

## COMMISSIONING (CxA) BID TABULATION

SOUTH HEIGHTS ELEMENTARY SCHOOL

HENDERSON COUNTY SCHOOLS

HENDERSON, KENTUCKY

MARCUM ENGINEERING NO. 19669

5/11/2021

BIDDER	BASE BID	TOTAL	REMARKS
FACILITY COMMISSIONING GROUP	\$ 32,560.00	\$ 32,560.00	NONE
PERFORMANCE COMMISSIONING AGENCY	\$ 22,040.00	\$ 22,040.00	NONE

# **SOUTH HEIGHTS ELEMENTARY SCHOOL HENDERSON, KY**

## **COMMISSIONING PROPOSAL**

**PROVIDED BY:**



PERFORMANCE COMMISSIONING AGENCY

109 WIND HAVEN DRIVE

SUITE 201

NICHOLASVILLE, KY 40356

P: (859) 277-0191

**Project:** South Heights Elementary School  
Henderson, KY  
\_\_\_\_\_

**Date:** 5/11/2021

**Specification:** 230800

The amount below is the estimated cost for Performance Commissioning Agency ("PCA") to provide commissioning services per the contract documents. This cost quote is only for the services provided by PCA and does not include any services provided by the owner, architect, engineer, or contractors unless stipulated below.

**Commissioning services included:**

☒ HVAC    ☒ Domestic Water    ☒ Lighting    ☐ Building Envelope Testing

<b>Total:</b> <u>\$22,040.00</u>
----------------------------------

**Remarks:**


**Price includes Commissioning plan, System Verification, functional performance test, And final commissioning report.**  
\_\_\_\_\_  
\_\_\_\_\_

Excluded from this quote are the following:

1. Any costs associated with delayed or failed test by any commissioning team member
2. Any costs associated with existing systems deficiencies beyond our control
3. Any costs associated with any commissioning team member's failure to perform their due diligence

This estimate is subject to a final written agreement signed by each party. If there are any questions concerning this quotation, please feel free to call.

Sincerely,



Steve Turner, President, TBT, CXA  
[sturner@perfcx.com](mailto:sturner@perfcx.com)

This quote is valid for 30 days from the date written above.

**Systems to be commissioned:**

- **Domestic Hot Water**
- **HVAC Controls**
- **Exhaust Fans**
- **Packaged Outdoor Units**
- **Water Source Heat Pumps**
- **Hydronic Pumps**
- **Hydrostatic Tests**
- **Flush Fill & Purge Activities**
- **Fluid Cooler**
- **Unit Heaters**
- **Louvers**
- **Relief Hoods & Vents**
- **Kitchen Exhaust Hood System**
- **Make Up Air Units**
- **Ductless Split Heat Pumps**
- **Lighting Controls**

**Additional services not included in the scope of work will be billed at \$105.00 per hour.**

**System verification checklists will be created based on the design documents and actual equipment submittals. The SVC's are to ensure**

**that all equipment is installed per the design documents, and that the equipment is ready for start-up.**

**Once all equipment has been started and balanced, we will then begin functional testing. Functional performance tests will be created and carried out based on the design documents. PerfCx will functionally test all equipment above with the aid of the contractors to ensure that all equipment is operating at or as close as possible to design conditions.**

**Once all testing is complete, we will submit a detailed final report with our findings to the owner and engineer for review.**

# **PERFORMANCE**

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## **COMMISSIONING AGENCY**

### **COMPANY INFORMATION AND SUBMITTALS**



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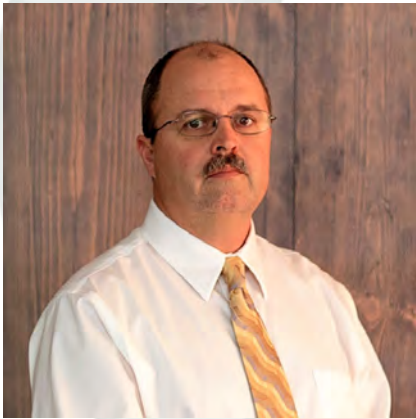
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# HISTORY

PERFORMANCE COMMISSIONING AGENCY (PCA) WAS ORIGINATED FROM 50 YEARS OF SERVICE IN THE TEST AND BALANCE INDUSTRY. IN THESE YEARS WE HAVE SEEN MANY COMMISSIONING PRACTICES AND KNEW THAT A BETTER PRODUCT COULD BE PROVIDED WITH LESS EXPENSE.

PERFORMANCE COMMISSIONING AGENCY WAS ESTABLISHED TO PROVIDE EACH CLIENT WITH AN EFFICIENT MEANS OF ESTABLISHING A HIGHLY EFFICIENT PRODUCT. OUR FIELD EXPERIENCE IN THE INDUSTRY CAN HELP STREAMLINE A COMMISSIONING PLAN WHICH WILL IN TURN BE MORE COST EFFECTIVE WHILE STILL ACHIEVING A HIGH PERFORMANCE BUILDING.

# LEADERSHIP



## **STEVE W. TURNER** **PRESIDENT, CxA, TBT**

OSHA 30 CERTIFIED  
COMMISSIONING EXPERIENCE: 14 YEARS  
BALANCE EXPERIENCE: 18 YEARS  
STURNER@PERFCX.COM

I bring a real world approach to the commissioning field. My Knowledge and expertise come from over 30 years of working in the fields of HVAC and electrical. Early in my carrier I held a master HVAC license as well as being a licensed electrician and owning and operating my own sheet metal and electrical company. After working for myself 10 years I then entered the field of test and balance, and went to work for Thermal Balance Incorporated, where I spent the next fifteen years before taking over as President and CxA of Performance Commissioning Agency.



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# ACG CERTIFICATIONS



## *Annual Membership Certificate*

*Awarded to*

***Performance Commissioning Agency, LLC***

*as a member in good standing of the AABC Commissioning Group for the year*

***2021***

*This company has met all requirements for membership and is entitled to all rights and privileges thereof. This certificate is renewable on an annual basis and expires December 31, 2021.*

A handwritten signature in blue ink, reading 'Troy Byers'.

Troy N. Byers, P.E., CxA, President

A handwritten signature in blue ink, reading 'Ray Bert'.

Ray Bert, Executive Director



**PERFORMANCE  
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*Partnering in Design Execution*

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Group



hereby certifies that

**Steve W. Turner**

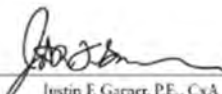
**Performance Commissioning Agency, LLC**

has met all prerequisites demonstrating independence and the technical, management, and communications skills required to implement the commissioning process in new and existing buildings, and passed the necessary examination to be awarded this certificate in recognition of their qualifications as an ACG

**Certified Commissioning Authority**

Registration number: 217-1509 . This certificate, valid only for the year 2021, is renewable on an annual basis upon meeting all requirements noted in the CxA Candidate Handbook.



  
Justin F. Garner, P.E., CxA  
Certification Council Chair



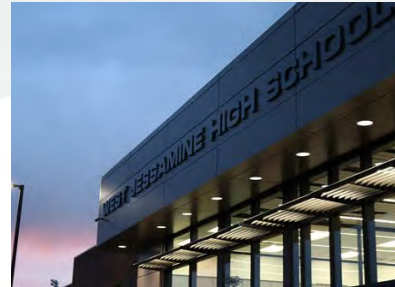
  
Ray Bert  
ACG Executive Director

This certificate is the sole property of ACG and must be returned upon request.

# RECENT PROJECTS

## **WEST JESSAMINE HIGH SCHOOL**

HVAC AND ELECTRICAL COMMISSIONING  
NICHOLASVILLE, KY



## **MURRAY HIGH SCHOOL**

HVAC AND ELECTRICAL COMMISSIONING  
MURRAY, KY

## **BAPTIST HEALTH MADISONVILLE PHARMACY RELOCATION**

HVAC AND ELECTRICAL COMMISSIONING  
MADISONVILLE, KY



## **BUFFALO TRACE DISTILLERY PROJECT TIRE**

HVAC COMMISSIONING  
FRANKFORT, KY

## **CAMPGROUND ELEMENTARY SCHOOL RENOVATION**

HVAC AND ELECTRICAL COMMISSIONING  
LONDON, KY



# REFERENCES

## **HOLLY KING**

Project Manager  
Sherman Carter Barnhart  
(270) 519-9867  
hking@scbarchitects.com

## **JEFF HALVERSON**

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Mechanical Engineer  
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## **JAY JOHNSON**

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## **DAVID JACKSON**

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## **JOSH McRAE**

Controls Project Manager  
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## **KEVIN RICKMAN**

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## **STEVE GRAVES**

Project Manager  
Triangle Enterprises  
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sgraves@triangle-co.com

# PURPOSE OF COMMISSIONING

BUILDING COMMISSIONING (Cx) IS THE PROCESS OF VERIFYING, IN NEW CONSTRUCTION, ALL (OR SOME, DEPENDING ON SCOPE) OF THE SUBSYSTEMS FOR MECHANICAL (HVAC), PLUMBING, ELECTRICAL, FIRE/LIFE SAFETY, BUILDING ENVELOPES, INTERIOR SYSTEMS (EXAMPLE LABORATORY UNITS), CO-GENERATION, UTILITY PLANTS, SUSTAINABLE SYSTEMS, LIGHTING, WASTEWATER, CONTROLS, AND BUILDING SECURITY TO ACHIEVE THE OWNER'S PROJECT REQUIREMENTS AS INTENDED BY THE BUILDING OWNER AND AS DESIGNED BY THE BUILDING ARCHITECTS AND ENGINEERS. RECOMMISSIONING IS THE METHODICAL PROCESS OF TESTING AND ADJUSTING THE AFOREMENTIONED SYSTEMS IN EXISTING BUILDINGS.

BUILDING COMMISSIONING IS A QUALITY-FOCUSED PROCESS NECESSARY FOR BOTH NON-COMPLEX AND COMPLEX MODERN CONSTRUCTION PROJECTS. NORMALLY THE INITIAL COMMISSIONING TEAM AND A TEAM LEADER (TYPICALLY KNOWN AS THE COMMISSIONING AUTHORITY OR CxA) IS INVOLVED FROM PROJECT INITIATION THROUGH ONE YEAR OF OCCUPANCY. IN MANY CASES AND IDEALLY, THERE IS AN ONGOING BUILDING ENHANCING AND COMMISSIONING PROGRAM AND TEAM FOR THE LIFE OF THE BUILDING. WHILE THE SERVICE METHOD CAN VARY FROM OWNER TO OWNER AND PROJECT TO PROJECT, THE BASIC FORMULA FOR A SUCCESSFUL BUILDING COMMISSIONING PROCESS INVOLVES A SYNERGY TEAM FROM PRE-DESIGN TO DEVELOP THE OWNER'S PROJECT REQUIREMENTS (OPR), COMMISSIONING SCOPE AND PLAN, INCLUDING BENCHMARKS FOR SUCCESS, REVIEW OF DESIGN DOCUMENTS AND CHECKLISTS FOR ACHIEVING THE OWNER'S PROJECT REQUIREMENTS (OPR), DEVELOPMENT OF CHECKLISTS AND VERIFYING A SAMPLE OF CONSTRUCTION CHECKLISTS AND SUBMITTALS, DEVELOPING TRAINING NEEDS AND EVALUATING TRAINING DELIVERED BY THE CONTRACTORS, WITNESSING AND VERIFYING CONSTRUCTION PHASE TESTS, AND PERIODIC SITE OBSERVATIONS DURING THE CONSTRUCTION PHASE, AND PERFORMING COMMISSIONING FUNCTIONAL TESTING AS THE PROJECT NEARS COMPLETION. WHILE THE PRACTICE OF BUILDING COMMISSIONING PROCESS IS STILL FAIRLY NEW IN THE CONSTRUCTION INDUSTRY, IT HAS QUICKLY BECOME COMMON PRACTICE AS BUILDING OWNERS AND DEVELOPERS TRY TO GET MORE OUT OF THEIR INVESTMENT. **THE COMMISSIONING PROCESS MAIN GOAL IS TO IMPROVE A PROJECT FROM THE DESIGN PHASE THROUGH POST CONSTRUCTION AND OCCUPANCY.**


# REASONING FOR THIRD PARTY COMMISSIONING

AN INDEPENDENT, CERTIFIED, COMMISSIONING AUTHORITY UNDER CONTRACT TO THE OWNER IS THE PREFERRED CONTRACTUAL ARRANGEMENT BETWEEN A COMMISSIONING PROVIDER AND BUILDING OWNER. **A THIRD PARTY PROFESSIONAL BRINGS OBJECTIVITY AND PRACTICAL EXPERIENCE TO THE PROJECT TO ENSURE THAT THE OWNER WILL TRULY GET THE BUILDING PERFORMANCE THAT HE OR SHE EXPECTS.** ACG MEMBERS MUST BE INDEPENDENT.


ALTHOUGH CONTRACTORS MAY HAVE THE KNOWLEDGE AND CAPABILITY TO TEST THE EQUIPMENT THEY INSTALL, THEY MAY NOT BE SKILLED AT TESTING OR DIAGNOSING INTEGRATION PROBLEMS. IN ADDITION, SOME CONTEND THAT IT IS DIFFICULT FOR CONTRACTORS TO OBJECTIVELY TEST AND ASSESS THEIR OWN WORK, ESPECIALLY SINCE REPAIRING DEFICIENCIES FOUND THROUGH COMMISSIONING MAY INCREASE THEIR COSTS.

IT IS IMPORTANT TO INVOLVE THE INDEPENDENT COMMISSIONING AUTHORITY AS EARLY IN THE PROJECT AS POSSIBLE. THIS ALLOWS THE PROVIDER THE OPPORTUNITY TO REVIEW THE DESIGN INTENT FOR THE PROJECT, BEGIN SCHEDULING COMMISSIONING ACTIVITIES, AND BEGIN WRITING SPECIFICATIONS INTO BID DOCUMENTS FOR OTHER CONTRACTORS.

# SAMPLE REPORT DOCUMENTS



**PERFORMANCE  
COMMISSIONING AGENCY**  
*Partnering in Design Execution*



**HVAC COMMISSIONING  
SYSTEM VERIFICATION/START-UP CHECKLIST  
HOT WATER BOILER**

PROJECT: \_\_\_\_\_

Equipment Name/Tag: \_\_\_\_\_ Location: \_\_\_\_\_

ITEM	✓	COMMENTS
<b>PRE-START-UP INSPECTION</b>		
Commissioning lock-out procedures reviewed	<input type="checkbox"/>	
Operation and maintenance information	<input type="checkbox"/>	
Boiler certificate / registration (copy attached)	<input type="checkbox"/>	
Mounting/support system	<input type="checkbox"/>	
Seismic restraints	<input type="checkbox"/>	
Maintenance clearance	<input type="checkbox"/>	
Local valving/piping correct (including expansion tanks and make-up water).	<input type="checkbox"/>	
Chemical cleaning and treatment (report attached)	<input type="checkbox"/>	
Temperature and pressure gauges	<input type="checkbox"/>	
Pressure relief valve	<input type="checkbox"/>	
Pressurization and leak tests	<input type="checkbox"/>	
Blowdown system	<input type="checkbox"/>	
Safety interlocks- low water and high temperature	<input type="checkbox"/>	
Combustion air supply and ventilation	<input type="checkbox"/>	
Insulation/lagging	<input type="checkbox"/>	
Stack and breaching	<input type="checkbox"/>	
Combustion chamber inspection	<input type="checkbox"/>	
Fuel system (including emergency shutdown and gas inspection certificate)	<input type="checkbox"/>	
Electrical wiring	<input type="checkbox"/>	
Overload protection (sized correctly)	<input type="checkbox"/>	
Disconnect switch (tested)	<input type="checkbox"/>	
Control system - point to point checks complete	<input type="checkbox"/>	
<b>START-UP</b>		
Start HWS pumps to create load.	<input type="checkbox"/>	
Start boiler circulation pumps.	<input type="checkbox"/>	
Boiler startup by supplier	<input type="checkbox"/>	
Supplier certificate or log provided for start-up and all specified and regulatory tests.	<input type="checkbox"/>	

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## HVAC COMMISSIONING SYSTEM VERIFICATION/START-UP CHECKLIST EXHAUST FAN

PROJECT: \_\_\_\_\_

Equipment Name/Tag: \_\_\_\_\_ Location: \_\_\_\_\_

ITEM	✓	COMMENTS
<b>PRE-START-UP INSPECTION</b>		
Commissioning lock-out procedures reviewed	<input type="checkbox"/>	
Operation and maintenance information	<input type="checkbox"/>	
Mounting/support system and vibration isolation	<input type="checkbox"/>	
Flexible connections	<input type="checkbox"/>	
Seismic restraints	<input type="checkbox"/>	
Equipment guards	<input type="checkbox"/>	
Alignment & V-belt tension	<input type="checkbox"/>	
Freedom of rotation	<input type="checkbox"/>	
Lubrication	<input type="checkbox"/>	
Plenum/volute clean and free of loose material	<input type="checkbox"/>	
Duct system tested and cleaned	<input type="checkbox"/>	
Fire & balance dampers positioned	<input type="checkbox"/>	
Exhaust louvers tested (gravity or motorized)	<input type="checkbox"/>	
Building & fan room cleanliness	<input type="checkbox"/>	
Electrical wiring	<input type="checkbox"/>	
Motor rated for VSD service	<input type="checkbox"/>	
Overload protection (sized correctly)	<input type="checkbox"/>	
Disconnect switch (tested)	<input type="checkbox"/>	
Control system - point to point checks complete	<input type="checkbox"/>	
<b>START-UP</b>		
Start-up by manufacturer's rep. (report attached)	<input type="checkbox"/>	
Direction of rotation	<input type="checkbox"/>	
Electrical interlocks - stop/start	<input type="checkbox"/>	
Local air leakage acceptable	<input type="checkbox"/>	
Vibration & noise level acceptable	<input type="checkbox"/>	
Motor Amps - Rated : ____ Actual : ____	<input type="checkbox"/>	
Motor Volts - Rated : ____ Actual : ____	<input type="checkbox"/>	

## HVAC COMMISSIONING FUNCTIONAL PERFORMANCE TEST PUMPS

PROJECT:	
Equipment Name/Tag: P#	Location: Room #
System/Area Served: Area #	Related:

**Occupied Mode:**

**Note**

Verify pump start using control system command ON	YES	NO
Verify pump start using control system command AUTO	YES	NO
Verify pump start using control system command OFF	YES	NO
Verify inlet pressure drop across strainer	_____	PSIG
Verify outlet pressure drop across strainer	_____	PSIG

**Verify pump inlet pressure reading with comparison to TAB and design conditions.**

Design Pump inlet pressure	_____	PSIG
TAB Pump inlet pressure	_____	PSIS
Actual Pump inlet pressure	_____	PSIG
Design Pump Outlet Pressure	_____	PSIG
TAB Pump Outlet Pressure	_____	PSIG
Actual Pump Outlet Pressure	_____	PSIG

**Operate pump at shutoff and at minimum flow or when all components are in full by-pass. Plot test readings on pump curve and compare results against readings taken from flow measuring devices.**

Pump Inlet Pressure SHUTOFF	_____	PSIG
Pump Inlet Pressure 100 Percent	_____	PSIG
Pump Outlet Pressure SHUTOFF	_____	PSIG
Pump Outlet Pressure 100 Percent	_____	PSIG
Pump Flow Rate SHUTOFF	_____	GPM
Pump Flow Rate 100 Percent	_____	GPM

## HVAC COMMISSIONING FUNCTIONAL PERFORMANCE TEST PUMPS

Operate pump at shutoff and at minimum flow or when all components are in full by-pass. Plot test readings on pump curve and compare results against readings taken from flow measuring devices

Pump Inlet Pressure SHUTOFF	_____	PSIG
Pump Inlet Pressure 100 Percent	_____	PSIG
Pump Outlet Pressure SHUTOFF	_____	PSIG
Pump Outlet Pressure 100 Percent	_____	PSIG
Pump Flow Rate SHUTOFF	_____	GPM
Pump Flow Rate 100 Percent	_____	GPM

Verify motor amperage each phase and voltage phase to phase and phase to ground for both the full flow and the minimum flow conditions.

### FULL FLOW

Phase 1 Amperage	_____	A
Phase 2 Amperage	_____	A
Phase 3 Amperage	_____	A
Phase 1 Voltage	_____	V
Phase 2 Voltage	_____	V
Phase 3 Voltage	_____	V
Phase 1 Voltage to Ground	_____	V
Phase 2 Voltage to Ground	_____	V
Phase 3 Voltage to Ground	_____	V

### MINIMUM FLOW

Phase 1 Amperage	_____	A
Phase 2 Amperage	_____	A
Phase 3 Amperage	_____	A
Phase 1 Voltage	_____	V
Phase 2 Voltage	_____	V



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COMMISSIONING AGENCY**

*Partnering in Design Execution*



## HVAC COMMISSIONING FUNCTIONAL PERFORMANCE TEST PUMPS

Phase 3 Voltage	_____	V
Phase 1 Voltage to Ground	_____	V
Phase 2 Voltage to Ground	_____	V
Phase 3 Voltage to Ground	_____	V

### Comments

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## HVAC COMMISSIONING FUNCTIONAL PERFORMANCE TEST ENERGY RECOVERY VENTILLATOR

**PROJECT:**

Equipment Name/Tag: ERV #

Location: Room #

System/Area Served: Area #

Related:

**Start Up**

**Note**

B.A.S. energizes ERV	YES	NO
When ERV energizes, Outside Air and Exhaust Air dampers open	YES	NO
Confirm that when OA damper is open, Supply Fan starts	YES	NO
When supply airflow proven, confirm that Exhaust Fan starts	YES	NO
Verify energy wheel rotation	YES	NO
Supply Fan Motor Nameplate FLA	_____	A
Supply Fan Motor Measured Amperage	_____	A
	_____	A
	_____	A
Exhaust Fan Motor Nameplate FLA	_____	A
Exhaust Fan Motor Measured Amperage	_____	A
	_____	A
	_____	A
Design Supply Airflow	_____	CFM
TAB reported Supply Airflow	_____	CFM
PCA Measured Supply Airflow	_____	CFM
Design Exhaust Airflow	_____	CFM
TAB reported Exhaust Airflow	_____	CFM
PCA Measured Exhaust Airflow	_____	CFM

## HVAC COMMISSIONING FUNCTIONAL PERFORMANCE TEST ENERGY RECOVERY VENTILLATOR

### Temperature

Entering Supply Air Temperature	_____	°F
Leaving Supply Air Temperature	_____	°F
Entering Exhaust Air Temperature	_____	°F
Leaving Exhaust Air Temperature	_____	°F

### Alarm Status

Simulate SF Failure, confirm SF alarm generated	YES	NO
Simulate EF Failure, confirm EF alarm generated	YES	NO

### Comments

## HVAC COMMISSIONING FUNCTIONAL PERFORMANCE TEST ROOF TOP UNIT

PROJECT:	
Equipment Name/Tag: RTU #	Location: Room #
System/Area Served: Area #	Related:

**Occupied Mode:**

**Note**

Confirm that SF is ON	YES	NO	
-----------------------	-----	----	--

**When heating is required, confirm that:**

MAD is positioned to minimum OA setpoint (value set by TAB agency).	YES	NO	
---	-----	----	--

DX cooling if OFF	YES	NO	
-------------------	-----	----	--

GB cycles ON/OFF to maintain space heating temp. setpoint.	YES	NO	
--	-----	----	--

**Record the following data:**

OA temperature	_____	°F	
----------------	-------	----	--

Max. space temp., when GB stops	_____	°F	
---------------------------------	-------	----	--

Min. space temp., when GB starts	_____	°F	
----------------------------------	-------	----	--

Max. supply air temp. (SAT)	_____	°F	
-----------------------------	-------	----	--

Min. SAT	_____	°F	
----------	-------	----	--

**When heating is not required, and free cooling can maintain space temp below cooling setpoint, confirm that:**

GB and DX cooling are both OFF.	YES	NO	
---------------------------------	-----	----	--

MAD modulates from min. OA position to 100% open to OA, to maintain space cooling setpoint	_____	°F	
--	-------	----	--

**When cooling is required, confirm that:**

MAD is positioned to minimum OA setpoint (value set by TAB agency).	YES	NO	
---	-----	----	--

DX cooling cycles ON/OFF to maintain space cooling temp. setpoint.	YES	NO	
--	-----	----	--

**Record the following data:**

OA temp.	_____	°F	
----------	-------	----	--

Max. space temp., when DX starts	_____	°F	
----------------------------------	-------	----	--

Min. space temp., when DX stops	_____	°F	
---------------------------------	-------	----	--



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## HVAC COMMISSIONING FUNCTIONAL PERFORMANCE TEST ROOF TOP UNIT

Max. supply air temp. (SAT) \_\_\_\_\_ °F

Min. SAT \_\_\_\_\_ °F

### Unoccupied mode:

When space temp. > night setback heating setpoint, confirm that:

MAD is tightly closed to OA. YES NO

Heating and cooling are both OFF YES NO

Supply fan (SF) is OFF. YES NO

When space temp. < night setback heating, confirm that:

MAD stays tightly closed to OA and cooling stays OFF. YES NO

SF is started YES NO

Gas heating (GB) fires YES NO

When space temp. rises to > night setback heating setpoint,  
confirm GB and SF turn OFF. YES NO

### Comments



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# PERFORMANCE

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## COMMISSIONING AGENCY

### THERMOGRAPHY INFORMATION



**BUILDING COMMISSIONING**  
CERTIFIED THERMOLOGIST



**ELECTRICAL**  
CERTIFIED THERMOLOGIST



**WATER INTRUSION**  
CERTIFIED THERMOLOGIST



**Roof Scan**  
CERTIFIED THERMOLOGIST



**BUILDING SCIENCE**  
CERTIFIED THERMOLOGIST



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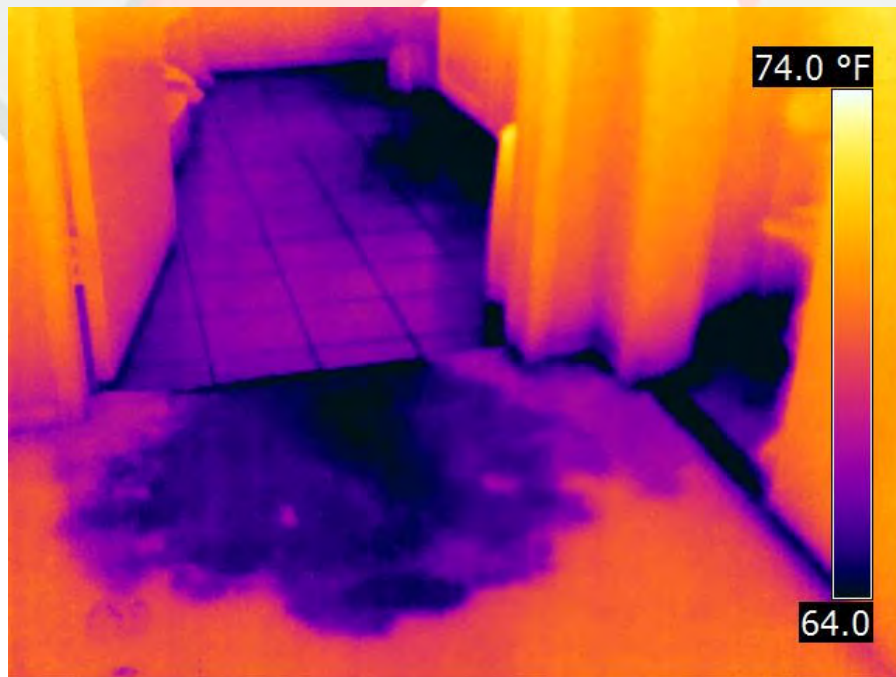
# ELECTRICAL SYSTEMS



THERMAL IMAGING IS A LOW COST, EFFECTIVE METHOD OF PROTECTING YOUR BUSINESS'S ASSETS AND GIVING YOU PEACE OF MIND. IT IS AN ESSENTIAL PART OF EVERY COMMERCIAL AND INDUSTRIAL BUSINESS'S PREVENTATIVE MAINTENANCE PLAN. AN ELECTRICAL HOT SPOT CAN RESULT IN EXTENSIVE DAMAGE TO YOUR SYSTEMS AND YOUR EQUIPMENT OR EVEN A CATASTROPHIC LOSS FROM FIRE. OUR ELECTRICAL SURVEYS WILL HELP REDUCE DOWN TIME, REPAIR COSTS, AND ALLOW FOR A TIMELY & SCHEDULED REPAIR VERSUS A COSTLY SHUT-DOWN. OUR THERMOGRAPHY METHODS CAN HELP IDENTIFY LOOSE CONNECTIONS, OVERLOADED EQUIPMENT, AS WELL AS BAD BREAKERS.

# WATER INTRUSION

EXCESSIVE MOISTURE DESTROYS THE STRUCTURAL INTEGRITY OF ANY BUILDING AND CAN CREATE EXPENSIVE PROBLEMS LIKE MOLD AND MILDEW WHICH CAN CAUSE SERIOUS HEALTH CONCERNS OR LAWSUITS. OFTEN, MOISTURE INTRUSION PROBLEMS ARE NOT OBVIOUS UNTIL IT'S TOO LATE. MOISTURE CAN COME FROM LEAKY ROOFING, PIPING, WINDOWS, TOILETS, EVEN HVAC EQUIPMENT. LET PERFCx USE THERMAL IMAGING TO NOT ONLY FIND THE AFFECTED AREA BUT THE SOURCE OF THE LEAK.



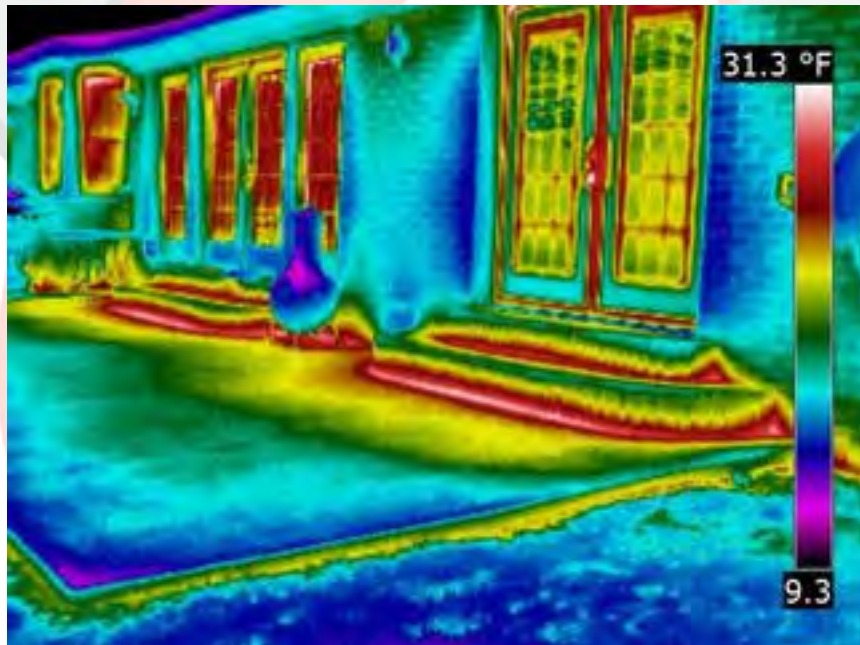
# ROOF SCAN



NON-DESTRUCTIVE INVESTIGATIONS SAVE TIME AND MONEY ALL WHILE TAKING THE GUESS WORK OUT OF COSTLY REPAIRS. OUR SCANS ALLOW YOU TO REDUCE YOUR ROOF BUDGET BY HELPING YOU KEEP DRY UNDAMAGED INSULATION INTACT. DON'T SPEND UNNECESSARY AMOUNTS ON FULLY REPLACING A ROOF THAT DOESN'T NEED IT! PERFCx CAN IDENTIFY AREAS THAT ARE INFILTRATED BY MOISTURE, AND IDENTIFY AREAS THAT ARE DRY. THIS ALLOWS THE OWNER TO REPLACE ONLY THE AFFECTED AREAS, SAVING THEM THOUSANDS IF NOT MILLIONS OF DOLLARS.

# ENERGY LOSS

AIR LEAKAGE FROM LARGE BUILDINGS IS JUST LIKE THROWING YOUR MONEY OUT THE WINDOW. INFRARED THERMOGRAPHY IS A PROVEN DIAGNOSTIC TECHNIQUE RECOMMENDED BY THE US DEPARTMENT OF ENERGY FOR IDENTIFYING AREAS OF HEAT LOSS. CONSIDERING YOUR HEATING AND COOLING LOAD CAN BE UP TO 50% OF YOUR ACTUAL ENERGY BILL, OUR SPECIALIZED IMAGING SERVICE OF YOUR PROPERTY CAN IDENTIFY WHERE THOSE WASTED DOLLARS ARE GOING REGARDLESS OF WHAT TYPE OF HEATING OR COOLING SYSTEM YOU HAVE.



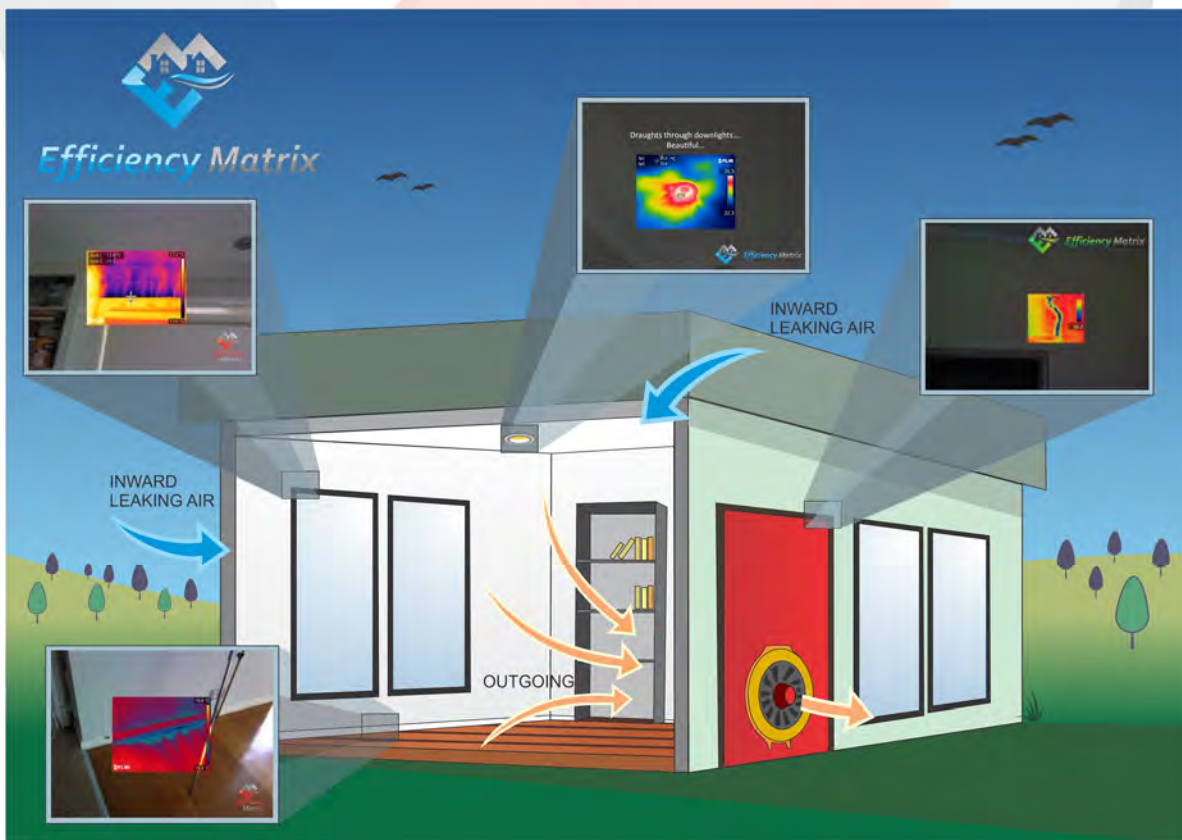
# BLOCK WALL SCAN



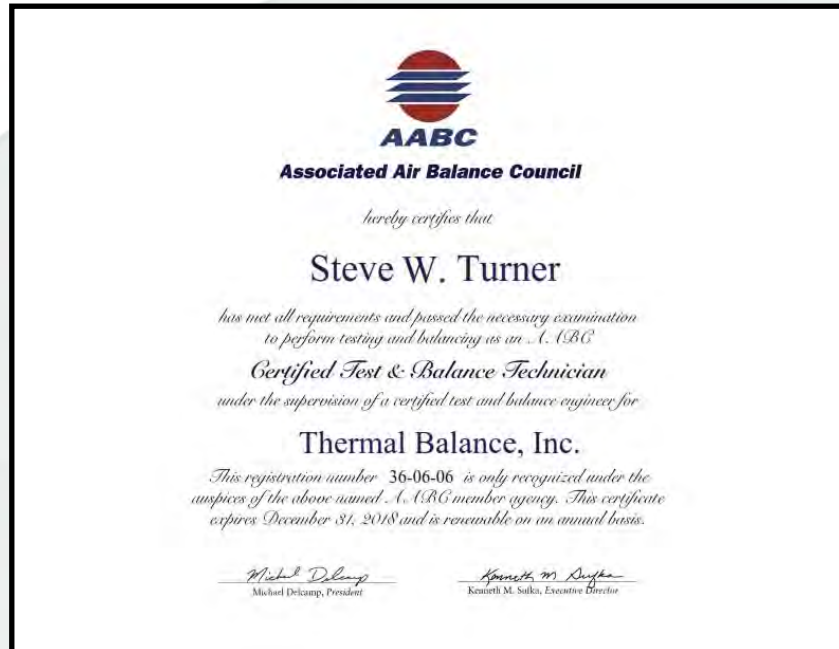
IMAGING OF NEWLY GROUTED CMU WALLS WILL PROVIDE PROPER INSTALLATION AND ALSO LOCATE DEFICIENCIES. IF DEFICIENCIES ARE LOCATED THEN THEY CAN EASILY BE REPAIRED WITHOUT THE DESTRUCTION OF EXCESSIVE MATERIALS. THIS IS A MUST TO HAVE AS A QC CONFIRMATION PRIOR TO INSTALLING ROOF SYSTEMS OR THE DEFICIENCIES MAY RESULT IN SHORT OR LONG TERM FAILURE.

# BUILDING ENVELOPE TESTING

BUILDING ENVELOPE TESTING IS THE PROCESS OF TESTING THE PHYSICAL SEPARATOR BETWEEN THE INTERIOR AND EXTERIOR OF A BUILDING TO DETERMINE IF THERE ARE ANY AIR, WATER, OR THERMAL LEAKS WITHIN THE STRUCTURE. THESE DIFFERENT INTRUSIONS CAN RESULT FROM AN IMPROPERLY BUILT OR MAINTAINED BUILDING ENVELOPE. ENVELOPE TESTING WILL ENSURE A PROPER SEAL IS MADE BETWEEN THE INSIDE AND THE OUTSIDE, AND REQUIRED FOR SOME LEED GREEN BUILDING RATINGS



# EMPLOYEE CERTIFICATIONS



**Steve Turner**  **Kentucky Thermal Institute**  
Platinum Partner EDUCATION · EQUIPMENT · TRAINING

**THERMOLOGIST #18003**  
 HAS SUCCESSFULLY COMPLETED THE  
 REQUIREMENTS AND TESTING PROCEDURES  
 FOR THE CERTIFICATION OF:

 **BLOCK WALL THERMOLOGIST**  
 KENTUCKY THERMAL INSTITUTE

 **FLIR** 90.0 °F 102 -33.6

*Harvey* *M. Askins*  
 FOUNDER / LEVEL 2 THERMOGRAPHER EDUCATION COORDINATOR / LEVEL 1 THERMOGRAPHER CERTIFICATION DATE  
 10/10/2018-10/13/2018

**Steve Turner**  **Kentucky Thermal Institute**  
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**THERMOLOGIST #18003**  
 HAS SUCCESSFULLY COMPLETED THE  
 REQUIREMENTS AND TESTING PROCEDURES  
 FOR THE CERTIFICATION OF:

 **Energy Loss Thermologist**  
 KENTUCKY THERMAL INSTITUTE

 **FLIR** 63.9 55.3

*Harvey* *M. Askins*  
 FOUNDER / LEVEL 2 THERMOGRAPHER EDUCATION COORDINATOR / LEVEL 1 THERMOGRAPHER CERTIFICATION DATE  
 10/10/2018-10/13/2018

**Steve Turner**  **Kentucky Thermal Institute**  
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**THERMOLOGIST #18003**  
 HAS SUCCESSFULLY COMPLETED THE  
 REQUIREMENTS AND TESTING PROCEDURES  
 FOR THE CERTIFICATION OF:

 **BUILDING SCIENCE THERMOLOGIST**  
 KENTUCKY THERMAL INSTITUTE

 **FLIR**

*Harvey* *M. Askins*  
 FOUNDER / LEVEL 2 THERMOGRAPHER EDUCATION COORDINATOR / LEVEL 1 THERMOGRAPHER CERTIFICATION DATE  
 10/10/2018-10/13/2018