

Vehicle Exhaust Removal System

Performance and Technical

Specifications

1. General:

1.01 **SCOPE.**

- A. The bidder shall provide all labor, materials, and equipment necessary, to put in working operation a complete system to remove both diesel and automotive exhaust gases, and particulate of operating vehicles within the confines of specified fire station(s). All necessary controls, fan, ductwork, labor and all other equipment and materials specified shall be part of the bidders work.
- B. All items of equipment and materials described in these specifications are to be furnished installed and placed into proper operating condition in accordance with good practice and manufacturer's written or published instructions.
- C. All workmanship and materials shall be in accordance with applicable codes and regulations. I.e.,SMACNA, BOCA, NEC, ASTM, UBC, UMC, NFPA, AMCA and IMC. Such codes and regulations are to be considered part of these specifications.
- D. The bidder shall warranty all materials, equipment and workmanship for a period of one (1) year from the date of final acceptance of the completed job, against original defects of material and workmanship, improper or insufficient maintenance, excessive wear and deterioration. Repairs shall be made at the bidders expense.
- E. Bidder shall install a complete automatic disconnect Diesel Exhaust Removal System, that addresses the problem of diesel fumes in the fire department station house that will not interfere with normal day-to-day operations. The system shall be a **Sliding Balancer Track Mag** type system and **MRP Rail Mag** type system that has the following performance criteria.
 - (1) The exhaust removal system must provide approximately 100% complete evacuation of all diesel fumes at the source from start up to exit of the apparatus from the fire station. The diesel exhaust removal system shall be capable of reaching to the undercarriage of the vehicle tailpipe located anywhere from 10 to 95 feet away from the exiting door. The system must be able to accommodate drive through and back in bays to meet all the needs of the fire department.
 - (2) The system must not affect personnel boarding the apparatus. Hose loops shall not hang any lower then seven feet

from the bay floor. The hose assembly shall not touch or drag on the bay floor.

(3) The exhaust system shall not block doorways, exits, and aisles in the apparatus bay, which could endanger the welfare of fire personnel visitors.

(4) To protect the apparatus electrical system from any possible damage, the system bid shall not incorporate any type of electromagnetic device that requires the apparatus to be utilized as and electrical ground for the systems operation.

(5) Due to the harmful effects of diesel exhaust, the system must be designed and capable of capturing approximately 100% of the exhaust gas and particulate even in the event of a complete power failure. The system shall not detach itself from the apparatus for any reason during a power failure other than normal exiting of the apparatus bay. **No exception to this requirement will be allowed.**

(6) Vehicle must be able to perform pump checks while connected to the system and capture approximately 100% of the diesel exhaust.

(7) Connection of the system to the vehicle must be made from a standing position. **No exception to this requirement will be allowed.**

(8) Manufacturer must be I.S.O. 9001 certified

- 1.02 **STANDARD PRODUCTS:** Equipment and materials provided for the system installation shall be a standard product of manufacturer's currently engaged in the manufacturing of automatic vehicle exhaust removal systems. Where the requirement calls for a packaged exhaust system to be provided, all items shall be the product of the manufacturer.
- 1.03 **QUALITY ASSURANCE:** All workmanship, manufacturing procedures, airflow design, and materials shall be performance guaranteed. If any findings or test studies reveal improper materials, defective components or inadequate performance as outlined in the performance/technical specifications, the bidder shall remove and replace the materials in question.
- 1.04 **EQUIPMENT WARRANTY:** The bidder shall guarantee all materials, equipment and workmanship for a period of one (1) year from the date of the final acceptance of the completed job against original defects of material and workmanship, or excessive wear or deterioration. Defects shall be made good at the bidders expense with no cost or obligation to the Owner.
- 1.05 **PRODUCT DELIVERY, STORAGE, AND HANDLING:** The bidder shall be solely responsible for the delivery, storage, and handling of all products. Any equipment placed in storage shall be protected from weather, humidity, temperature variations, dirt, dust, or other contaminants.

- 1.06 **BIDDER QUALIFICATIONS:** Bids will only be accepted from companies that have an established reputation in the field of manufacturing and installing Diesel Exhaust Removal Systems. The bidder must be established in the business of Diesel Exhaust Removal Systems for a minimum of no less than ten (10) years. Bidder shall show proof that their system has been field tested and proven by supplying a list of not less than 100 fire department references (seven within the state the municipality is going to bid) to include a phone number and contact name.

Bids will only be accepted from companies that have a local (within 200 miles of the job site) inventory of spare parts (a minimum of \$10,000) and factory certified and trained service technicians to perform the required service maintenance and to ensure there is no interruption if field service due to a lack of certified parts locally.

Any company offering a bid including a manufacturer other than the one specified is required to have a written letter from the owner stating the substitute manufacturers product is considered an equal. This letter must be signed by the owner, and dated a minimum of 30 days prior to the bid date.

2. PRODUCTS:

2.01 **MANUFACTURER**

A. **PlymoVent Corporation**/Plymovent Ventilation Systems or approved equal.
5 Corporate Dr.
Cranbury, New Jersey 08512
USA
Toll Free: (800) 644-0911
FAX: (609) 655-0569
WEB: info@plymoventusa.com

B. **LOCAL CONTACT**

Air Exchange, Inc.
495-A Edison Ct.
Fairfield, CA 94534
Contact Name: Chris Koss
Toll Free: (800) 300-2945
Email: info@airexchange.com
Email: ckoss@airexchange.com

A. Substitution: Under provisions of Section .

B. Any company offering a bid including a manufacturer other than the one specified is required to have a written letter from the owner stating the substitute manufacturers product is considered an equal. This letter must be signed by the owner, and dated a minimum of 30 days prior to the bid date.

C. Any company offering a bid including a manufacturer other than the one specified is required to have submitted that manufacturer's product submittals to the architect for approval 10 days prior to the bid date.

2.02 **AIR MOVING DEVICES:**

A. **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 radial design for high static pressure performance. Impeller wheels shall be spark resistance and made of aluminum material 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, vibration-free operation.

The fan motor and assembly shall be mounted on a steel frame for durability in any type of weather conditions. The base shall have four (4) pre punched openings at bottom of fan base for field attachment to either an exterior wall or roof structure.

B. **Fan motor and bearing:**

All 1 to 10 horsepower motors shall be totally enclosed fan cooled (TEFC). The bearings shall be self-aligned; ball bearing type permanently sealed and lubricated. Fan shafts shall be steel and rotate in a non-sparking TEFLON seal to prevent hot gases coming in contact with the motor bearings. The exhaust discharge outlet shall be in compliance with ACGIH recommendations and EPA requirements (min. of 40 " above roofline). Air intakes, windows, cascade systems, prevailing currents, communication equipment and building aesthetics shall be considered in the final location of the fan. Silencers shall be provided when fan sound decibels exceed 64 Dba.

C. **Performance:**

The Fan Capacity shall be sized as such as to deliver the required CFM at each hose drop the vehicle engine exhaust (based on an airtight connection at tailpipe), lengths of ductworks, elbows, branches, shut down. wyes, etc. which accumulate the static pressure at the field inlet. The manufacturer's provided fan(s) shall be performance guaranteed.

D. **Location:**

The fan shall be located on the outside of the fire station as far away from any living quarters as possible so that firefighters would not be disturbed by the system activation.

2.03 **ELECTRICAL CONTROLLERS**

A. **Controller type:**

The controller shall be manufactured and delivered as an Operating System with one series controller manufactured by the bidder or An equal to the specifications to follow.

B. **Electrical controllers:**

The electrical controller offered shall be approved by Underwriters Laboratories (UL) as a complete electrical system for enclosed industrial control panels. **No exceptions.**

(1) Electrical controllers shall be UL listed/approved and manufactured

in accordance with Underwriters Laboratories standard UL-508 enclosed industrial control panels. Enclosures shall be NEMA 12 rated and UL listed as Type 12. The electrical enclosure shall be provided and mounted in an electrical enclosure to restrict access to internal components of controller by only authorized entry.

C. **Electrical Contactor:**

Contactor shall be Allen Bradley Industrial Electrical Contactor, provided with the appropriate adjustable overload relays to meet the proper full load amperage of motor that is outlined in these specifications. The contactor shall conform to the following standards: BS-5424, VDE0660, and be approved by UL Certification as an approved component.

D. **Control Transformer:**

Shall be UL listed industrial control circuit transformer with primary and secondary fuse blocks. Transformer shall be provided with multi-tap primary 208V through 480V, AC, and 24V through 120V secondary.

E. **Electrical Timer:**

Shall be solid state five- (5) minute adjustable timer. The operating logic shall complete this cycle. Input voltage shall be applied to the timer at all times. Upon closure of a normally open isolated start switch, the load energizes and remains energized as long as the switch is closed. When the start switch opens, the timing cycle shall start. At the end of the preset time delay, the load de-energizes and the timer is ready for a new timing cycle. Timer shall be a UL recognized component under file number E65038.

F. **Engine Start Switch:**

Shall be of an engine pressure sensing type, capable of recognizing the output pressure of any type of motor vehicle exhaust. The electrical contact shall be dry type or not to exceed 24V.

G. **Electrical Wiring:**

Shall be run in wire channel to allow for easier identification of wiring circuit and appearance. All wiring circuitry shall meet UL listed for proper bending radiuses and terminations.

H. **Electrical Terminal Block:**

Shall be 600 V, UL rated and recognized. It shall provide individual connection points for remote controls, power and motor connections.

I. **Electrical Wiring Schematic:**

Shall be provided with each electrical control box supplied. Wiring schematic shall show internal circuitry as well as all primary and secondary connections to the controller.

2.04 **DUCTWORK SYSTEM:**

A. **Ductwork type and materials:**

Shall be UMC class 2 or SMACNA class 11 product conveying. It must meet or exceed criteria for construction and performance as outlined in Round Industrial Duct Construction Standards, SMACNA. Materials of construction unless otherwise specified for all ductwork and fittings shall be a minimum G-90 galvanized sheet metal in accordance with ASTM-A525 and A527. Only when specified, type 304 stainless steel in accordance with ASTM A240 shall be provided.

B. **Ductwork sizing and gauges:**

All ductwork subject to positive or negative pressure shall be of round, spiral pipe construction, with the range of available sizes not to exceed 20 inches in diameter. Duct gauge shall depend on diameter and a minimum operating pressure of 8 inches water gauge. Acceptable gauge and reinforcement requirements shall be in accordance to the following. Inner duct diameter 4" - 13" dia. shall be 26 gauge standard spiral pipe and 14" - 20" dia. shall be 24-gauge standard spiral pipe.

C. **Ductwork Fittings:**

All exhaust fittings shall be round and have a wall thickness 2 gauges (one even gauge number) heavier than the lightest allowable gauge of the downstream section of duct to which they are connected. Air duct branch entrances shall be fabricated fittings or fabricated duct/tap assemblies. Fittings shall be constructed so that air stream converge at angles no greater than 45 degree. All seams shall be spot welded and if necessary internally sealed to insure airtightness. Tapered body fittings shall be used manifold. **No exceptions.**

D. **Ductwork Design Velocities:**

Shall be a minimum of 3000 feet/minute transport velocity at 275 cubic feet/per minute volume in metal ductwork at riser clamp which is the standard for design.

E. **External Ductwork:**

Shall be sized for the exact inlet and outlet of the exhaust fan blower. If the fire station is exposed to unusual inclement weather, unusual levels of acid rain or is within 3 miles of salt water, stainless steel shall considered for all exterior ductwork components. An exhaust rain cap shall be supplied and manufactured in accordance with EPA standard for free draft rain cap requirements. Included as an integral part of this rain cap shall be a back draft damper to provide protection from rain and other inclement weather or air.

F. Exhaust Penetrations:

To protect the fire departments best interest ductwork shall only penetrate exterior walls rather than a roof penetration. In all cases when making a wall penetration through masonry or concrete walls it shall be done by the use of a professional core-drilling machine. The core drilling shall be properly sized to reduce the diameter of the opening to the smallest possible size. Only after all possible avenues for wall penetration are exhausted, shall the roof penetration be accepted. The original roofing contractor shall perform the work if possible to insure any warranties on the existing roof are not voided. If the original roofing contractor cannot be notified a licensed roofing contractor shall be used.

2.05 **VEHICLE EXHAUST REMOVAL SYSTEM EQUIPMENT:**

A. Scope of System Operation:

The vehicle exhaust removal system shall capture approximately 100 % of the exhaust emissions directly at the tailpipe of the vehicle and exhaust those emissions to a specified area safely outside the building. The operating controller shall be designed to complete this cycle. A magnetic operated collection nozzle shall be connected to the motor vehicle's exhaust tailpipe, when the vehicle is started by the driver, the exhaust fan will automatically energize and vent the toxic gases directly to the outside of the building. This automatic feature shall be achieved by means of a pressure sensor located inside the exhaust ducting; this pressure sensor shall sense the engines output pressure upon the first stroke of the engine piston and energize the fan starter. The automatic controller shall use an adjustable timer to keep the contactors energized for a designated period of time. Should the operating vehicle not exit the station within the designated preset time period the manual run button on the OS-3 control panel must be engaged, this will keep the fan running while the vehicle is running and must be turned off manually via stop button on OS-3 control panel. The magnetic connection device shall stay connected to the vehicle tailpipe as it travels to the exit door in a pre-engineered sliding track system. The sliding track shall be securely attached to the building structure and supports a flexible hose assembly that moves with vehicle inside the station. As the vehicle nears the exit door, the magnetic nozzle connection located at the tailpipe shall tension release automatically therefore releasing the nozzle from the tailpipe. This shall be accomplished by means of balancer and end stop strategically located on the sliding track. After the system releases the vehicle tailpipe at the door, it shall retract passively and smoothly into a convenient storage position. When the vehicle returns to the station, a system operator manually pulls the flexible hose assembly to the entrance door. The system operator holds the magnetic connection device approximately 18" from the floor and at the door threshold. The system operator, without bending over, attaches the magnetic connection device just inside the door threshold as the vehicle enters the station, at which time the exhaust fan motor energizes. The vehicle driver momentarily stops the vehicle when the tailpipe is just at the door threshold (a backup man will notify the driver when it is time to stop the vehicle). The system operator, standing straight up shall slide the connection device up against a flanged adapter attached to the vehicle tailpipe. The cycle is completed as the

exhaust fan starts and vents the toxic gases with the magnetic connection nozzle firmly attached to the vehicle exhaust pipe. The vehicle then proceeds to its designated resting position.

B. Sliding Balancer Track Material:

The sliding track shall be a one-piece continuous extruded aluminum track in a minimum length of 20 feet. The construction profile shall be of a boxloc type pro-file, which shall adhere to the following dimensions. Track height 3 1/8", width 1 1/2", thickness 1/8". The track material shall be aircraft aluminum alloy type AA-06063. The aluminum track shall be an extruded design that shall incorporate three separate and functioning channels. The three channels shall be for the following, mounting channel, trolley channel and the boxloc channel. Each of these sections performs a specific function to make the system work effectively. The mounting compartment shall be designed to accept the slider bars (which shall be provided with factory supplied vertical legs and riser clamp duct connection) and allow positioning along the full length of the slotted track mounting channel.

The trolley channel shall allow the trolley/balancer/hose assembly to glide to the door threshold in a safe and effective manner. The boxloc channel shall allow the whole track to remain rigid as it hangs from factory supplied leg supports and also shall provide an area to attach bolts for splicing additional tracks together for systems over 20 feet long. The overall extruded track lengths shall be 20 foot standard and weight no more than 35 lbs. The track system shall be equipped with end stops that limit travel of flex hose as the vehicle exits the building. The end stop shall be fabricated of zinc plated steel in a U shape form, with a rubber end stop on the impact end. It shall be attached by using a 1/4" molded locking bolt. The end stop shall be secured to the track with no less than (2) 1/4" bolts and locking nuts located on the underside of the track. For security, a 1/4" bolt shall be drilled through the ends of each track system to insure that the trolley/balancer assembly(s) roll no further than the end of the track system.

B1. MRP Rail Material:

Rail Material: One-piece continuous extruded aluminum rail in a minimum length of 19 ft. (5.8 m) in an effort to reduce the points of leakage due to joints or connections. The construction profile shall be of a square profile type, width of 5 3/4 inches (146 mm) with a rail thickness of 0.177 inch (4.5 mm). The bottom portion of the rail shall have a continuous slot to accept a rubber lip seal. Rail Material: Aircraft aluminum alloy Type AA-6063 (ASTM B209/B209M). Aluminum Rail: Extruded as a one piece design to maximize the structural integrity of the rail and to minimize joints. Extruded into the rail profile shall be all necessary mounting guides, which will allow for support of the rail mounting hardware. Mounting Channels: Provided continuously along the top on both sides of the rail extrusion in order the proper positioning of all required mounting supports in accordance with codes. The rail shall allow the trolley/hose assembly to glide to the door threshold in a safe and effective manner. The extruded rail channel shall allow the whole rail to remain rigid and shall provide an area to attach bolts for splicing additional rails together for systems over 19 ft. (5.8 m) long. The overall extruded rail lengths shall be 19 ft. (5.8 m) standard. Rail System: Equipped with a

hydraulic braking system that limits travel of flex hose/trolley as the vehicle exits the building. Hydraulic Brake: Incorporated into the end cap of the suction rail.

A. Top Mounting Suspension: Designed to attach with 2 mounting cleats to the mounting slots that are extruded into the top of the rail profile. The top suspension mount support shall consist of 2 triangular plates with a 90 degree brake providing a mounting cleat provided with 2 pre-punched $\frac{3}{8}$ inch (10 mm) holes for attaching to the aluminum leg assembly.

C. Support Legs:

Support legs shall be manufactured and provided by the supplier of the primary exhaust removal system. (Equipment Manufacturer). This is to ensure that the unit is installed as a complete system including the mounting hardware. Support legs are 2" x 2" aluminum cut to proper lengths during installation work. Adjustable mounting bracket kit consists of two brackets to be thru bolted to leg stock. Side bracket kit comes with clamp for leg stock and two side braces for lateral and longitude bracing. Approximately one support left every ten feet. The angle shall be completely adjustable to the leg support and mounted perpendicular and parallel to direction of the track. The typical support angle shall be 45 degrees from the center line of the factory provided support leg. The standard leg shall be capable of meeting a Seismic 4 requirement.

F. Riser Clamp Assembly:

The riser clamp shall be fabricated as a one piece welded assembly and manufactured to create the transfer of the hard spiral pipe joined at the top and flexible duct connection at the bottom. A slider bar and associated hardware shall be provided with riser clamp assembly. Sizes of the riser clamp will range from 3" - 6 " diameter to match the output velocity of the vehicles that will park in that station.

G. Accutrack Trolley / Balancer Assembly:

The trolley assembly shall be manufactured as a two piece galvanized steel assembly including bumper stops at each end. Fixed to the side of the trolley are solid steel pins, which shall be for load carrying bearings that are sealed and permanently lubricated. The Load carrying bearings shall travel internally in track trolley channel. Two additional permanently lubricated trolley wheels shall be provided on bottom side of the track to reduce wobble of trolley as it conveys the hose assembly to the door threshold. A release plate shall be attached to the chassis of the trolley to smoothly energize the uncoupling release valve when the trolley-balancer assembly approaches the door threshold. The system balancer assembly shall be a self-adjusting weight spring tension balancer with a lifting capacity of no less than 31 Lb. The balancer shall have a minimum diameter stainless steel cable of .080 and a safety link connection. The system supplier shall manufacture the balancer and trolley for the sole purpose of conveying the flexible hose to the door threshold for automatic release of the system. Only a stainless steel balancer cable will be accepted. **No exceptions.**

H. **Upper Flexible Hose:**

Hose shall be flexible exhaust hose manufactured for the sole purpose of venting high temperature exhaust gases, which are produced by internal combustion engines. The flexible hose shall be designed strictly for the harsh environment of rapid response and auto-release of a vehicle exhaust tailpipe. Hose shall range from 3" - 5" diameters with varying lengths depending on the system length required ranging from 20 - 43 feet without joining or splicing connections. Hose material shall be high temperature synthetic rubber impregnated into a high temperature laminated fabric with a minimum overlapping thickness of 2 7/16". This construction of hose must be capable of operating at continuous temperatures of 400 degrees F and intermittent temperatures of 500 degrees F such as are experienced when pump checks are performed inside the station. Independent testing by a recognized UL laboratory must accompany this bid as proof of performance claim. Wire Helix shall be bound and protected in laminations of hose winding. This shall be accomplished in a fashion, which eliminates any possibility of personnel coming in contact with an exposed hot metal helix. The hose shall further protect the internal wire helix from heat buildup and in turn add increased visibility to personnel. Wear strip shall be 9/16" wide and be provided as a safety yellow color. The bend radius of the high temperature hose shall be no lesser than 1.5 times the diameter of hose to insure that hot gases be restricted as they pass through the system.

I. **Lower Hose Assembly:**

Shall be a rigid 3"-5" diameter by 2 foot long section of yellow and black hose identical in appearance to the upper hose assembly. Lower hose shall support the magnetic connection nozzle and chrome reducing elbow in a rigid fashion as to allow for the operator to place hose collection nozzle onto the tailpipe without bending over. Lower hose is the only section of hose which shall disconnect from the upper hose assembly and act as a safety disconnect in the unlikely event the nozzle gets entangled.

J. **Safety Disconnect Coupling:**

A coupling shall be incorporated in the design of the system enabling the lower two foot hose assembly to separate from the upper hose assembly thus reducing the possible chance of damage to system, in the unlikely event the exhaust connection nozzle assembly may become entangled. This device shall consist of two spun aluminum collars connected by an ergonomic round handle. The release tension of this device shall separate the two at no greater than 88 Lb. **This is considered a safety requirement and any system bid must incorporate a safety disconnect. No Exceptions.**

K. **Collection Nozzle Assembly:**

Collection Nozzle Assembly: Provides a substantially air tight seal around exhaust tail pipe when connected thus allowing for virtually 100% source capture. The seal shall limit escape of life threatening exhaust gases, which may be present during the following conditions:

1. In the event vehicle's engine is accelerated above normal idle resulting in an exhaust velocity greater than 5000 feet per minute (25.4 meters per second).
2. In the event that the output velocity or CFM of the exhaust exceeds the manufacturers normal capture velocity or CFM of exhaust system.

Magnetic Nozzle: Engineered and specially designed Patent Pending exhaust system nozzle (female connection) that is specifically designed to fit tightly over the circumference of an engineered conical mating ring (male connection) that attaches to the tail pipe and attaches tightly around the ring to capture virtually 100% of the carcinogenic diesel exhaust

The Stainless-reducing elbow that connects to the connection nozzle shall be fabricated using continuous welded construction. Angle of Transition: No less than or greater than 67 degrees from the centerline of the reducer. Stainless Reducer: Incorporate a primary expanded metal debris screen, which is permanently affixed by welded seams to the inside, opening of exhaust fitting.

L. **Hose Saddle:**

A hose suspension saddle shall be a steel elbow specifically manufactured for the sole purpose of suspending high temperature flexible hose. The design of the saddle shall smoothly transition the direction of the hose during its travel along the track. Securing clamps shall be provided including a link fastener, for the purpose of mounting it to the balancer safety link.

M. **Special Features:**

The system must be designed to expand for future apparatus to a tandem vehicle arrangement (one vehicle behind the other) by adding to the proposed system. Systems that require replacement of the existing system or major components to meet a tandem vehicle arrangement shall not be accepted. Unique occasions may require the emergency vehicle to depart from the back door in a drive through station. Overall system design and performance shall be for both back in and drive-through configurations when applicable, this assures door to door coverage and collection of dangerous exhaust gases from the point of connection at the doorway.

Provide a crab/trolley return system that automatically returns the MRP crab & hose to the rear of drive through bays upon release of the nozzle from the vehicle's exhaust pipe at the front of the bay. This return system must be able to accommodate tandem vehicles in any drive through apparatus bay. This is considered a health & safety issue. **No exceptions.**

N. **Vehicle Tailpipe Modification:**

The bidder shall supply a drawing for the precise modification procedure for the vehicles to attach to the exhaust removal system. The modification shall vent the exhaust gases at a 90-degree angle on the passenger side of vehicle. Tailpipe modifications requiring a 45-degree angle of exhaust venting shall not be acceptable, so to prevent exhaust blow back into station after the auto-release system disengages from the tailpipe. A flange shall be provided

and installed by the bidder as a precisely located stopping point for the collection nozzle.

3. TRAINING:

3.03 **TRAINING:**

The bidder or authorized approved personnel, shall provide training to fire department personnel in the daily use and maintenance of the vehicle exhaust removal system that has been installed and specified herein. The fire department shall be notified at least 2 days prior to the date scheduled for the training course. Training shall be for all personnel involved with the operation of the exhaust removal system to include all shifts required to man the particular facility. The Training session, shall be performed in person by a recognized representative of the manufacturer of the exhaust removal system, in addition a training video shall be provided to the fire department.