

## CAMEL® 1200 TRUCK-MOUNTED, COMBINATION HIGH-PRESSURE JET /VACUUM MACHINE

1500 Gallon - 12 Cubic Yard - Ejector Type Debris Body



### INSTRUCTIONS

The bidder shall indicate compliance to each section of the specifications by a **yes** or **no**. Any **no** indication must be fully explained in the deviations, exceptions, exclusions space, or it will be assumed that the features and performance are as specified and will be supplied without exception. If additional space is needed, bidder shall attach (on bidder's letterhead) a statement of deviations, exceptions, exclusions. Failure to deliver unit as specified will result in rejection of the unit and non-payment.

### GENERAL

The equipment described herein shall be utilized for the purpose of simultaneous high pressure hydraulic flushing of sanitary and storm drain sewer pipes and removal of liquids and solids from the manhole by use of vacuum generated by a positive displacement dual lobe blower. All operations shall be able to be performed by one operator. All material from the manhole shall be deposited within one cylindrical debris tank. The entire unit is to be of a single engine design. The chassis engine is to power all functions of the combination unit. Units utilizing additional engines and fan type vacuum air movement are unacceptable due to weight, fuel costs, emissions, and maintenance costs.

#### A) Water Storage Tanks

1. 1500 gallon minimum usable capacity.
2. Water storage saddle tanks mounted no lower than chassis frame rails.
3. Rotational molded non-cross linked polyethylene construction with ultraviolet stabilizer and minimum ¼" thick wall. Must be repairable type polyethylene.
4. Bottom of tank protected by ¼" steel to eliminate potential puncture from road debris.
5. The total tank capacity shall be divided into 250 gallon, separate, self-baffling cells and interconnected together. Individual tanks shall all be mounted at the same level to prevent pressurization and breather problems.
6. Tank to pump suction shut-off valve with cast iron, "Y" type strainer with stainless steel filter element.
7. Easily accessible inspection ports provided on top of each tank.
8. Lifetime "no rust-through or corrosion warranty" provided.
9. Minimum 4" air gap on fill tube to prevent siphoning of water from storage tanks back into hydrant.
10. Clear sight level indicator tubes mounted both sides of unit

**Water Storage Tanks - Comply:** Yes \_\_\_\_\_ No \_\_\_\_\_

**Deviations, exceptions, exclusions:**

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### B) Water Pump

1. Double acting, single piston hydraulic powered water pump with 1:1 oil to water ratio
2. Rated design capacity of 100 GPM and 3,000 PSI continuous duty
3. Hydraulic pump and water pump shall be sized to produce 80 GPM @2000 PSI
4. Dual hydro-pneumatic nitrogen charged accumulator with on/ off valve shall be provided. Hydro-pneumatic accumulator shall be equipped with valve to allow operator to selectively activate blockage busting or smooth flow characteristic.
5. Piston and/or packing must not require greasing.
6. Dial at control panel shall control engagement and disengagement and variable flow from 0 to full pressure.
7. Pump driven hydraulically by a tandem hydraulic pump powered by a transmission-mounted hot shift PTO.
8. Pump mounted below water tanks, forward of debris tank to assure flooded inlet at all times to prevent cavitation.
9. Single two way ball valve for sewer nozzle operation.
10. Multi flow system with dial valve at control panel to allow full vacuum with independent control of water pressure and flow
11. An in line water charged oil cooler shall be installed between the water tanks and the pump. The oil cooler shall not be installed within another component such as a water or oil tank.
12. For maintenance and serviceability, the water pump shall not require removal from the unit chassis for maintenance or repair. Additionally there shall be a maximum of three seals required for reassembly of the pump.
13. Water pump to be designed to handle recycled water.

**Water Pump - Comply:**    Yes \_\_\_\_\_    No \_\_\_\_\_

**Deviations, exceptions, exclusions:**

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### C) Vacuum System Positive Displacement

1. Vacuum Pump Rotary lobe positive displacement "Roots type" using two figure-eight impellers rotating in opposite directions to move entrapped air around the case to the outlet port. Pump shall be rated for continuous duty.
2. Unit equipped with a high efficiency exhaust silencer.
3. Vacuum pump direct shaft driven from the transfer case without the use of belts, poly chains or intermediate hydraulic or hydrostatic systems. Power supplied from chassis engine via transfer case.
4. Controls supplied in cab to engage and disengage vacuum pump for operator safety.
5. Two (2) automatic opening vacuum relief valves shall be provided.
6. Single 14" diameter, internal stainless steel float ball supplied for automatic vacuum system shut off when unit is full. (Electric shut off systems not acceptable). A minimum 113 square inches must be provided at the air exit duct to reduce air velocity and carryover.
7. An externally mounted, vertical cyclone separator with a 16" diameter clean out door shall be incorporated between the positive displacement vacuum pump and the debris tank. The clean out door shall be accessible from ground level. The cyclone shall have a minimum 2012 cubic inch internal operating size and be rated to 50 micron.
8. Vacuum relief vent door switch located at operators station to automatically relieve vacuum. Switch shall open a vent door via an air cylinder to relieve the vacuum without disengaging the vacuum pump.
9. Vacuum pump shall produce 4500 CFM and 18" Hg
10. Vacuum Pump to be Roots Model 824 RCS
11. Vacuum pump shall be protected by an HX cartridge filter capable of containing particles sized 10 microns or larger.
12. HX Cartridge filter housing shall be constructed on ¼" steel 28" in diameter and 22" in depth.
13. Filter housing shall have one single door hinged on the left for easy access. Door shall be secured by one single 12" "T" bolt.
14. Filter element shall be 22" x 21" constructed of washable rigid polyester, unitized in stainless steel housing, 98% efficient @ 10 microns. Filter element shall have Qty of 130-2" pleats with a total filter area of 120 sq. ft.
15. Hydraulically operated vacuum supercharger valve shall be supplied. The valve shall close off the air flow through the boom, creating full rated vacuum inside the debris tank.
16. When opened, a supercharged velocity of air shall rush through the boom and vacuum tubes.

**Vacuum System Positive Displacement - Comply:**    Yes \_\_\_\_\_ No \_\_\_\_\_

**Deviations, exceptions, exclusions:**

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### **D) Debris Body – Ejector Unloading & Compaction Dewatering System**

1. Minimum volumetric capacity of 12.0 cubic yards.
2. Cylindrical shaped for strength and corrosion resistance. Flat sided debris tanks are specifically prohibited due to flex and weld deterioration.
3. Designed to withstand 360" of water vacuum.
4. Debris tank to be constructed of abrasion and corrosion resistant ¼" A36 steel, with a yield point of 50,000 PSI and tensile strength of 70,000 PSI
5. Unloading of body is accomplished without going behind unit when body is full.
6. Hydraulic powered open and close, full height and width flat rear door with self-compensating, double lipped neoprene seal located on door. Rear door to be opened and closed by (2) two power up / down hydraulic cylinders. The door shall hydraulically open 90 degrees to allow easy access to the debris body interior for clean out.
7. Four (4) mechanical, wedge pin and receiver, hydraulically operated tailgate latches shall be supplied for securing rear debris tank door. Hydraulic latching shall be accomplished by a single hydraulic cylinder with mechanical linkage, separate from the door open close cylinders. The design of the locking system will not allow tailgate to open if hydraulic power is lost. Systems requiring separate manual latches to secure the door in the event of hydraulic system failure are unacceptable.
8. Exterior mechanical liquid level gauge. Stainless steel float and rod.
9. Internal tank manifold flushing system with eight jets working from the water pump.
10. The debris inlet pipe shall be bolted to the debris tank and not require welding to replace
11. The make/break connection between debris inlet pipe and boom must compensate for uneven road and ground conditions by way of spring-loaded and gasketed mating plates.
12. Full diameter fabricated steel ejector plate with two-stage hydraulic cylinder.
13. Rear body pivot pins to be greasable to increase pin life.
14. Controls for latching/unlatching, opening/closing and extending/retracting ejection plate must be located on the driver's side behind the cab and forward of the debris tank for operator protection.
15. One (1) internal surge baffle for debris tank.
16. Adjustable elastomer wipers to clean bottom, sides and top of tank while unloading debris.
17. Baffle shall keep debris away from front drain to maximize dewatering capabilities.
18. The ejector system will be designed to allow the operator to compress material in the debris tank to remove the maximum amount of liquid possible.
19. The forward section of the debris tank shall raise 24" to assist in cleanout and at dump locations with a truck nose down ramp.

20. In the compaction cycle, the hydraulic system will be preset so as to limit the stroke of the cylinder.
21. Controls to operate the compaction system will be integrated with the standard ejector plate control.
22. Front gravity drain valve shall be a minimum 6" diameter opening for decanting of liquids from debris body and shall include a knife valve with locking handle and 35' of fabric drain hose.
23. Body drain capable of pneumatic back flushing in order to unclog without opening tailgate
24. A combined visual and audible alarm must provide an alert whenever the debris body or tailgate is being raised or lowered.
25. The debris tank shall have a rear splash shield installed from the 3 to 9 o'clock position at the tailgate.

**Debris Tank - Comply:**    Yes \_\_\_\_\_    No \_\_\_\_\_

**Deviations, exceptions, exclusions:**

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### **E) Air Purging and Winter Recirculation Systems**

1. Self-contained system for purging water from jetting hose, handgun lines and pump to prevent freeze-up supplied.
2. Winter recirculation
3. A system will be supplied to prevent freeze-up by pumping water through the system, including hose reel while driving to the jobsite.
4. Winter recirculation system will enable travel over the road without damaging pump, drive systems or truck transmission.

**Air Purging Winter Recirculation Systems - Comply:**    Yes \_\_\_\_\_    No \_\_\_\_\_

**Deviations, exceptions, exclusions:**

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### F) Hose Reel, Front Mount "Rotating"

1. The hose reel assembly shall be front mounted at the center of the unit with 180 degree manual rotation to facilitate manhole entry and reduce traffic flow interruption. Manual rotation shall occur between the headlights of the truck chassis keeping the reel at a centered position at all times.
2. Hose reel assembly shall rotate on a large diameter ball bearing and include a pneumatically actuated lock, which will positively lock the reel in any position across its operating range.
3. The hose reel shall have a minimum capacity of 1000' of 1" I.D. sewer hose. Drum and flanges constructed of ¼" steel, designed to withstand maximum working pressure without distortion. The drum shall have a minimum of 30" diameter to prevent hose damage. The reel shall be supported by two (2) heavy duty self-aligning pillow block bearings, bolted to a ¼" thick support frame.
4. 600 feet of 1" dia. plastic sewer cleaner hose supplied, with 2500 PSI working, 6250 PSI burst pressure ratings minimum. Hose must be constructed per standards established by NSWMA. Rubber type sewer hoses are not acceptable.
5. Reel driven by a double chain, hydraulic drive producing a minimum 14,600 in/lbs. torque and a variable speed from 0 to 50 RPM. The reel frame must be capable of pivoting down to allow for tilting of the chassis hood by use of an electric over hydraulic system powered by a 12 volt DC power pack.
6. A means to lower and raise the hose reel frame shall be provided that does not require the truck engine to be running.
7. Manually controlled level wind provided, utilizing four rollers. The top roller must be designed to pivot over center to allow for sewer hose removal without having to completely rewind back on the reel.
8. Sewer hose footage counter shall be electronic with digital readout.
9. A containment system enclosing the top ¼ of the hose reel shall be provided, consisting of a guard constructed entirely of Lexan. The transparent containment system permits viewing of hose reel and sewer hose, while protecting the operator from hose burst or coupling failure.

**Hose Reel Front Mount "Rotating" - Comply:**    Yes \_\_\_\_\_    No \_\_\_\_\_

**Deviations, exceptions, exclusions:**

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### G) Power Boom

1. The power boom shall have a minimum of 250 degree hydraulic rotation and be lockable in any position.
2. A boom rest for transport shall be directly mounted to the sub frame.
3. Boom shall not raise with debris body.
4. The boom shall have an articulated function that provides a vertical range of motion of no less than 21' (44 degrees) upward and 3' (19 degrees) downward from its horizontal position.
5. Boom shall be equipped with a heavy duty channel reinforced elbow for added life.
6. The lift capacity at the boom end with boom fully extended shall be 1,000 pounds minimum.
7. A joy stick shall be permanently mounted to the operator control station for boom functions: up, down, left and right, in/out.
8. The boom shall be remote controlled from a wired and wireless pendant station. A boom pendant capable of up to 20 functions shall be supplied with: up, down, in, out, right, left.
9. The boom vacuum pipe shall be 8" and reach a minimum of 26' from centerline of unit. Hydraulic boom extension of 8' shall be true telescoping tube inside of tube design which will extend and retract without affecting the vertical position of the boom terminus. The boom structural support tubes shall be equipped with ultra-high molecular poly slides to reduce friction of the sliding portions of the assembly and not require lubrication.
10. The travel storage position shall be at front right corner of truck bumper for driver visibility.

**Power Boom - Comply:**    Yes \_\_\_\_\_    No \_\_\_\_\_

**Deviations, exceptions, exclusions:**

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### H) Control Center

1. The operator control center shall be located at the front of unit.
2. The control center shall include a digital display including:
  - Tachometer
  - Engine oil pressure
  - Engine temperature
  - Fuel consumption
  - Fuel level
  - Sewer hose footage counter with 10 bank memory
3. Single two way ball valve for jetter hose on/off.
4. Hose reel joystick control -pay in/pay out with speed control. Joystick shall be universal mounting type to allow individual operator selection of directional movement and comfort.
5. Boom joystick control
6. Low water alarm located at front operators station.
7. System to have shutoff override to silence the alarm.

8. Water pressure gauge
9. Emergency kill red knob
10. Vacuum relief control switch
11. Vacuum Supercharger valve control switch
12. Reel tilt control switch
13. Reel pivot brake control switch
14. Water pump variable flow control
15. Throttle control
16. In the event of failure by the chassis to provide power to the hydraulics, a 12 volt power-pack will provide emergency hydraulics to the body, boom and hose reel. All standard body, boom and hose reel control inputs will function when under the emergency hydraulics.

**Control Center - Comply:**    Yes \_\_\_\_\_ No \_\_\_\_\_

**Deviations, exceptions, exclusions:**

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### **I) Vacuum Tubes and Brackets**

1. 8" O.D. aluminum tubes with male/female fittings supplied for ease of assembly.
2. One (1) 7' section, two (2) 5' sections, (2) 8' sections and one (1) 3' section supplied.  
One (1) gasket and over center clamp for each tube supplied. No tools required with clamps.
3. One (1) 8" fluidizing suction tube
4. One (1) 8" circular operators handle
5. One (1) 8" serrated tube
6. Four (4) tube storage rack, located on rear door with nylon tube holders
7. Two (2) 3-tube vertical storage racks to be mounted on passenger side.

**Vacuum Tubes and Brackets - Comply:**    Yes \_\_\_\_\_ No \_\_\_\_\_

**Deviations, exceptions, exclusions:**

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### J) Toolboxes

1. One (1) lockable diamond plate aluminum toolbox, 18"x18"x48" lower frame mounted, passenger side
2. One (1) lockable diamond plate aluminum toolbox, 18"x18"x48" upper frame mounted, passenger side
3. One (1) lockable diamond plate aluminum toolbox, 22"x14"x60" frame mounted, drivers side

**Toolbox - Comply:**    Yes \_\_\_\_\_            No \_\_\_\_\_

**Deviations, exceptions, exclusions:**

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### K) Nozzles

1. One (1) 1" x 15 degree steel nozzle with hardened orifice supplied.
2. One (1) 1" x 35 degree steel nozzle with hardened orifice supplied.
3. One (1) 1" nozzle extension supplied.

**Nozzles - Comply:**    Yes \_\_\_\_\_            No \_\_\_\_\_

**Deviations, exceptions, exclusions:**

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### L) Water Washdown System

1. Main water pump shall supply water source with means of regulating pressure from 0 to 2000 PSI available at handgun.
2. Retractable hose reel with live center complete with 50' x ½" hose.

**Water Wash-down System - Comply:**    Yes \_\_\_\_\_            No \_\_\_\_\_

**Deviations, exceptions, exclusions:**

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### M) Water Recycling System

Combination sewer cleaning truck stores sewage and debris into a debris tank using an onboard vacuum system. A water saving system automatically filters sewer water supplying it to a high-pressure water pump for reuse in the sewer for jetting work. This system allows the operator to continue working by jetting with sewer water and not having to shut down and travel elsewhere to refill with potable water.



The system transfers the saturated sewage liquid from the debris body by means of a hydraulic driven charge pump and then processes it through a six stage filtration system direct to high pressure water pump be reused for high pressure sewer cleaning.

#### 6-STAGE FILTRATION SYSTEM:

- 1) First stage separation of water and debris takes place inside the debris body. All debris and affluent material enters the debris tank on the front side of the ejector plate where initial water and debris separation takes place.
- 2) Second stage, the ejector plate in the debris tank separates liquid from solids. The ejector plate has small clearances and passages to allow liquids to pass to the rear side of the ejector plate, holding solids on the front side.
- 3) Third stage is the settling area behind the ejector plate where water accumulates for the recycling process.
- 4) Fourth stage consists of an oscillating self-cleaning filter screen inside the debris tank on the rear side of the ejector plate. The oscillation creates a counter flow and agitates the materials and liquids around it. This filter screen includes two self-cleaning spray bars. The first is a low-pressure spray bar utilizing recycled water that is constantly cleaning the outside of the screen. The second is an internal intermittent high-pressure spray bar that uses fresh water to internally clean the screen.
- 5) Fifth stage centrifugal separator located on the front tank head of debris body. Separator is designed to remove particles from the liquid via centrifugal action. System shall include an automatic continuous discharge of particles back into the debris body.
- 6) Sixth stage consists of a "Y" type cast iron strainer with a stainless steel filter element that filters the liquid prior to the high pressure water pump.

The externally mounted charge pump draws liquids out of the debris tank through the secondary filter. This pump also pressurizes the water enough to force the water through the next filter and beyond. The flow rate of the charge pump meets the entire flow rate requirement for the jetting water pump, self-cleaning filters, y-strainer filter, and low-pressure spray bar assembly.

**Six Stage Filtration System - Comply:**    Yes \_\_\_\_\_    No \_\_\_\_\_

**Deviations, exceptions, exclusions:**

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**Controls – Water Saving System:**

1. Water saving system shall be fully automatic and when selected by the operator, shall be functional when-ever a sufficient water supply exists in the body. All controls shall be located at the front control panel HMI screen.
2. When the recycling system is in full operation, the control system shall monitor the flow of the secondary filter via a flow sensor and differential pressure switch. The variance in pressure determines the clogged state of the filter and the reduction in flow. A range of pressure and flow will be pre-determined and programmed into the logic that determines various output events. If the flow sensor for the secondary filter determines this filter is to dirty to operate the control system will automatically send a message to the HMI screen to initiate a high-pressure flush.
3. System shall include debris level indicator with LED readout at front control panel HMI screen. This system shall continuously monitor and display debris and liquid levels inside the debris tank. Debris level indicator shall be capable of working in vacuum pressures up to 28" Hg and in temperatures from -40 to +176 F.
4. Color display screen at front control panel to include:
  - Debris lever indicator, LED display
  - Fresh water indicator, LED display
  - Recycled water consumed meter
  - Water saved meter
  - Secondary filter condition
  - Key operational tips

**Control System - Comply:**    Yes \_\_\_\_\_                      No \_\_\_\_\_

**Deviations, exceptions, exclusions:**

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**Additional Requirements – Water Saving System:**

1. System capable of 80 GPM @ 2500 PSI.
2. Recycled water to go direct from debris body to high pressure water pump for jetting.
3. Systems that deposit recycled water into fresh water tanks or settling tanks prior to the high pressure water pump will not be accepted due to contamination of fresh water supply and high maintenance.
4. Check valves in water system to prevent recycled water from entering the fresh water tanks. Fresh water tanks will remain clean and never need to be flushed or cleaned.
5. System shall automatically change over to fresh water when there is not enough water to recycle.
6. Minimum of (2) two 1" general cleaning nozzles exclusively designed to handle recycled water.
7. Minimum of (5) five years of manufacturing a waste water recycling system.

**Additional System Requirements - Comply:**    Yes \_\_\_\_\_                      No \_\_\_\_\_

**Deviations, exceptions, exclusions:**

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### N) Accessories

1. Front and rear tow hooks.
2. 2½" x 25' fill hose with fittings for filling water tanks supplied, including storage bin.
3. Minimum 5000 psi rated handgun shall be supplied.
4. Hydro-Excavation accessory kit.
5. One (1) 8" x 6" Reducer.
6. One (1) 6" x 6' Dig tube with non-conducting cuff.
7. One (1) Handgun with on/off trigger.
8. Two (2) ¾" x 6' Pipe extensions with quick disconnects.
9. One (1) Urethane coated nozzle with three replaceable jets.
10. One (1) "tiger tail" hose guide supplied complete with rope.
11. Leader hose 1" x 10'
12. Hydrant wrench
13. Puller hook
14. Two (2) LED strobe lights mounted top rear of body
15. Two (2) LED strobe lights mounted at front section of boom.
16. One (1)LED top rear traffic advisor
17. Two (2) LED boom lights
18. Two (2) LED strobe lights mounted on lower front of unit
19. Two (2) LED strobe lights mounted mid-length of unit
20. Two (2) LED strobe lights mounted on lower rear of unit
21. Quarter fenders – front and back of rear wheels
22. Two (2) each operation, maintenance and parts manual supplied.

**Accessories - Comply:**    Yes \_\_\_\_\_    No \_\_\_\_\_

**Deviations, exceptions, exclusions:**

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### O) Paint

1. Urethane paint: unit to match chassis cab.
2. Color White

**Paint - Comply:**    Yes \_\_\_\_\_    No \_\_\_\_\_

**Deviations, exceptions, exclusions:**

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**P) Warranty**

1. Warranty minimum one (1) year on sewer/catch basin cleaner on defects in material and workmanship.
2. Minimum ten (10) years on debris tank on defects in material and workmanship.
3. Minimum ten (10) years on water tanks on defects in material and workmanship.
4. Lifetime rust-through and corrosion on water tanks.
5. Minimum three (3) years on single piston water pump on defects in material and workmanship. Wear items are not included in warranty.

**Warranty - Comply:**    Yes \_\_\_\_\_    No \_\_\_\_\_

**Deviations, exceptions, exclusions:**

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**Q) Safety**

1. The entire unit shall be no more than 11' 6" in overall height to reduce high center of gravity tipping risk.

***Bidder to state overall height of unit*** \_\_\_\_\_

2. To eliminate obstruction of a driver's field of vision, the boom hose or tube end must be removable from the boom elbow. For safety of personnel, removal of the boom hose or tube must be able to be completed from ground level without the use of ladders, lifts, steps or any other access assisting device.

**Safety - Comply:**    Yes \_\_\_\_\_    No \_\_\_\_\_

**Deviations, exceptions, exclusions:**

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## **R) Chassis Specifications (Minimum 60,000 Lb. GVW)**

1. 435 hp Diesel Engine, 1550 lb-ft Torque
2. Electronic Engine Warning System
3. Remote Mounted Engine Control
4. 160 Amp Alternator
5. Three Batteries 3375 CCA Total
6. Circuit Breakers
7. 19 CFM Air Compressor
8. Dust Shields on Air Brake Chambers, Front and Rear
9. Air Dryer
10. Allison 4000 RDS Automatic Transmission with Oil Cooler, Push Button Control
11. Transmission Temperature Gauge
12. 20,000 lb. Front Axle and Suspension
13. 40,000 lb. Rear Axle, 5.29 Ratio
14. Electric Over Air Power Divider Switch with Indicator Light
15. Hendrickson RT-403 Rear Suspension
16. Vertical Exhaust RH
17. 120,000 PSI Frame with inner C Channel Reinforcement
18. Integral Front Frame Extension, 12"
19. 100 Gallon Aluminum Fuel Tank LH Mount
20. Full Gauge Cluster – Speedometer, Tachometer, Oil Pressure, Dual Air Gauges, Coolant, Volts, Fuel, Transmission Temp
21. Overhead Storage Pockets (2)
22. Cruise Control
23. Driver Air Seat
24. Fixed Passenger Seat
25. Dual Mirrors with Dual Convex Spot Mirrors
26. AM/FM Radio w/ Weather band
27. Air Conditioning
28. Tinted Glass
29. Disc Wheels Steel front
30. Disc wheels steel rear
31. Front Tires: 425/65R 22.5 20 Ply Radial
32. Rear Tires 11R 22.5 14 Ply Radial
33. Body Builder Wiring and Interface
34. Wheel base 254"
35. Rear frame overhang 52"
36. Paint: White

**- END OF SPECIFICATIONS -**

***Contact Super Products with any questions regarding these product specifications.***