preferred location would be between the tank and the secondary shut-off. In many cases, a valve is already required at this point. Check publication CFR 49, Department of Transportation, to determine the requirements for individual pieces of equipment.

VAPORIZATION – Volatile products often have a very high rate of vaporization, especially under vacuum conditions. As with foaming, load as slowly as possible and crack the bleeder valve to minimize the effect.

Finally, if the unit is full, shut off the pump. Any small leaks in the air system, especially if your tank has an internal scrubber, will allow product to move through the system and enter the pump.

THINGS TO REMEMER

When switching between vacuum and pressure, be sure to use your bleeder valve to equalize the pressure or vacuum in the tank before moving any valves. This avoids any great surge shocks to the vacuum pump and helps control what might be happening at the end of your hose.

When working with flammables, always use a static discharge cable between the truck and the storage tank. Do this whether you are loading or unloading. The flow of material through the hose can build enough static electricity to throw a very large spark when the hose is disconnected. This can be very dangerous in an area where a vapor cloud has formed.

Another point to remember when working with flammables, corrosives, or poisons: Be aware that the exhaust from the vacuum pump and the exhaust from the bleeder valve will contain large quantities of vapor from the product in the tank. Vapor from the pump or tank can cause an explosion, overcome the operator, or cause the tank engine to accelerate. When in doubt, pipe the exhaust from the pump and bleeder to a safe location.

SOME DO'S and DON'TS

DO ENGAGE YOUR PUMP CAREFULLY. Don't engage vacuum pumps with the engine at full speed and then "pop the clutch". This is very hard on the vanes in a rotary pump, and very hard on bearings and seals in piston pumps. EASY DOES IT!

DON'T EXCEED PRESSURE RATINGS ON PUMPS OR TANKS. Excessive pressure is not only hard on equipment but can be very dangerous. When off loading into a holding tank, don't forget to consider the pressure ratings of the hoses and fittings, including the hose bands and clamps.

NEVER REACH UNDER, OR CRAWL UNDER, ANY TRUCK WHILE THE PUMP IS ENGAGED. Every year, fingers and hands are lost when operators try to check pumps, PTO's, and belts while the pump is running. IF YOU MUST WORK ON OR NEAR PUMPS, DRIVELINES, OR ANY OTHER MOVING PARTS, SHUT THE ENGINE OFF.

DO CHECK YOUR OIL LEVEL ON A DAILY BASIS. Vacuum pumps, like most mechanical devices, require lubrication. Piston pumps are lubricated much like that of an automobile engine. The crankcase should always have the proper amount and type of oil. Rotary vane pumps are usually of a "one time through" design. Again, the oil reservoir should always have the proper amount and type of oil.

DO FOLLOW PUMP RUNNING INSTRUCTIONS. Higher than recommend pump speeds result in excessive heat and can lead to early failure. In most cases, speeds above recommended RPS's do not give corresponding increase in air flow. FASTER IS NOT ALWAYS BETTER.

DO KEEP YOUR EQUIPMENT CLEAN. Pumps and engines tend to run much hotter than usual when covered with oil and dirt. Cooling fans lose much of their efficiency when clogged. There is also a good chance of getting dirt into the oiling system when adding oil. HEAT AND DIRT ARE YOUR PUMPS' WORST ENEMIES.

DO CHECK YOUR EQUIPMENT DAILY. As pumps and engines run, and as they go bouncing down the road, things have a tendency to vibrate themselves loose. This causes a number of problems. Parts have been known to fall off running pumps and engines, creating an unsafe condition for the operator and other bystanders. Loose pump couplings can cause the pump and engine or PTO to bind or vibrate. This can destroy a very expensive piece of equipment in a very short time. On pumps with suction filters, check the filter screens at least once a day. Clean when needed and replace torn screens promptly.

DO PAY ATTENTION TO WHAT YOUR EQUIPMENT IS TELLING YOU. Most problems with pumps and engines happen over a period of time. An engine that bogs down could have dirty filters, or the pump could be contaminated with product. Other sure signs of trouble are slipping belts, chattering from vane pumps, or bearing knock from piston pumps.

Finally, DO REMEMBER – The proper operation of your equipment is what feeds your family and pays your bills! When in doubt, always ask. Dumb questions are the ones you should have asked but didn't.

ANATOMY OF A VACUUM SYSTEM

Vacuum has become universally accepted as the best and most efficient method form pumping liquid wasted.

The advantage of vacuum is that the waste products never come in contact with the pump. Materials that would normally ruin a product pump are easily handled by a vacuum system, because the only medium in contact with the vacuum pump is air.

COMPONENTS IN A VACUUM SYSTEM

A. TANK – The tank must be a pressure vessel capable of withstanding vacuum. It is normally make of 1/4" steel and has dished ends.

B. PRIMARY SHUTOFF – when the tank is nearing capacity, the liquid raises a float ball which contacts a ball seat and shuts off the airflow to the pump.

C. SECONDARY SHUTOFF (Scrubber) – The secondary shutoff has a float-type shutoff similar to the primary shutoff and stops airflow to the pump if the primary shutoff malfunctions. A properly designed secondary will also scrub the air as it passes through, removing water vapor and droplets.

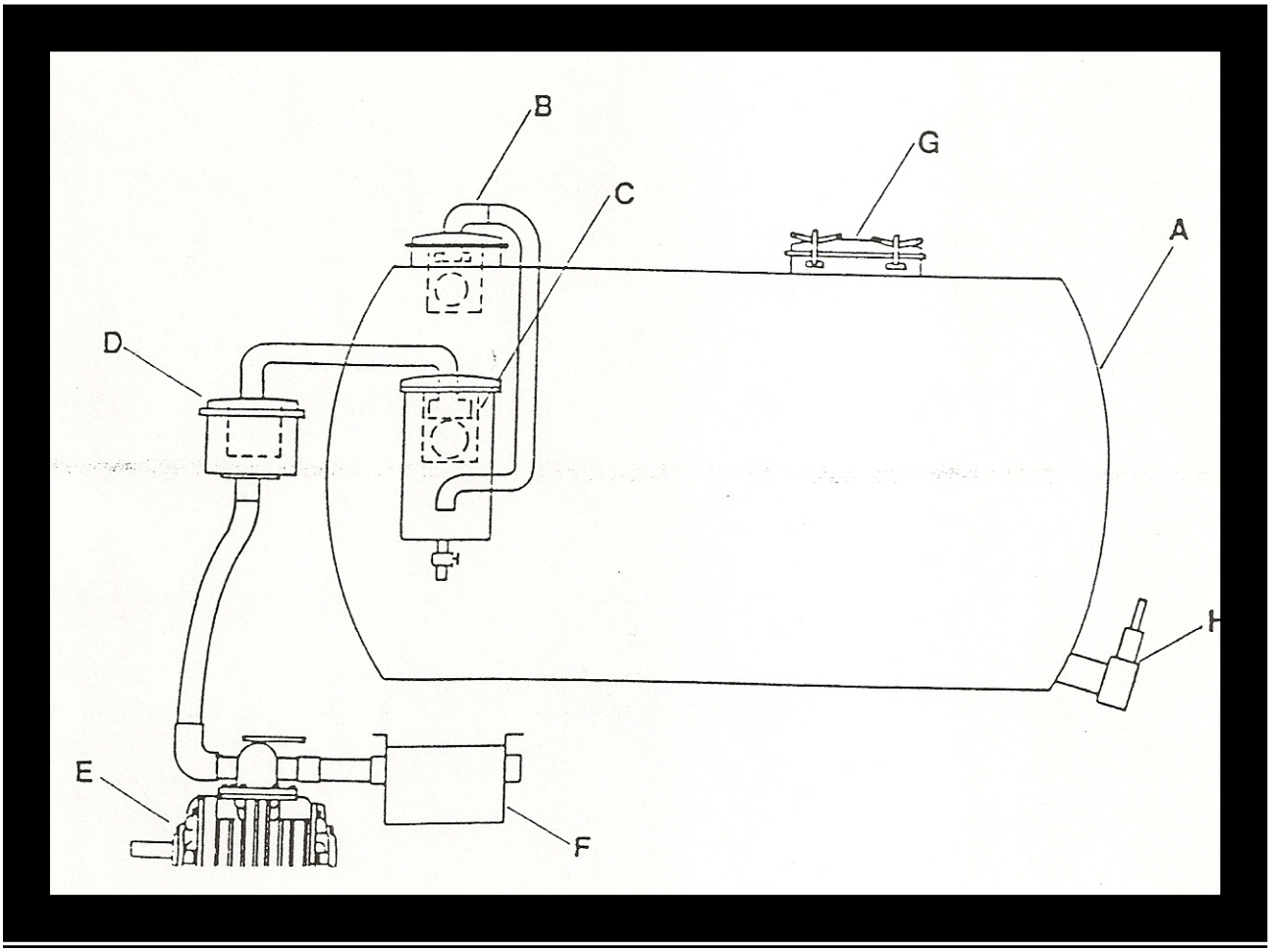
D. FINAL FILTER – a filter usually make of wire mesh designed to catch particulate matter before it enters the pump, greatly extending pump life. A filter should be capable of catching gritty material down to .020".

E. VACUUM PUMP – Usually a rotary vane type used to evacuate air from the tank. Normally equipped with a valve to allow the pump to be used also as a compressor for agitation or pressure discharge. There are many different sizes and types available, depending on your particular needs.

F. OIL CATCH MUFFLER – Because rotary pumps are constantly oiled, oil is discharged in the exhaust flow. An oil catch muffler should be used to catch this oil and quiet the pump. The oil catch should also have a valve to allow drainage of used oil.

G. MANWAY – Every vacuum tank should be equipped with a manway to allow for inspection and repair of the tank. It is not unusual to have several manways for easier access and cleaning.

H. VALVES – Valves normally range in size from 2” to 6”. Full open ball valves and gate valves are considered best for this application because there are no protrusions in the product flow.



A. Tank

B. Primary Shutoff

C. Secondary shutoff

D. Final Filter

E. Vacuum Pump

F. Oil Catch Muffler

G. Manway

H. Valves

DIVERSIFIED FABRICATORS, INC. is hereinafter called DFI.
The products manufactured by DFI, exclusive of used or re-built machinery or equipment, are subject to the following warranty:

a) Warranty.
DFI warrants all products manufactured by it to be free from defects in material and manufacture at the time of shipment and for twelve (12) months from date of delivery to customer, and provided that the product is in normal use and service. DFI will furnish to the customer without charge, f.o.b. Griffin, Georgia replacements for such parts as DFI finds to have been defective at the time of shipment, or at DFI's discretion, will make repairs to such parts, provided that, upon request, such parts are returned, transportation prepaid, to the factory at Griffin, Georgia. THIS WARRANTY SHALL NOT BE EFFECTIVE IF THE BUYER IS IN DEFAULT AS OUTLINED BELOW.

This warranty is furnished to customer **only if work is performed** at our manufacturing facility in Griffin, Georgia.

This warranty shall not apply to any product which has been subjected to misuse, misapplication; neglect (including but not limited to use of unauthorized parts or attachments), unauthorized adjustments, or unauthorized repair. Engines, motors, and any accessories furnished with DFI's products, but which are not manufactured by DFI, are not warranted by DFI but are sold only with the express warranty, if any, of the manufacturer thereof. THE FOREGOING IS IN LIEU OF ALL OTHER WARRANTIES, WHETHER EXPRESS OR IMPLIED (INCLUDING THOSE OF MERCHANTABILITY AND FITNESS OF ANY PRODUCT FOR A PARTICULAR PURPOSE), AND OF ANY OTHER OBLIGATION OF LIABILITY ON THE PART OF DFI. FURTHERMORE, THERE ARE NO WARRANTIES WHICH EXTEND BEYOND THE DESCRIPTION OF THE FACE HEREOF.

b) Limitation of Liability
It is expressly understood that DFI's liability for its products, whether due to breach of warranty, negligence, strict liability, or otherwise, is limited to the furnishing of such replacement parts, and DFI will not be liable for any other injury, loss, damage, or expense, whether direct or consequential, including but not limited to loss of use, income, profit, or production, or increased cost of operation, or spoilage of or damage to material, arising in connection with the sale, installation, use, or inability to use, or the repair or replacement of, DFI's products.

Any operation expressly prohibited in the operating instructions or safety manual furnished with the machine, or any adjustment, or assembly procedures not recommended or authorized in the operating or service instructions shall void such warranty.

c) THIS WARRANTY IS VOID UNLESS "DIVERSIFIED FABRICATORS WARRANTY" CARD IS COMPLETED AND RETURNED TO THE FACTORY AT GRIFFIN, GEORGIA WITHIN 30 DAYS AFTER DELIVERY OF UNIT TO CUSTOMER.

d) The laws of the State of Georgia apply to this transaction. DFI shall be granted by the Purchaser as listed on the front side, a purchase money security interest in the machinery, equipment, and parts listed and maintains the right to file a U.C.C.-1 financing statement to perfect said interest. Buyer hereby waives signature for the execution of the U.C.C.-1 and grants DFI a limited Power of Attorney to execute on Buyer's behalf a U.C.C.-1 financing statement if necessary. As this is a commercial transaction, DFI maintains the right to declare the indebtedness created by this invoice in default if payment is not made within forty-five (45) days or if the Buyer breaches any other term of this invoice.

e) In the event of default, DFI shall have the right of self help repossession in addition to other remedies allowed under the laws of the State of Georgia. Additionally, DFI shall have the right to apply for an immediate writ of possession pursuant to O.C.G.A.§44-14-260 et.seq. DFI shall be entitled in addition to the principal and interest reflected on the front of the invoices all costs of collection including 15% of the unpaid principal and interest as attorney fees.

f) Buyer listed on the front side of this invoice hereby agrees that this is a commercial transaction and waives any and all rights to notice of seizure by DFI if payment is not made within forty-five (45) days from the date of delivery on the front side of the invoice. Additionally, Buyer hereby waives and posting of bond by DFI for the issuance of the immediate writ of possession as outlined in O.C.G.A. §44-14-260 et.seq.

ALWAYS GIVE PART NAME, NUMBER, AND EQUIPMENT SERIAL NUMBER WHEN ORDERING PARTS

GQ-0155938B (06/02)

All accounts due and payable on terms as stated on the front of this invoice shall incur a finance charge of 1½% per month (18% Annual Percentage Rate) after 30 days from the date delivered.

A handling fee will be charged on all correctly filled orders returned for credit.

THANK YOU - WE APPRECIATE YOUR CONFIDENCE!