

## REQUEST FOR PROPOSALS

All information outlined in the RFP, along with any other pertinent facts necessary for a proper evaluation of this proposal, should be ascertained from:

City of Springfield  
Jimmy Hamill, Fire Chief

The City of Springfield TN reserves the right to waive any and all irregularities, refuse any or all proposals, and award the bid that is in the best interest of The City of Springfield TN. The City of Springfield TN specifically reserves the right to reject any and all proposals and will normally reject those which make it impossible to determine the intent or cost of the proposal. The City of Springfield TN reserves the right to take adequate time to examine and evaluate all proposals before a decision is made and announced.

Proposals shall be presented in a sealed envelope prior to the given deadline. Proposal number must be listed on the outside of the envelope.

## ENGINEERING SPECIFICATIONS

The following bid proposal includes all engineering specifications, installation, training, service and warranty for an Emergency Vehicle Exhaust Extraction System. **Any deviations from this specification must be noted. Lowest priced equipment may not be approved if not considered to be equal and not in the best interest of the end user.**

- 1) The function of the vehicle exhaust removal system will be to source capture 100% of the exhaust emissions directly at the tail pipe of the vehicle and exhaust those emissions to a specified area safely outside the building.
- 2) The exhaust system must not interfere with access to the vehicle, nor impede doorways/walkways/or exits that would endanger the welfare of fire personnel. Drooping loops of hose or the hose assembly touching the floor will not be permitted.
- 3) As safety to personnel is of the utmost importance, the system shall be so designed as not to whip or fly back into quarters upon disconnection. Vehicles shall be capable of exiting quarters at normal speed without causing damage to the system or taking any portion of the hose or nozzle assembly along with the exiting vehicle.
- 4) The fan shall automatically start prior to vehicle ignition.
- 5) The exhaust system must move with the vehicle in a forward or reverse direction of travel and have an automatic release design without any positive locking device or air bladder that clamps or binds to the tail pipe. **No system that uses the vehicles tailpipe, as a pulling force will be considered.**
- 6) The exhaust system shall utilize a minimum 6" diameter hose in order to insure that the exhaust system can accommodate vehicle apparatus checks; and not limited to just emergency departures. Any smaller hose does not offer the required cross sectional area considered adequate for the volume of hot exhaust fumes discharged during extended run times required during routine vehicle check procedures.

- 7) Each bid must be accompanied by a set of detailed specifications, which describe the proposed System and equipment in the same sequence as this advertised specification for ease of comparison.
- 8) The exhaust system shall attach directly to the tail pipe. A general room ventilation method or ceiling-mounted air cleaner shall not be accepted. Only a source capture system protects the firefighter from harmful diesel fumes.

### **SYSTEM OPERATION**

Upon emergency dispatch of the vehicle, the exhaust fan shall automatically start prior to the engine being energized (through a transmitter in each vehicle that is tied to the engines auxiliary key switch). The exhaust fan will remain on as long as any engine is running. Upon vehicle exit, the hose assembly remains connected to the tail pipe and automatically disconnects at a specified distance outside the door by de-energizing the electromagnet when the trolley goes over a sensor release. The nozzle and hose assembly shall smoothly separate from the vehicle and safely retract to the stored position ready to connect to the vehicle upon reentry. Upon disconnection, the hose assembly shall not be permitted to swing wide or touch the floor, possibly endangering personnel or apparatus. The hose shall remain at the door, ready for reconnection. Once the apparatus has left the building, the fan will automatically shut down after a preset time interval.

Upon return, the fan is automatically activated prior to vehicle entry through the control panel receiving the RF transmitter signal; and the nozzle is connected to the tail pipe in a standing position. **Bending over to connect the exhaust system and expose the operator to harmful exhaust fumes is not permitted.** No positive locking device or moving parts shall be permitted to be connected to the tail pipe. After the vehicle has been turned off, the fan will continue to operate for 30 seconds.

### **SCOPE OF WORK**

- 1) A licensed and insured TN Contractor with S Pollution Equipment / Installation Control Certificate shall furnish and install a Source Capture Emergency Vehicle Exhaust Extraction System as designed and specified for the station(s).
- 2) The TN Contractor shall provide and install a centrifugal exhaust fan with capacity for all connected vehicles and sized for expansion if specified.
- 3) The TN Contractor shall provide and install an automatic fan start control console. The control console and all internal components shall be UL listed and manufactured in accordance with UL standard 508A and bear the UL label.
- 4) The TN Contractor shall provide and install all ductwork.
- 5) The TN Contractor shall be responsible for the delivery, safe storage, and handling of the products and protect them from weather elements.

### **EQUIPMENT**

The equipment specified herein shall be a standard product of Nederman, Incorporated.

### **OVERHEAD TRACK ASSEMBLY (Station 1: 6 MagnaTracks, 6 bays all back-in)**

The guide track supports and stores the horizontal hose and is mounted overhead and to the side of the vehicle. Mounted to the guide track is a 6.2 inch diameter flexible hose with individual inner trolleys, which ride inside the guide track and permit the flexible hose to expand and contract while the vehicle is moving. This concept shall prevent any continuous hanging or drooping loops of hose, which could obstruct or hinder movement of people or vehicles in the work place. Each horizontal guide track shall be provided with an adjustable self-aligning clamping bracket to support and connect the guide track to the installation brackets. The guide track can be mounted from 12 inches to 20 inches from the side of the vehicle to keep the hose tight to the vehicle and allow the apparatus floor to be free of unnecessary obstructions or hazards.

### **EXTRACTION TROLLEY ASSEMBLY**

The Extraction Trolley Assembly serves as the component in the Rail System that travels in the suction rail, carries and supports the vertical hose assembly, balancer, current collectors, shock absorber and trolley stop mechanism. The Extraction Trolley body shall be made of light weight composite with a low friction surface on each side to enable the trolley to travel smooth through the rubber seal. Also, on a formed bracket mounted to the composite body, shall be a Disconnection box, acting as a circuit breaker for the Electro Magnet. The rail design must be capable of handling up to 4 vehicles parked in tandem for future needs.

### **BALANCER**

Integrated to the Extraction Trolley Assembly is a Balancer. The adjustable tension Balancer shall retract the hose and nozzle away from the vehicle as it leaves the building and safely suspend the assembly off the floor in the storage position when not in use. The Balancer shall have a spring characteristics that ensure that the cord is wound onto the drum at a safe and constant speed.

### **VERTICAL HOSE**

The Upper Vertical Suction Hose shall be 6.2" in diameter, and of suitable flexibility to have a compression ratio of minimum 8:1. The hose material shall be Trevira fabric covered with HYPALON (CSM, Chloro-sulfonated polyethylene). The hose shall be fire resistant according to DIN 4102 B1. The hose shall be capable of withstanding temperatures of 340 degrees Fahrenheit continuously, up to 370 degrees Fahrenheit on an intermittent usage basis. (NOTE: If a 'closed type sealed system' is being used, the temperature ratings must be 680°F and 740°F respectively.) ***(Exhaust hoses that are laminated neoprene-coated polypropylene fabric with wire helix structure shall not be accepted.)*** The helix shall be external and made of aluminum. The helix shall have high flexibility and the fabric able to withstand oil, chemical, ozone and weather resistance.

### **NOZZLE**

The High Level (HL) Nozzle opening shall be a minimum of 8" diameter and designed to capture 100% of the vehicle exhaust fumes generated at the vehicle tail pipe and is held in place by an electromagnet mounted on the HL handle. The exhaust hose shall be 6.2" in diameter, and 6 feet long with a 6:1 compression ratio. These hose properties are critical to the HL operation, since stack heights vary, and the Nederman hose is flexible enough to attach to multiple heights. Also, the HL nozzle permits an ambient air mix in the air stream to immediately reduce exhaust emission temperatures up to 50% at the point of capture. The reduced air stream temperatures prolong component life by not permitting thermal breakdown of materials. The HL Nozzle shall be designed so as not to cause or create back pressure on any vehicle engine, nor draw raw diesel- or gasoline fumes into the exhaust hose while connected to a non-operating vehicle, nor create the possibility of spinning a non-lubricated turbo which could result in bearing failure.

In a 'closed type sealed system', a pressurized container is created presenting an explosive potential when drawing raw fumes from a non-operating vehicle and all system electrical components must be of explosion proof design. **No closed system will be considered.** These conditions are non-existent with an ambient air mix nozzle design.

The HL Nozzle shall be constructed of both metal and rubber, with no internal movable parts related to the connection of the Nozzle to the stack. The HL Nozzle is used in conjunction with the Nederman anchor plate. The hose material shall be lightweight coated fiberglass with a smooth bore. **Tail pipe adapters are not permitted nor required. No positive locking devices or a concept of a positive locking device, pneumatics, internal or external air hoses, wires, airbags, valves or precautionary devices for pneumatic bursting pressure shall be permitted or allowed.**

## **ELECTROMAGNET ASSEMBLY**

An electromagnet shall be used as the means of keeping the nozzle and hose assembly attached to the vehicle, whether at rest or as it moves to the point of exit. The electromagnet shall be 24 volts, DC with power supplied via an insulated conductor encapsulated within the helix of the upper hose. The electromagnet assembly shall consist of a nitro carburized electromagnet disc, a manual override switch, and an anchor plate. The electromagnet disc assembly shall be slightly recessed to serve as a guide for ease of connection to the anchor plate mounted on the vehicle and serve as the energized contact point. The formed collar shall be of a smooth and rounded configuration to prevent hooking or catching on external devices of the vehicle.

A manual override switch shall be easily accessible to disconnect the hose assembly while accessing storage compartments or performing vehicle maintenance. The manual override switch shall be conveniently mounted facing the operator. The purpose of the switch shall be to manually de-energize the electromagnet, allowing the hose and nozzle assembly to come away unrestrained from the vehicle when in the parked position within the building. The 24-volt UL switch shall be surrounded and mounted in a closed cell water resistant neoprene jacket.

The Anchor Plate shall be mounted on the vehicle (or on the stack with a U-bolt and Nederman anchor plate holder) to allow the operator, in an upright position, to connect the electromagnet. The Anchor Plate shall have an outer circular isolated holder made of hard resilient plastic. Recessed in the center of the holder shall be a finished, Nedox treated steel disc to receive the electromagnet. The Anchor Plate shall be positioned on the vehicle in relation to the vertical and horizontal centerlines of the stack outlet.

## **DISCONNECTION SWITCH**

Affixed to the Rail near the exit door, shall be a permanent magnet, which in conjunction with the disconnection box causes a 24-volt electromagnet to disconnect the hose assembly from the vehicle. The separation of the entire hose assembly from the vehicle is a one step process whereby no stress or strain is transferred from the vehicle to the exhaust hose or overhead brackets. Numerous mechanical functions to achieve nozzle separation such as valve activation, pneumatic deflation, and pulling forces to remove the nozzle from the tail pipe are not permitted. The disconnection switch shall be adjustable to create a nozzle release point at a specified distance as the vehicle exits the building. If a proper disconnect does not occur, the electromagnet has a built-in safety disconnection feature, which releases it with a 50-pound shear force. Then the hose and nozzle assembly remains intact. With other systems utilizing a mechanical or pneumatic direct connection to the tail pipe, a breakaway system is required to prevent the entire hose assembly from leaving the building with the vehicle.

## **END STOP**

The Rail shall be equipped with an End Stop, one for each Trolley, which is designed to stop the travel of the entire hose, nozzle, and balancer assembly. The stopping action itself must be spring cushioned to prevent the assembly from coming to an abrupt and immediate halt at an exit speed of up to 15 mph. The End Stop consists of a coiled spring hydraulic oil damper, which is located in the front end of each Suction unit.

## **FAN AUTO-START**

The Fan Auto-Start serves to act as a remote control for fan start up to ensure the exhaust system is always running whenever an emergency vehicle is in operation. Upon dispatch, the exhaust fan shall automatically start and be running at full rpm prior to engine start up via a radio frequency transmitter mounted within the vehicle. The fan stays on as long as any vehicle is in operation. Upon vehicle exit or shut down, a variable timer then activates and the fan automatically turns off after a variable timed cycle. Upon vehicle return, the transmitter shall automatically activate the exhaust fan prior to the vehicle entering the building. The fan remains in operation until all vehicles are turned off and the timer then activates. The Control unit shall be FCC-approved and shall not interfere with radio communications garage doors or on board computers.

## **CENTRIFUGAL FANS**

The fan shall be a direct drive centrifugal type, high pressure, single width, single inlet as required or indicated. Impeller wheels shall be of a modified radial tip design, with top forward curve and airfoil thickness configuration characteristics. Impeller wheels shall be spark resistant and made of aluminum to prevent static electricity build up. The impeller shall be dynamically and static balanced, and of the non-overloading type to provide maximum efficiency while achieving quiet, vibrations free operation. The fan housing shall be manufactured from cast aluminum. The fan and motor assembly shall be mounted on a galvanized steel frame, which shall protect the motor, while also serving as a mounting platform for field installation.

For fans 5 HP and larger, centrifugal fans shall be fully enclosed, single-width, single-inlet steel construction as required or indicated. Impeller wheels shall have backward inclined or backward curved blades of the non-overloading type. The bearings shall be self-aligned ball bearing type permanently sealed and lubricated. Fan shafts shall be steel and rotate in a non-sparking aluminum rubbing ring. Fans shall be accurately finished, and shall be provided with key and key seats for impeller hubs and fan pulleys. The fans shall be furnished with factory finish protective weather coating and a drain kit. The motor shall be totally enclosed fan cooled (TEFC). Motor starters shall be magnetic with general-purpose enclosures. The fan shall be structurally supported and provided with vibration isolators as specified to ensure quiet and smooth operation. The exhaust discharge outlet shall be in compliance with ACGIH recommendations and EPA requirements. Air intakes, windows, cascade systems, prevailing currents, communications equipment and building aesthetics will be considered in the final location of the fan. Exhaust filtration systems will be provided upon request and silencers will be provided when needed. All fans are tested in accordance with AMCA Standards in an AMCA approved test facility.

## **AIR FLOW PERFORMANCE**

Fan capacity shall be sized as such as to deliver a minimum of 700 cfm (or as otherwise specified) at each hose drop to the vehicle being served. The exhaust system shall pull exhaust into the nozzle also inducing ambient air. The system shall be designed entirely for a negative pressure vacuum method of exhaust extraction. At no point in exhaust system will ducting be under positive pressure. Exhaust system hose drops shall be sized to maintain equal or larger cross sectional diameters than vehicle tailpipe. Exhaust systems, which do not size hose drops in accord with the vehicle engine capacity, as well as vehicle tailpipe diameter, shall not be accepted. The purpose of this portion of the specification is to insure that the exhaust system is designed to cool down exhaust as they are conveyed to the outside of fire station. This type of exhaust extraction keeps exhaust temperatures well below their designed temperature tolerances. This also prevents thermal break down of hose material thus adding years to system life. Exhaust systems that size exhaust drops without dilution ventilation and also down size the exhaust connection hose, unnecessarily put the vehicle engine warranty at risk. The delivered volume shall take into account all lengths of ductwork, elbows, and branches, shut off, wyes, etc., which accumulate the static pressure at the fan inlet. Manufacturer provided fans shall be performance guaranteed.

## **DUCT SYSTEM**

### **DUCT WORK**

Ducts, unless otherwise specified or approved, shall be round and conform to the dimensions as shown on the drawings. Ducts shall be straight and smooth on the inside with airtight joints. Wherever ducts are used with crimped ends, the joint shall have crimp and bead arrangement. The bead shall provide a rigid stop for the mating open end to seat. Ducts shall be constructed of galvanized steel and sealed in accordance with standard SMACNA methods, for the system designed negative pressure in inches wg. All duct joints to sealed and air tight.

### **DUCT FITTINGS**

Reducing fittings shall have a minimum of 1" graduating increase in diameter per 8" in length. Elbows up to 12" in diameter shall have a centerline radius of not less than 1.5 times the diameter. Elbows beyond

12" in diameter shall have a centerline radius of not less than 2.5 times the diameter. Branches shall enter the mains at a specified angle of not less than 30° with the centerline of the main duct in the direction of airflow, unless otherwise indicated or approved. Flexible connections to the main or branch duct shall be braced with approved metal straps or members.

## **CONNECTIONS**

Where duct of dissimilar metals are connected, or where sheet metal connections are made to fan inlet and outlet, only an approved fireproof flexible connection shall be used. The connection shall be installed and securely fastened by zinc coated steel clinch type draw bands for round ducts.

## **FRAMED OPENINGS AND DUCT SLEEVES**

Duct sleeves shall be provided for all round ducts  $\leq 15$ " diameter that pass through floors, walls, ceilings, or roofs. Sleeves in non-load bearing walls shall be fabricated of 20-gauge steel conforming to ASTM A 525. Sleeves in load bearing walls shall be fabricated of standard weight galvanized steel pipe conforming to ASTM A 53. Collars for round ducts  $\leq 15$ " shall be fabricated from 20-gauge galvanized steel. Round ducts  $> 15$ " in diameter passing through floors, walls, ceilings, or roofs shall be installed through framed openings. Structural steel members for framed openings shall conform to ASTM A 36. Framed openings shall provide a 1" clearance between the duct and the opening. A closure collar of galvanized steel  $\geq 4$ " wide shall be provided on each side of the walls or floors where sleeves or framed openings are provided.

## **STACKHEAD**

The exhaust discharge stack head will be a no loss type as recommended by ACGIH or as otherwise specified. The stack head design will protect against weather elements or introduction of debris.

## **DUCT TEST HOLES**

Test holes with covers shall be provided where indicated or directed, in the duct and plenum to insert Pitot tubes to take air measurements for balancing the air moving system if required.

## **INSTALLATION**

### **EXHAUST SYSTEM**

The exhaust removal system shall be installed as indicated and recommended by the manufacturer. Welding and brazing shall conform to ASME-17. Slip joints shall be sealed. Riser duct shall be supported to the structure as indicated on the drawings. Main duct shall be attached to building structural members.

### **BUILDING SURFACE PENETRATIONS**

All penetrations shall be sealed. Sleeves or framed openings shall be utilized where duct penetrates building surfaces. The space between the sleeve or framed opening and the duct shall be packed with mineral wool or approved material. Closure collars shall be installed around the duct on both sides of the penetrated surface. Collars shall fit tight against the building surfaces and snug around the duct.

## **GUIDE TRACK**

Installation height of Guide Track shall be between 10' to 16' range or as otherwise indicated on the drawings. The Guide Track shall be installed approximately 14" from the side of the vehicle and  $\geq 12$ " away from the side edge of the exit door. The Guide Track for the exhaust system shall include corrosion resistant brackets for ease of mounting to structural channel, trusses, or angle iron. Brackets shall be a minimum of 0.125" thickness. Mounting bolts to be no less than 0.375" diameter (structural grade 8) for connection to steel frame. Bolts required for masonry installation shall be 0.5" x 3.5" expansion bolts, or 0.375" x 4" sleeve anchors for wall mount masonry connection. Recommendation: Unistrut 1 5/8" or Angle Iron 2"x 2"x 3/16".

## **TESTS**

Each exhaust system and inlet shall be balanced to produce the indicated air quantities within 10 percent at the conditions shown. Any fans with bearings shall be lubricated, and the speed, direction and rotation of each fan shall be checked and verified as running correctly. The running current of each motor shall be checked and verified as correct. Upon completion and prior acceptance of the installation, the exhaust system shall be tested at the operating conditions to demonstrate satisfactory functional and operating efficiency. The TN Contractor shall provide all instruments, facilities, and labor required to properly conduct the tests.

## **TRAINING**

The TN Contractor, or authorized approved personnel, shall provide training to the Owner (or appointed representative) in the daily use of and maintenance of the vehicle exhaust removal system installed and specified herein.

## **QUALITY ASSURANCE**

All workmanship, manufacturing procedures, airflow design, and materials shall be tested and performance guaranteed.

## **EQUIPMENT WARRANTY**

The Manufacturer and TN Contractor shall guarantee **all materials, equipment, labor, freight for a period of three (3) year from date** of final acceptance of the complete job, against original defects of material and workmanship, or excessive wear or deterioration. Heat damage is not included.

## **SUBMITTALS**

The following submittals and code compliance shall be required;

- 1) Written proposal
- 2) Product brochures (tracks, fans)
- 3) TN License with S Pollution Equipment / Installation Control
- 4) Employee safety training documentation
- 5) 3 Year Warranty, stating all material, labor, freight included