

## **SECTION 233516.00 - ENGINE EXHAUST SYSTEMS**

### **PART 1 - EXTRACTION SYSTEM OVERVIEW**

#### **1.1 DESCRIPTION OF WORK**

- A. The exhaust system shall be designed to vent 100 % of exhaust gases and particulate safely to the outside of the fire station. The exhaust system shall be designed and installed by factory trained and authorized personnel, certified by the manufacturer of the exhaust system. Manufacturers shall be required to have a minimum of five years of proven manufacturing experience in the manufacture of emergency vehicle exhaust extraction equipment.
- B. The department shall be able to use the exhaust system for performing engine and pumper checks indoors.
- C. System must be designed for high temperature vehicle exhaust fire rescue applications. The system shall automatically activate, disconnect, shutdown, and reactivate upon return without human intervention.
- D. Exceptions and Variances from any of the specifications outlined in these bid specifications must be acknowledged and listed on a sheet attached to your bid. Failure to list and acknowledge exceptions to the specifications will result in rejection of the bid.

#### **1.2 QUALITY STANDARD ASSURANCE AND EXPERIENCE:**

- A. All standards of quality are meet and adhered to: UL, NFPA, AMCA, IMC, ASME, UMC, NEC and all local and state building codes. A current ISO-9001-2008 certificate must be included in the bid package from the manufacturer of the system.
- B. Independent System testing information documenting the overall the effectiveness of the proposed system in a fire hall must be available.
- C. References: At least 10 recent fire station references in the state within the last five years a list must be included to verify experience in the fire/ rescue market. References are only to be provided for the specific equipment and model number being proposed for this project. Contact information shall be provided upon request.
- D. Manufacturing Experience: Companies that have 5 or more years of manufacturing experience of automatic vehicle exhaust removal systems for the fire/ rescue market are preferred.

- E. Installing Contractor must show experience of installing vehicle exhaust removal systems in the fire rescue industry.

### **1.3 SYSTEM DESCRIPTION**

- A. The exhaust system shall be a source capture system designed to handle exhaust fumes from diesel engines. The system shall address a total of 6 capture points housed in 1 Stations of the Springdale Fire Department. Fans shall be large enough to provide a minimum of 650cfm per vehicle. System shall be designed to provide as much flexibility as possible. Tailpipe Adapters shall be of similar size throughout. Installation must be neat and clean using best material available.
- B. Three bays shall feature drive thru rails 70 foot in length that can expanded to include more vehicles at a later date, if desired.
- C. Three bays are for back in vehicles that can be address with a rail or track system that does not have hose loops or dips in hose that interfere in aisles.
- D. A source capture swing arm assembly shall be included as a seventh pick up point for exhaust from small engines

### **1.4 AIR VOLUME AND FAN REQUIREMENTS**

- A. The exhaust fan for each facility shall provide a minimum of 650 cfm per vehicle at 6.0 inches static pressure loss. Motor/ Blower curve performance information from the manufacturer must be provided with the bid document showing air handling capacity at various static pressure losses.
- B. Exhaust system hose drops shall be the same cross sectional diameter as the vehicle tailpipe or greater. Also, exhaust system shall maintain CFM that matches the cfm of the vehicle engine exhaust when running at 1500 RPM. Hose drops that do not match or exceed the size of the tailpipe and the cfm of the engine's exhaust shall not be accepted.
- C. The fan shall be a backward incline fan made from continuous welded construction. Fan housings that are screwed together or riveted are not acceptable. Fans shall be tested and balanced prior to installation, be manufactured in an ISO Certified Facility in accordance to AMCA Certification Standards. A safety disconnect in the vicinity of the blower fan motor must be provided.

### **1.5 TURNKEY INSTALLATION**

- A. Complete exhaust system installation including the exhaust fan, control box, ductwork, track, hose and nozzle connection must be completed. All electrical work from the panel out is included in this scope of work. Tailpipe modifications from the muffler out that are required to ensure proper system operation are to be included in the scope of the

work. All duct material installed shall conform to existing Class II SMACNA Standards. An appropriate rain cap shall be provided on the building exterior.

- B. All system components shall be labeled with manufacturer identification.
- C. Installation of Exhaust System shall be accomplished by a factory trained and authorized installation team that specializes in the business of installing emergency response exhaust systems. Name of installation firm must be indicated in the bid document with exhaust removal system experience provided.

## **1.6 NOZZLE ATTACHMENT**

- A. The Exhaust Capture System must provide complete, 100% exhaust removal at the source from vehicle start up to exit of the apparatus from the station. In no event shall the nozzle allow for the potential escaping of diesel exhaust into the bay area. A check valve is required to stop contaminant from escaping into the bay area. It is a requirement of this bid that the system be capable of capturing 100% of exhaust gas and particulate even in the event the fan does not activate. Any nozzle that does not seal completely seal 100% around the tailpipe will not be accepted.
- B. The exhaust system shall be attached to the vehicle within 3 feet of the door threshold.
- C. The system shall be designed so that attachment to exhaust hose is accomplished by the operator standing erect and with one simple motion to connect system to the vehicle.
- D. A rigid lower hose section with handle shall be provided to allow for easy hose connection.
- E. The nozzle shall allow for the introduction of ambient air to significantly cool the air stream inside the hose and prolong the life of the equipment. Any system that does not seal around the tailpipe and allow for cool ambient air introduction shall be eliminated.
- F. All adapters and nozzles shall be of similar size to allow vehicles to freely move from bay to bay. Any Nozzle adapter shall not exceed 7-inch diameter to allow adequate ground to tailpipe clearance.
- G. Tailpipe adapter and nozzle must have inlet that is 5 inches or greater so, exhaust airflow is not impeded. Nozzle to flex hose elbow transition must also be 5 inches or larger to maximize airflow.

## **1.7 NOZZLE RELEASE AND MATERIAL**

- A. The release of the nozzle shall occur by a forward motion of an apparatus. The separation shall be accomplished by a simple mechanical release. Systems requiring support systems for nozzle separation such as pneumatics or electronics are discouraged.

- B. The disconnection of the hose shall not be speed dependent and have a balancer that helps lift the exhaust nozzle off the vehicle tailpipe. The nozzle must separate from the tailpipe at the same point each time regardless of the speed of the vehicle.
- C. Any auto-release system that is speed sensitive requiring the driver to modify the exit speed to control the nozzle release shall not be accepted. Any nozzle requiring trip switches and support systems such as compressed air or electrical support to operate or release are discouraged.
- D. Release of nozzle from the tailpipe shall not cause tugging or stretching of the hose to occur. Stress from separation and transporting of the hose to the door shall be borne by an internal cable to prolong life of the hose.
- E. Nozzle elbows constructed of one piece, cast aluminum are preferred to eliminate the possibility of denting, rusting and breaking. Tailpipe adapters and nozzles should be made of rust resistant components

### **1.8 SLIDING ALUMINUM TRACK/ EXPANDABLE HOSE TRACK**

- A. The exhaust system shall use a lightweight aluminum track support system to convey the exhaust hose from door threshold to vehicle park position. The aluminum track shall be of box lock design with two cross supports for rigidity. Systems that use steel uni-strut or aluminum H track design are not acceptable. Hose length from the track shall not exceed 13 feet.
- B. An expandable hose track system shall be offered in the station to eliminate hose loops. The expandable hose shall be 6-inch diameter and have a compression/expansion ratio of 6:1. The expandable hose shall be attached to the track using a set of trolleys secured to the hose at 9 inch intervals.
- C. Rail and track system must be supported using adjustable, telescopic support legs allowing for future adjustment and changes to the system.

### **1.9 SUCTION RAIL**

- A. The suction rail system shall be comprised of Rail Sections which shall have a length of ten feet (10'). Aluminum Material shall be 6063-T-5 with a standard mill finish.
- B. The aluminum suction rail shall be constructed from a one-piece continuous extruded aluminum profile. Construction shall be 6" round in diameter, with guide rails on each side to accommodate the external trolley assembly, and molded slots on the top for leg and support bracing
- C. The trolley assembly shall be of external guide rail design. Four Delron wheels must be out of the exhaust airstream and allow the trolley assembly to roll freely along the external guide rails. The chassis shall include a fitted cone assembly, designed to part

the memory sealing lips. The cone assembly shall be designed with a series of friction rollers. These rollers shall be designed to reduce the resistance between the memory lips and the cone assembly.

- D. Shock absorber assembly shall incorporate an adjustable hydraulic cylinder, capable of reducing the forward impact of the trolley assembly, without causing damage to either the suction rail or the trolley assembly.
- E. A rubber bumper shall be located on the trolley assembly and designed as a contact point. The hydraulic cylinder shall be equipped with a rubber bumper end stop. Both bumpers shall be designed to align upon impact, and at no time shall metal to metal or plastic to metal contact be allowed.

#### **1.10 THE SYSTEM BALANCER**

- A. The hose balancer shall be designed to operate as a non-locking or self-locking adjustable balancer with a lifting capacity of no less than 31 lbs to keep hose off bay floor.
- B. Hose shall be supported by the balancer using a lifting elbow with an internal cable to reduce stress and wear and tear to the hose.

#### **1.11 EXTRACTION SYSTEM EXHAUST HOSE**

- A. The flexible exhaust hose is manufactured for the sole purpose of venting high temperature exhaust gases which are produced by internal combustion engines.
- B. This construction of hose must be capable of operating at a continuous minimum temperature of 400°F and intermittent temperatures of 550°F. Hoses that are not rated at or higher than these temperatures will not be accepted. Testing support data verifying the hose rating must be included in the submittal portion of this bid package.
- C. Five-inch diameter flex hoses are preferred to smaller hoses to provide less static pressure loss and more efficient fan performance.
- D. A two foot, rigid, lower section hose shall be included with extreme heat tolerance. Hose shall be tested by independent certified laboratory to be capable to 850 degrees F. Lower section hose additionally shall be flame retardant and be constructed using engineered materials to maintain shape and integrity.

#### **1.12 AUTO-START CONTROL SYSTEM**

- A. Shall be designed to sense the output pressure normally generated by any internal combustion engine. When the nozzle is connected to the vehicle's exhaust tailpipe and the vehicle is started by the operator an automatic controller, the increased output

pressure shall be detected by a pressure sensor and activate the exhaust fan. A low voltage timer will keep the exhaust fan operating for a period of time designated by fire department procedures. As an option, ignition start activation may be also offered for consideration.

- B. Controller Electrical controller must be UL listed/approved and manufactured in accordance with Underwriters Laboratories standard UL-508 enclosed industrial control panels and incorporate a limited energy control circuit. For safety the enclosure must be NEMA4X rated fiberglass construction with a water tight seal.

**1.13 SYSTEM WARRANTY**

- A. Complete exhaust system parts warranty shall be for a minimum of 5 years. A warranty certificate describing the warranty to be provided must be included in the bid. Location and name of nearest service outlet should be listed in the bid. Location of parts inventory shall be indicated as well. All equipment must be supplied by one system manufacturer with the complete system covered in its entirety by the manufacturer's warranty.

**1.14 POINT OF ORIGIN:**

- A. 13.1 Equipment shall be manufactured by a U.S. Company that is base headquartered in the USA. Systems that are built using 100% American parts supplied from U.S. vendors are preferred. All components of shall be American Standard.

**1.15 SUBMITTAL REQUIREMENTS**

- A. Product Data
  - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
  - 2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
  - 3. Clearly state equipment markings (i.e. AHU-1), capacities, voltages and model numbers on all submittals.
  
- B. Shop Drawings
  - 1. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
  - 2. Include diagrams for power, signal, and control wiring.

**1.16 MANUFACTURERS**

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Airpro Inc.
  - b. Magnegrip
  - c. Monoxivent
  - d. Plymovent

**PART 2 - PRODUCTS (NOT USED)**

**PART 3 - EXECUTION (NOT USED)**

**END OF SECTION 233516.00**