



Radon & Soil Gas Mitigation Services
Anthony G. Hendricks P.E.

October 14, 2013

SCS Engineers
Mr. Robert Langdon
rlangdon@scsengineers.com
(608) 216-7329

Post Mitigation Report For

Mr. Ivan L. Stiltj'es, 135 W. Lincoln Ave., Little Chute, WI 54140

Project

A mitigation system had been installed in this home to control soil vapor intrusion. The system had been found to be ineffective. Based on an inspection and evaluation by Jack Bartholomew, August 27, 2013 an estimate to upgrade the system by adding two additional pickup points to connect to the existing three inch piping and increase the fan size was made.

The upgrade of the existing system was made in this home October 10 & 11, 2013. The basement of the home is approximately 30 feet wide by 30 feet long. There's a divide between an unfinished portion of the basement and a finished portion of the basement at about the midpoint. There's a step up into the unfinished portion of the basement indicating a potential footer separating the two portions.

Pickup Point(s)

Based on the report by Jack Bartholomew and pictures site(s) for the pickup points were chosen. Pickup point A is located near the middle of the unfinished section near the wall separating the unfinished and finished sections of the basement. Pickup point B is located near the middle of the unfinished portion of the basement near the street side close to the sewer lateral entering the home. (See the drawing for approximate location.) Note: The old cast iron sewer had been replaced a number of years ago and new concrete patched in over the newer PVC sewer.)

A hole was opened in the concrete floor for each pickup point. The material under the concrete was tight clay like soil with some stones. The hole was dug to a depth of approximately 35 inches in point A and 32 inches in point B. Approximately 6 to 7 buckets of material was removed from each pickup point. A sump lid was installed over each hole and sealed. A two inch discharge pipe was installed on the sump lid then routed to connect to the existing 3 inch pipe. The old fan was removed. The outside piping had to be modified by adding new fittings



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so that a larger fan could be installed. The new fan was mounted on an upturned fitting of the modified piping. The existing discharge had been turned down pointing the gases toward the ground. That was cut off so that the discharge would get straight up and get maximum dilution. The final discharge is a minimum of ten feet above ground and over a foot above the eave line. An ice/debris trap was installed above the fan in the discharge line. The ice/debris trap has a stainless steel screen and easy clean out.

Depressurization Testing

One fan was tested. The fan that was found to be acceptable has a maximum 2.7 inches of water column. Extensive depressurization testing was done. During depressurization testing a imbalance was found between the two pickup points. Based on the knowledge that point B was near the sewer lateral and depressurization readings near B indicated that point B was moving the most air reducing the ability to depressurize the finished portion of the basement. Based on the depressurization readings a recommendation to add a valve and restrict flow from B was made and approved. After the valve was installed adjustments were made to restrict flow from B with the valve and increase suction on A. After each adjustment depressurization readings were taken again.

Depressurization Readings (See drawing.)

- 1) Located in front right corner about 9 feet from B. (A hole reused made by J. Bartholomew.)
- 2) Storage nearest A, about 14 feet from A. (Hole reused made by J. Bartholomew.)
- 3) About 4 feet from A. (A Hole reused, made by J. Bartholomew.)
- 4) Behind the bar in the finished room, about 12 feet from A. (Hole reused, made by original installer.)
- 5) Near sump in a closet in the finished room. New hole made on Oct. 11, 2013.

Initial Readings (before valve was installed and adjusted)

- 1) Minus 0.116
- 2) Minus 0.004
- 3) Minus 0.102
- 4) Minus 0.005
- 5) 0.000

Readings Made After Final Valve Adjustment

- 1) Minus 0.02
- 2) Minus 0.005
- 3) Minus 0.100
- 4) Minus 0.008
- 5) Minus 0.001



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Note: All readings taken in inches of Water Column.

Backdraft Testing

The home has a gravity vent hot water heater. After startup of the larger fan a smoke pen was used to check for back drafting. Smoke from the smoke pen drafted up the vent indicating no back drafting under the conditions tested.

Fan Installed

AMG Prowler with maximum suction of 2.7 inches of water column. The fan comes with a manufacture's warranty of five years.

Manometer & Installation Information

A manometer already installed on the riser pipe was reset to zero. The manometer read 2.5 inches of water column after air flow restriction using the valve in the line to B. Based on the fan curve this would be approximately 9 cfm of soil gas discharge. A label already installed beside the manometer had the following information added: Date of Start Up of the New Fan, Installer, Installers Phone Number, Fan Model and Inches of WC at startup.

Conclusion

The results of the testing demonstrate that the slab has been successfully depressurized.

(Note: All pressure readings made with an Infiltec Digital Micro-Manometer.)

Prepared by: Anthony G. Hendricks P.E.

Maintenance Plan For The Sub Slab Depressurization System For

Mr. Ivan Stiltjes
135 W. Lincoln Ave.
Little Chute, WI

Existing System Upgraded: October 10 & 11, 2013
Installed by Acura Services LLC

System Description

Soil gas enters a home due to a positive pressure under the slab (floor) of the basement. A sub slab depressurization system works by changing that positive pressure into a negative pressure. The negative pressure created by the pickup point and fan sucking on the pickup point causes the soil gas to flow to the pickup point and to be exhausted through the fan outside the home. As long as that negative pressure is maintained the soil gas that would enter the home is captured and exhausted outside along with any harmful constituents of that gas. Harmful constituents of the gas include volatile organic compounds and radon for example.

Fan Operation & Maintenance

The fan, the manometer, a valve and the on/off switch are the only moving parts to this sub slab depressurization system. The fan is designed to run all day year round. If the fan stops or is shut down the pressure under the slab will probably return to positive and potentially allow sub slab soil vapors to enter the home. The functioning of the fan is therefore the most essential component of the system. The valve has been set to balance out the system and should only be adjusted by a professional.

The manometer, which reads inches of water column, indicates the proper operation of the fan. The manometer reading at startup is recorded on a label affixed on the riser pipe beside the manometer. This reference allows you to compare that initial reading with any current reading. The manometer may bounce around a small amount due to changing weather conditions overall that variation will be small compared to the initial reading. Any significant change needs to be evaluated to insure that the system is operating properly.

If the manometer reading drops to zero, that is both sides of the manometer are at the same level the system needs to be checked out.

Step One: Determine if the manometer is hooked up properly. A small tube on one side of the manometer has been placed in a hole drilled in the riser pipe. If for any reason that tube has been pulled out of the riser pipe or from the manometer the manometer will not read properly. To correct reinsert the tube into the hole in the riser pipe or the tube of the manometer. Once this is done the manometer reading should return to approximately the initial startup reading.

Step Two: After checking the manometer you find that the fan is not running. First check the breaker in the electric panel to see if it is on. If the breaker is off turn it to on. If the breaker is in the proper position go outside to check the lockable on/off switch for the fan. A child or other person may have turned the switch off. If in the off position move to the switch to the on position and listen for the fan

to start up. Once the fan starts up go check the manometer reading to verify that the fan is operating normally. To prevent this happening in the future you may insert a lock into the lockable on/off switch. Make sure the switch is in the on position. Verify by checking the manometer immediately.

Step Three: What if after checking the fan operation you find it's not running. On the riser pipe is the contact information for Acura Services LLC. Call for assistance. Although these are high quality fans made specifically for mitigation systems all mechanical devices can and will fail. When calling please have the following information handy to communicate; 1) Startup Date; 2) Initial manometer reading; 3) Fan Model (this will be on the fan name plate and/or the label on the riser pipe.

Warning Check The Manometer Regularly

The manometer is the primary run indicator for the system. Get in the habit of checking the manometer regularly. All fans wear out eventually and since these systems are user friendly they tend to get ignored over time. If your laundry is in the basement a good habit is to check the manometer every time you do laundry. Checking the manometer a minimum of once a week is recommended. Daily is better.

The mitigation system is designed to protect your health from harmful soil vapors including radon. You are responsible to see that the system is functioning properly. By keeping a regular check on the manometer you can feel confident that you and your family are being protected.

If You Plan on Remodeling or Ad an Addition to Your Home?

Some remodeling may impact the effectiveness of the system. Call Acura Services LLC to discuss the planned project so any potential impact to the mitigation system may be evaluated. **Warning;** Many to most builders do not understand the importance of mitigation systems and may give you assurances that the system will not be impacted. These assurances may not be valid.

Maintenance

The fan is the only major moving part. The fan is maintenance free. By checking the manometer regularly you'll be checking the proper operation of the fan. There is an Ice/Debris trap with a stainless steel screen just above the fan. The manufacture recommends that this be cleaned annually. Shut off the fan then remove the screw in plug. Clean out any debris trapped on the screen. Screw the plug back in and turn the fan back on.

If you have any further questions about your mitigation system call Acura Services LLC. We take pride in our systems and want you and your family to enjoy a healthy home.

Installation & Wiring Instructions for AMG In Line Centrifugal Duct Fans



Model: AMG Spirit, Fury, Legend, Hawk, Maverick,
Prowler, Eagle



IMPORTANT NOTE : DO NOT CONNECT THE POWER SUPPLY UNTIL THE FAN IS COMPLETELY INSTALLED.
MAKE SURE THE ELECTRICAL SERVICE TO THE FAN IS LOCKED IN "OFF" POSITION.

PLEASE READ AND SAVE THESE INSTRUCTIONS :

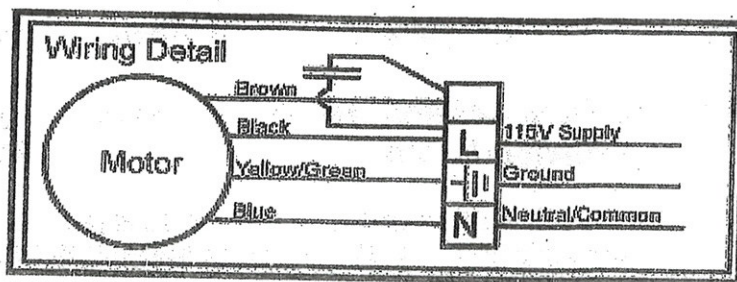
Warning – To reduce the risk of fire, electric shock or injury to persons, observe the following.

1. This unit is only for use in the manner intended by the manufacturer. If you have any questions contact the manufacturer Festa Manufacturing Enterprises LLC.
2. Installation work and electrical wiring must be done by qualified person'(s) in accordance with all applicable codes and standards, including fire-rated construction.
3. Sufficient air is needed for proper combustion and exhausting of gases through the flue, (chimney) of fuel burning equipment to prevent back drafting. Follow the heating equipment manufacturer's guideline and safety standards such as those published by the National Fire Protection Association (NFPA), and the American Society for Heating, Refrigeration and Air Conditioning Engineers (ASHRAE), and the local code authorities.
4. When cutting or drilling into wall or ceiling, do not damage electrical wiring and other hidden utilities.
5. Ducted fans must always be vented to the outdoors.
6. These units can be mounted indoors or outdoors.
7. Do not use these fans with solid state speed controllers.
8. The electric motor is protected by an internal overheat device to prevent/minimize motor damage. If the motor stops working, immediate inspection should be carried out by suitably qualified persons.
9. Before servicing or cleaning the unit, switch power off at service panel and lock the service disconnecting means to prevent power from being switched on accidentally. When the service disconnecting means cannot be locked, securely fasten a prominent warning device, such as a tag, to the service panel.
10. Do not use in a window.
11. If this unit is to be installed over a tub or shower, it must be marked as appropriate for the application and be connected to a GFCI (Ground Fault Circuit Interrupter) – protected branch circuit.
12. Never place a switch where it can be reached from a tub or shower.
13. CAUTION: For General Ventilating Use Only. Do Not use to Exhaust Hazardous Or Explosive Materials and Vapours.
12. CAUTION: This unit has an unguarded impeller. Do Not Use in Locations Readily Accessible To People or Animals.

Installation of FME AMG PATRIOT Radon Fans.

The FME AMG PATRIOT Fan can be mounted indoors or outdoors. We suggest that EPA recommendations be used in choosing the fan location. The AMG Fans may be mounted directly onto the piping system or fastened to a supporting structure. When mounting directly onto a vertical piping system, it is the installers responsibility to make provision to prevent the pipe system sliding into and onto the fan motor and impeller. When installing a system with short duct runs terminating close to the fan i.e. within 60" (1.5m) suitable guards should be incorporated. It is the responsibility of the installer to ensure that all aspects of the system are taken into consideration. Rigid ducting sections should be connected to fan spigots by flexible connectors and clips. The flexible connectors used should be suitable for routine servicing and vibration isolation.

Electrical Connections



Ensure that the mains supply voltage, frequency, number of phases and power rating comply with the details on the unit rating label (situated internally on inside of box cover). All wiring must be in accordance with local and / or national electrical codes as applicable, or the appropriate standard in your country. The fan must be supplied through a double pole isolating switch having a contact separation of not less than 1/8" (3mm). Wiring to the terminal box should be made in liquid tight flexible conduit to facilitate easy maintenance.

Operational Checks.

Ensure all duct connections are tight and leak free.

Check the system vacuum pressure with a manometer, ensure that the vacuum pressure is less than the maximum recommended operating pressure.

Check and verify Radon levels by testing to EPA protocol.

Cleaning and Maintenance.

We would recommend that the fan be periodically checked against the listed operational checks to ensure trouble free long lasting operation.

FIVE (5) YEAR WARRANTY

Conditions of Warranty

Festa Manufacturing Enterprises ("FME") warrants that the AMG PATRIOT shall be free from defects in material and workmanship for a period of (5) years from the date of purchase by the customer. If within the applicable warranty period the Products prove to be defective by reason of faulty workmanship or materials, FME will undertake to have the defective Product (or any part thereof) replaced at no cost to the customer subject to the following conditions:

1. The Product has been purchased and used solely in accordance with all Environmental Protection Agency ("EPA") standard practices and state and local codes of practice.
2. The Product is returned promptly on being found defective, together with this warranty and proof of date of installation at the customers risk and expense to Festa Manufacturing Enterprises LLC. ("FME") from whom the Product was purchased. All enquiries must be through FME.
3. This warranty shall not apply to any Product failure or defect due to any cause beyond the reasonable control of FME including; damage caused through fire, flood, explosion, accident, misuse, wear and tear, neglect, incorrect adjustment or repair, damage caused through installation, adaptation, modification or use in an improper manner or inconsistent with the technical and/or safety standards required where the Product is used, or to damage occurring during transit to or from the customer.
4. If at any time during the Warranty Period any part or parts of the Product are replaced with a part or parts not supplied or approved by FME, or the Product has been dismantled or repaired by any person not authorized by FME, FME shall have the right to terminate this warranty in whole or in part immediately without further notice.
5. FME's decision on all matters relating to complaints and Products defects and failure (alleged or actual) shall be final. Any Product or defective part, which has been replaced, shall be FME's.
6. FME will offer to customers a Warranty of a full Five Years, from date of purchase, in accordance with the terms listed above.

Festa Manufacturing Enterprises, LLC. 47A Progress Ave. Cranberry Twp., PA 16066
Tel. Toll Free 1(800) 806-7866 Fax 1(412) 931-0754



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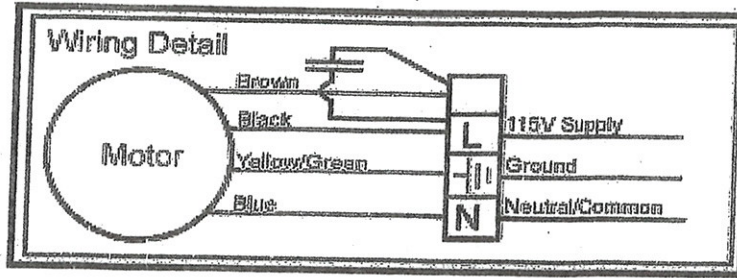
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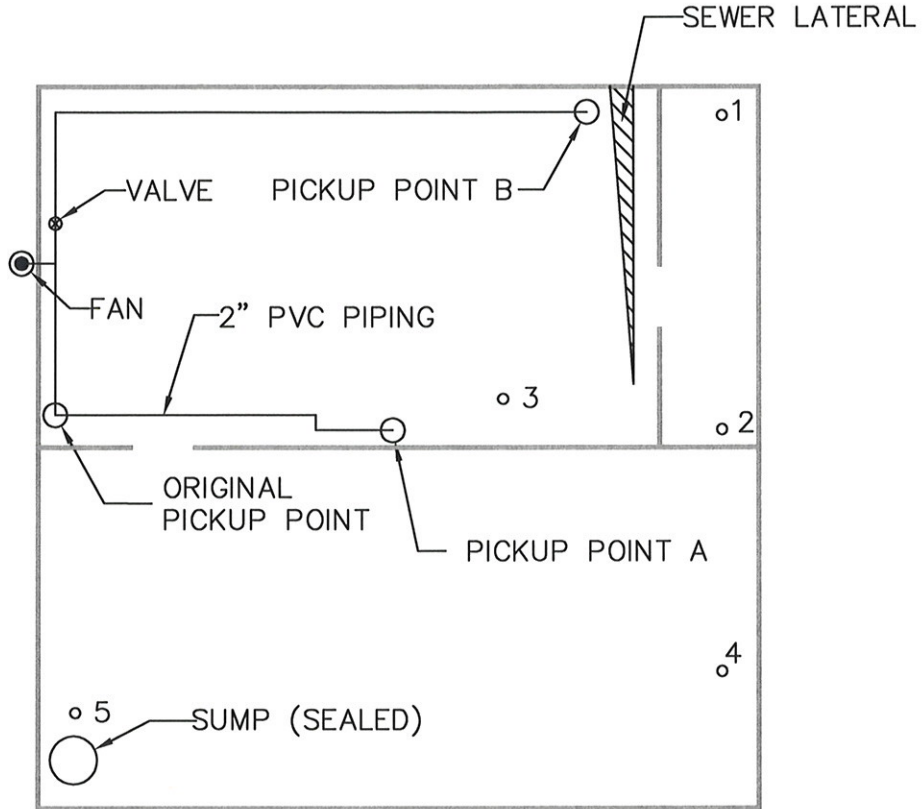
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Tel. Toll Free 1(800) 806-7866 Fax 1(412) 931-0754



0508

BASEMENT LEVEL



LEGEND

o 1 VACUUM MONITORING POINT


NOTES:

1. INFORMATION OBTAINED FROM NOTES PROVIDED BY ACURA SERVICES, LLC AND RADON ENERGY AND VENTILATION SERVICES.

2. SCALE AND SUB-SLAB DEPRESSURIZATION SYSTEM LOCATIONS ARE APPROXIMATE.



SCALE: 1" = 8'

CLIENT		WISCONSIN DEPARTMENT OF NATURAL RESOURCES	SITE	135 W. LINCOLN STREET LITTLE CHUTE, WISCONSIN	SUB-SLAB DEPRESSURIZATION SYSTEM
	PROJECT NO.	25213180.02		DRAWN BY:	
	DRAWN:	11/07/13	CHECKED BY:	RL	ENGINEER SCS ENGINEERS 2830 DAIRY DRIVE MADISON, WI 53718-6751 PHONE: (608) 224-2830
	REVISED:		APPROVED BY:	RL 12/13/13	

Mitigation System Photos
135 W. Lincoln Avenue, Little Chute, Wisconsin
SCS Engineers Project #25213180.02



Photo 1: Looking northeast at installation of Pickup Point B



Photo 2: Pickup Point B cover and seal during installation

Mitigation System Photos
135 W. Lincoln Avenue, Little Chute, Wisconsin
SCS Engineers Project #25213180.02



Photo 3: Looking southeast at Pickup Point A during construction



Photo 4: Looking west at Pickup Point A and drop pipe

Mitigation System Photos
135 W. Lincoln Avenue, Little Chute, Wisconsin
SCS Engineers Project #25213180.02



Photo 5: Looking northeast toward Pickup Point B



Photo 6: Looking east at completed Pickup Point B and PVC pipe

Mitigation System Photos
135 W. Lincoln Avenue, Little Chute, Wisconsin
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Photo 7: Looking west at drop pipe to Original Pickup Point. Pipe extends east along ceiling to Pickup Point A



Photo 8: Soil removed during pickup point construction

Mitigation System Photos
135 W. Lincoln Avenue, Little Chute, Wisconsin
SCS Engineers Project #25213180.02



Photo 9: Looking south at piping along ceiling with drop pipe to Original Pickup Point in background. Pipe exits west side of basement to connect to exterior fan



Photo 10: Looking southeast at west side of house with fan and exhaust pipe