

12. Mini Super Sucker of 8 Cum.

GENERAL DESCRIPTION

This should be a truck chassis mounted, combined unit Suction unit. The unit should also be capable of creating vacuum for siphoning out effluents, liquids slurry, sludge and other material from sub-soil located drain lines, manhole chambers, sump tanks and other locations from depths of around 7 to 10 Mtrs, depending on the specific gravity of the effluent. The equipment consists of suction Unit.

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Air mover unit (vacuum generation plant) should be fitted with a high vacuum, high airflow, positive displacement tri-lobe type Vacuum Blower/Vacuum Pump driven thru Split Shaft PTO.

The equipment shall be stationed close to the point of application and the sludge and slurry shall be extracted under high vacuum and high flow rate conditions, through a suction hose and a specially designed suction tool.

The Equipment should be Designed to meet the following Operational Highlights

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Equipment is fitted with an exhauster/compressor that can be operated in both pressure and vacuum mode. The pressure mode can be used to discharge the tank's contents under pressure without effecting the rear door opening, and also for blowing back pressurized air into the chamber/line to agitate and dislodge Sediments / sludge in the liquid effluent.

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Truck's engine power is utilized to drive the exhauster/compressor through a manually operated Full Torque PTO fitted between the vehicle's Gear Box and the Rear Axle.

Equipment fitted with a High flow -High Vacuum, continuous rating vacuum blower. The sludge tank's rear door opening will be affected hydraulically through two hydraulic cylinders.

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Emptying of the sludge tank will be affected by hydraulic tipping of the same. This facilitates emptying with necessity of man entry.

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EQUIPMENT MOUNTING

The equipment shall be mounted on TATA/Ashok Leyland/Eicher/Mahindra, etc Truck chassis having 16 Ton GVW.

Drive system

The Suction Blower shall be driven by the vehicle's engine, the power of which shall be tapped from a new generation total power-take-off (split shaft PTO) which shall be mounted in the center of the auxiliary frame and between the vehicle's gearbox and the differential. Full-Torque Split-Shaft-PTO Drive: The total-power-take off shall be fitted with two independent output drive shafts from which individual drives can be obtained. The complete unit shall be mounted over suitable AVMs on the sub-frame and between the vehicle's gearbox and the differential. Changeover of the various drives shall be made effective by independent pneumatic clutches.

The total power take-off shall be of renowned PTO manufacturer of TATA /PZB/VAS make and its design shall allow drawing of the full power/throughput torque of the vehicle engine and drive.

The hydraulic pump shall be independently driven by the factory fitted lateral I axial PTO fitted onto the vehicle's gearbox.

SLUDGE STORAGE TANK

The tank will be fabricated from 6 mm thick M.S. Plate conforming to IS 2062 Grade 'A' standard and will have a combined volumetric capacity of about 8000 liters. It shall be designed to withstand conditions prevailing from the operating vacuum and pressure conditions. The tank will be of a cylindrical design with torrispherical.-dished ends to ensure a complete and fast off-loading of the collected material. Mounted on a heavy C-sectioned sub-frame to provide additional structural strength to the chassis frame, the tank will be supported at the rear end by two heavy-duty hinge arrangements to facilitate its hydraulic tipping of 30° for unloading the collected material at appropriate disposal grounds. The tipping cylinder will be front end mounted and will be of a multistage design to achieve the required tipping angle. The forward end of the tank will be fitted with robust saddle supports, which will rest firmly on the sub-frame.

The tank's rear door will be of a fully open able type, and the shell's perimeter will be reinforced for structural integrity. Two heavy-duty hinges will support the tank's rear door. Two suitably dimensioned double acting hydraulic cylinders will affect raising and lowering of the door. The door will be raised through a minimum angle of 80° to the vertical. Locking and sealing of the rear door will be done by hand wheel operated bolts, which will be of a robust design located circumferentially on the tank's rear end of the shell.

A High-quality hollow "D" section type door sealing neoprene rubber gasket will be used to ensure the door to be leak proof.

Tank Fittings:SLUDGE COMPARTMENT.

- i.1 no.100 mm Knife Gate Valve located at the bottom most position at the rear-dished end for draining the tank's contents.
- ii.Level glass fitted in a convenient position to enable the operator to gauge the content's level inside the tank.
- iii.A Ball Float type, Primary shut-off to prevent water from entering the pumping system due to an accidental overflow.
- iv.1 no. Pressure relief valve.

Technical Data

Capacity: 8000 Ltrs.

Max. Operating Pressure: -0.9 to 1 bar

Construction: Cylindrical shell with torrispherical dished ends.

Material: 6 mm thick plates as per IS 2062 Grade '-A' for shelland rear dished ends.

TANK MOUNTING

The Tank will be mounted on a sub-frame, fabricated from ISMC 150 channel sections.

This arrangement distributes the weight of the equipment and payload evenly over the chassis long-bearers and renders the arrangement torque resistant when operating in off-road conditions existing at disposal sites.

Suction Plant –Vacuum GenerationWorking Principle

Aspiration of the effluent from sewer and drain water lines and chambers shall be carried out on the principle of generating high vacuum in the sludge tank.

The suction plant consists of:

- Air mover -Injection Air-cooled, Vacuum Blower
- Air-material Separation system-Combined Cyclone Separator / shut-off
- System's accessories and safety equipment Vacuum Blower

The equipment will be fitted with a continuous rating, Rotary lobe, air cooled positive displacement type, vacuum blower, free airflow rating of

720 Cub.mmm/hour and shall be capable of achieving maximum vacuum upto 7000mm (Water Column) i.e. vacuum pressure of 70% during suction. The vacuum blower shall be driven through a pneumatically actuated Full Torque PTO, The vacuum blower shall be manufactured by Vacuum Blower manufacturer as specified.

The Technical details of vacuum blowers:

Type: Rotary Tri-lobe Blower/PUMP.

Make: JUROP/TMVT/KAY INTERNATIONAL

Delivery: 720 cum/hr free air flow

Max Vacuum: 60% (7000mmWC)

Max. Pressure: 1 bar (g) continuous

The salient features of the vacuum blower are:

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The precision machined, heavy-duty, lobe rotor profile safely allows for operations at high rpm, and contributes towards the system's negligible pulsation characteristics thus providing outstanding energy-efficiency.

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Cylindrical roller bearings designed to take up the radial forces generated during operations and in belt transmission arrangements, thus achieving longer operational life.

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Rotor shafts are fitted with the unique well-proven labyrinth seals for effective sealing and low wear.

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Precise synchronization of the rotors is achieved through precise machining of the helical timing gears a major factor contributing to the blower's high volumetric efficiency and smooth and near noiseless operations

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The air injection cooling system incorporated in the blower ensures cooler continuous duty operations under all vacuums.

Cyclone Separator

A CYCLONE SEPARATOR

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SHUTOFF shall be fitted immediately before the blower inlet.

They function to protect the vacuum blower from any probable carry over of suspended water and sludge particles which may be drawn into the system from the water surface in the sludge compartment due to the high vacuum conditions within. The cyclonic effect thus created within

these devices, separates out the heavier water and sludge particles which accumulate and drained regularly after each operations through a drain valve provided at the separator's bottom.

The air stream entering the chamber spirals downwards and the denser water and sludge particles are hurled towards the cyclone wall due to the centrifugal force. The particles on hitting the wall separate out from the air stream, which get collected in the cyclone's bottom compartment. A drain valve is provided at the bottom to clean out the accumulated material. A ball float shut-off arrangement should be incorporated inside the cyclone, for the protection of the blower system from any accidental overflow and carryover of material from the suction dump tank.

Accessories and Safety Equipment

The suction system shall come equipped with all the necessary accessories and safeties as below.

Vacuum Limitation Valve shall be line mounted to protect the equipment and system from excessive vacuum. The valve shall be factory set to control operating vacuum parameters of the system. As the system reaches the set vacuum level, this valve lifts and ventilates the system by virtue of allowing the air outside to enter the system.

Silencer / Filter - Blower inlet shall be incorporated in the airflow circuit between the cyclones and the blower. It is designed to handle the Blower's flow rating and filter out any particulate matter sizes beyond that of the Blower handling capacity. Further it also serves as a silencer in the system. Exhaust Silencers shall be fitted on the blower's exhaust and cooling air-injection ports respectively to effectively reduce the pump's operational noise levels. The air injection silencer / filter shall come fitted with a filter to protect the unit against infiltration of atmospheric impurities, during operation.

Suction Hose-1 No., 150 mm dia., hose of 15 meters long in segment of 3 mtrs, shall be supplied along with the equipment. The suction hose shall be of a lightweight, heavy duty, wire reinforced, PVC construction, and shall be renowned manufacturer as specified.

1 no. deep suction tool of 100mm dia., and fitted with a quick-connect coupling shall be supplied as a standard accessory.

DRIVE SYSTEM

Drive for the vacuum pump will be tapped from a new generation total power take off (split shaft P.T.O.). The total power take off will be fitted with two independent auxiliary output drive shafts and the complete unit will be mounted in the centre of the auxiliary frame and between the vehicle's gearbox and the differential.

The hydraulic pump will be independently driven by the factory fitted lateral/ axial PTO fitted onto the vehicle's gearbox. The total power take-off is entirely designed and manufactured by M/s. PZB/OMSI./VAS The design allows drawing of all the power from the vehicle engine. The P.T.O. will be provided with one main transmission and two independent auxiliary output drive shafts. The engagement and disengagement of the P.T.O. outputs will be effected manually through an air control valve fitted in the driver's cabin.

TECHINICAL DATA

Manufactured By:M/s PZB/OMSI/VAS

Throughput Torque:400KGM

No. of Outputs (auxiliary):Two.

Hydraulic System

A hydraulic pump of ample capacity to meet the operational requirements of the system will be of DOWTY make, manufactured by DYNAMATIC TECHNOLOGIES LTD, under the brand name of DOWTY, UK.

The hydraulic system shall be provided with an oil-storage .tank of suitable capacity, suction and return line filters, and a direction control valve. All hydraulic connections shall be a combination of high-pressure seamless pipes and flexible hoses, to facilitate easy field replacement / repairs.

ACCESSORIES AND SAFETY FEATURES INCORPORATED IN THE SUCTION SYSTEM

A. Pressure Relief Valve -Fitted in a suitable position, this device provides safety to the storage tank as well as the complete system. The valve is of a spring loaded adjustable type and provides continuous relief when the system's pressure exceeds the preset limit.

B. Vacuum Relief Valve -It is set to function at a desired operating value and protects the pump as also the complete system from operating under high, undesired vacuum conditions. As the system reaches the set Vacuum level, this valve lifts and ventilates the system by virtue of allowing the air outside to enter.

C. Suction Filter -Incorporated in the airflow circuit between the secondary shut-off and the pump, is a stainless steel, basket type Safety Filter designed to handle the pump's flow rating and filter out solid and semi-solid particulate impurities of size beyond that of the pumps handling capacity.

D. Exhaust Silencer -will be fitted on the pump's exhaust side of the airflow circuit. This device dampens the airflow with minimum back

pressure in the system, thus reducing the operational noise levels considerably.

The following general technical specifications shall be complied with:

-(a). All hydraulic circuits shall be fitted with safety valves to avoid pressurization of the system.

(b). All hydraulic lines shall be adequately clamped.

(c). All hydraulic tanks shall have a level sight glass or dipstick level indicator,

(d). All equipments shall be painted after primer coat in two coats or more of enamel paint of color 'specified by Client.

All the equipments supplied should be in ready to use condition in all respect and all operation of the equipment should be from the outside.

SURFACE PREPARATION AND FINISH

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Both, exterior and interior of the tank will be sanded prior to spray painting.

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The tank exterior shall be spray-painted with two coats of superior quality anti-corrosive primer and two coats of enamel metal paint of a reputed make. The colour shade will be as per the customer's choice.

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To resist corrosion, the compartment will be internally coated with two coats of anti-corrosive primer and two coats of gray enamel paint.

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The Sludge compartment tank will be internally coated with two coats of epoxy paint to resist corrosion due to weak acids.