

NOT MEASUREMENT SENSITIVE

MIL-T-83826
13 August 1992MILITARY SPECIFICATION
TRUCK, HIGH PRESSURE SEWER CLEANING
AND MANHOLE VACUUM

This specification is approved for use by all Departments and Agencies of the Department of Defense.

1. SCOPE AND CLASSIFICATION

1.1 Scope. This specification covers a truck mounted unit for sewer pipe and manhole (catch basin) cleaning using high pressure water and a vacuum system.

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications and standards. Unless otherwise specified, the following specifications and standards of the issue in effect on date of invitation for bids or request for proposal, form a part of this specification to the extent specified herein.

SPECIFICATIONS

FEDERAL

QQ-S-766

- Steel, Stainless and Heat Resisting, Alloys, Plate, Sheet and Strip.

KKK-T-2109

- Trucks and Truck Tractors: Commercial, Diesel Engine Driven, 15 650 to 30 000 Kilograms (34,500 to 66,000 Pounds) GVW, 6x4.

STANDARDS

FEDERAL

FED-STD-595

- Colors.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Warner Robins Air Logistics Center, ATTN: WR-ALC/LVRG, Robins AFB GA 31098-5345, by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

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AMSC N/A

FSC-2320

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MILITARY

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| MIL-STD-831 | - Test Reports, Preparation of. |
| MIL-STD-889 | - Dissimilar Metals. |
| MIL-STD-965 | - Parts Control Program. |
| MIL-STD-1474 | - Noise Limits for Army Materiel (Metric). |
| MIL-STD-1556 | - Government/Industry Data Exchange Program Contractor Participation Requirements. |
| MS51317 | - Light, Warning, Vehicular, Rotating, DC. |

(Copies of specifications, standards, drawings, and publications required by manufacturers in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting officer.)

2.1.2 Other Government documents. The following other Government documents form a part of this specification to the extent specified herein. Unless otherwise specified, the issues shall be those in effect on the date of invitation for bid or request for proposal.

US AIR FORCE (USAF) DRAWINGS

- | | |
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| 8838302 | - Fastener Quality Assurance Requirements for WR-ALC/MMV Vehicle and Support Equipment. |
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(Copies of specifications, standards, drawings, and publications required by manufacturers in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting officer.)

2.2 Other publications. The following documents form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of documents shall be those in effect on the date of invitation for bid or request for proposal.

AMERICAN WELDING SOCIETY (AWS)

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| B2.1-84 | - Welding Procedure and Performance Qualification. |
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(Application for copies should be addressed to American Welding Society, 2501 NW Seventh Street, Miami FL 33125.)

SOCIETY OF AUTOMOTIVE ENGINEERS (SAE)

- | | |
|-------|--|
| J534 | - Lubrication Fittings. |
| J1096 | - Measurement of Exterior Sound Levels for Heavy Trucks Under Stationary Conditions. |
| J1349 | - Engine Power Test Code - Spark Ignition and Compression Ignition - Net Power Rating. |

(Application for copies should be addressed to Society of Automotive Engineers, 400 Commonwealth Drive, Warrendale PA 15096.)

2.3 Order of precedence. In the event of a conflict between the text of this specification and the references cited herein (except for associated detail

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specifications, specification sheets or MS standards), the text of this specification shall take precedence. Nothing in this specification however, shall supersede applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Design.

3.1.1 Materials. Materials shall be as specified herein. Materials not specifically covered by this specification or referenced documents shall be suitable in every respect for this type equipment. Except as otherwise specified, wood shall not be used.

3.1.1.1 Protective treatment. Materials that are subject to deterioration shall be protected in such a manner that shall in no way prevent compliance with the performance requirements of this specification. Protective coatings that will chip, crack, or scale with age or extremes of climatic conditions shall not be used.

3.1.1.2 Dissimilar metals. Unless protected against electrolytic corrosion, dissimilar metals shall not be used in intimate contact with each other. Dissimilar metals are defined in MIL-STD-889.

3.1.2 Construction. The vehicle shall be a complete truck mounted unit for sewer pipe and manhole (catch basin) cleaning using high pressure water and a vacuum system. The cleaning unit shall be mounted on a Type I, Class B diesel powered truck chassis as specified in KKK-T-2109. The sewer cleaner shall be constructed so that parts do not work loose in service and shall withstand the loads, shocks, vibrations, and other conditions incident to operation, shipping, and storage with minimum loss of time for maintenance, repair, and servicing. Its design shall ensure safe, efficient, and economical operation. All assemblies, controls, and installed equipment shall be located so that there is no adverse interference with each other, or with the operation, and shall be readily accessible for maintenance, operation, and replacement.

3.1.2.1 Commercial product. The truck and attachments must be the manufacturer's standard commercial product (see 6.6), except as modified to meet the requirements of this specification. Upon request of the contracting officer, offerors must submit evidence to establish commerciality of the machine and furnish names and addresses of non-Government sources that have acquired the sewer cleaner at least a year prior to the solicitation opening date.

3.1.2.2 Maintainability. The sewer cleaner shall be designed and constructed to provide the following:

- a. A minimum number of parts consistent with the performance required herein.
- b. A minimum amount of time for assembling, disassembling, locating trouble sources, and maintaining the vehicle. Where practical, components shall be located for rapid inspection and recognition of potential failure.
- c. Ease of adjusting, servicing, and replacing parts and components.

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- d. Use of readily available standard tools and equipment for maintenance.
- e. Maintenance with a minimum number of tools.

3.1.2.3 Foolproofness. Where improper installation of an item could cause a malfunction, an asymmetric mounting system shall be provided, where practical, to ensure proper mounting of the item.

3.1.2.4 Fastening devices. All screws, bolts, nuts, pins, and other fastening devices shall be properly designed, manufactured, and installed with adequate means of preventing loss of torque or adjustment. Cotter pins, lock washers, or nylon patches shall not be used for this purpose, except for attachment of trim items or as provided in commercial (see 6.6) components. Tapped aluminum threads shall have a minimum thread engagement of at least two times the nominal fastener diameter. All fasteners of Grade 5 or higher must meet the quality assurance requirements of US Air Force Drawing 8838302.

3.1.2.5 Servicing provisions. Drains, grease fittings, lines, and check points for all components shall be so located that they are readily accessible and do not require special tools for proper servicing.

3.1.2.6 Lubrication. All parts normally requiring grease for lubrication shall be provided with lubrication fittings in accordance with SAE J534. Where the use of high lubrication pressures may damage grease seals, a pressure relief device shall be provided. Extended fittings shall be provided to lubricate parts or assemblies which are not readily accessible for direct lubrication or which are likely to be overlooked because of inaccessibility.

3.1.2.7 Component protection. All space in which work is performed during operation, service, and maintenance of the vehicle shall be free of hazardous protrusions, sharp edges, or other features which may cause injury to personnel. All rotating and reciprocating parts and all parts subject to high operational temperatures or subject to being electrically energized, that are of such nature or so located as to be hazardous to personnel, shall be guarded or insulated to the extent necessary to eliminate the hazard.

3.1.2.8 Parts control. The contractor shall participate in the Government Industry Data Exchange Program (GIDEP) in accordance with MIL-STD-1556. In the design of the vehicle, the contractor shall ensure the components selected have not been identified as a problem or unresolved deficiency by GIDEP. The contractor shall submit an Alert/Safe-Alert on a DD Form 1939 whenever an actual or potential problem is evident with respect to a part, component, material, process, safety condition or to test equipment. The contractor shall certify maximum use of off-the-shelf items in accordance with MIL-STD-965.

3.1.3 Temperature conditions. The sewer cleaner shall be capable of continual performance at any ambient temperature from -40°F to $+125^{\circ}\text{F}$ and storage at any ambient temperature from -60°F to $+160^{\circ}\text{F}$ when serviced in accordance with the manufacturer's recommendations.

3.1.4 Weight distribution. The weight distribution of the vehicle in any loading condition shall not be unbalanced or improperly distributed. The difference in load between the left and right wheels of any axle shall not

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exceed 2.5 percent of the total load on the axle.

3.1.5 Electromagnetic interference. The requirements of KKK-T-2109 for electromagnetic radiation suppression shall apply not only to the truck chassis but also to the entire vehicle (i.e. they shall apply after the cleaning unit and auxiliary engine (if furnished) have been installed on the truck chassis).

3.1.6 Sound levels.

3.1.6.1 Cab interior sound level. The cab interior sound level shall not exceed 89 dB(A) when the vehicle is tested in accordance with 4.6.7.1.

3.1.6.2 Exterior sound level. The exterior sound level shall not exceed 89 dB(A) when measured in accordance with 4.6.7.2.

3.1.6.3 Equipment operation sound level. The sound level produced by operation of the sewer cleaning equipment shall not exceed 89 dB(A) when measured in accordance with 4.6.7.3.

3.1.6.4 Noise hazard caution signs. If the interior, exterior or any of the equipment operation sound level measurements exceed 84 dB(A), a noise hazard caution sign(s) shall be posted in accordance with paragraph 4.2 of MIL-STD-1474. A sound level measurement in excess of 89 dB(A) shall be unacceptable regardless of its location.

3.2 Performance.

3.2.1 Mobility. The sewer cleaner, when fully equipped and with a full payload, shall meet all speed and gradeability requirements specified by KKK-T-2109. A full payload shall be defined as five cubic yards of debris at a weight of 3,000 pounds per cubic yard.

3.3 Chassis.

3.3.1 Truck chassis. The sewer cleaning unit shall be mounted on a truck chassis in accordance with KKK-T-2109, Type I, Class B. The GVW rating specified for a KKK-T-2109 Class B truck chassis (39,500 pounds) shall be the minimum acceptable. This GVW rating may be increased if required by the manufacturer's standard commercial (see 6.6) design. The following requirements shall be met in lieu of, or in addition to, the requirements of KKK-T-2109.

a. Work lights. A floodlight shall be furnished and mounted on the top rear of the vehicle to illuminate the vehicle and worksite during nighttime operation. A hand held spotlight shall also be furnished. The hand held light shall plug into an outlet located at the operator's station and shall be sufficiently bright to allow inspection of a manhole during daytime or nighttime operations.

b. Warning light. An amber rotating warning light conforming to MS 51317 shall be furnished. The light shall be mounted with reinforcement on the vehicle centerline for 360° visibility. The warning light shall be operated by a separate switch with red indicator light. The switch shall be marked to indicate its function.

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c. The sewer cleaner shall be furnished with all special tools, if any, that are required for its operation together with the manufacturer's regular tool storage space or box.

3.3.2 Sewer cleaning unit. The sewer cleaning unit shall consist of at least the following components:

- a. Power source.
- b. High pressure cleaning system.
- c. Vacuum system.
- d. Control panel.

3.3.2.1 Power source. The high pressure cleaning system and the vacuum system shall be powered by an auxiliary engine or by a power take-off (PTO) from the vehicle transmission and/or engine. If an auxiliary engine is used, it shall be a commercial (see 6.6), diesel, water cooled, industrial type; rated for continuous duty. The total power output required by all items driven by the engine, when the items are operated simultaneously at maximum capacity, shall not exceed the engine's net power rating at 2000 feet elevation, determined in accordance with SAE J1349. It shall be equipped with automatic shutdown devices against low oil pressure and high coolant temperatures and shall have a replaceable type oil filter, electric starter, alternator with charge indicator light or gauge, variable speed governor and an hourmeter with a totalizing mechanism of at least 9,999 hours. The design of the engine air intake shall prohibit water, dust, etc. from entering the engine. The engine shall share the chassis engine fuel tank. The requirements for operation on JP-8 turbine fuel contained in KKK-T-2109 paragraph 3.4.1.1 shall apply to this engine also. If a PTO is used as the source of power for the high pressure cleaning and vacuum systems, it shall have sufficient capacity to power both systems when they are operated simultaneously at maximum capacity.

3.3.2.2 High pressure cleaning system.

3.3.2.2.1 Water tank. The water tank shall be of 10 gauge (0.1345 inch) minimum thickness stainless steel, 316L in accordance with QQ-S-766 and shall have a capacity of not less than 1,000 gallons. The surface of the steel shall be passivated. The tank shall have an elliptical or modified rectangular cross section, and the bottom of the tank shall be contoured to provide a sediment collection sump. The tank shall have a drain with valve at this point that provides a method to drain the tank and any sediments collected in the sump area. The valve shall be controlled from the side of the vehicle. The tank shall be fitted with connections and necessary controls and hose for filling the tank from a standard fire hydrant. The fill point shall be on the curb side or at the rear of the vehicle. The vehicle shall be fitted with gauges to determine the water level in the tank. One gauge shall be located at the fill point and one at the operator's station during equipment operation. The tank shall be vented for fill and discharge through an air gap antisiphon system. The tank shall have a strainer to filter the water going to the pump. The tank shall be constructed to withstand all static and dynamic loads imposed during normal operation of the vehicle.

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3.3.2.2.2 Water pump. The water pump shall be a positive displacement type, rated for continuous duty at not less than 50 gallons per minute (GPM) flowrate and not less than 2,000 pounds per square inch (PSI) pressure. The location of the pump shall not hinder pump service. It shall be possible to operate the pumping system independently of the hose reel system and also to operate the reel system and pumping system simultaneously. The pump shall be capable of recirculating water through the closed system.

3.3.2.2.3 Hose reel. The vehicle shall have a reel to hold the high pressure hose. The reel shall have a capacity of not less than 800 feet of one inch inside diameter (ID) high pressure hose. The construction of the reel shall be such that it can withstand the static and dynamic loads imposed by 800 feet of pressurized hose used during sewer cleaning. The sides of the reel shall afford protection to the operator in the event of hose failure. The reel shall be power driven in both directions and shall be equipped with a means of manual emergency operation. The reel shall be designed so that it will not be necessary for the operator to guide the hose onto or off it. All drive chains, sprockets, etc., shall be provided with guards where necessary for the safety of the operator. Provisions shall be made to purge the hose of water after it is wound on the reel.

3.3.2.2.3.1 Footage counter. The hose reel shall have a footage counter to indicate the hose payed out and recovered. The counter shall be capable of indicating not less than 999 feet in one foot increments.

3.3.2.2.4 Hose. Not less than 800 feet of one inch ID, heavy duty hose shall be furnished and installed on the reel. The hose working pressure shall be not less than the maximum output pressure of the water pump. The cover of the hose shall be resistant to the scuffing, acids and greases normally encountered during the cleaning of a sewer line. The hose and fittings shall be capable of withstanding a minimum of 3,000 pounds tensile load without damage. The length of the hose shall not change more than 1 percent as a result of changes in internal pressure in the range of 0 PSI to maximum pressure at the inlet end of the hose. The end of hose shall be provided with a fitting to accept lead hoses, nozzles and hose extensions. The hose shall have a bursting pressure of not less than 5,000 PSI and a proof test of 2,500 PSI. Each hose shall be hydrostatically tested to the proof test pressure.

3.3.2.2.4.1 Lead hose. A 10 foot minimum high pressure lead hose shall be furnished. The hose shall be of an easily visible color, such as yellow, and shall have fittings on each end that shall mate with the hose on the reel or with a nozzle. The lead hose shall be stored on the vehicle when not in use.

3.3.2.2.4.2 Hose guide shoe. A hose guide shoe with sectional (add-on type) handle shall be furnished. The design of the guide shoe shall facilitate entry of the nozzle and hose into sewers and shall protect the hose from sharp ends of sewer tile.

3.3.2.2.4.3 Hose repairing set. Hose repairing sets, a minimum of 10 sets as normally supplied with the pipe and sewer cleaner, shall be furnished. The 10 sets shall consist of five each hose menders (repairing) and five each terminal "hose end" hardware. The repairing set shall include any necessary tools required to repair the hose.

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3.3.2.2.5 Piping. All high pressure piping, both pipe and fittings, shall be designed for continuous operation at pressures up to the maximum output pressure of the water pump, with adequate provision for over pressure. All high pressure piping shall have a safety factor of not less than four to one. All suction and low pressure return lines may be of standard weight pipe and malleable fittings. Cast iron fittings shall not be used. The piping system shall be designed so as to facilitate complete draining of the entire system. The number of fittings and elbows shall be held to a minimum. The entire system, including the pump, shall be fitted with drains to drain the water for cold weather storage.

3.3.2.2.6 High pressure cleaning gun. A high pressure general purpose cleaning gun shall be provided. The gun capacity shall be not less than 3 1/2 GPM up to a maximum output pressure of 800 PSI. The cleaning gun shall provide discharge stream patterns ranging from a high to a low trajectory solid stream. A high pressure hose, 25 feet in length with 1/2-inch inside diameter, shall be provided for use with the gun. The hose shall be equipped with fittings for connections to the gun and to a high pressure water outlet. The gun shall be capable of being connected to and used with the vehicle high pressure water system to wash down the vehicle on the worksite. It shall not be possible to over pressure the cleaning gun with maximum engine RPM.

3.3.2.2.7 Nozzles. Unless otherwise specified in 3.3.2.2.7.1 or 3.3.2.2.7.2 below, all nozzles shall be stainless steel or hardened carbon steel.

3.3.2.2.7.1 Sand nozzle. A sand nozzle designed for use in sanitary and storm sewers with large build up of sand and gravel shall be provided. The sand nozzle shall be a 15 to 18 degree radial nozzle with replaceable jets. The sand nozzle need not be steel.

3.3.2.2.7.2 Penetrator nozzle. A 30 to 35 degree nozzle designed for rapid penetration of blockage shall be provided.

3.3.2.2.8 Spray bar. When specified (see 6.2), the truck shall be equipped with a spray bar (or nozzles) for the discharge of water or insecticides. Means shall be provided for controlling the spray bar. These controls shall provide, but not be limited to, means to start, control volume and stop the flow to the spray bar.

3.3.2.3 Vacuum system.

3.3.2.3.1 Debris tank. The debris tank shall have a minimum useable capacity of five cubic yards. It shall be designed to ensure protection from corrosion and to ensure strength with a minimum of internal baffles. Additionally the tank design and the configuration and placement of any baffles shall ensure continuous draining of collected water during emptying and cleaning of the tank. The tank shall have an indicator to display the level of water and debris contained within it. All intake and outlet piping shall allow water passage at a rate of not less than 250 GPM and shall allow the passage of not less than four inch diameter spherical solids. The tank shall have a hinged, full opening rear door and a hoisting mechanism for emptying, and shall also have a means of discharging liquids contained in the tank without opening the rear door. The tank shall be capable of being cleaned through the rear opening using the high pressure cleaning gun. It shall not be necessary for the operator to enter the tank for cleaning.

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3.3.2.3.1.1 Rear door and hoist. The door shall have a positive means of locking in the closed position and shall be capable of being locked and unlocked by the operator without the use of tools. When closed, the door shall effectively seal the tank and shall not leak when the tank is filled to capacity with liquid and/or debris at any temperature within the operating range of 3.1.3. The door shall be self opening so that the operator is not required to manually open the door or enter the path of liquid/debris discharge after the door has been unlocked. The hoist shall be a double acting hydraulic cylinder(s) and shall be capable of lifting the tank, when loaded with five cubic yards of debris as specified in 3.2.1, to an angle of at least 60°. The design of the sewer cleaner shall ensure stability of the vehicle during emptying of the debris tank.

3.3.2.3.2 Vacuum pump. The pump shall be capable of handling sludge, mud, gravel, seepage, grit, sewage and slime and shall be compatible with the rough usage encountered in manhole cleaning. It shall produce a suction pressure of not less than 90 inches of water and shall be capable of picking up material with a density of not less than 150 pounds per cubic foot. None of the picked up liquid and debris (50 micron or larger) shall pass through the pump. Any exhaust from the suction system shall vented up and away from the operator.

3.3.2.3.3 Suction tube and hose. Not less than 14 feet of pick up tube shall be furnished. The tube shall be in not less than two and not more than three sections, joined together with quick disconnects or one handle operated circular, overcenter clamps. Sufficient hose and elbows shall be provided to allow the pick up tube to be connected to the suction manifold and then positioned in a 14 foot deep manhole. The hose and manifold connection shall have sufficient flexibility so that the pick up tube can be positioned in a manhole located in front or to either the right or left side of the connection (120° minimum inclusive movement) by one person. The connection shall be such that if disconnection is necessary for debris tank emptying, the disconnection shall be accomplished without the aid of tools. The connection shall be self cleaning, self aligning and self sealing after tank emptying. Power assist, or counterbalance, shall be provided to aid in positioning the pick up tube. The effort required to position the pick up tube shall not exceed 80 pounds in any direction (x, y and z axes). The hose and pick up tube shall be not less than six inches in diameter.

3.3.2.4 Control panel. All gauges, switches, levers, valves and controls necessary for the operation of the unit shall be provided and placed in a fixed control panel. The control panel shall be located in a position to provide ease of operation and protection for the operator from moisture and debris encountered during normal operation of the vehicle. The controls and electrical components of the the truck mounted sewer cleaning equipment shall be protected from or resistant to moisture and debris encountered during normal operation of the vehicle and from environmental conditions.

3.4 Finish and protective coatings.

3.4.1 Painting. The entire exterior surface of the vehicle shall be painted with the manufacturer's standard commercial (see 6.6) polyurethane or acrylic urethane paint. The color of the finish coat shall be Forest Green, Color Number 24052 of FED-STD-595. These requirements shall supersede the painting

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requirements of KKK-T-2109.

3.4.1.2 Rustproofing. The level of rustproofing specified for the truck chassis in the KKK-T-2109 ordering data shall apply to the entire vehicle (i.e. to the truck chassis and the sewer cleaning unit). The first article unit shall not be rustproofed until after approval of the first article test report.

3.5 Markings and data plates. The vehicle shall be marked and data plates shall be furnished as specified in KKK-T-2109 paragraph 3.1.1.2 except that "US Air Force", the vehicle reg number and "For Official Use Only" are not required on the sides or rear of the vehicle. However, the vehicle reg number and contract number are still required on the vehicle data plate in accordance with MIL-STD-1223. Also, the vehicle reg number and contract number must be shown on the DD Form 250.

3.6 Part numbering of interchangeable parts. All parts having the same manufacturer's part number shall be functionally and dimensionally interchangeable.

3.7 First article. When specified in the contract or purchase order, a sample shall be subjected to first article inspection (see 4.4 and 6.4).

3.8 Fabrication.

3.8.1 Welders and welding.

3.8.1.1 Welders. All welders employed in the fabrication of the vehicle, except for commercial (see 6.6) components, shall be certified in accordance with the applicable requirements of B2.1-84 Welding Qualifications of the American Welding Society .

3.8.1.2 Welding. Welding procedures shall be in accordance with a nationally recognized welding code. The surface of parts to be welded shall be free from rust, scale, paint, grease and other foreign matter. Welds shall be of sufficient size and shape to develop the full strength of the welded parts. Welds shall transmit stress without cracking or permanent distortion when the parts connected by the welds are subjected to test, proof and service loadings.

3.8.2 Bolted connections. Bolt holes shall be accurately punched or drilled and shall be deburred. Unless torque is specified, threaded fasteners shall be tight and shall not work loose during testing or service usage.

3.8.3 Riveted connections. Rivet holes shall be accurately punched or drilled and shall be deburred. Rivets shall be driven with pressure tools and shall completely fill the holes. Rivet heads, when not countersunk or flattened, shall be of an approved shape. Rivet heads shall be full, neatly made, concentric with the rivet holes and in full contact with the surface of the component.

3.8.4 Gear and lever assemblies. Gear and lever assemblies shall be properly aligned and meshed and shall be operable without interference, tight spots, loose spots or other irregularities. Where required for accurate adjustment, gear assemblies shall be free of backlash.

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3.8.5 Cleaning. The vehicle shall be cleaned. Loose, spattered, or excess solder, welding slag, stray bolts, nuts and washers, rust, metal particles, pipe compound and other foreign matter shall be removed during and after final assembly.

3.9 Workmanship. The vehicle, including all parts and accessories, shall be constructed and finished in a thoroughly workmanlike manner. Particular attention shall be given to freedom from blemishes, defects, burrs and sharp corners and edges; accuracy of dimensions, surface finish and radii of fillets; thoroughness of soldering, welding, brazing, painting, wiring and riveting; marking of parts and assemblies; alignment of parts and tightness of assembly fasteners; etc.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. The contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified, the contractor may use any inspection facilities and services acceptable to the Government. Inspection records of the examinations and tests shall be kept complete and available to the Government. The Government reserves the right to perform any of the inspections set forth in this specification where such inspections are deemed necessary to assure that the vehicle conforms to the prescribed requirements.

4.1.1 Responsibility for compliance. All items must meet all requirements of sections 3 and 5. The absence of any inspection requirements in the specification shall not relieve the contractor of the responsibility of assuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling in quality conformance does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to acceptance of defective material.

4.2 Classification of tests. The inspection and testing of the vehicle shall be classified as follows:

- a. First article testing (see 4.4 and 6.4).
- b. Acceptance testing (see 4.5).

4.3 Test conditions.

4.3.1 Apparatus. Apparatus used in conjunction with the testing specified herein shall be of laboratory precision type and shall be calibrated at proper intervals to ensure laboratory accuracy.

4.3.2 Data. During all testing specified herein, at least the following data, unless not applicable, shall be recorded at intervals not to exceed 30 minutes. Additional data and/or shorter intervals shall be provided as appropriate for any specific test.

- a. Date.
- b. Time started.

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- c. Time finished.
- d. Ambient temperature.
- e. Engine speed.
- f. Engine oil pressure.
- g. Engine coolant temperature.
- h. Vehicle odometer reading at the start and finish of each test.
- i. Engine hourmeter reading at the start and finish of each test.

4.3.3 Preparation for tests. The vehicle, complete with all specified equipment, shall be fully serviced and all equipment shall be prepared for immediate operation.

4.3.4 Test rejection criteria. Throughout all tests specified herein, the vehicle shall be closely observed for the following conditions, which shall be cause for rejection:

- a. Failure to conform to design or performance requirements specified herein.
- b. Spillage or leakage of any liquid, including fuel, coolant, lubricant, or hydraulic fluid, under any operating condition, except as allowed herein.
- c. Structural failure of any component, including permanent deformation, or evidence of impending failure.
- d. Evidence of excessive wear.
- e. Interference between vehicle components or between the vehicle, the ground, and all required obstacles, with the exception of normal contact by the tires.
- f. Misalignment of components.
- g. Evidence of undesirable roadability characteristics, including instability in handling during cornering and braking.
- h. Conditions which present a safety hazard to personnel during operation, service, or maintenance.
- i. Overheating of the engine, transmission, or any other vehicle component.

4.4 First article testing.

4.4.1 First article test sample. The first article test sample shall be identical to the items procured under the terms of the contract. Approval of the first article test report shall not constitute a waiver by the Government of its rights under the provisions of the contract.

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4.4.2 First article tests. The first article tests shall consist of all tests listed under 4.6.

4.4.3 Test report. Upon completion of the first article tests, a first article test report shall be prepared in accordance with MIL-STD-831. An authorized Government representative shall countersign all data sheets and the report. The following shall be incorporated as a part of the test report:

- a. All data collected, failures, maintenance performed, and other events recorded. These shall be identified by accumulated operation time, miles, cycles or position in the test procedure, as appropriate. Test conditions at the time of failures or irregular operations identified shall be recorded.
- b. Summary of the engineering reasoning and of any tests conducted to determine assignable causes for all failures and irregular operations identified.
- c. Summary of the engineering reasoning behind any corrections made, to be made or proposed to be made and the predicted effectiveness of those corrections.
- d. Test activity and/or contractor comments on item features or requirements that, if modified, should improve the item.
- e. Test activity and/or contractor comments on field conditions or operating procedures to be avoided or cultivated to increase the reliability and useful life of the item.
- f. List of special tools and diagnostic equipment necessary to perform field level maintenance.

4.5 Acceptance testing. Acceptance testing shall be classified as follows:

- a. Individual testing (see 4.5.1).
- b. Random sample testing (see 4.5.2).

All defects identified shall be corrected prior to acceptance.

4.5.1 Individual testing. Each production vehicle shall be subjected to the tests specified in 4.6.1 and 4.6.2.

4.5.2 Random sample testing. Any production vehicle may be selected by the procuring activity at any time to be subjected to the examination described in 4.6.1 and the tests described in 4.6.4, 4.6.5 and 4.6.6. Upon completion of the random sample testing, the contractor shall prepare a test report in accordance with MIL-STD-831. An authorized Government representative shall countersign all data sheets and the report.

4.5.2.1 Random sample test failure. When a vehicle fails to successfully complete any random sample test, the cause of the failure shall be determined, corrective action shall be taken, and the test shall be repeated to verify adequacy of the corrective action. Tests not involving the defective

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component(s) may be continued pending the investigation of the failure. Vehicles to be delivered pursuant to the contract shall be inspected for all defects identified during all random sample tests and may not be accepted prior to verification of adequacy for the corrective action for a random sample test failure.

4.6 Test methods.

4.6.1 Examination of product. The vehicle shall be inspected to determine compliance with the requirements specified herein. Particular attention shall be given to materials, workmanship, dimensions, surface finishes, protective coatings and their application, welding and riveting and markings. For the first article and random sample vehicles, this examination shall be accomplished by use of a checklist which lists each requirement not validated by a test and the results of the examination.

4.6.2 Preliminary operation. Sewer cleaners produced in fulfillment of the contract or order shall be completely assembled, adjusted, lubricated and otherwise serviced for operation. A run-in test shall be conducted for each machine, before delivery, in accordance with the manufacturer's recommendations. During this operational test, all controls, adjusting mechanisms, brakes, hydraulic systems and other accessories shall be operated sufficiently to ensure against restrictions or malfunctions. Failure to pass any phase of this test shall be cause for rejection.

4.6.3 Pump test. It shall be demonstrated that the pump for the high pressure water system conforms to all requirements of 3.3.2.2.2.

4.6.4 High pressure water system test. The sewer cleaning unit shall be used to propel the high pressure hose through pipe. A cleaning nozzle shall be attached to the hose and the hose guide shoe shall be used as necessary to position the hose in an actual sewer pipe. The hose shall be propelled by the high pressure water system through the pipe for a minimum distance of 800 feet and shall then be retrieved using the hose reel. It shall also be demonstrated that the hose reel can be operated manually.

4.6.5 Suction test. The vacuum system shall be used to clear a simulated manhole or catch basin of water and debris. The manhole or catch basin shall be a minimum of 11 feet deep and shall have debris and a minimum of four feet of standing water. The debris shall consist of not less than 1 cubic yard of sand, 36 water filled cans (soft drink size), 24 bottles (soft drink size), and 2 cubic yards of varying size rock. The average weight of the rock shall be 150 pounds per cubic foot minimum, and it shall start as sand size and vary up to rock which is a minimum of four inches in diameter. A minimum of 12 percent by weight of the rock shall be three inches in diameter or larger. The unit shall be operated by one person who shall position the pick up tube and, by suction, remove debris and liquid until the tank is full. The tank may be drained of liquid from time to time as necessary to provide room for the debris. The sewer cleaner shall remove all water and debris in not more than ten minutes. During the test, the pick up tube shall be submerged and at times it shall be allowed to "slurp". During either of these methods of pick up, the unit shall continue to operate without losing suction.

4.6.5.1 Suction pressure test. The suction pressure generated by the vacuum

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pump shall be measured at the connection between the pick up tube and the suction manifold to determine conformance to 3.3.2.3.2.

4.6.6 Road test. The fully loaded vehicle, including a full payload as described in 3.2.1, shall be driven for a distance of not less than 50 miles over paved road at speeds up to 55 miles per hour (mph). The fully loaded vehicle, including payload, shall then be driven over unimproved roads for a distance of not less than 25 miles at speeds up to 25 mph. Any evidence of instability during handling and cornering and braking or of any undesirable roadability characteristics shall be cause for rejection.

4.6.7 Sound level testing.

4.6.7.1 Cab interior sound level test. The vehicle shall be tested to determine conformance to the cab interior sound level requirement of 3.1.6.1. The vehicle shall be operated as specified by paragraph 5.1.2.3.1.1 of MIL-STD-1474. The test environment, instrumentation and microphone location shall be as specified in MIL-STD-1474 paragraphs 5.1.2.5.1 through 5.1.2.5.3.1.4.

4.6.7.2 Exterior sound level test. The vehicle shall be tested to determine conformance to the exterior sound level requirement of 3.1.6.2. The sound level shall be measured in accordance with the criteria and parameters of paragraphs 5.3.1 through 5.3.2 of MIL-STD-1474.

4.6.7.3 Equipment operation sound level test. The vehicle shall be tested in accordance with SAE J1096 to determine conformance to the equipment operation sound level requirements of 3.1.6.3. The microphone shall be positioned 4 ft above the ground plane and 50 ft from the centerline of each major vehicle surface (front, left side, right side and rear) in lieu of the microphone location described in paragraph 3.3 of J1096. Also, the mounted sewer cleaning equipment shall be operated through two complete cycles for each major surface in lieu of the test procedure described in paragraphs 4.1 through 4.1.4 of J1096. A complete cycle of operation shall be defined as paying out and retrieving the entire length of the hose by using the sewer cleaning equipment and simultaneously operating the vacuum system and pick up tube at a manhole or catch basin. Debris need not be present in the manhole or catch basin during the test. Additionally, the test shall be repeated with the microphone located at the operator's ear level, and at a horizontal distance of approximately six inches from his ear, while he is operating the equipment.

4.6.8 Weight distribution test. The weight on each corner of the vehicle shall be measured with the unit standing on a flat level surface, both in the empty and fully loaded conditions, to demonstrate compliance with 3.1.4. The fully loaded vehicle shall include ballast to simulate a 250 pound crew member in each seating position and payload as described in 3.2.1.

4.7 Refurbishment. After successful completion of all required testing, the vehicle shall be restored to "like new" condition. The unit shall be comparable in appearance and function to a unit which has just come off the assembly line. Any component which is scuffed, scratched or damaged during testing shall be repainted or repaired and made to look like new. If it cannot be made to look like new, it shall be replaced with a new item."

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5. PREPARATION FOR DELIVERY

5.1 Preparation for delivery shall be in accordance with the terms of the contract.

6. NOTES

6.1 Intended use. The vehicle covered by this specification is intended for general preventive maintenance cleaning of sewers and storm drains with water at high pressure. The vehicle can also be used to clear clogged sewers and storm drains and vacuum manholes, catch basins and septic tanks.

6.2 Ordering data. Procurement documents should specify the following:

- a. Title, number, and date of this specification.
- b. Any ordering data as required by KKK-T-2109 (see 3.3.1).
- c. If a spray bar is required (see 3.3.2.2.8).

6.3 Consideration of data requirements. The following data requirements should be considered when this specification is applied on a contract. The applicable Data Item Descriptions (DID's) should be reviewed in conjunction with the specific acquisition to ensure that only essential data are requested/provided and that the DID's are tailored to reflect the requirements of the specific acquisition. To ensure correct contractual application of the data requirements, a Contract Data Requirements List (DD Form 1423) must be prepared to obtain the data, except where DOD FAR Supplement 27.475-1 exempts the requirement for a DD Form 1423.

Paragraph No.	Data Requirement Title	Applicable DID No.
4.3.2, 4.4.1, 4.4.3, 4.6.1, 4.6.2, 4.6.3, 4.6.4, 4.6.5, 4.6.5.1, 4.6.6, 4.6.7, 4.6.8.	First Article Inspection Report	DI-NDTI-80809A
4.5.2, 4.6.1, 4.6.4, 4.6.5, 4.6.6.	Random Sample Inspection Report	DI-NDTI-80809A

6.4 First article. When first article inspection is required, the contracting officer should provide specific guidance to offerors whether the item(s) should be a first article sample, a first production item, or a standard production item from the contractor's current inventory and the number of items to be tested as specified in 4.4. The contracting officer should include specific instructions in acquisition documents regarding arrangements for examinations, approval of first article test results and disposition of first articles. Invitations for bids should provide that the Government reserves the right to waive the requirement for samples for first article inspection to those bidders offering a product which has been previously acquired or tested by the Government, and that bidders offering such products, who wish to rely on such production or test, must furnish evidence with the bid that prior Government approval is presently appropriate for the pending contract.

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6.5 Subject term (key word) listing.

High Pressure
Vacuum
Cleaner
sewer
Catch Basin

6.6 Definitions.

6.6.1 Commercial. A manufacturer's standard (product or process) having been marketed, in production and sold in substantial quantities to the general public for a minimum of one year prior to the date of invitation for bid or request for proposal. An item is "sold in substantial quantities" only when the quantities regularly sold are sufficient to constitute a real commercial market. Nominal quantities such as models, samples, prototypes or experimental units do not meet this requirement. The "general public" is a significant number of buyers other than the Government or affiliates of the offeror; the item involved must not be for Government end use. For the purpose of this specification items acquired for "Government end use" include items acquired for foreign military sales.

MILITARY INTERESTS:

Custodians

Air Force - 99

Review Activities

Navy - YD

PREPARING ACTIVITY:

Air Force - 84

Project Number 2320-0597

FSC 2320

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

INSTRUCTIONS

1. The preparing activity must complete blocks 1, 2, 3, and 8. In block 1, both the document number and revision letter should be given.
2. The submitter of this form must complete blocks 4, 5, 6, and 7.
3. The preparing activity must provide a reply within 30 days from receipt of the form.

NOTE: This form may not be used to request copies of documents, nor to request waivers, or clarification of requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements.

I RECOMMEND A CHANGE:

1. DOCUMENT NUMBER

2. DOCUMENT DATE (YYMMDD)

3. DOCUMENT TITLE

4. NATURE OF CHANGE (Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.)

5. REASON FOR RECOMMENDATION

6. SUBMITTER

a. NAME (Last, First, Middle Initial)

b. ORGANIZATION

c. ADDRESS (Include Zip Code)

d. TELEPHONE (Include Area Code)

7. DATE SUBMITTED (YYMMDD)

(1) Commercial

(2) AUTOVON
(If applicable)

8. PREPARING ACTIVITY

a. NAME

b. TELEPHONE (Include Area Code)

(1) Commercial

(2) AUTOVON

c. ADDRESS (Include Zip Code)

IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT:
 Defense Quality and Standardization Office
 5203 Leesburg Pike, Suite 1403, Falls Church, VA 22041-3466
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