

The most <u>trusted</u> name in New England when it comes to Vehicle Exhaust Fume Removal Systems

REFERENCES

Highland Ambulance EMS, Inc.

New MagneGrip Group System

Installed by Murphy Specialty, Inc.

Vehicle Exhaust Fume Removal System

Michael Rock

Service Director

P.O. Box 84 256 Main St.

Goshen, MA 01032

Office: 1-413-268-7272

Date: 09/2016



The most *trusted* name in New England when it comes to Vehicle Exhaust Fume Removal Systems

REFERENCES

Westminster DPW Garage

New MagneGrip Group System

Installed by Murphy Specialty, Inc.

Vehicle Exhaust Fume Removal System at the Garage Hose Reels, Duct risers with Blast Gates

Joshua W. Hall, P.E.

Director of Public Works

Town of Westminster

2 Oakmont Ave.

Westminster, Massachusetts 01473

Office: 978-874-5572

Date: 06/2016



The most <u>trusted</u> name in New England when it comes to Vehicle Exhaust Fume Removal Systems

REFERENCES

Peabody Municipal Light Plant

New MagneGrip Group System

Installed by Murphy Specialty, Inc.

Vehicle Exhaust Fume Removal System at the Garage Hose Reels and Articulating Boom Arm

Dennis Ahlin, CUSP

Asst. Superintendent of Electrical Distribution

Safety & Support - Peabody Municipal Light Plant

201 Warren St. Ext.

Peabody Ma. 01960

Office 978-573-1142

Date: 02/2016



The most <u>trusted</u> name in New England when it comes to Vehicle Exhaust Fume Removal Systems

REFERENCES

West Peabody Fire Department - M

New MagneGrip Group System

Installed by Murphy Specialty, Inc.

597 Lowell St. Peabody, MA 01960

Building Maintenance Supervisor: Joseph DaSilva

Tel. # 1-978-531-2200 1 Fire Station: 1 apparatus Date: 4/2016

Because of the countless problems with the Existing Pneumatic system with Yellow and Black hoses, Murphy was brought in to make needed repairs and to remove the continually broken down Existing Pneumatic system. We were able to retrofit the existing Tracks and Ductwork, and installing the MagneGrip Group system, saving money for the City, and providing a much healthier work environment for the first responders.



The most <u>trusted</u> name in New England when it comes to Vehicle Exhaust Fume Removal Systems

REFERENCES

Western Massachusetts Fire Academy - P

New MagneGrip Group System

Installed by Murphy Specialty, Inc.

100 Grochmal Ave. Springfield, MA 01151

Facilities Director: James DiRico 1 State Rd. Stow, MA 02360

Tel. # 1-978-567-3161

1 Fire Station: 7 apparatus

Date: 11/2015

NOTE: The MA State Fire Marshall specified the MagneGrip Group system as proprietary system.



The most <u>trusted</u> name in New England when it comes to Vehicle Exhaust Fume Removal Systems

REFERENCES

Boston EMS Garage – 22 Bay Station - P New MagneGrip Group System

Installed by Murphy Specialty, Inc.

203 River St. Boston, MA 02126

Facilities Director: John Cushing 785 Albany St. Boston, MA 02118

Tel. # (617)-343-2367 1 Station: 22 Vehicles Date: 10/2015

NOTE: The entire City of Boston uses the Pneumatic System with Yellow and Black hoses. The City was building a new state of the art EMS garage. Based on its research, and history with its Existing Pneumatic System, the City of Boston decided not to use the Yellow and Black hose system, and instead contracted Murphy to install the MagneGrip Group system.



The most <u>trusted</u> name in New England when it comes to Vehicle Exhaust Fume Removal Systems

REFERENCES

<u> Nahant – 4 Bay Station - P</u>

New MagneGrip Group System

Installed by Murphy Specialty, Inc.

67 Flash Rd. Nahant, MA 01908

Fire Chief: Michael Feinberg

Tel. # 1-781)-581-1235 1 Station: 4 Vehicles Date: 09/2014



The most <u>trusted</u> name in New England when it comes to Vehicle Exhaust Fume Removal Systems

REFERENCES

Provincetown Fire Department - P

New MagneGrip Group System

Installed by Murphy Specialty, Inc.

25 Shank Painter Rd. Provincetown, MA

Deputy Fire Chief: James J. Roderick

Tel. # 1-508-487-7023

1 Fire Station: 8 apparatus

Date: 5/2014

NOTE: Provincetown Fire specified the MagneGrip Group system



The most <u>trusted</u> name in New England when it comes to Vehicle Exhaust Fume Removal Systems

REFERENCES

Rutland Fire Department - P

New MagneGrip Group System

Installed by Murphy Specialty, Inc.

240 Main St. Rutland, MA 01543

Fire Chief: Bradley D. Weber, EFO Tel. # 1-508-886-4107 1 Fire Station: 7 apparatus Date: 09/2013



The most <u>trusted</u> name in New England when it comes to Vehicle Exhaust Fume Removal Systems

REFERENCES

Peabody Fire Department - M

New MagneGrip Group System

Installed by Murphy Specialty, Inc.

41 Lowell St. Peabody, MA 01960

Building Maintenance Supervisor: Joseph DaSilva

Tel. # 1-978-531-2200 1 Fire Station: 1 apparatus Date: 6/2014

Because of the countless problems with its Existing Pneumatic System with Yellow and Black hoses in the City's other stations, Murphy was brought in to install new MagneGrip System of Track, Ductwork, Fan, and Control Panel.



The most <u>trusted</u> name in New England when it comes to Vehicle Exhaust Fume Removal Systems

REFERENCES

<u> Massachusetts Firefighters' Academy - P</u>

New MagneGrip Group System

Installed by Murphy Specialty, Inc.

1 State Rd. Stow, MA 02360

Facilities Director: James DiRico

Tel. # 1-978-567-3161

- 1 Fire Station: 8 apparatus
- 1 Maintenance Building: 3 Vehicles
- 1 Emergency Response Building: 3 Vehicles

Date: 1/2010



The most <u>trusted</u> name in New England when it comes to Vehicle Exhaust Fume Removal Systems

REFERENCES

General Dynamics / Electric Boat - M

New MagneGrip Group System

Installed by Murphy Specialty, Inc.

Quonset Point-Fire Marshall Electric Boat Corporation North Kingstown, RI 02852

Contact:

Jason J Pagano Tel. # 1-860-433-17831 1 Fire Station: 3 Vehicles Date: 4/2013

NOTE: General Dynamics / Electric Boat specified the MagneGrip Group system as proprietary system.



The most <u>trusted</u> name in New England when it comes to Vehicle Exhaust Fume Removal Systems

REFERENCES

Cumberland Hill Fire Department - M

New MagneGrip Group System

Installed by Murphy Specialty, Inc.

3502 Mendon Rd. Cumberland, RI 02864

Fire Chief: Kenneth A. Finlay Tel: # 1-401-658-0544 x 401 1 Fire Station: 2 Vehicles Date: 8/2012



The most <u>trusted</u> name in New England when it comes to Vehicle Exhaust Fume Removal Systems

REFERENCES

Tully Fire Station - M

New MagneGrip Group System

Installed by Murphy Specialty, Inc.

50 Millyard Road Orange, MA 01364

Fire Chief: Dennis M. Annear Tel. # 1-978-544-3145 1 Fire Station: 3 Vehicles Date: 6/2010

Because of the countless problems with the Existing Pneumatic System with Yellow and Black hoses in the Town's HQ's station, Orange, MA voted to make the MagneGrip System a proprietary system for their new station.

See Meeting Minutes Below

Information courtesy of Daniel Hardiman



The most trusted name in New England when it comes to Vehicle Exhaust Fume Removal Systems

REFERENCES

Minutes of the Tully Fire Station Design and Building Committee

Chairman Dick Hall called the meeting of December 9, 2008 to order at 4:00pm. Members present: Chairman Dick Hall, Jeff Cole, John Drew, David Gale, Clinton Smith and Lloyd Taylor.

Also present: Town Administrator Rick Kwiatkowski, Kevin Chrobak from Juster Pope and Frazer, and Diana Towle.

The Attorney General did not approve the fact that L N King Company had submitted two different bids for the HVAC system. The Attorney General said that we can protest it but in doing so we would have to delay going for general bids.

Town Administrator Rick Kwiatkowski wants to keep the project moving; so, Kevin has resubmitted the sub bids just for the HVAC system.

The request was submitted on Monday December 8, 2008. All sub bids have until December 31, 2008, at which time the bids will be opened in the Town Hall at 3:30pm.

The general bids will be opened on January 14 2009.

It was brought to our attention that we had to have a vote on which exhaust system we would like.

Jeff Cole made a motion stating that we only wanted the MagneGrip System installed into the Tully Station. John Drew seconded the motion.

The "Plymovent" exhaust system uses a pneumatic coupling to the vehicle exhaust system tailpipe. The **Plymovent** vehicle exhaust system as presently installed at the main Orange fire station has had **repeated problems** with the pneumatic coupling system therefore the building committee has requested that the bidding documents use the MagneGrip vehicle exhaust system at the Tully Station as a proprietary specification. The MagneGrip system uses a magnetic coupling. The Building Committee felt that it was in the best interest of the town to use the magnetic coupling system due to the **continuing problems** with the pneumatic coupling "**Plymovent**" system.

The motion was voted and passed.

Our next meeting will be held on January 14, 2009 at 4:00pm in the Fire Station.

Meeting adjourned at 5:05pm.



The most <u>trusted</u> name in New England when it comes to Vehicle Exhaust Fume Removal Systems

REFERENCES

Douglas, MA Fire Department - P

New MagneGrip Group System

Installed by Murphy Specialty, Inc.

64 Main St. Douglas, MA 01516 Engineer: Dixon Salo Architects: Wayne Salo Tel. # 1-508-238-6890

Fire Chief: Don Gonynor Tel. # 1-508-476-2267 1 Fire Station: 8 apparatus Date: 6/2010



The most <u>trusted</u> name in New England when it comes to Vehicle Exhaust Fume Removal Systems

REFERENCES

Plymouth, Ma. Fire Department - M

New MagneGrip Group System

Installed by Murphy Specialty, Inc.

114 Sandwich Street Plymouth, MA 02360

Fire Chief: G. Edward Bradley Tel. # 1- 508-830-4213 x 1 7 Fire Stations and 1 Maintenance Building 37 Vehicles Date: 7/2009



The most <u>trusted</u> name in New England when it comes to Vehicle Exhaust Fume Removal Systems

REFERENCES

Mashpee, Ma. Fire Station # 2 - P

New MagneGrip Group System

Installed by Murphy Specialty, Inc.

101 Redbrook Rd, S. Mashpee, Ma. 02649

Engineer: Richard Pomroy
Tel. # 1-508-238-6890
Deputy Fire Chief: Jack Phelan
Tel. # 1-508-539-1457
1 Fire Station: 3 Vehicles with expansion to 4 Vehicles
Date: 1/2009

NOTE: Mashpee uses an Existing Pneumatic System with Yellow and Black hoses at its headquartesr station. Mashpee, based on its own research, decided not to use the same company, and instead contracted Murphy to install the MagneGrip Group system.



The most <u>trusted</u> name in New England when it comes to Vehicle Exhaust Fume Removal Systems

REFERENCES

Reading, Ma. Fire Department P and M

New MagneGrip Group System

Installed by Murphy Specialty, Inc.

757 Main St. Reading, MA 01867

Fire Chief: Gregory J. Burns Tel. # 1-781-944-3132 2 Fire Stations: 7 Vehicles Date: 12/2008

Existing Existing Pneumatic System with Yellow and Black hoses needed to be upgraded. The Town contracted Murphy to install the MagneGrip Group System. We were able to retrofit the existing Tracks and Ductwork. Extensive Ductwork repairs needed to meet SMACNA standards. Original installer did not seal any of ductwork and did not seal any of the duct penetration through the exterior of the building. This caused toxic fumes to re-enter the fire station and caused mold issues.



The most <u>trusted</u> name in New England when it comes to Vehicle Exhaust Fume Removal Systems

REFERENCES

Dudley, Ma. Fire Department - M

New MagneGrip Group System

Installed by Murphy Specialty, Inc.

128 West Main Street Dudley, MA 01571

Fire Chief: Jeffrey E. Phelps

Tel. # 1-508-949-8040

1 Fire Station: 11 Vehicles

Date: 8/2008



The most <u>trusted</u> name in New England when it comes to Vehicle Exhaust Fume Removal Systems

REFERENCES

Jamestown, RI Fire Department - M

New MagneGrip Group System

Installed by Murphy Specialty, Inc.

50 Narragansett Ave Jamestown, RI 02835

Fire Chief: Jim Bryer

Tel. # 1-401-423-0062

1 Fire Station: 7 Vehicles

Date: 9/2007



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REFERENCES

Fall River, Ma. Fire Department - P

New MagneGrip Group System

Installed by Murphy Specialty, Inc.

140 Commerce Drive Fall River, MA 02722

Senior Mechanic for the Fire Department:

Tel. # 1-508-324-2748

5 Fire Stations: 24 Vehicles

Date: 8/2007



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REFERENCES



"NO Air Lines, NO Bladders, NO Problem".

Information courtesy of Daniel Hardiman



The most <u>trusted</u> name in New England when it comes to Vehicle Exhaust Fume Removal Systems

REFERENCES

Contact Murphy Specialty, Inc.

@ 617-361-3242

We are

1 in New England

for

NON-Pneumatic and Pneumatic

Source Capture Vehicle Exhaust Fume Removal Systems



The most *trusted* name in New England when it comes to Vehicle Exhaust Fume Removal Systems

REFERENCES



an ISO 9000:2008 certified company "To Ensure Quality"

> Pneumatic = P Magnetic = M

Information courtesy of Daniel Hardiman



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REFERENCES

The MagneGrip Group system uses a manual connection of the nozzle to the tailpipe, from an upright standing position without bending over. This is to reduce personnel exposure of the toxic diesel exhaust fumes and prevent personnel from possible burns from handling the nozzle or touching the hot exhaust tailpipe. Additionally, personnel do not have to bend down to connect the nozzle to the vehicle's tailpipe, which would put them out of view of the driver, which is not acceptable.



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REFERENCES



Photo: John P. Hardiman - Outside Superintendent Nozzle attached to apparatus tailpipe in less than 5 seconds, "without bending over".

Information courtesy of Daniel Hardiman



The most *trusted* name in New England when it comes to Vehicle Exhaust Fume Removal Systems

REFERENCES





The most trusted name in New England when it comes to Vehicle Exhaust Fume Removal Systems

REFERENCES



Information courtesy of Daniel Hardiman



The most trusted name in New England when it comes to Vehicle Exhaust Fume Removal Systems

REFERENCES





The most trusted name in New England when it comes to Vehicle Exhaust Fume Removal Systems

REFERENCES



MOUNT AUBURN CEMETERY

December 13, 2010

Re: Murphy Specialty General Contracting Work for Mount Auburn Cemetery

To Whom It May Concern,

Mount Auburn Cemetery has for a number of years employed Murphy Specialty on a variety of projects where they have successfully provided the skills and services of General Contracting.

We have been pleased with the quality of their work, the caliber of their personnel, and their commitment to client service. We look forward to the next opportunity to use them, and would recommend the same to others.

'I'm happy to answer questions or provide further specifics upon request.

William G. Barry, Jr.

Vice President of Preservation & Facilities Mount Auburn Cemetery

wbarry@mountauburn.org 617-607-1906 direct

> 580 Mount Auburn Street | Cambridge, Massachusetts 02138 | t: 617-547-7105 | f: 617-876-4405 www.mountauburn.org



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REFERENCES



December 15, 2010

Operational Services Division One Ashburton Place, Room 1017 Boston, MA 02108-1552

Re: Murphy Specialty, Inc. Business Reference

To Whom it May Concern:

We have had the pleasure of working with Murphy Specialty, Inc. on various projects throughout eastern Massachusetts. As General Contractors, Murphy Specialty, Inc. has always successfully completed each project on time, with excellent craftsmanship, without any safety of code violations and met their contractual responsibilities. Murphy Specialty, Inc. has always worked well with both building owners and users, carefully coordinating work complete by their own forces as well as work by their subcontractors.

If you wish to speak with me or have any questions, please do not hesitate to call me.

7

Sincerely,

Wendall Chalan

Wendall C. Kalsow, AIA Principal



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REFERENCES



Facilities Planning, Design & Construction

January 27, 2009

Murphy Specialty, Inc. 158 Arlington Street Hyde Park, MA 02136

Attn: Paul Hardiman

Subj: Third Floor Lab Renovation, Science & Engineering Building

Mr Hardiman,

I want to thank you for taking the initiative for the redesign of the lab renovation project at our Science & Engineering Building. Your firm's input as the General Contractor on this project was invaluable. The finished product looks great and we would welcome working with your firm in the future.

Thank you

Peter Geldmacher Construction Project Manager UMASS Dartmouth

mstyletter

www.umassd.edu

University of Massachusetts Dartmouth = 285 Old Westport Road = North Dartmouth = MA 02747-2300 Ph: 508.999.9223 = Fax: 508.999.9103



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REFERENCES

.... of 2010 13.46 2222

P.01/01

Boston

John P. Henderson Superintendent Boston Fire Department Communications & Dispatch 59 Fenway, Boston 02115 617-343-2050

To Whom It May Concern:

The Boston Fire Department's Operation center located at 59 Fenway in the Back Bay where all of the department's dispatching, communications, 911, fire apparatus control, etc, is handled is located in a large 25 foot high ceiling room that was built in 1925. We were replacing an old and noisy HVAC system about 8 months ago and that was when I first met Murphy Specialty Inc. and their representatives. Ultimately they won the bid for the project and that was where our professional relationship began.

We had many special issues here such as noise containment, air circulation and working within a historical and public safety emergency operations environment that would have to be dealt with by this vendor. Their members, especially Mr. Paul Hardiman showed up almost daily to take pictures and asking questions in preparation of presenting a final plan. He ultimately was able to solve every one of our problematic issues and an old, loud, clunky system was replaced with a quiet, "out of site" HVAC system that functionally presented an environment with cool, fresh air.

He passed on all of the vital operational information to our building maintenance director with a full physical inspection followed by supporting documentation hard copy and CD form.

I would strongly recommend this Company for HVAC projects because they were very proactive in identifying our needs, planning the work and following through completely.

Sincerely in Heulun a John Henderson



Thomas M. Menino, Mayor/FIRE DEPARTMENT/115 Southampton Street 02118



The most trusted name in New England when it comes to Vehicle Exhaust Fume Removal Systems

REFERENCES



April 2, 2007

Project Name: Installation of Diesel Exhaust Systems (Engine #10, Tower Ladder #3, Rescue #1, and Division I) or the Boston Fire Department.

To whom it may concern,

I am writing this recommendation on behalf of Murphy Specialty, Inc. regarding the Diesel Exhaust Systems they installed at Engine 10, Rescue 1, Tower Ladder 3, and Division I, for the City of Boston Fire Department.

As the HVAC and General Contractor for this project, they performed and managed a wide variety of items, such as furnishing and installing: ductwork, fans, vehicle exhaust systems, concrete cutting, roofing, electrical, testing and balancing, plumbing/compressed air lines, and fireproofing. To this date, we've never had a problem with their workmanship.

Murphy Specialty, Inc. performed this work in one of the busiest firehouses in the City of Boston. Murphy Specialty, Inc., thru its coordination, quality workmanship, and scheduling completed the work with almost no interference to our day to day activities.

I would give my sincere recommendation to Murphy Specialty, Inc. and its staff for a job well done.

incerel m Dennis Flynn

Superintendent of Maintenance



Thomas M. Menino, Mayor/FIRE DEPARTMENT/115 Southampton Street 02118

intormation courtesy of Damer Harunnan



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REFERENCES



April 13, 2011

Murphy Specialty, Inc. P.O. Box 292 Readville, MA 02137

Contracting Specialists Incorporated appreciates the excellent work of Murphy Specialty, Inc. We have had the pleasure of working with Murphy Specialty, Inc. on several projects, all of which have been handled in a professional manner.

The following particular projects were recently performed on time and within budget:

Morton Hospital, Taunton, MA

Repaired Copper Sheet Metal Flashing for Copular and Slate Roofing Replacement

Harvard University (Multiple Projects), Cambridge, MA

Sheet Metal work for thru wall flashing. Work performed off of swing staging and lifts. All appropriate safety training was performed as required by Harvard University.

Children's Hospital, Boston, MA

Installation of through wall flashings and aluminum

Fogg Library Renovations, South Weymouth, MA

Fabrication and Installation of zinc coated copper flashing. Work also included through wall flashing at rebuilt chimney.

Murphy Specialty excelled at being "team players" and was also conscientious about proper documentation and following approval procedures. We would highly recommend Murphy Specialty, Inc. for future projects that you may have.

Please feel free to contact me with any questions.

Sincerely Mélissa M. Harris

CORPORATE OFFICET POTAte Office Manager Boston, MA

REGIONAL OFFICES Fort Lauderdale, FL Portland, ME

Information courtesy of Daniel Hardiman


The most trusted name in New England when it comes to Vehicle Exhaust Fume Removal Systems

REFERENCES





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REFERENCES



Business (508) 949-8040 Fax (508) 943-4424 Dudley Permanent Firefighters Association Local 4271 c/o Dudley Fire and Emergency Services 128 West Main Street Dudley, Massachusetts 01571



Re: Reference for Murphy Specialty Inc.

To Whom It May Concern:

I am writing this letter of recommendation of free minded about Murphy Specialty and the owner Paul G. Hardiman, Paul and his company won a public bid for installation on a vehicle exhaust system that would be installed at our Fire Station Located at 128 W. Main St.

After many years of breathing diesel fumes, Paul Became one of my heroes, he and his crew showed up two weeks before the agreed start date of the contract, to go over the layout of the project, in a small compacted station with Ambulances and rescue truck running in and out this did not change the pace or concentration of Paul and his crew to measure and mark and plan placement of product and storage of staging and tools.

Before they started drilling their first hole they made sure the fire Chief and I had no question or concerns with the information that was given to us. Paul every morning explained what their plan would be for the day so I was able to keep my crews informed so they knew what was going on in their house and where they would have to avoid. Once work started we could see progress every day and before I knew it they were done, not with out huge challenges of course in our old station, once the system was up and working removing all the contaminates from the station we saw immediate air quality changes with in the building on both floors.

Paul spent hours teaching the personnel how the system works and how to maintain and make adjustments. Paul was very patient and professional with the crews. If their was any time we had a issue with the system in the first couple of weeks of operation Paul would be back to our rescue with in one business day or less to fix any of the issues which 99% of the time where operator error firemen do not like change, and Paul's commitment to us still stands 2 years later if there is a issue he calls us back with in a hour or so and if he cannot talk us threw it on the phone he is in the truck headed this way.

So with that being said I am very happy with the quality of workmanship that Murphy Specialty, and Paul Hardiman and his crew did for this Department and the challenges they faced with my crews, I would have this company come back in the future if I ever need this king of service again. Summed up in one word with our experience with Murphy Specialty, EXCELLENT

Sincerely,

Brian Ceccarelli President Local 4271 Ems Coordinator Town of Dudley



The most trusted name in New England when it comes to Vehicle Exhaust Fume Removal Systems

REFERENCES

Mr. Paul Hardiman, Jr. Murphy Specialties, Inc. PO Box 292 Readville, MA 02137 Subject: Project Reference Mr. Hardiman, I am writing to acknowledge and confirm your firms satisfactory completion of recent project work which involved Hvac improvements made to the systems serving the Exhibit Halls located at the Boston Convention and Exhibition Center located at 415 Summer Street Boston, MA 02210. The work performed by Murphy Specialties, Inc. has made significant improvements to the exhibit hall environment since completion and has contributed greatly to energy savings we have realized since the installation was completed. The Massachusetts Convention Center Authority wishes to extend our sincere appreciation and thanks to you and your firm for a job well done. We look forward to Murphy Specialties, Inc. performing other work at our four facilities in the near future. Respectfully and with best regards, John T. Haley, Jr. **Chief Facilities Officer** Mass Convention Center Authority



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REFERENCES



Village Place I 448 Turnpike Street, Suite 2-1 | South Easton, MA 02375 | T 508/238-5040 | F 508/238-5042

www.pomroyassociates.com

<u>Mashpee Fire Station No 2 Project</u> Memorandum

- Date: January 23, 2009
- Subject: Vehicle Exhaust Recovery System

To: To Whom It May Concern

From: Richard W. Pomroy, Owner's Project Manager

The Town of Mashpee, MA recently completed the construction of its new Fire Station No 2. The project included the installation of a new Vehicle Exhaust Recovery System ("VERS") to accommodate (3) vehicles. The VERS work was bid separately from the general contract and scheduled to be installed after the general contractor was 100% complete and off of the project.

The Town of Mashpee bid the VERS work publically and the contract was awarded to Murphy Specialty Inc. on September 3, 2008 as the lowest responsible bidder. Murphy Specialty Inc's bid was based on a pneumatic exhaust venting system manufactured by HazVent. As part of the qualification of the bid, Mashpee FD and Pomroy Associates performed an inspection of a HazVent system installed by Murphy Specialties in Fall River. The Fall River FD was very pleased with the HazVent system and Murphy Specialty, and our inspection was very positive.

Murphy's submittal process began shortly after the award and the submittals were approved by the project architect in mid October 08. The equipment and materials were available for installation within 45 days of the approved shop drawings and Murphy was ready for the installation of the system in the first week of December 08. The Town of Mashpee requested that the install be delayed until after the official ribbon cutting on December 9, 2008. As such Murphy began its installation on December 22, 2008 and was 100% complete by January 5, 2009. Mashpee's electrical contractor then provided the service and equipment connections and the system was tested and training took place with the FD on January 12, 2009. The entire system from award to turn-over took just over 4 months of which the owner (Town of Mashpee) was responsible for at least a month of the time for ribbon cutting and electrician.

Our experience with Murphy Specialty, Inc has been very positive from the beginning of this project to the end. Their team has been very accommodating every step of the way and the quality of work has been excellent. The attention to detail and communication is also excellent. There was never a point in this project where someone from Murphy was not available to us and they kept us fully informed during the entire process. The HazVent system is also of the same quality and operates as expected. The Mashpee FD was fully trained on the system and are very pleased with the system and services provided by Murphy Specialty, Inc.

I would recommend Murphy Specialty Inc and the HazVent system without reservation and would be pleased to speak to any Awarding Authorities and/or prospective users regarding Murphy Specialty, Inc and the HazVent system.



The most trusted name in New England when it comes to Vehicle Exhaust Fume Removal Systems

REFERENCES



TOWN OF PLYMOUTH FIRE DEPARTMENT

114 Sandwich Street Plymouth, Massachusetts 02360-2453

> (508) 830-4213 FAX: (508) 830-4174

Re: Reference for Murphy Specialty Inc. and Magnegrip

To Whom It May Concern

The Town of Plymouth Fire Department completed the installation of new Source Capture Vehicle Exhaust Removal Systems in all seven Plymouth Fire Stations and the Apparatus Repair Division in July 2009.

The project was bid in accordance to M.G.L. Chapter 149 requirements; Murphy Specialty Inc. was the low bidder and subsequently installed the Magnegrip System in all our facilities. The work also included the removal of the existing vehicle exhaust removal systems at the stations, those systems consisted of exhaust and make-up air fans which did nothing more than make 6 air changes per minute on the apparatus floor with outside ambient air.

Our experience with Murphy Specialty was very positive from the start of the project and continues today. Their staff has been accommodating to our crews and they worked without disruption in each of the seven Fire Stations. Their staff answered every question, provided training to all firefighters and left each job site neat and clean each day. Their communication and attention to all details is excellent. Murphy always kept us fully informed and has always been available to us for any reason.

The Magnegrip System operates as expected and is a high quality system. The Magnegrip System and adaptors were easily installed on our specialized fleet of Brush Breaker Apparatus. The systems have been operating in our stations for over a year now and the Town has seen substantial energy savings at each of the Fire Stations, both the heating and electrical usages have decreased. In today's economy all municipal departments are looking for any savings that are available, the Magnegrip Systems have exceeded our expected energy savings.

I would recommend Murphy Specialty Inc. and the Magnegrip System without any reservations.

Should you have any questions regarding this recommendation, please fell free contact me directly at $508-830-4213 \times 106$

Sincerely,

Howard Good a G. Edward Bradley

Fire Chief

Printed on Recycled Pape



The most trusted name in New England when it comes to Vehicle Exhaust Fume Removal Systems

REFERENCES



READING PUBLIC SCHOOLS

Patrick A. Schettini, Jr. Superintendent 62 Oakland Road Reading, Massachusetts 01867 Telephone 781-942-5492 Fax 781-942-5436

Joseph P. Huggins Director of Facilities

TO: To Whom It May Concern

en stand have the set of a first frank for the

FROM: Joseph P. Huggins

DATE: April 1, 2009

RE:

Source Capture Vehicle Exhaust Removal System

The Town of Reading has just completed the upgrades and installation of a Source Capture Vehicle Exhaust System at the Main Street and Woburn Street Fire Station. The project was bid out following M.G.L. Chapter 149 bid requirements. Murphy Specialty was the low bidder and successfully installed the Haz-Vent Systems.

Our key contact Paul Hardiman was informative, professional and sensitive to the needs of the Fire Department.

The installation at both stations went extremely well and all products used were as specified. The staff received proper training on the systems and the staff is very pleased with the end product.

I would highly recommend Murphy Specialty for anyone interested in installing this type of system at their facility.

The Reading Public Schools does not discriminate on the basis of race, color, sex, religion, national origin, sexual orientation, age or disability.

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REFERENCES



CONSOLIDATED FACILITIES DEPARTMENT 525 CANTON AVE MILTON, MASS 02186

Director of Consolidated Facilities

To: Whom it may concern

From: William F. Ritchie, Director of Consolidated Facilities

Date: December 10, 2012

Re: Project Reference for Murphy Specialties, Inc.

During the summer and fall of 2011, Murphy Specialties Inc. under the direct supervision of Paul Hardiman Construction Superintendent, removed and installed new exterior duct systems to five RTU's at two school buildings in the Town of Milton. The project cost was \$187,000 which was advertised in the Central Registrar, DCAM and within our local newspaper. The entire project took approximately four months to complete and it was finished on time and on budget.

Without hesitation, I can professionally state that Murphy Specialties is a reputable Mechanical and Service Company that was reliable and 100% committed to our project. As far as doing business with Paul and Murphy Specialty Inc. they were one of the better mechanical contractors that we have dealt with over the years.

Based on my experience as a Facilities Director and Building Engineer for some twenty five years, I am pleased to recommend Murphy Specialty Inc. as contractor who I would hire and recommend in the future.

Should you have any questions or concerns regarding this personal recommendation you can contact me at 617-898-4930.

Sincerely,

William F. Ritchie CPE, CFA

525 Canton Ave Milton, Massachusetts 02186

Information courtesy of Daniel Hardiman



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REFERENCES

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Section 1- General P	roject Inform	ation - Section I must	t be complet	ed in its enti	rety.
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Reference		Date:	9/21/1	1	
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Standard Contractor Evaluation Form Revised: August 15, 2007



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Standard Contractor Evaluat	tion Form		10		Page 2 of 4	



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REFERENCES

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REFERENCES

Section IV- Evaluator Certification

I certify that the information contained in this evaluation form represents, to the best of my knowledge, a true analysis of this contractor's performance record on this contract.

I also certify that I have no ties with this contractor either through a business or family relationship.

I have mailed a copy of this completed evaluation form to the contractor on $\frac{p/y}{ll}$ (public awarding authorities must mail a copy of this completed evaluation form to the contractor).

Signature

Section VI- Additional Comments

Comments:

prevides exceptional Service and precise in their execution. pecialty Inc. urphi S and



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REFERENCES

Division of Ca Standard Con	apital Asset Management tractor Evaluation Form		
Prime/General Contractor	r Subcontractor Section I must be completed in its entirety.		
Reference	Reference		
Name: PETER GELOMACHER	Telephone #: 508-999-8938		
Reference CONSTNUCTION	Date: 1-27.09		
Reference Agency/Firm: UMASS DARTMOUTH	DCAM Interviewer (if any):		
Name of Contractor Being Evaluated: MURPHY SPECIALTY, INC. P.O. TOOX 292 RENDVILLE, MA 02137	Total Contract Cost 924, 444 ⁻ With Change Orders: \$ 968, 454.95 (if change order amount unknown for subcontractor then estimate as 5% of subcontract amount)		
Project Science ; BAGINEERING - 320 Flo Title: LAB REMOVATIONS.	Start/ End Dates:		
	Actual Completion Date: DEC 2008		
Scope of Work: FUME HODDS, ERU.	Electric		
Project Location (city and state): UMASS	DARTMOUTH		
*****	*Important**********		
Please check (1) if this is a :	Preliminary Evaluation (50% complete); or Final Evaluation (once use and/or occupancy, or ssuance of a certificate of use and/or occupancy, o contract termination have been achieved, whicheve earlier)		
e			
Please check (🖌) if: 🗌 1 dollars	The project was estimated to be greater than \$1.5M and required an Owner's Project Manager.		

Information courtesy of Daniel Hardiman



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REFERENCES

Section II- Evaluation Questionnaire

Please rate this contractor's performance in each of the following areas. If you need additional space, attach additional sheets. If you rate the contractor below "satisfactory" in any area, please provide detailed information to explain the rating assigned. You are not restricted to using the numerical values (points) shown and may score in between the points shown. A total of 80 points are required for a passing grade.

1. Quality of Workmanship (0-28 points)

Carry over points

here \downarrow

Rate the quality of this contractor's workmanship. Were there quality-related or workmanship problems on the contract? Was the contractor responsive to remedial work required? If so or if not, provide specific examples.

unacceptable 🗌 0 points	poor 🗌 14 points	satisfactory 🗌 24 points	very good 🗗 26 points	excellent [] 28 points	$\rightarrow 26 points$
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2. Project Management

a) Scheduling- (0-13 points) Rate this contractor's performance with regard to adhering to contract schedules. Did this contractor meet the contract schedule or the schedule as revised by approved change orders? If not, was the delay attributable to this contractor? If so, provide specific examples.

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c) Safety and Housekeeping Procedures- (0-9 points) Rate this contractor's safety and housekeeping procedures on this project. Were there any OSHA violations or serious safety accidents? If so, provide specific examples.



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REFERENCES

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Information courtesy of Daniel Hardiman



The most trusted name in New England when it comes to Vehicle Exhaust Fume Removal Systems

REFERENCES

Section IV- Evaluator Certification

(optional)

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I certify that the information contained in this evaluation form represents, to the best of my knowledge, a true analysis of this contractor's performance record on this contract.

I also certify that I have no ties with this contractor either through a business or family relationship.

I have mailed a copy of this completed evaluation form to the contractor on 1-27-09(Public Awarding Authorities must mail a copy of this completed evaluation form to the contractor).

For Public Projects below \$1,500,000, this form must be signed by the Awarding Authority and may be signed by the Owner's Representative (i.e. Architect/Designer) in conjunction with the Awarding Authority:

Signature of Awarding Authority Print Name and Title

Signature of Awarding Authority's Representative Print Name and Title

Date

Date

For Public Projects above \$1,500,000 bid under M.G.L., c. 149, § 44A 1/2, this form must be signed by the Owner's (Awarding Authority's) Project Manager and the Awarding Authority:

Signature of Owner's (Awarding Authority's) Project Manager	Print Name and Title Date	
Signature of Awarding Authority	Print Name and Title Date	
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Standard Contractor Evaluation Form Revised: 8/07	Page 5 of 5	



The most trusted name in New England when it comes to Vehicle Exhaust Fume Removal Systems

REFERENCES



240 Main Street Rutland, MA 01543 508-886-4107 Fax 508-886-4122



Brad Weber, Chief

September 25, 2014

To Whom It May Concern:

As the Chief of the Rutland Massachusetts Fire Department, I am writing this letter of recommendation for Murphy Specialty INC.

As for the work that was performed at the Rutland Fire Station 240 Main Street Rutland Ma (Vehicle Exhaust System), I am completely satisfied with the end result. Paul and Brian Hardiman are skilled at their craft. I have had excellent communication with the company and would recommend them for this type of work in the future.

Anyone wishing to contact me about this recommendation may do so at 508-886-4107 or by email at <u>firechief@townofrutland.org</u>

Sincerely,

Chief Bradley D Weber EFO Town of Rutland Fire Department



12-5-2014

Effectiveness of the MagneGrip Group's Systems

Source Capture Emergency Vehicle Exhaust Fume Removal ("VEFR")

Dear Firefighting Industry Professionals, Government Officials, Architects, and Engineers:

On 1-10-2014, Murphy Specialty, Inc. retained the services of Cashins and Associates, Inc. to conduct a test and evaluate the effectiveness of the MagneGrip Group Source Capture Emergency Vehicle Exhaust Fume Removal System that we installed at the Reading, MA Fire Headquarters.

Murphy Specialty, Inc. has been installing all types of exhaust and ventilation systems since 1988. Since that time, we have been members of the Sheet Metal and Air Conditioning Contractors' National Association ("SMACNA") and the Sheet Metal Workers' International Association Union, Local # 17, Boston, MA. We take a proactive approach to ensure that the VEFR exhaust systems we install, are working as effectively as possible, day in and day out, for the *Health and Safety* of First Responders and Maintenance Garage Personnel.

We have listed some of our licenses, safety certificates, and a sample of recent past projects.

Licenses and Training

Massachusetts Master Sheet Metal Business License # 133 Massachusetts Master / Unrestricted Sheet Metal Worker License # 3853 Rhode Island Master Sheet Metal Worker License # 7613 Construction Supervisor License # 56479 Diesel / Gas Exhaust Fume Removal Certified TABB / ICB - Fire Life Safety Air Filtration Certified Fire / Smoke Damper Testing Training 30 Hour OSHA Training Confined Space Entry Training M.B.T.A. Right of Way Safety / Access Training OSHA Hoisting, Rigging, and Signaling Certified

Past Exhaust System Projects

Massachusetts Firefighters' Academy, Stow, MA Boston, MA - Fire Department Orange, MA - Fire Department Plymouth, MA - Fire Department Reading, MA - Fire Department General Dynamics/Electric Boat, Quonset Point, RI Jamestown, RI - Fire Department Fall River, MA - Fire Department Douglas, MA - Fire Department Dudley, MA - Fire Department Cumberland Hill, RI - Fire Department Mashpee, MA - Fire Department West Barnstable, MA - Fire Department Army National Guard Bourne, MA - DPW Bedford, MA - DPW Rutland, MA - Fire Department Provincetown, MA - Fire Department Peabody, MA - Fire Department

Please see the following report by Cashins and Associates, Inc., and Bulletin 371 from the Commonwealth of Massachusetts Department of Labor Standards.

Please do not hesitate to contact me if you have any questions.

Sincerely,

Paul

Paul G. Hardiman, Jr.

158 Arlington St. Boston, MA 02136 Tel. # 617-361-3242 www.murphyspecialty.com



January 17, 2014

Mr. Paul Hardiman, Jr. Murphy Specialty, Inc. 158 Arlington St. Boston, MA 02136

RE: Assessment of Exhaust Capture System Reading, Massachusetts Fire Department Headquarters

Dear Mr. Hardiman:

Cashins & Associates, Inc. was retained by Murphy Specialty, Inc. to evaluate the effectiveness of a vehicle exhaust capture system installed at the Reading, Massachusetts Fire Department Headquarters. This assessment took place on January 10, 2014.

Overview

The Reading Fire Department's existing vehicle exhaust fume removal system at the Headquarters was retrofit with upgrades in March of 2009 by Murphy Specialty, Inc.. This system has been in real world use for over four (4) years. The components utilized in this system are manufactured by Clean Air Concepts / MagneGrip Group. There are two tailpipe connections that are utilized at the Reading Fire Station. One is a pneumatic boot called HazVent and one is a magnetic attachment called MagneGrip.

The HazVent connector attaches to the tailpipe and a rubberized boot inflates with air to clasp onto the tailpipe. The MagneGrip attaches with a magnetic coupling, creating a secure fit. These direct connect nozzles are ducted to an exhaust fan which discharges outside the building. When a vehicle is started exhaust is discharged into the attached nozzle and duct. A pressure sensor inside the duct immediately detects the pressure change which then actuates the exhaust fan. Informational cut sheets on these direct connect nozzles are attached in Appendix A.

During this assessment we evaluated a vehicle attached with the Hazvent and with the MagneGrip. The vehicles in the Fire Station are diesel powered.

Diesel exhaust is a highly complex and variable mixture of noxious gases, vapors and very small particles and has been classified as a Group 1 human carcinogen by the International Agency for Research on Cancer (IARC). The gases in the diesel emissions include carbon monoxide, carbon



Murphy Specialty, Inc. 2 of 11 Assessment of Exhaust Capture System - Reading, MA Fire Department

dioxide, nitric oxide, nitrogen dioxide, sulfur dioxide, aromatic hydrocarbons, aldehydes, and others. The particulate matter consists of microscopic particles and liquid droplets which are small enough to be inhaled and retained in the lungs. The particles bear chemicals which include unburned fuel, oil, Polycyclic aromatic hydrocarbons and thousands of other compounds some of which are genotoxic (damages DNA molecules in genes). The amount and composition of the exhaust vary greatly, depending upon factors such as fuel and engine type, maintenance schedule, tuning, work load and exhaust gas treatment.

New research indicates that diesel exhaust in combination with cholesterol may significantly increase the risk for heart attack or stroke.

The complex mix of contaminants contained in diesel exhaust is difficult to assess. Elemental carbon (carbon in the soot particle core) can be used as a surrogate in the assessment of the exposure potential for long term, full shift exposures. In the fire station the vehicles are started and are quickly driven out of the station. Therefore the exposure potential can be high for short term duration. We determined that the best approach would be to measure carbon monoxide (CO), carbon dioxide (CO₂), ultra-fine particulate (UFP), and nitrous fume. These components are easily measured with direct reading instrumentation. These measurements lend itself nicely for this type of short term exposure evaluation.

Methodology

The following instruments were utilized for this assessment:

- TSI, Inc Q-Trak® (CO, CO₂, Temperature, Relative Humidity)
- TSI, Inc. P-Trak® (Ultra-Fine Particles 0.02 µm 1.0 µm in diameter)
- Draeger, Inc. Chip Measurement System (Nitrous Fume)

The instruments were all zeroed and field calibrated per manufacturer instructions prior to use.

Murphy Specialty was interested in determining worst case exposure data. This was achieved by positioning the monitoring equipment 2 - 3 feet away from the tailpipe of the test vehicle. In addition the instruments were placed three feet above the ground which is significantly closer to the source than an average humans breathing zone.

Initially background measurements were collected in the garage for CO, CO_2 , and UFPs. After background measurements were obtained we had a firefighter start the engine and allow it to idle. After a minute of idling we had the firefighter throttle the engine as if they were exiting the building. This was done in order to maintain worst case condition. We did not want the garage bay doors opened which would bring in outside air causing dilution of the exhaust contaminants we are trying to evaluate. This procedure was done on the Ladder 1 vehicle with a MagneGrip connector and on Engine 4 with a HazVent connector. As a comparison we had a firefighter start Ladder 1 vehicle without the MagneGrip exhaust system connected. Results are reported in Table No.1. Photographs of the assessment are contained in Appendix B.



Table No.1

Ladder 1 and Engine 4

Air Monitoring Data – Reading, Massachusetts Fire Department Headquarters

January 10, 2014

Location	Conditions	Capture Device	CO_2	CO	UFPs	Nitrous ¹
						Fume
Ladder 1	Background	NA	440 - 500	0	30,000 - 33,000	NA
Ladder 1	Engine started, Idling and engine throttled	MagneGrip	500 - 560	0	32,000 - 38,000	<0.5
Ladder 1	Engine Started, Idling and engine throttled	NA – No exhaust capture device used	2,054	22	325,000 - 338,000	>15.0
Engine 4	Background	NA	505	0	18,000 - 22,000	NA
Engine 4	Engine Started, Idling and engine throttled	HazVent	496	0	18,000 - 21,000	<0.5
Outside	Outside Background	NA	373	0	23,000 - 25,000	NA

Instrumentation is sensitive and updates continuously. Ranges were provided if measurements were varied moment to moment.

Applicable Occupational Exposure Values

- Note these are 8 hour time weighted exposure values with the exception of the Ceiling limit.

	OSHA	ACGIH	
CO_2	5,000 ppm	5,000 ppm	<u>Note</u> : Typical CO ₂ concentration in outdoor air is $300 - 400$ ppm. The
CO	50 ppm	25 ppm	Massachusetts Department of Public Health recommends that CO ₂
NO_2	5 ppm Ceiling	0.2 ppm	concentrations be maintained below 800 ppm in indoor environments.
NO	25 ppm	25 ppm	The EPA National Ambient Air Quality Standard for CO is 9 ppm.
UFPs	NA	NA	

1 – Nitrous Fume test was found to be an ineffective test for this assessment. The Draeger CMS unit required several minutes of sample collection time when concentrations are low. The sample collection time exceeded the amount of time that the engine remained idling.



Results and Discussion

Our test was setup to be as worst case as possible. Our sensitive monitors were positioned directly at the tailpipe and the engines were throttled several times during the monitoring period. The main constituents tested (CO, CO₂ and UFPs) did not change significantly during the test with the exhaust extraction system operating. Results overwhelmingly indicate that the HazVent and MagneGrip system capture tailpipe emissions effectively. Levels of CO, CO₂ and UFPs were virtually the same as the background test values. Further the difference between the engine operating with the exhaust capture system and without it was very significant. Table No.2 provides a comparison of the highest background levels obtained to the levels measured with no exhaust capture system operating on Ladder 1.

Table No. 2			TTT				
Comparison of Diesel Contaminants Levels with Exhaust Extraction and Without							
Contaminant	Highest Level With	Concentration Without	Percent				
	Exhaust Extraction	Exhaust Extraction	Difference				
	Operating						
СО	0 ppm^1	22 ppm	4,300 %				
CO ₂	560 ppm	2054 ppm	267 %				
UFPs	38,000 pt/cc	338,000 pt/cc	789%				
	o						

1 – Measured value was 0 ppm; for percentage calculation purposes a detection limit of 0.5 ppm was utilized.

It is concluded that use of the Clean Air Concepts / MagneGrip Group tailpipe extraction system is effective at capturing diesel exhaust emissions. Use of such a system will significantly reduce fire fighter exposure potential to cancer and asthma inducing diesel exhaust constituents in fire stations. The exhaust extraction system maintains airborne contaminant levels significantly below applicable Federal and State regulations\guidelines.

Based upon the effectiveness of this system we can recommend that Fire Departments consider this system for vehicle exhaust capture. In addition, implementation of this system will fulfill the recommendations outlined by the Massachusetts Division of Occupational Safety in a bulletin titled: *Engine Exhaust Fumes in Fire Stations: Health Effects and General Recommendations* (Bulletin# 371).

This concludes our work on this evaluation. If you have any questions, please call.

Sincerely, Cashins & Associates, Inc.

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Michael R. Cashins, CIH Manager of Industrial Hygiene Services



Appendix A

MagneGrip and HazVent Information











MagneGrip



Appendix B

Photographs





Reading Fire Department Headquarters



Ladder 1 – MagneGrip – Test Setup





Test Instruments Setup Close to Exhaust Tailpipe



Engine 4 – Test Setup





Engine 4 – Test Equipment Proximate to Exhaust Tailpipe



Engine 4 – Test Setup at Tailpipe



Engine Exhaust Fumes in Fire Stations

Health Effects and General Recommendations



Executive Office of Labor and Workforce Development Department of Labor Standards



Introduction

It is the responsibility of the Workplace Safety and Health Program to investigate workplace conditions with respect to health hazards, to determine the severity of such hazards, and to recommend controls when necessary. In the late 1980s, this agency conducted a series of indoor air surveys at numerous fire stations in response to concerns expressed by firefighters. The following discussion and recommendations were a result of those surveys. Because of the high-risk fire fighters face on the job, exposures at the stations themselves should be carefully controlled and kept to the lowest possible level.

Fire departments are encouraged to self-evaluate each station. Factors to be considered in the evaluations include building design and construction, engine types, routes of air movement between apparatus floor and crew quarters, ventilation, and actual levels of air contaminants.

Health Effects

Gasoline and diesel exhaust and their combustion products contain carbon monoxide, oxides of nitrogen and sulfur, hydrocarbons and solid particles of respirable (breathable) size. Among the hydrocarbons are formaldehyde, methane, benzene, phenol, 1-3-butadiene, acrolein and a group of compounds known as polyaromatic hydrocarbons (PAHs), several of these hydrocarbons can cause cancer. The chemical compounds can also attach to the solid particles and be carried into the lungs. Fire fighters are often exposed to cancer causing chemicals while fighting fires. The presence of diesel and gasoline fumes in the fire station extends the time, variety and dose of materials to which employees may be exposed. This increases the risk of cancer. A Canadian study [Scandinavian Journal of Work and Environmental Health 14 (1988) pp. 79-90] showed that increased gasoline exhaust exposure increased the risk of developing squamous cell lung cancer. Diesel exhaust contains 30-100 times more particles than gasoline exhaust. This may increase the quantity of organic compounds brought into the lungs. This, in turn, increases the risk of cancer. As a result of this and other experimental evidence, the National Institute for Occupational Safety and Health (NIOSH) released a bulletin in August 1988 stating that diesel exhaust should be considered a potential occupational carcinogen (cancer causing agent). Since there is no known "safe" (risk-free) level of exposure to carcinogens, exposure to diesel and gasoline exhaust in fire stations should be reduced to the lowest possible level.

In addition to the long-term effects described above, combustion products may also produce acute or short-term health effects. These include irritation of the eyes and respiratory tract. The carbon monoxide in combustion gases presents a serious hazard; it can cause headache, confusion, weakness and nausea as it reduces the ability of the blood to supply oxygen to the body. At very high concentrations it can lead to loss of consciousness, coma and death. The nitrogen and sulfur oxides irritate the lungs, and may reduce the body's ability to defend itself against infectious agents and other chemicals. These effects may contribute to the combustion products' ability to cause cancer.

General Recommendations

The impact of engine exhaust emissions in fire stations on firefighters' health depends upon the intensity and duration of carbon monoxide, nitrogen dioxide and diesel exhaust exposure. The intensity and duration of exposures will vary with the number of runs, types of engines, weather conditions, ventilation, and other factors.

There are several types of actions that can be taken to reduce engine exhaust exposures in fire stations. There are measures that reduce emissions at their source (i.e. engine maintenance and local exhaust capture), prevent significant build-up of exhaust emissions (general exhaust ventilation and minimal idling times), and hinder the migration of emissions into crew quarters (door and fire pole seals).

 Engines should be properly maintained and tuned. Exhaust and emissions control systems should be properly operating. Engines that have particularly high particulate and gas emissions, despite tune-ups, should be removed from service until repaired and used only as a last resort. If such engines must be kept in service, they should be stationed where their emissions are best controlled. The best control is local exhaust ventilation capture of emissions (See recommendation 5).

- Regular shift run-ups of engines are not advised unless the vehicles are removed from the station.
 Engines should idle as short a time as possible inside the fire station, never more than one minute. If brake pressure cannot be built up in less than a minute, auxiliary airline compressors should be used.
- 3. The positioning of vehicles can be important. Vehicle exhaust pipes should not be allowed to blow directly against doorways or up stairways to other areas. If alternate positioning of vehicles will not improve the situation, the vehicle exhaust pipe should be redirected.
- 4. Other equipment with internal combustion engines should be tested outside, not inside the building.
- 5. Ensure adequate ventilation of the apparatus area throughout the year to prevent the build-up of exhaust gases and fumes in any part of the fire station. Flexible hoses attached to the vehicles' exhaust pipes and venting directly to the outside are the most effective methods of removing exhaust and minimizing accumulation in the fire station. Professionals are needed to oversee the design and installation of mechanical exhaust systems in order to ensure their appropriateness and effectiveness.

In a small station with one or two vehicles and a low number of runs, and with crew quarters well sealed off from exhaust emissions, emissions may be adequately minimized by opening bay doors immediately when vehicles are started and keeping them open long enough to clear the apparatus floor of exhaust. This will not be very effective if there is poor or no cross-ventilation, weather conditions are inappropriate, or if there are staffing and security limits.

In stations with a high number of daily runs, that have poor natural ventilation, and/or have vehicles that can't be tuned adequately, a local or general exhaust ventilation system should be used. A local exhaust ventilation system uses a hose attachment to capture engine fumes at the tailpipe and exhaust the fumes directly outside. These systems have several advantages over general exhaust ventilation including that only low levels of emissions escape into room air and that less tempered air is exhausted from the space. The disadvantages for fire station purposes include maintenance, the fact that engine fumes on vehicle return would not be captured, the need to place the hose on the exhaust pipe and potential problems with system layout and installation. There are commercially available local exhaust ventilation systems that attempt to minimize these problems.

A less effective alternative is general ventilation, usually in the form of wall or window fans. These are easy to install and relatively inexpensive. For the highest effectiveness, they must be positioned close to the vehicles' tailpipes. The farther away the fans are located from the tailpipes, the more the contaminated air is likely to migrate into other areas. Because air travels the path of least resistance, there should be no openings to areas outside the apparatus floor between fan and tailpipe. In general, there should be no permanent openings at all, other than exhaust fans on the apparatus floors. These problems can be partially overcome by designing a partially ducted general exhaust ventilation system with large exhaust vents located where engine exhaust normally initially accumulates. Air volumes needed are generally smaller than with wall exhaust fans and fume capture is more effective. However, system layout and installation can be difficult.

In general exhaust ventilation, a two speed or variable speed fan can save on heat in the winter. A lower speed should be sufficient in preventing engine emissions from migrating into crew quarters, when used with doors and windows shut, The high speed should ensure a rapid clearing of apparatus room air. An effective system should provide a room air change every ten minutes. A makeup air heating unit may be needed to maintain reasonable temperatures in the wintertime.

When makeup air enters the apparatus room, as part of exhaust ventilation, it should be controlled and directed to enhance the clearing of engine emissions from the room air. Examples of accomplishing this might be the slight opening of a bay door opposite the fan or the automatic opening of a louvered vent in a bay door. Another example is a makeup air ventilation system with supply vents positioned to flush the apparatus floor.

Vehicle maintenance that requires engines to run inside a building must be done with adequate ventilation. Local exhaust ventilation is recommended. A flexible exhaust hose with one end attached to the exhaust pipe and the other outside the building can be effective, but, the hose must not be not too long or damaged, and the end around the exhaust pipe must fit snugly.

6. Any exhaust system installed needs to be used and maintained properly and effectively. Station personnel should be familiar with the system and how it is to be used. A general exhaust system should run long enough after vehicles leave or return to clear the air in the apparatus area. As conditions vary from station to station, system running time should be determined locally.

- 7. Some stations have automatic controls that turn on exhaust ventilation. They may be activated by bay door openings, by exhaust sensors, or by other means. A timer turns off the ventilation after a period of time thought sufficient to clear the air. Where such controls also control bay door operation, fail-safe mechanisms are needed to prevent accidents caused by moving bay doors.
- 8. Isolation is one method of controlling migration of exhaust fumes. There is a tendency for air (and engine exhaust fumes) to move between the apparatus floor and adjacent offices and crew quarters through openings of any size as a result of temperature differences, air pressure differences (because of outside winds) and human traffic between areas. Isolation measures, in effect, seal off the apparatus room from other areas. A potential problem is the trapping of fumes in the apparatus room. The significance of this depends upon the volume of the apparatus area, the rate and duration of engine emissions, the amount of time firefighters have to spend in the area, and the effectiveness of any mechanical or natural ventilation.
 - a) Keep all doors leading to the apparatus floor closed when not in use. Install self-closing mechanisms on these doors. Weather-strip these doors to ensure good seals.
 - b) Fire poles need self-closing lids or doors with weather-stripping that minimizes gaps. Permanently seal off those no longer in use.
 - c) Install a self-closing door and its supporting walls at either the top or bottom of open stairwells connecting with the apparatus floor.
 - d) Inspect seals and self-closing mechanisms for damage or wear every year and repair when necessary.
 - e) Seal or weather-strip all openings between the apparatus floor and occupied areas. These openings include, but are not limited to, hose towers, pipe runs, pole holes, windows and doors.

- Efforts to seal off occupied areas from the apparatus floor can result in inadequate ventilation in some areas. Watch rooms commonly have this problem. If additional access to natural ventilation does not ensure good ventilation, positive pressure mechanical ventilation should be provided.
- 10 Besides exhaust ventilation and isolation, filtering mechanisms on vehicles and in apparatus rooms are additional ways of reducing engine emissions. Vehicle engine exhaust filtering and capturing devices can effectively minimize the release of particulate into stations. However, depending on the type, they may not prevent engine gases such as carbon monoxide and nitrogen oxides from being emitted. Improper use and maintenance can lead to engine problems. Vehicles not equipped with the devices would still be a potential engine exhaust source.

Re-circulating overhead air filtration units can save on heating costs. Properly positioned, they can do an effective job of removing airborne particulate. Special filters can remove some air borne combustion gases. Knowing when filters are no longer effective, and properly replacing them can be a problem.

11. Ensure that the annual Right to Know training required in Massachusetts includes the potential hazards of engine exhaust fumes within fire stations and other enclosed spaces.



Commonwealth of Massachusetts Deval L. Patrick, Governor Timothy P. Murray, Lt. Governor Joanne F. Goldstein, Secretary Executive Office of Labor and Workforce Development Heather E. Rowe, Director Department of Labor Standards Department of Labor Standards www.mass.gov/dols





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