CAASTLC
Community Action Agency of St. Louis County, Inc.
2709 Woodson Road • St. Louis, MO 63114
Office: (314) 863-0015 • Fax: (314) 863-1252 • http://www.caastlc.org/index.html

REQUEST FOR QUOTATION

June 9, 2025

TO ALL BIDDERS:

Attached please find a several-part REQUEST FOR QUOTATION (RFQ) for Heating, Ventilating and Air Conditioning (HVAC) and mechanical services. This copy will become the "Contract" if you are awarded the bid. This package must be fully completed to be valid. Please note that it is necessary for an authorized person to sign not only the initial page of the proposal, but also all additional pages that indicate a signature. Failure to complete all forms may invalidate the bid. Small oversights and minor clerical errors that will not change the bid price may allow a bid to be considered.

Community Action Agency of St. Louis County, Inc. (hereafter “CAASTLC”) is a non-profit Community Action Agency. Federal funds are made available to CAASTLC through the Missouri Department of Natural Resources Division of Energy (hereinafter “DNR/DE”) for weatherization services to low-income residents of St. Louis County, Missouri. Funding for this program is provided by the U.S. Department of Energy, through DNR/DE. Additional funding is provided by Ameren Missouri, Spire, and the Missouri Department of Social Services.

The Program basically operates as follows: **We have an estimated 99 jobs which could include equipment replacement, repair, clean and tune, ventilation and the necessary plumbing and electrical installation requirements beginning July 1, 2025, and ending on June 30, 2026**. Expenditures per home are permitted to average $8,547 for labor and materials (including infiltration work, which is bid separately).

CAASTLC encourages small, minority and women-owned business enterprises to submit bids in response to this RFQ.

We provide weatherization services over the program for low-income clients in St. Louis County. The number of estimated homes to receive weatherization services is derived from the percentage of low-income households. Work is expected to be of high quality, performed under the NEAT audit procedure, standards, and cost limitations established by DNR/DE. Energy conservation measures typically applied include cleaning & tuning/repair and installation of boilers, radiant, electric, and forced air gas appliances, water heaters, heat pumps, resistance heaters, air conditioners HWH, and ductwork. Each home is assessed by CAASTLC auditors to determine the most cost-effective measures to be undertaken and is inspected again for materials and workmanship when the contractor's work is completed. Materials must conform to specifications listed in Attachment C.

Prospective bidders are hereby invited to furnish and install mechanical equipment and materials specified in this RFQ. Bids are sought only from contractors with the demonstrated capability to perform. The criteria listed in Attachment A will be used to judge this capability. All bidders must provide a bid bond or similar guarantee of $500.00. Bidders who have not successfully completed a contract with CAASTLC in the past two years must provide reference letter(s) (see Attachment A). The specifications and requirements in this package, including this cover letter, Attachments A-E and the Contractual Requirements, are considered a part of this REQUEST FOR QUOTATION.

Your attention is called in particular to the provisions regarding insurance requirements, a performance bond, test data for certain materials, and subcontractor approval. These items must all be obtained by the successful bidder(s) within three (3) working days from winner notification. Please note also that not less than the minimum wage must be paid, and that employees and applicants for employment are not to be discriminated against because of race, religion, color, national origin, or sex.

WORK PROCEDURE AND PAYMENT

The procedure for work assignments and payment is as follows:

1. CAASTLC staff performs diagnostic tests on each furnace, water heater or air conditioner. Based on test results and visual inspection, CAASTLC will identify the work needed in each home.

2. CAASTLC issues the contractor a Work Order, which identifies the specific work to be performed.

3. The contractor provides all needed work identified by the auditor on the Work Order. If the contractor feels additional work is needed, it must receive written approval from CAASTLC before doing the work or payment for the additional work will not be made. An on-site phone call is best.

4. The contractor reports the completed work with a detailed invoice. A detailed invoice shall include the following information: company name, contact information, dates of service, job number and/or client's name, quantity of material and labor by unit, description of service with individual measures documented, and costs broken out by material and labor. In addition, for all HVAC equipment, water heaters, and ASHRAE 62.2 ventilation fans, invoices must include the make, model number and serial number of the equipment. Material and labor costs must be separately listed for each repair item. Invoices are to reflect the measures and associated pricing from Attachment E of this RFQ so that each measure can be easily checked against Attachment E to ensure that bid prices are being followed.

5. CAASTLC inspects the completed work.

6. CAASTLC provides payment for services (provided work is of acceptable quality). If deficiencies are noted, they must be corrected before payment is made.

Costs must be clearly shown for items on the RFQ for the bid to be accepted. Complete each blank using ink or typewriter, showing material and labor costs separately for each item. Multiply these amounts by the estimated quantity given to reach the total cost for each item. The category subtotals are summarized

at the end to reach the grand total, which is compared among the eligible bidders to determine the winning bid(s). Percentages for labor may vary between material items or priorities.

CAASTLC will utilize a multiplier effect on each item to emphasize measures according to their relative work order frequency. The use of the multiplier lessens the effects of utilizing extremely low pricing on infrequently utilized measures to reduce the overall bid. The multiplier effect, indicated on each item, is as follows: high frequency measures (multiplier 200) down to infrequent measures (multiplier 1). The multiplier will be applied to the bid price and then the totals will be computed indicating the lowest bid as the one with the lowest cost after the multiplier effect. CAASTLC's use of these multiplier numbers is in no way guarantees of quantity to be ordered from the contract once awarded.

Jobs are scheduled on a weekly or as-needed basis. Under normal circumstances, five (5) business days will be allowed to complete each clean & tune and general repairs assignment, and ten (10) days will be allowed for HVAC replacement work. Credit for the completed work shall be provided when all weatherization work (including any rework) for the job has passed final inspection by CAASTLC. Upon passing final inspection, CAASTLC shall make every reasonable effort to provide payment for completed work within forty-five (45) days, however, contractor is advised that payment may take up to ninety (90) days pending release of funds from DNR/DE.

CAASTLC reserves the right to retain client work orders for services that require low material cost measures. It will always be CAASTLC's prerogative to perform certain weatherization measures on client homes assigned to a contractor. Labor cost will be deducted from bid cost when materials are installed by CAASTLC, and material costs will be deducted from bid cost when labor is used to install CAASTLC materials.

CAASTLC may elect to hire employees to do the work at its discretion in an area without a contractor due to lack of bidders; due to original or subsequent contractor's loss of contract; or in the event CAASTLC should elect to perform any work itself. Any new measure called for during this contract period by DNR/DE or CAASTLC that is not on this contract will be negotiated by CAASTLC and the contractor at that time.

CAASTLC reserves the right to select more than one responsive and responsible contractor for this contract period (see Contractual Requirements section on "Primary, Secondary, Tertiary, Etc. Contractors"). All contractors must be registered and in good standing with the Missouri Secretary of State.

A pre-bid conference will be held, via online Zoom Conferences at **9:00 a.m. on Tuesday, June 24, 2025.** The meeting link for this Conference will be available on CAASTLC's homepage (https://www.caastlc.org/) the day of the Conference and the login attendee ID and password for these Conference are as follows:

CAASTLC is inviting you to a scheduled Zoom meeting.

Topic: Pre-Bid Conference for HVAC and Mechanical Services
Time: June 24, 2025, 09:00 AM Central Time (US and Canada)

Join Zoom Meeting
https://us02web.zoom.us/j/83703797239?pwd=PmtHNtZx5QdmH43KB8qpBaNyFbt90V.1&jst=1

Meeting ID: 837 0379 7239
Passcode: 14!Hd0L.
One tap mobile
+ 13126266799,,83703797239#,,,,*01341885# US (Chicago)
+ 13092053325,,83703797239#,,,,*01341885# US

Dial by your location
+1 312 626 6799 US (Chicago)
+ 1 309 205 3325 US
+ 1 305 224 1968 US
+1 305 224 1968 US
+1 646 558 8656 US (New York)
+1 646 931 3860 US
+1 301 715 8592 US (Washington DC)
+1 386 347 5053 US
+1 507 473 4847 US
+1 564 217 2000 US
+1 669 444 9171 US
+1 669 900 9128 US (San Jose)
+1 689 278 1000 US
+1 719 359 4580 US
+1 253 205 0468 US
+1 253 215 8782 US (Tacoma)
+1 346 248 7799 US (Houston)
+1 360 209 5623 US
Meeting ID: 837 0379 7239
Passcode: 01341885

Find your local number: https://us02web.zoom.us/u/kcYNPpUnfj

Bids must be sealed, marked "Sealed Bid," and delivered to CAASTLC Inc., 2709 Woodson Road, Overland, Missouri 63114, no later than **5:00 p.m., Wednesday, June 25, 2025**.

To be eligible for evaluation, the bid must meet stated standards for materials and comply with all conditions listed in the RFQ. As determined by CAASTLC, the award will be made to the lowest priced, responsive and responsible bidder. CAASTLC reserves the right to choose more than one (1) contractor to perform the work under the Contract (see Contractual Requirements section on “Primary, Secondary, Tertiary, Etc. Contractors”).

Bids will be opened and read publicly, via online Zoom Conference, at **2:00 p.m., Friday, June 27, 2025,** at CAASTLC's main office. The meeting link for this Conference will be available on CAASTLC’s homepage (https://www.caastlc.org/) the day of the Conference and the login attendee ID and password for this Conference are as follows:

CAASTLC is inviting you to a scheduled Zoom meeting.

Topic: Bid Opening

Time: June 27, 2025, 02:00 PM Central Time (US and Canada)

Join Zoom Meeting
https://us02web.zoom.us/j/87068928417?pwd=eAsfHAd4MmBEbBbCfdZp0goRaVcSp8.1&jst=1

Meeting ID: 870 6892 8417
Passcode: Z2!k$4w=
One tap mobile
+13126266799,,87068928417#,,,,*54644380# US (Chicago)
+13092053325,,87068928417#,,,,*54644380# US

Dial by your location
+1 312 626 6799 US (Chicago)
+1 309 205 3325 US
+1 646 931 3860 US
+1 301 715 8592 US (Washington DC)
+1 305 224 1968 US
+1 646 558 8656 US (New York)
+1 346 248 7799 US (Houston)
+1 360 209 5623 US
+1 386 347 5053 US
+1 507 473 4847 US
+1 564 217 2000 US
+1 669 444 9171 US
+1 669 900 9128 US (San Jose)
+1 689 278 1000 US
+1 719 359 4580 US
+1 253 205 0468 US
+1 253 215 8782 US (Tacoma)

Meeting ID: 870 6892 8417
Passcode: 54644380

Find your local number: https://us02web.zoom.us/u/kcf9VBcGVd

All bids shall be awarded on the basis of criteria listed in Attachment A. CAASTLC reserves the right to reject any and all bids, or to call for re-bid if necessary.

Hopefully, you can gain a fair profit and the Program can run as efficiently as possible within government regulations. We look forward to a mutually beneficial relationship.

If you have any questions, please contact me at **(314) 446-4417** or **Dale Hickman at (314) 446-4442.**

Sincerely,

Keith Robinson
Director of Weatherization & Support Services

Enclosures: Attachment A – Evaluation
Attachment B – Technical Specifications
Attachment C – Minimum Material Specifications
Attachment D – Weatherization Work Standards
*Attachment E – Request For Quotation - Bid Form
*Contractual Requirements Pursuant to Weatherization Program Contract
Clean & Tune and General Repairs Work Orders and CAZ Test Form (Exhibits A-F)
Certification regarding Debarment, Suspension and other Responsibility Matters
Qualifications Statement for Heating Contractors
Contractor Self-Attestation
RFQ Pre-Bid Conference Insert

*Items to be completed, signed, and returned with the bid along with the capability to perform and bid bond.

DUE: June 25, 2025
5:00 P.M.

ACKNOWLEDGMENT OF BID PACKAGE CONTENTS

FCT/R 25-26

BID PACKAGE CONTENTS

1. Letter “To All Bidders”
2. Acknowledgment of Bid Package Contents
3. Attachment A, Bid Evaluation and Selection
4. Attachment B, Technical Specifications
5. Attachment C, Material Specifications
6. Attachment D, Work Standards
7. Attachment E, Bid Form
8. Contractual Requirements
9. Clean & Tune and General Repairs Work Orders and CAZ Test Form (Exhibits A-F)
10. Certification regarding Debarment, Suspension and other Responsibility Matters
11. Qualifications Statement for Heating Contractors
12. Contractor Self-Attestation
13. RFQ Pre-Bid Conference Insert

Receipt by CAASTLC, INC. of Attachment E and Contractual Requirements, properly completed and signed, will constitute your bid.

Your signature on this page indicates that you have received the complete bid package as listed here. Please return this page with or prior to, your bid.

_____
Contractor Signature

ATTACHMENT A TO WEATHERIZATION PROGRAM CONTRACT NO. FCT/R 25-26
BID EVALUATION AND SELECTION

CONTRACTOR NAME: _____ AUTHORIZED SIGNATURE: _____

CAASTLC, INC.
ATTACHMENT A – WEATHERIZATION PROGRAM CONTRACT
BID EVALUATION AND SELECTION

All bids received will be evaluated according to the following criteria. A "no" answer to any one of the items 1 through 9 will disqualify the bidder's proposal from further consideration. If all answers are "yes" the total bid price will be compared to the other eligible bids.

FOR CAASTLC, INC. USE ONLY

Number of jobs bid on is 1 Contractor_____ **YES** **NO**

TOTAL AMOUNT (BASED ON _99_ HOMES) $ 424,500 ___ ___

1. Was bid received by time and date of closing? ___ ___

2. Was the bid submitted in a sealed envelope marked "Sealed Bid"? ___ ___

3. Was sealed bid accompanied by a photocopy of the original bid in a second sealed envelope marked "Sealed Bid B Photocopy"? ___ ___

4. Was all requested information supplied? ___ ___

5. Was Attachment E completed (all items bid on, amounts shown separately for labor and material, and correctly totaled) and each page signed in ink? ___ ___

6. Was the original bid either handwritten in ink or typed? ___ ___

7. Was "Contractual Requirements" signed and returned with the bid? ___ ___

8. Did bidder submit a bid bond, a letter of credit or cashiers check for no less than $500.00? ___ ___

9. Capability to perform:

   a) Has successfully completed a contract with CAASTLC, INC. in the past ___ ___
   OR
   b) Has submitted letters of reference from other Missouri Weatherization agencies ___ ___
   OR
   c) Has submitted letters of reference from other sources ___ ___

CONTRACTOR NAME: _____ AUTHORIZED SIGNATURE: _____

ATTACHMENT A – cont'd

All bidders must submit a guaranteed surety, such as a bid bond, irrevocable bank letter of credit, cashiers check with CAASTLC, Inc. as beneficiary, in an amount no less than $500. The instrument selected will be held in escrow to provide assurance that all contractual documents, including the performance bond, will be executed by the successful bidder within ten (10) working days from the notice of award. The bid bond or other instrument will be returned if the bid is unsuccessful, or the contract documents are provided in time. Otherwise, it will be forfeited.

Capability to perform must be demonstrated by all bidders in at least one of the following three ways. (Documentation for items 2. or 3. must be submitted **with the bid**.)

1. Bidder has successfully completed at least one weatherization contract with CAASTLC, Inc. in the previous two years. Successful completion includes, but is not limited to, timely and proper performance of work.

The following procedures will be used in evaluations of bids from contractors previously unsuccessful in completions:

If, prior to June 30, 2023, a contract has been terminated by CAASTLC, Inc. for bankruptcy, insolvency, default, or other failure to perform, or if 25% of such previous contract was incomplete or failed to be completed for some other reason at the contract's expiration, CAASTLC, Inc. may at its discretion, apply the appropriate exclusionary period to such business.

If it is found that any of the principles and/or a substantial percentage of the employees, of a business which withdrew from a contract with CAASTLC, Inc. or had such contract terminated prior to June 30, 2023, have joined or formed a business with a different name, CAASTLC, Inc. may, at its discretion, apply the appropriate exclusionary period to the differently named business.

Any contractor that had breached its contract with CAASTLC, Inc. since July 1, 2023, whether such contractor is currently operating under the same business name or a different business name, is not eligible to bid on this Contract.

2. Showing of successful completion of a contract similar in amount and type of work, with another Missouri Weatherization agency within the past two years. Reference letter(s) must be submitted verifying that the amount of weatherization work performed was comparable, (i.e., at least 70% of the size in dollar amount of bid or estimated number of homes bid on), that the work was satisfactory, and must be signed by an authorized agency representative.

3. Showing of successful completion of work for any purchaser with whom the bidder has had similar contract(s) within the past two years. Reference letter(s) must verify that type of work performed was similar (i.e., at least 70% of the size in dollar amount of bid or estimated number of homes bid on), that the work was satisfactory, and must be signed by the purchaser or authorized representative.

CONTRACTOR NAME: _____ AUTHORIZED SIGNATURE: _____

ATTACHMENT A – cont'd

Sealed bid envelopes and bid photocopy envelopes should be clearly marked with the bidder's name. The photocopies will remain in the sealed envelopes in CAASTLC, Inc. files for future review, if necessary.

Rebates and/ or discounts shall not be considered or allowed.

During the bid qualification process, CAASTLC, Inc. may make documented, minor corrections to the bid, but only if the changes do not affect the unit prices or the validity of the bid. In case of error in extension costs, the unit price will govern.

As determined by CAASTLC, Inc., the eligible responsive and responsible bidder with the lowest total price will win the number of homes indicated on the bid. In case of a tie, a third party with no vested interest will draw the winning bid. CAASTLC, Inc. reserves the right to reject any and all bids.

Written notice will be furnished to each bidder of the selection made. Five (5) business days from the date of notification will be allowed for protest by bidders. All protests must be in writing. Awards may be made after the five-day protest period ends. If no written protest is received by CAASTLC, Inc. within five (5) working days, the selection will be considered final, and award made. The award may be made even if a protest is submitted if CAASTLC, Inc. believes the protest is without merit.

During the five (5) day period following the date of bid opening, any bidder may petition for withdrawal of their bid. Final judgment to allow a bidder to withdraw without penalty rests with CAASTLC, Inc. Once a bid has been withdrawn from consideration after bid opening, corrections or re-submissions shall not be allowed. (Before bid opening, withdrawal of a bid is allowed. The bidder may then re-submit a bid if prior to the bid deadline.)

Bidders selected as winners are obligated to fulfil the conditions of the bid. Non-fulfillment of the requirements of the REQUEST FOR QUOTATIONs and attachments shall be deemed as a breach of contract, and the bid bond shall be forfeited.

To summarize, bidders must submit the following prior to or with the completed RFQ:

CONTRACTOR NAME: _____ AUTHORIZED SIGNATURE: _____

ATTACHMENT A - cont'd

1. Proof of capability to perform, including bid bond, and letters of reference, if necessary.

2. Signed and completed REQUEST FOR QUOTATION, (Attachment E).

3. Signed "Contractual Requirements Pursuant to the Weatherization Program Contract."

When awards are made, the successful bidder must submit any of the following not already on file before the Contract is executed. (Bidders are encouraged to submit any or all of the following documents with the bid to expedite processing time.) Three (3) working days from the date of notice will be allowed to submit the following documents:

1. Performance bond from an insurance company, or other generally recognized and acceptable surety institution guaranteeing timely completion, or an irrevocable letter of credit from a financial institution, unless the bidder has successfully completed a contract in the past with CAASTLC, Inc. or the bidder has submitted name(s) of other purchasers for whom they have successfully completed a contract. The amount of the instrument shall be $25,000. The bonding document shall name CAASTLC, Inc. as beneficiary, and shall cover the entire contract period of July 1, 2025, through June 30, 2026. CAASTLC, Inc. reserves the right to reject any instrument that does not comply with this paragraph.

2. Insurance certificate(s) with minimum amount as follows:

   a. Workman's Compensation - As required by laws of the State of Missouri, including Employees Liability -- $500,000.000.

   b. Public Liability - Limits of not less than $500,000.00 per occurrence and $1,000,000.000 aggregate, to protect the Contractor against claims for injury to, or death of, one, or more than one, person due to occurrences which may result from operation under the contract. Products/Completed Operations and Broad Form Property Damage Insurance, with limits not less than $300,000.00 aggregate. Public Liability Insurance and Property Damage Insurance shall each include coverage for owned, non-owned, hired cars and trucks of not less than: Bodily Injury - $500,000.00 per person, $500,000.00 per occurrence, Property Damage - $300,000.00 per occurrence for a Split Liability Limit (SLL) policy or $800,000.00 for a Combined Single Limit (CSL) policy.

3. List of any subcontractors for which approval is requested. Note that approval must be obtained from both CAASTLC, Inc. and Missouri Department of Natural Resources.

CONTRACTOR NAME: _____ AUTHORIZED SIGNATURE: _____

ATTACHMENT A - cont'd

4. Signed “Certification regarding Debarment, Suspension and other Responsibility Matters”

5. Completed & signed “Qualifications Statement for Heating Contractors”

6. All required licenses including, but not limited to, current business license and/or occupational license(s).

7. Evidence of OSHA-10 Certification for all of the bidder’s employees.

8. Self attestation statement letter that Contractor shall remain in compliance with all aspects of Missouri's Wage and Hour rules and regulations and that all weatherization workers, supervisors, and other personnel have completed the OSHA-10-Hour safety training.

9. Signed Attachments A, B, C and D.

An extension of time allowed to furnish the Contract documents may be requested by the bidder, if good and sufficient reason exists for delay. CAASTLC, Inc. shall determine whether or not the reasons presented by bidder warrant an extension. If the request is not granted, CAASTLC, Inc. reserves the right to offer the contract to the next lowest eligible bidder. The original winner's bid bond will be forfeited.

All material standards and specifications stated in the REQUEST FOR QUOTATION must be complied with by bidders, whether federally mandated or established by CAASTLC, Inc. Failure to comply may result in disqualification of the bid or termination of the Contract.

PLEASE NOTE that bidders are expected to examine ALL specifications and instructions pertaining to the items and services rendered and procedures for bid submission. Failure to do so will be at the bidder's risk.

The Weatherization Assistance Program is funded by the Missouri Department of Natural Resources and the Missouri Department of Social Services. Additional funding is provided by Ameren Missouri and Spire.

CONTRACTOR NAME: _____ AUTHORIZED SIGNATURE: _____

ATTACHMENT B TO WEATHERIZATION PROGRAM CONTRACT NO. FCT/R 25-26
TECHNICAL SPECIFICATIONS

Technical Specifications

All work must be performed to manufacturer's design specifications, industry standards and accepted practices. Materials must meet or exceed the specifications cited or subsequent approved standards which supersede these specifications.

Thermostat Control Systems
Line voltage or Low Voltage Room Thermostats: NEMA DC 3-2003 (or the latest version).
Thermostat setting numbers must be legible. Thermostat must have a thermometer. (Thermometer is not mandatory to mobile home units: Mercury-bulb type thermostat is not applicable to mobile home units).

Hydronic Boiler Control: Commercially available.

Water Heater Modifications
Install Vent Damper, Gas Fueled: Conformance to ANSI Z21.67, including Addenda A and B 1985, and NFPA 54-2012 (or the latest version).

Boiler Repair and Modifications/Efficiency Improvements
Readjust Boiler Water Temperature or Install Automatic Boiler Temperature Reset Control: Conformance to ANSI/ASME CSD-1-2006 and NFPA 31-2011 (or the latest version).

Install/Replace Thermostatic Radiator Valves: Commercially available. One-pipe steam systems require steam air vents on each radiator. See manufacturer's requirements.

Clean Heat Exchanger, Adjust Burner Air Shutter(s). Check Operation of Pump(s) per manufacturer's requirements.

Install Boiler Duty Cycle Control System: Commercially available. National Electric Code and local electrical codes provisions for wiring.

Replace constant burning pilot with electronic ignition device and electrically operated damper on gas-fueled boilers: Conformance to ANSI Z21.71-1993 and ANSI Z21.71a-2005 (or the latest version).

Replace Combustion Chamber in Oil Boiler: Conformance to NFPA 31-2011 (or the latest version).

Heating System Repairs and Tune-Ups/Efficiency Improvements
Duct Insulation: Conform to ASTM C1290 - 06e1 Standard Specification for Flexible Fibrous Glass Blanket Insulation Used to Externally Insulate HVAC Ducts and with attention paid to manufacturers' recommendations (or the latest version).

Clean Heat Exchanger and Adjust Burner: Adjust air shutter and check CO2 and stack temperature; clean or replace air filter on forced air furnace; Conformance to ANSI Z223.1-2012 (NFPA 54-2012), National Fuel Gas Code (or the latest version).

Install Vent Dampers (gas fueled systems: Conform to applicable sections of ANSI Z223.1 (NFPA 54-2012), including Appendices H, I, J, and K. Thermally Activated Vent Dampers: ANSI A21.68-1985 and Appendices A and B (or the latest version).

CONTRACTOR NAME: _____ AUTHORIZED SIGNATURE: _____

Technical Specifications

Reduction of Vent Connector Size of Gas Fueled Appliances: Conform to ANSI Z223.1-2012 (NFPA 54-2012) Part 9 and Appendices G and H (or the latest version).

Readjust fan switch on forced air gas or oil fueled furnaces: Conform to applicable sections and Appendix H of (NFPA 54-2012) for Gas Furnaces and NFPA 31-2011 for Oil Furnaces (or the latest version).

Replace Air Diffusers, Intakes, Registers and Grills: Commercially available.

Install/Replace Warm Air Heating Metal Ducts: Commercially available.

Install combustion air in accordance with NFPA 54-2012 (or the latest version).

Repair/Replace Oil-Fired Equipment: Conformance to NFPA 31-2011 (or the latest version).

Replace Combustion Chamber in Oil-Fired Furnace: Conform to NFPA 31-2011 (or the latest version).

Check Smoke Number on Oil-Fueled Equipment.

Replacement of Oil Nozzle and Filter: Per manufacturer's instructions.

Adjust Barometric Draft Regulator for Fuel Oil: NFPA 31-2011 and per manufacturer's (furnace or burner) instructions (or the latest version).

All materials and installations must comply with the NREL Standard Work Specifications for Home Energy Upgrades (SWS): https://sws.nrel.gov

MATERIAL STANDARDS:

Replacement Furnace or Boiler, Gas-fired:

Replace gas fired, central furnaces: conformance to NFPA 54-2012 (or the latest version).

Minimum AFUE Rating for high-efficiency gas-fired central furnaces: 90% + Direct Vent.
Minimum AFUE Rating for mobile home furnaces: 90% + Direct Vent.

AGA designed certified and carry AGA seal.

Replacement boiler must conform to the 2007 ASME Pressure Vessel Code (or the latest version).

Liquid Petroleum Gas Storage: conformance to NFPA 58-2008 (or the latest version).

Electric or hot surface ignition systems are allowable with a replacement furnace or boiler.

CONTRACTOR NAME: _____ AUTHORIZED SIGNATURE: _____

Technical Specifications

Replacement Furnace or Boiler, Oil-fired:

Replace oil furnace: conformance to NFPA 31-2012 (or the latest version) + Direct Vent.

Replace boiler: conformance to the 2007 ASME Pressure Vessel Code (or the latest version).

Minimum AFUE for oil-fired furnace/boiler: 85% + Direct Vent.

Replacement Space Heater, Gas-fired: (includes all vented floor, wall, and room-type space heaters)

Replace gas-fired space heater: conformance to NFPA 54 – 2012 (or the latest version).

AGA design certified and carry AGA seal.

Liquid Petroleum Storage: conformance to NFPA 58-2008 (or the latest version).

No minimum AFUE for gas-fired space heaters, but space heaters must be Direct Vent.

Replacement/Installation/Operational Specifications:

Replacement furnace/space heater must:

Be of same fuel type as the unit being replaced, unless otherwise approved by DNR/DE.

Have return air filtration system on forced-air systems (excludes wall furnaces, floor furnaces and vented space heaters), with a minimum MERV 6 filtration with no air bypass around the filters.

Be sized appropriate to the dwelling and/or existing distribution system. Document through Manuel J or Manufacturer's sizing guide.

Flue Requirements:

The flue of the unit is to be sized according to manufacturer's specifications and installed correctly. (Refer to GAMA of NFPA Venting Tables.).

Replacement includes any sheet metal, piping, wiring, flue pipe, draft regulators or barometric dampers and any controls necessary to complete the replacement.

Contractors must assure proper operation of newly installed units by starting and running the system through one full cycle and verifying proper operation of all controls and components.

All work performed by the Contractor must be to the SWS, manufacturer’s specification, industry standards and accepted practices.

CONTRACTOR NAME: _____ AUTHORIZED SIGNATURE: _____

ATTACHMENT C TO WEATHERIZATION PROGRAM CONTRACT
NO. FCT/R 25-26
MINIMUM MATERIAL SPECIFICATIONS

The Federal Specifications shown are from the Federal Register 10 CFR, Part 440, Revised Appendix A, June 2006 edition. Material used must conform to these standards, or other subsequent ASTM, ANSI, or F.S. approved standards, which supersede the specification given.

CONTRACTOR NAME: _____ AUTHORIZED SIGNATURE: _____

APPENDIX A—STANDARDS FOR WEATHERIZATION MATERIALS

If the standards listed in this appendix conflict with those required by current local codes, the local code shall have precedence and a copy of the applicable section will be retained with procurement records.

The following Government standards are produced by the Consumer Product Safety Commission and are published in title 16, Code of Federal Regulations:

Thermal Insulating Materials for Building Elements Including Walls, Floors, Ceilings, Attics, and Roofs Insulation—organic fiber—conformance to Interim Safety Standard in 16 CFR part 1209;

Fire Safety Requirements for Thermal Insulating Materials According to Insulation Use—Attic Floor—insulation materials intended for exposed use in attic floors shall be capable of meeting the same flammability requirements given for cellulose insulation in 16 CFR part 1209;

Enclosed spaces—insulation materials intended for use within enclosed stud or joist spaces shall be capable of meeting smoldering combustion requirements in 16 CFR part 1209.

The following standards which are not otherwise set forth in part 440 are incorporated by reference and made part of part 440. The following standards have been approved for incorporation by reference by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. These materials are incorporated as they exist on January 3, 2002 and a notice of any change in these materials will be published in the FEDERAL REGISTER. The standards incorporated by reference are available for inspection at the Office of the Federal Register Information Center, 800 North Capitol Street, Suite 700, Washington, DC 20001.

The standards incorporated by reference in part 440 can be obtained from the following sources:

Air Conditioning and Refrigeration Institute, 4301 N. Fairfax Drive, Suite 425, Arlington, VA 22203; (703) 524-8800.

American Architectural Manufacturers Association, 1827 Walden Office Square, Suite 104, Schaumburg, Illinois 60173-4268; (847) 303-5664.

American Gas Association, 400 N. Capitol Street, NW, Washington, DC 20001; (202) 824-7000.

American National Standards Institute, Inc., 11 West 42nd Street, New York, NY 10036; (212) 642-4900.

American Society of Mechanical Engineers, Three Park Avenue, New York, NY 10016-5990; (212) 591-7722.

American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959; (610) 832-9585.

Association of Home Appliance Manufacturers, 1111 19th Street, NW, Suite 402, Washington DC, 20036; (202) 872-5955.

Federal Specifications, General Services Administration, General Services Administration, Federal Supply Service, Office of the CIO and Marketing Division, Room 800, 1941 Jefferson Davis Hwy., Arlington, VA 22202; (703) 305-6288.

Gas Appliance Manufacturers Association, 2107 Wilson Boulevard, Suite 600, Arlington, Virginia 22201; (703) 525-7060.

National Electrical Manufacturers Association, 1300 North 17th Street, Suite 1847, Rosslyn, VA 22209; (703) 841-3200.

National Fire Protection Association, 1 Batterymarch Park, P.O. Box 9101, Quincy, MA 02269-9101; (617) 770-3000.

Sheet Metal and Air Conditioning Contractors Association, 4201 Lafayette Center Drive, Chantilly, Virginia 20151-1209; (703) 803-2980.

Solar Rating and Certification Corporation, c/o FSEC, 1679 Clearlake Road, Cocoa, FL 32922-5703; (321) 638-1537.

Steel Door Institute, 30200 Detroit Road, Cleveland, OH 44145-1967; (440) 899-0010.

Steel Window Institute, 1300 Sumner Avenue, Cleveland, OH 44115-2851; (216) 241-7333.

Tubular Exchanger Manufacturers Association, 25 North Broadway, Tarrytown, NY 10591; (914) 322-0040.

Underwriters Laboratories, Inc., 333 Pfingsten Road, Northbrook, IL 60062-2096; (847) 272-8800.

Window & Door Manufacturers Association, 1400 East Touhy Avenue, Suite 470, Des Plaines, IL 60018; (800) 223-2301.

More information regarding the standards in this reference can be obtained from the following sources:

Environmental Protection Agency, 401 M Street, NW, Washington, DC 20006; (202) 554-1080.

National Institute of Standards and Technology, U.S. Department of Commerce, Gaithersburg, MD 20899; (301) 975-2000.

Weatherization Assistance Program, Office of Building Technology Assistance, Energy Efficiency and Renewable Energy, 1000 Independence Avenue, SW, EE-42, Washington, DC 20585-0121; (202) 586-4074.

THERMAL INSULATING MATERIALS FOR BUILDING ELEMENTS INCLUDING WALLS, FLOORS, CEILINGS, ATTICS, AND ROOFS

[Standards for conformance]

Insulation--mineral fiber:	
Blanket insulation	ASTM[1] C665-98.
Roof insulation board	ASTM C726-00a.
Loose-fill insulation	ASTM C764-99.
Insulation--mineral cellular:	
Vermiculite loose-fill insulation	ASTM C516-80 (1996)e1.
Perlite loose-fill insulation .	ASTM C549-81 (1995)e1.
Cellular glass insulation block	ASTM C552-00.
Perlite insulation board . . .	ASTM C728-97.
Insulation–organic fiber:	
Cellulosic fiber insulating board	ASTM C208-95.
Cellulose loose-fill insulation	ASTM C739-00.
Cellulose wet-spray insulation	ASTM C1149-97.
Insulation–organic cellular:	
Preformed block-type polystyrene insulation	ASTM C578-95.
Rigid preformed polyurethane insulation board	ASTM C591-00.
Polyurethane or polyisocyanurate insulation board face with aluminum foil on both sides	FS[2] HH-I-1972/1 (1981).
Polyurethane or polyisocyanurate insulation board face with felt on both sides	FS HH-I-1972/2 (1981) and Amendment 1, October 3, 1985).
Insulation–composite boards:	
Mineral fiber insulation board	ASTM C726-00a.
Perlite board	ASTM C728-97.
Gypsum board and polyurethane or poliso-cyanurate composite board	FS HH-I-1972/4 (1981).

[1] ASTM indicates American Society for Testing and Materials.

[2] FS indicates Federal Specifications.

THERMAL INSULATING MATERIALS FOR BUILDING ELEMENTS INCLUDING WALLS, FLOORS, CEILINGS, ATTICS, AND ROOFS–Continued

[Standards for conformance]

Materials used as a patch to reduce infiltration through the building envelope	Commercially available.

THERMAL INSULATING MATERIALS FOR PIPES, DUCTS, AND EQUIPMENT SUCH AS BOILERS AND FURNACES

[Standards for conformance]

Insulation–mineral fiber:	
Preformed pipe insulation .	ASTM[1] C547-00.
Blanket and felt insulation (industrial type)	ASTM C553-00.
Blanket insulation and blanket type pipe insulation (metal-mesh covered, industrial type)	ASTM C592-00.
Block and board insulation	ASTM C612-00.
Spray applied mineral fiber thermal and sound absorbing insulation	ASTM C1014-99ae1.
High-temperature fiber blanket insulation	ASTM C892-00.
Duct work insulation	ASTM C1290-00.
Insulation–mineral cellular:	
Calcium silicate block and pipe insulation	ASTM C533-95.
Cellular glass insulation . .	ASTM C552-00.
Expanded perlite block and pipe insulation	ASTM C610-99.
Insulation–organic cellular:	
Preformed flexible elastomeric cellular insulation in sheet and tubular form	ASTM C534-99.
Unfaced preformed rigid cellular polyurethane insulation	ASTM C591-00.
Insulation skirting	Commercially available.

[1] ASTM indicates American Society for Testing and Materials.

FIRE SAFETY REQUIREMENTS FOR INSULATING MATERIALS ACCORDING TO INSULATION USE

[Standards for conformance]

Attic floor	Insulation materials intended for exposed use in attic floors shall be capable of meeting the same smoldering combustion requirements given for cellulose insulation in ASTM[1] C739-00.
Enclosed space	Insulation materials intended for use within enclosed stud or joist spaces shall be capable of meeting the same smoldering combustion requirements given for cellulose insulation in ASTM C739-00.
Exposed interior walls and ceilings	Insulation materials, including those with combustible facings, which remain exposed and serve as wall or ceiling interior finish, shall have a flame spread classification not to exceed 150 (per ASTM E84-00a).
Exterior envelope walls and roofs	Exterior envelope walls and roofs containing thermal insulation shall meet applicable local government building code requirements for the complete wall or roof assembly.
Pipes, ducts, and equipment	Insulation materials intended for use on pipes, ducts, and equipment shall be capable of meeting a flame spread classification not to exceed 150 (per ASTM E84-00a).

[1] ASTM indicates American Society for Testing and Materials.

STORM WINDOWS

[Standards for conformance]

Storm windows:	
All storm windows . .	AAMA/NWWDA[1] 101/I.S. 2-97.
Aluminum frame storm windows	AAMA[2] 1002.10-93.
Rigid vinyl frame storm windows	ASTM[3] D4726-00.
Frameless plastic glazing storm	Required minimum thickness for windows is 6 mil (0.006 inches).
Movable insulation systems for windows	Commercially available.

[1] AAMA/NWWDA indicates American Architectural Manufacturers Association/National Wood Window & Door Association (now the Window & Door Manufacturers Association).

[2] AAMA indicates American Architectural Manufacturers Association.

[3] ASTM indicates American Society for Testing and Materials.

REPLACEMENT WINDOWS

[Standards for conformance]

Replacement windows:	
All windows	AAMA/NWWDA[1] 101/I.S. 2-97.
Steel frame windows	Steel Window Institute recommended specifications for steel windows, 1990.
Rigid vinyl frame windows	ASTM[2] D4726-00.

[1] AAMA/NWWDA indicates American Architectural Manufacturers Association/National Wood Window & Door Association (now the Window & Door Manufacturers Association).

[2] ASTM indicates American Society for Testing and Materials.

STORM DOORS

[Standards for conformance]

Storm doors:	
All storm (glass) doors	AAMA/NWWDA[1] 101/I.S. 2-97.
Aluminum frame storm doors	AAMA[2] 1102.7-89.
Sliding glass storm doors	AAMA 1002.10-93.
Rigid vinyl storm doors .	ASTM[3] D3678-97 and D4726-00..
Vestibules:	
Materials to construct vestibules	Commercially available.

[1] AAMA/NWWDA indicates American Architectural Manufacturers Association/National Wood Window & Door Association (now the Window & Door Manufacturers Association).

[2] AAMA indicates American Architectural Manufacturers Association.

[3] ASTM indicates American Society for Testing and Materials.

REPLACEMENT DOORS

[Standards for conformance]

Replacement doors:	
All replacement doors	AAMA/NWWDA[1] 101/I.S. 2-97.
Steel doors	ANSI[2] A250.8-98.
Wood doors:	
Flush doors	ANSI/NWWDA[3] I.S. 1-97 (Amendment, exterior door provisions).
Stile and rail doors	NWWDA[4] I.S. 6-97.

[1] AAMA/NWWDA indicates American Architectural Manufacturers Association/National Wood Window & Door Association (now the Window & Door Manufacturers Association).

[2] ANSI indicates American National Standards Institute.

[3] ANSI/NWWDA indicates American National Standards Institute/National Wood Window & Door Association (now the Window & Door Manufacturers Association).

[4] NWWDA indicates National Wood Window & Door Association (now the Window & Door Manufacturers Association).

CAULKS AND SEALANTS

[Standards for conformance]

Caulks and sealants:	
Glazing compounds for metal sash	ASTM[1] C669-00.
Oil and resin base caulks	ASTM C570-00.
Acrylic (solvent types) sealants	ASTM C920-98e1.
Butyl rubber sealants	FS[2] Commercial Item Description A-A-272 (6/7/95).
Chlorosulfonated polyethylene sealants	ASTM C920-98e1.
Latex sealing compounds	ASTM C834-00e1.
Elastomeric joint sealants (normally considered to include polysulfide, polyurethane, and silicone)	ASTM C920-98e1.
Preformed gaskets and sealing materials	ASTM C509-00.
Duct sealing mastic	UL[3] 181A-M, Second Edition, 1994 and UL 181B-M, First Edition, 1995.

[1] ASTM indicates American Society for Testing and Materials.

[2] FS indicates Federal Specifications.

[3] UL indicates Underwriters Laboratories.

WEATHERSTRIPPING

[Standards for conformance]

Weatherstripping	Commercially available.
Vapor retarders	Selected according to the provisions cited in ASTM[1] C755-97. Permeance not greater than 1 perm when determined according to the desiccant method described in ASTM E96-00.
Items to improve attic ventilation	Commercially available.

[1] ASTM indicates American Society for Testing and Materials.

HEAT EXCHANGERS

[Standards for conformance]

Heat exchangers, water-to-water and steam-to-water	ASME[1] Boiler and Pressure Vessel Code, 1998, Sections II, V, VIII, IX, and X, as applicable to pressure vessels. Standards of Tubular Exchanger Manufacturers Association, Eighth Edition, 1999.
Heat exchangers with gas-fired appliances[2]	ANSI/UL[3] 462, Ninth Edition, approved by ANSI February 28, 1997.

[1] ASME indicates American Society for Mechanical Engineers.

[2] The heat reclaimer is for installation in a section of the vent connector from appliances equipped with draft hoods or appliances equipped with powered burners or induced draft and not equipped with a draft hood.

[3] ANSI/UL indicates American National Standards Institute/Underwriters Laboratories.

BOILER/FURNACE CONTROL SYSTEMS

[Standards for conformance]

Automatic set back thermostats	Listed by UL[1]. Conformance to NEMA[2] DC3-1989 (R1996).
Line voltage or low voltage room thermostats	Listed by UL. Conformance to NEMA DC3-1989 (R1996).
Clock thermostats	Listed by UL. Conformance to NEMA DC3-1989 (R1996).
Automatic gas ignition systems	ANSI[3] Z21.21-2000. AGA[4] Laboratories Certification Seal.
Energy management systems	Listed by UL.
Hydronic boiler controls	Listed by UL.
Other burner controls . .	Listed by UL.

[1] UL indicates Underwriters Laboratories.

[2] NEMA indicates National Electrical Manufacturers Association.

[3] ANSI indicates American National Standards Institute.

[4] AGA indicates American Gas Association.

WATER HEATER MODIFICATIONS

[Standards for conformance]

Insulate tank and distribution piping	(See insulation section of this appendix)
Install heat traps on inlet and outlet piping	Applicable local plumbing code.
Install/replace water heater heating elements	Listed by UL[1].
Electric, freeze-prevention tape for pipes	Listed by UL.
Install stack damper, gas-fueled	ANSI[2] Z21.66-1996, including Exhibits A & B, and ANSI Z223.1-1999 (same as NFPA[3] 54-1999).
Install stack damper, oil-fueled	UL 17, Third Edition, 1994, NFPA 31-2001, NFPA 211-2000 (same as ANSI A52.1), and ANSI/ NFPA 70-1999 (same as IEEE[4] National Electrical Code).
Install water flow modifiers	Commercially available.

[1] UL indicates Underwriters Laboratories.
[2] ANSI indicates American National Standards Institute.
[3] NFPA indicates National Fire Prevention Association.
[4] IEEE indicates Institute of Electrical and Electronics Engineers.

REPLACEMENT WATER HEATERS

[Standards for conformance]

Electric (resistance) water heaters	10 CFR[1] 430 and UL[3] 174.
Heat pump water heaters	UL 1995, Second Edition, 1995. Electrical components to be listed by UL.
Gas water heaters:	
Rated ≤ 75 kBtu/hr . .	10 CFR 430 and ANSI[4] Z21.10.1-1998.
Rated ≥ 75 kBtu/hr . .	ANSI Z21.10.3-1998.
Oil water heaters	UL 732, Fifth Edition, 1995.

[1] CFR indicates Code of Federal Regulations.
[2] UL indicates Underwriters Laboratories.
[3] ANSI indicates American National Standards Institute.

SOLAR WATER HEATING SYSTEMS

[Standards for conformance]

Solar water heating systems including forced circulation, integral collector storage, thermo-syphon, and self-pumping systems	System must be certified per SRCC[1] OG 300, July 16, 1998.

[1] SRCC indicates Solar Rating and Certification Corporation.

WASTE HEAT RECOVERY DEVICES

[Standards for conformance]

Desuperheater/water heaters	ARI[1] 470-1995 and UL 1995, Second Edition, 1995.
Condensing heat exchangers	Commercially available components installed per manufacturers' specifications. NFPA[2] 211-2000 (same as ANSI A52.1) may apply in certain instances. See also the Heat Exchangers section of this appendix.
Heat pump water heating heat recovery systems	UL 1995, Second Edition, 1995. Electrical components to be listed by UL.
Energy recovery equipment	Energy Systems Analysis and Management, 1997 (SMACNA[3]).

[1] ARI indicates Air Conditioning and Refrigeration Institute.
[2] NFPA indicates National Fire Prevention Association.
[3] SMACNA denotes Sheet Metal and Air Conditioning Contractors' National Association.

BOILER REPAIR AND

Install gas conversation burners	ANSI[1] Z21.8-1994 (for gas- or oil-fired systems), ANSI Z21.17-1998, and ANSI Z223.1-1999 (same as NFPA 54-1999). AGA[2] Laboratories Certification Seal.
Replace oil burner	UL[3] 296, Ninth Edition, 1994 and NFPA 31-2001.
Install burners (oil/gas)	ANSI Z223.1-1999 for gas equipment and NFPA[4] 31-2001 for oil equipment.
Re-adjust boiler water temperature or install automatic boiler temperature reset control	ASME[5] CSD-1-1998, ANSI Z223.1-1999, and NFPA 31-2001.
Replace/modify boilers	ASME Boiler and Pressure Vessel Code, 1998, Section II, IV, V, VI, VIII, IX, and X. Boilers must be Hydronics Institute Division of GAMA equipment.
Clean heat exchanger, adjust burner air shutter(s), check smoke no. on oil-fueled equipment. Check operation of pump(s) and replacement filters.	Per manufacturers' instructions.
Replace combustion chambers	Refractory linings may be required for conversions.

BOILER REPAIR AND MODIFICATIONS/EFFICIENCY IMPROVEMENTS—Continued

[Standards for conformance]

Replace heat ex-changers, tubes	Protection from flame contact with conversion burners by refractory shield.
Install/replace thermo-static radiator valves	Commercially available. One-pipe steam systems require air vents on each radiator; see manufacturers' requirements.
Install boiler duty cycle control system	Commercially available. ANSI/NFPA 70-1999 (same as IEEE National Electrical Code) and local electrical code provisions for wiring.

[1] ANSI indicates American National Standards Institute.
[2] AGA indicates American Gas Association.
[3] UL indicates Underwriters Laboratories.
[4] NFPA indicates National Fire Prevention Association.
[5] ASME indicates American Society for Mechanical Engineers.

HEATING AND COOLING SYSTEM REPAIRS AND TUNE-UPS/EFFICIENCY IMPROVEMENTS

[Standards for conformance]

Install duct insulation . .	ASTM[1] C612-00 (see insulation sections of this appendix).
Reduce Input of burner; derate gas-fueled equipment	Local utility company and procedures if applicable for gas-fueled furnaces and ANSI[2] Z223.1-1999 (same as NFPA[3] 54-1999) including Appendix H.
Repair/replace oil-fired equipment	NFPA 31-2001.
Replace combustion chamber in oil-fired furnaces or boilers	NFPA 31-2001.
Clean heat exchanger and adjust burner; adjust air shutter and check CO_2 and stack temperature. Clean or replace air filter on forced air furnace	ANSI Z223.1-1999 (same as NFPA 54-1999) including Appendix H.
Install vent dampers for gas-fueled heating systems	Applicable sections of ANSI Z223.1-1999 (same as NFPA 54-1999) including Appendix H, I, J, and K. ANSI Z21.66-1996 and Exhibits A&B for electrically operated dampers.
Install vent dampers for oil-fueled heating systems	Applicable sections of NFPA 31-2001 for installation and in conformance with UL[4] 17, Third Edition, 1994.

HEATING AND COOLING SYSTEM REPAIRS AND TUNE-UPS/EFFICIENCY IMPROVEMENTS—Continued

[Standards for conformance]

Reduce excess combustion air:	
A: Reduce vent connector size of gas-fueled appliances	ANSI Z223.1-1999 (same as NFPA 54-1999) part 9 and Appendices G & H.
B: Adjust barometric draft regulator for oil fuels	NFPA 31-2001 and per furnace and boiler manufacturers' instructions.
Replace constant burning pilot with electric ignition device on gas-fueled furnaces or boilers	ANSI Z21.71-1993.
Readjust fan switch on forced air gas-or oil-fueled furnaces	Applicable sections and Appendix H of ANSI Z223.1-1999 (same as NFPA 54-1999) for gas furnaces and NFPA 31-2001 for oil furnaces.
Replace burners	See install burners (oil/gas).
Install/replace duct furnaces (gas)	ANSI Z223.1-1999 (same as NFPA 54-1999).
Install/replace heat pumps	ARI[5] 210/240-1994. UL 1995, Second Edition, 1995.
Replace air diffusers, intakes, registers, and grilles	Commercially available.
Install/replace warm air heating metal ducts	UL 181, Ninth Edition 1996, including UL 181A, Second Edition 1994 and 181B, First Edition, 1995.
Filter alarm units	Commercially available.

[1] ASTM indicates American Society for Testing and Materials.

[2] ANSI indicates American National Standards Institute.

[3] NFPA indicates National Fire Prevention Association.

[4] UL indicates Underwriters Laboratories.

[5] ARI indicates Air Conditioning and Refrigeration Institute.

REPLACEMENT FURNACES, BOILERS, AND WOOD STOVES

[Standards for conformance]

Chimneys, fireplaces, vents and solid fuel burning appliances	NFPA[1] 211-2000 (same as ANSI[2] A52.1).
Gas-fired furnaces	ANSI Z21.47-1998 and ANSI Z223.1-1999 (same as NFPA 54-1999).
Oil-fired furnaces	UL[3] 727, Eighth Edition, 1994 and NFPA 31-2001.
Liquefied petroleum gas storage	NFPA 58-2001.
Ventilation fans:	
Including electric attic, ceiling, and whole-house fans	UL 507, Ninth Edition, 1999.

[1] NFPA indicates National Fire Prevention Association.
[2] ANSI indicates American National Standards Institute.
[3] UL indicates Underwriters Laboratories.

AIR CONDITIONERS AND COOLING EQUIPMENT

[Standards for conformance]

Air conditioners:	
Central air conditioners	ARI[1] 210/240-1994.
Room size units	ANSI/AHAM[2] RAC 1-1992.
Other cooling equipment:	
Including evaporative coolers, heat pumps, and other equipment	UL[3] 1995, Second Edition, 1995.

[1] ARI indicates Air Conditioning and Refrigeration Institute.
[2] ANSI/AHAM indicates American National Standards Institute/Association of Home Appliance Manufacturers.
[3] UL indicates Underwriters Laboratories.

SCREENS, WINDOW FILMS, AND REFLECTIVE MATERIALS

[Standards for conformance]

Insect screens	Commercially available.
Window films	Commercially available.
Shade screens:	
Fiberglass shade screens	Commercially available.
Polyester shade screens	Commercially available.
Rigid awnings:	
Wood rigid awnings	Commercially available.
Metal rigid awnings .	Commercially available.
Louver systems:	
Wood louver awnings	Commercially available.
Metal louver awnings	Commercially available.
Industrial-grade white paint used as a heat-reflective measure on roofs, awnings, window louvers, doors, and exterior duct work (exposed)	Commercially available.

REFRIGERATORS

[Standards for conformance]

Refrigerator/freezers (does not include freezer-only units)	UL[1] 250. Replaced units must be disposed of properly per Clean Air Act 1990, Section 608, as amended by 40 CFR[2] 82, May 14, 1993.

[1] UL indicates Underwriters Laboratories.
[2] CFR indicates Code of Federal Regulations.

FLUORESCENT LAMPS AND FIXTURES

[Standards for conformance]

Compact fluorescent lamps	ANSI/UL[1] 542, Seventh Edition, February 6, 1997 and UL 1993, First Edition, 1993.
Fluorescent lighting fixtures	UL 1570, Fourth Edition, 1995.

[1] ANSI/UL indicates American National Standards Institute/Underwriters Laboratories.

ATTACHMENT D TO WEATHERIZATION PROGRAM CONTRACT NO. FCT/R 25-26

EXCERPT FROM

MISSOURI TECHNICAL OPERATION MANUAL

(AUGUST 2023)

All work must be performed in accordance with the criteria set forth in the attached document.

The WEATHERIZATION FIELD GUIDE FOR Missouri explains in detail how weatherization measures should be installed; however, procedures in the Missouri Technical Operation Manual supersede the Field Guide. To read the full Field Guide and Work Standards, visit http://wxfieldguide.com/mo/MOWxFG_033115_Web.pdf.

CONTRACTOR NAME: _____ AUTHORIZED SIGNATURE: _____

Section II: Health and Safety

Health and safety issues have become an important part of the Weatherization Assistance Program (WAP) as knowledge about the hazards within dwellings has increased since the Program's inception. When a health or safety hazard is detected, it is the policy of the Department of Natural Resources' Division of Energy (Department), administrator of the Missouri Weatherization Assistance Program, to address the hazard. This policy is tempered by recognition that the primary goal of the WAP is energy conservation and that funds should focus on that goal. Although balance is needed between these competing issues, the health and safety of the building, occupants and weatherization crews or contractors shall not be compromised by any retrofit material, technique or practice.

According to 10 CFR Part 440, allowable energy related health and safety actions are those actions necessary to maintain the physical well-being of both the occupant(s) and/or weatherization workers where:

- Costs are reasonable as determined by DOE in accordance with the Grantee's approved Grantee Plan; AND
- The actions must be taken to effectively perform weatherization work; OR • the actions are necessary as a result of weatherization work.

A sub-grantee must ask themselves two questions:

- What must we do within reasonable costs to get the home to a point we can go forward with weatherizing, where the weatherization work will be lasting and effective?
- What must we do to ensure that the weatherization work we conducted does not create a health or safety problem for the occupant(s)?

Code corrections are allowable health and safety costs when they are required by the local Code Authority in order for weatherization work to be performed. You must note the specific code requirement with reference to the efficiency measure(s) that triggered the code activity. If the code correction cannot be related to weatherization work, then WAP funds cannot be used to make the code correction. An example of this would be bringing handrails up to code. Since it is not related to the installation of the efficiency measures, it would not be an allowable cost. When health and safety costs are not reasonable or beyond the sub-grantees budget, the home may need to be deferred.

Sub-grantees may not provide only health and safety measures on a home without conducting other cost effective weatherization measures. For example, a sub-grantee is not allowed to only install a smoke detector or carbon monoxide detector as a health and safety measure, without energy conservation measures (ECM), such as insulation or air sealing.

The following sections establish areas of concern that may affect the health and safety of the workers and the clients. In most cases, the best approach to limiting the health and safety risk is to minimize their exposure to the hazard. The inability to minimize exposure may result in some or all of the work being stopped on any particular dwelling.

A. Worker Safety

A sub-grantee is responsible for complying with Occupational Safety and Health Administration (OSHA**)** requirements in all weatherization activities that involve staff personnel. When contractors are employed by sub-grantees, those contractors also are required to comply with OSHA. For detailed information on worker health and safety, refer to *Construction Industry OSHA Safety and Health Standards* (29 CFR 1926).

The department expectation is for crews, contractors and auditors to be able to work under conditions that do not jeopardize their own health and safety. The office, warehouse and other workspace owned or rented by each sub-grantee should be a safe and healthy environment.

The contractor cost to comply with OSHA, as applicable, is part of the contracted bid price. Related costs for sub-grantees to comply with OSHA requirements may be charged as tools and equipment. Sub-grantees are responsible for purchasing all OSHA required tools and equipment and are required to immediately repair or replace any defective tool or equipment. Work that threatens worker or client health or safety may not be undertaken.

1. General Guidelines.

The following are general guidelines for accident prevention and should be followed by agencies, crews, auditors and general contractors involved in weatherization work. In addition, this section outlines some of the employer responsibilities to the weatherization crews.

a. The sub-grantee or contractor has the responsibility, as employers, to initiate and maintain such programs as may be necessary to comply with this part.

b. The employer shall provide training in the area of health and safety that will allow weatherization personnel to identify existing and potential threats to the client’s or crew's health and/or safety. Upon the identification of a threat to the client's health and/or safety, the client will be informed in writing as to the available options for dealing with this threat.

c. Design will be incorporated to eliminate or minimize hazards (e.g., material selection, access to equipment for installation and maintenance, placement of equipment, ductwork and condensate lines).

d. The employer shall allow for frequent and regular inspections of the job sites, materials and equipment to be made by competent persons designated by the sub-grantee or state grantee.

e. The employer shall tag all machines, tools, materials or equipment identified as being unsafe making them inoperable by locking the controls or physically removing them.

f. The employer shall permit only those employees qualified by training or experience to operate equipment and machinery.

g. The employer shall require its employees and its representatives to take all reasonable precautions against performing work on homes that will subject clients to health and safety risks. At the time of initial client contact, the weatherization worker will make a cursory evaluation of the individual health of the homes occupants. In cases where a person's health is fragile and/or the crew work activities constitute a health or safety hazard, those occupants at risk will be asked to leave during the work activities.

h. The Department will allow technical waivers for non-performance of audits, installations and/or inspections, or any portion of these functions, if such action will expose workers to conditions regarded as unsafe or unhealthy as determined by OSHA Construction Industry Standards.

i. Expenditure of weatherization funds for materials, protective clothing, respirators, medical exams, proper tools and equipment and other items or activities related to the health and safety of workers are allowable costs under the Missouri Weatherization Assistance Program.

j. When in doubt, sub-grantees should seek consultation services from an OSHA subsidized professional safety consultant (See: OSHA Publication #3047, Consultation Service for the Employer) for identifying hazards and developing a worker health and safety program.

k. First responders (911) will be called when necessary.

2. Sub-grantee Health and Safety Policy

A sub-grantee must have a Health and Safety Policy in place to protect worker health and safety. At a minimum, this policy must contain the following:

a. Safety Data Sheets (SDS) on the job site and available to medical personnel.

b. Employees should know where to go for treatment.

c. A written procedure for reporting medical emergencies.

d. A written procedure for reporting non-emergency accidents.

e. Provision for prompt medical attention for serious injuries.

f. Prompt transportation or a system for contacting an ambulance, in the case of a serious emergency.

g. Telephone numbers of physicians, hospitals or ambulances should be conspicuously posted.

3. Sub-grantee First Aid Program

A first aid program must be in place. At a minimum, the program must include the following:

a. First aid training provided to at least one member of each crew.

b. CPR training provided to at least one member of each crew.

c. One complete first aid kit per vehicle.

d. One eyewash station with at least one refill per vehicle.

4. Sub-grantee Personal Protection Program

Sub-grantees must establish a Personal Protective Equipment Program which will require providing training and wearing of protective clothing. At a minimum, this program must include the following:

a. Respiratory equipment and use training:

(1) Proper respiratory protection will be provided and worn if the risk of airborne contaminants cannot be prevented. (e.g., N-95 or equivalent face mask).

(2) Air purifying masks with an organic vapor cartridge and P-100 particulate filter will be used when applying low-pressure 2-component spray polyurethane foam. Consult SDSs for respiratory protection requirements.

(3) Supplied air respirators (SARs) will be used when applying high-pressure spray polyurethane foam (SPF) insulation. Consult SDSs for respiratory protection requirements.

(4) Supplied air respirator equipment must be fit tested by a trained person and employees must be trained on respirator use.

b. Eye protection shall be made available and worn when appropriate. (e.g., safety glasses, goggles if not using full-face respirator).

c. SDSs and *OSHA* regulations will be consulted for protective clothing and equipment requirements and usage guidelines.

d. Protective coveralls should be made available and worn when needed to protect worker health or safety. If contaminants are present (e.g., insulation materials), removable protective clothing will be worn.

e. Durable and wrist-protecting gloves will be worn that can withstand work activity when hand protection is necessary.

f. Appropriate footwear and clothing will be worn as well as personal protective equipment (PPE) will be used (e.g. knee pads, bump caps, additional padding, etc. on the job sites when needed).

g. Proper lifting techniques will be used when lifting over-size and over-weight objects.

h. Appropriate ventilation, hydration, rest breaks, and cooling equipment will be provided.

i. Ensure staff is aware of risks during summer months, including the symptoms of heat stroke and heat exhaustion.

j. Ensure that auditors are aware of contaminants that can be encountered in and around the home. Sources of contamination such as sewage, dead animals, needles, etc. will be corrected, repaired or removed before performing inspections. If appropriate, the contaminant will be neutralized and/or a protective barrier will be installed in the area. If the contaminates cannot be corrected or protected from the auditor or crewmembers, the home must be deferred.

5. Sub-grantee Tool Safety Program

Agencies must have in place a Tool Safety Program designed to protect employees from work place hazards. This program should ensure the following:

a. All power tools will be inspected and used in accordance with manufacturer specifications to eliminate hazards associated with missing ground prongs, ungrounded circuits, misuse of power tools, noise, and improper or defective cords or extension cords.

b. All tools, including electrical tools, will be assessed and found safe and adequate for the job. Worn or frayed electrical cords will not be used. A three-wire type extension cord will be used with all portable electric tools.

c. All devices used will be verified as ground-fault circuit interrupters (GFCI) or double insulated.

d. Water sources such as drains and condensation pans will be kept separate from all electrical sources.

e. Employees are trained in the safe and proper operation of tools and equipment used in their work. Employees are trained in the hazards of arc flash (refer to NFPA 70E).

f. Safety guards are in place on all tools that come equipped with such devices.

g. Precautions will be taken when ladders are used, when working at heights, or when balancing on joists. Metal ladders will be avoided when possible to prevent electric shock. When scaffolding is used, manufacturer set-up procedures will be followed. Walk boards will only be used when practical.

h. Hearing/ear protection will be provided to individuals working around high-decibel equipment or in high-dust environments.

i. That special precautions are taken if knob and tube wiring is present.

j. Exhaust gases from compressors and generators will be prevented from entering interior space.

k. Hand tools will be used for their intended purpose.

l. It is required that all agency crew and contract workers complete a ten hour Occupational Safety and Health Administration (OSHA) construction safety program (OSHA-10). All crew and contract workers shall complete the course in construction safety and health approved by OSHA or a similar program approved by the Department that is at least as stringent as an approved OSHA program. All employees are required to complete the program within sixty (60) days of beginning work on such construction project. Furthermore, agencies may elect to have contractors, crew leaders and/or crewmembers complete a thirty-hour OSHA construction safety program (OSHA-30). Crew leaders and crewmembers must be able to provide documentation to confirm compliance with OSHA training requirements. Certified AHERA Professionals have met asbestos-specific safety training requirements; therefore, are not required to complete the OSHA-10 training requirement.

6. Sub-grantee Fire Protection Program

Agencies must implement a Fire Protection Program. This program should include the following:

a. Charged fire extinguishers are provided and are located in the sub-grantee offices and warehouse, located in each vehicle and that each is inspected regularly.

b. Training on fire extinguisher use.

c. Fire emergency procedures.

d. The identification and elimination of ignition sources, such as pilot lights, when flammable materials are being used.

e. A reduction in the use of flammable materials and fire rated materials will be implemented.

7. Sub-grantee Job Hazards and Chemical Safety Identification Program

Agencies need to implement a Job Hazards Identification Program. Inspection will be conducted for hazards, such as damaged or exposed electrical conductors, mold, sewage effluent, potential asbestos containing materials, friable fiberglass, pests, and other potential hazards. Agencies Job Hazards Identification Program should include the following:

a. Investigation for job specific safety hazards. Hazardous materials will be handled in accordance with manufacturer specifications or SDS standards to eliminate hazards associated with volatile organic compounds (VOCs), sealants, insulation, contaminated drywall, dust, foams, asbestos, lead, mercury, and fibers. The least toxic suitable material will be chosen.

b. Hazard Communication Procedures that include the following:

(1) Written policies for dealing with job hazards.

(2) All hazardous materials containers labeled with:

(a) Hazardous chemical contents.

(b) Hazard warning appropriate for employee protection.

(c) Legible and prominent labels on all containers.

(3) Means of communication for non-routine tasks and unlabeled chemicals.

(4) A means for the exchange of information between sub-grantees and contractors regarding hazardous materials.

(5) Access and egress points will be located before beginning work.

(6) Identification of spaces with limited ingress and egress and restricted work areas will be considered confined spaces.

(7) Adequate ventilation will be provided.

8. Safety Data Sheet Catalog

Agencies and contractors must develop and maintain a catalog of Safety Data Sheets (SDS) for all hazardous material. A SDS catalog must be made available to all employees, kept on file at the sub-grantee offices and on all job sites. SDS catalogs should be organized and

tabbed, by product, in a binder for quick reference in case of an emergency. The SDS catalog should contain the following:

a. Specific identity of chemical and common name.

b. Physical and chemical characteristics.

c. Known acute and chronic health effects and related health effects.

d. Precautionary measures.

e. Exposure limits.

f. Identification of carcinogens.

g. First aid procedures.

9. OSHA Confined Space Requirements

A confined space is:

- Any space large enough for a worker to enter;
- Has limited means of entry or exit; and
- Is not designed for continuous occupation

According to the OSHA definition, (29 CFR 1926 Subpart AA) attics and crawl spaces are generally considered to be confined spaces. All confined spaces must be evaluated by a trained 'Competent Person', prior to entry, to determine if the confined space is a permit required confined space. If a confined space is determine to be a permit required space, no weatherization work shall take place within that space until the identified hazard(s) has/have been eliminated. For the purpose of weatherization, most permitted confined spaces can be reclassified by removing or controlling the hazard(s). Once the hazard is removed or controlled, weatherization activities can proceed.

B. Building/Occupant Safety

To ensure appropriate consideration for health and safety, relevant procedures and assessments will be conducted as part of the building analysis. Each home weatherized must be individually assessed to determine the existence of potential hazards to workers or clients. When conditions within the home are such that the health and safety of the client, crew or contractor will be jeopardized prior to providing assistance, weatherization must not proceed until such problems are remedied. In some cases, mitigation of problems may be beyond the scope of the WAP. In these instances, the agency must invoke the "Deferral" policy and the client must be notified in writing and referred to any alternative resources that are available for resolution of the problem.

In those instances where the existing conditions pose a threat to the crew or contractor's health and/or safety, the Missouri Weatherization Assistance Program allows technical waivers for any audit or inspection process installation or any portion of the weatherization activity. Efficient auditing protocol would make a deferral determination as early in the inspection process as possible, yet thorough to the point of documenting necessary actions to be taken by the client for weatherization to proceed. Refer to Section II, Subsection D: Required Minimum Sub-grantee Deferral Policy for additional information.

Under the department Health and Safety Standards, the following subsections describe the health and safety assessments and associated actions that must be performed:

1. Carbon Monoxide (CO)

a. When combustion appliances are present in the dwelling, or where there is reason to suspect a significant level of carbon monoxide (CO**)** present in the ambient air (such as with an attached garage) the ambient air will be tested for CO at the initial building audit and immediately after the implementation of weatherization measures. The testing procedure is:

(1) Establish building in the winter (heating season) mode with exterior windows and doors closed.

(2) Calibrate the personal CO monitoring equipment in the outdoor ambient air.

(3) Enter the home and walk-through the various rooms and locations and note any areas where CO above the outdoor ambient air level is found.

(a) If indoor ambient CO levels are lower than 9 ppm above outdoors, proceed with testing of combustion appliances.

(b) If the personal CO monitor indicates an indoor ambient CO level between 9 ppm and 70 ppm, the auditor may complete the mechanical systems audit. The auditor shall advise the homeowner/occupant that CO has been detected, and recommend that all possible sources of CO be checked. Windows and doors will be opened after the mechanical systems audit is complete. The auditor shall recommend that all possible sources of CO be turned off immediately. Where it appears that the source of CO is a permanently installed appliance, the owner shall be advised to contact a qualified servicing agent or the agency may proceed following the guidelines given in Section II, Subsection B, Topic 6: Non-Emergency, One-Day Follow-Up Required.

(c) If measurable levels are 70 ppm or higher than outdoors, discontinue testing, remove the occupants, turn off combustion appliances, ventilate the building and contact fuel vendor(s). Sources of high carbon monoxide must be mitigated prior to continuing or completing weatherization work, refer to Section II, Subsection B, Topic 5: Emergency Situations, Immediate Follow-Up Required.

2. **Combustion Safety Alarms**

a. Smoke alarms should be in every home and must be installed if not present in a home receiving weatherization services. Existing smoke alarms will be tested to ensure that they are operational. A smoke alarm should be installed near combustion zone(s) and one near bedrooms. Smoke alarms may be hardwired or battery operated. Refer to the Missouri Weatherization Field Guide for additional detail on installation and consult manufacturers' recommendations.

b. All homes will have at least one functioning CO detector/alarm. Existing CO detector(s)/alarm(s) will be tested to ensure that they are operational. CO detector(s)/alarm(s) must be installed if not present in every home receiving weatherization services. CO detector(s)/alarm(s) will be installed outside of each separate sleeping area in the immediate vicinity of the bedrooms in accordance with *ASHRAE* 62.2 and authority having local jurisdiction. Homes having combustion appliances must have a CO detector/alarm installed in the immediate vicinity of the combustion appliance zone (CAZ). **CO detector(s)/alarm(s) must be installed by the end of the first day of any work commencing at the home.** CO detector(s)/alarm(s) may be hardwired or battery operated. Refer to the Missouri Weatherization Field Guide for additional detail on installation and consult manufacturer's recommendations.

3. Combustion Systems

a. Unvented Space Heaters: the Department considers an operable, unvented space heater in a dwelling a potential health and safety hazard. U.S. DOE now distinguishes between primary and secondary unvented space heaters as heat sources (See Attachment *1.1)*. Unvented heaters will be removed from the home except when only used as an emergency heat source, and when it can be confirmed that the unit meets *ANSI* Z21.11.2 standards. Refer to Section III, Subsection G, Topic 2: Unvented Space Heaters for additional information.

b. All conventionally vented (this excludes direct-vent appliances) combustion appliances must be tested for spillage using the worst-case depressurization procedures in Section III. Worst-case depressurization testing **must** always be done before and after all weatherization measures are installed.

(1) If present, the operability of the draft regulator will be verified and tested.

(2) Combustion venting systems will be inspected for damage, leaks, disconnections, inadequate slope, and other safety hazards.

c. Sub-grantees must seek to eliminate conditions where carbon monoxide levels are at or over the levels stated in Section III, Subsection C, Topic 3: Measuring Spillage and CO Under Worst Case Depressurization.

d. Carbon monoxide testing of space and water heating appliances must be done with a digital combustion gas analyzer before dilution air enters the vent system. If there is a flue port opening for each burner, the test must be done in each flue port opening individually.

e. When an atmospheric combustion appliance is located in a bedroom but passes all combustion safety tests, then no action is required since this is a pre-existing condition.

f. When an atmospheric combustion appliance is located in a bedroom and does not pass all combustion safety tests, then as part of correcting the safety issue:

(1) The appliance must be isolated from the bedroom air by drawing combustion air from another appropriate source;

(2) If the appliance is replaced, a sealed combustion system must be installed; or

(3) The appliance should be moved to a more appropriate location.

g. When an atmospheric combustion appliance installed by the Sub-grantee is located in a residential garage and/or adjacent space open to the garage, all equipment and appliances having an ignition source shall be elevated such that the source of ignition is not less than 18 inches above the floor unless listed as flammable vapor ignition resistant.

h. A heat shield must be installed when it is determined that a venting system is too close to combustible materials or the venting system must be moved to ensure proper clearance.

i. All visible fuel lines must be tested for fuel leaks both outdoors and indoors, starting at the meter or LP tank.

j. All non-functioning humidifiers from forced air furnace systems may be removed with prior client approval.

k. All gas valves should have at least a single safety. If a gas valve has no safety, then the sub-grantee should replace the gas valve with the most cost-effective replacement:

(1) A 100% safety millivolt gas valve.

(2) A 100% safety 24 volt gas valve.

(3) A remote bulb gas valve.

l. When there is a suspicion that the pilot safety system is not functioning properly, sub-grantees should perform a simple test of the pilot safety device to ensure that it is functioning properly. Procedures for this test are:

(1) Light pilot and let it warm the thermocouple for at least one minute. Do not operate the heater during this time.

(2) Observe the second hand on a watch or clock, then either blow out the pilot flame or put controller to the off position.

(3) Count the number of seconds from when the pilot is shut off until you hear the sound of the electromagnet valve closing shut. A good drop out time is usually 20 to 30 seconds; longer is better. Heaters equipped with power vents have drop out times of 10 to 15 seconds.

(5) Repeat the test to confirm it is consistent.

m. Sub-grantees should use a non-contact voltage sensor to ensure that the main switch will properly turn off the electricity to a space-heating unit.

n. All 110 volt wiring connections should be secured with wire nuts and electrical tape, and enclosed in an electrical junction box or other appropriate enclosure.

o. The proper size and type of wire should be used. The wire should have the correct rating for voltage, amperage and heat exposure.

p. Draft hoods, draft diverters, and barometric dampers should be well secured to the appliance, level, and should not reduce or restrict the size of the vent.

q. All gas ranges should be tested for carbon monoxide according to Section III: Mechanical Systems and Combustion Appliances.

r. Flexible gas connectors should be installed so that they do not pass through the appliance housing, cabinet or casing. Semi-rigid tubing and listed connectors shall be permitted to extend through an opening on an appliance housing, cabinet or casing where the tubing or connector is protected against damage.

s. All direct vent (sealed combustion) water heating and space heating appliances must be tested for carbon monoxide, as per Section III, unless the tests cannot be safely performed due to access limitations.

4 **Response to Combustion Appliance Problems**

a. The sub-grantee should determine if it is best to contact the local gas company or oil dealer to correct these problems. Gas utilities have their own emergency response protocols and these should be respected. The items listed below are not intended to interfere with gas utilities emergency protocols (often called tagging procedures).

b. In each of the situations in Section II, Subsection B: Building and Occupant Safety, Topics 4-7, the auditor or appliance technician will evaluate the client's situation, in

consultation with the Sub-grantee Weatherization Director, for the purpose of determining if:

(1) The client can safely remain in the home if an alternative source of heat (portable electric space heaters) can be obtained or whether the client must relocate for a short time.

(2) If the technician believes the client cannot safely remain in the home, the client will be advised to make arrangements to stay with family or friends until the unit can be occupied again.

5. Emergency Situations: Immediate Follow-up Required

Some safety problems may warrant a discontinuing of the combustion appliance testing or shutting off the appliance until the repairs can be made. The client must be notified of any issues and of any methods used to address the emergency situation until repairs can be made. Whenever a technician questions the safety of a situation, they should consult a supervisor.

Examples of this type of situation are:

a. ***Major Natural Gas Leak*:** Gas can be smelled more than two feet from the gas line.

b. ***Major Propane Gas Leak*:** Propane can be smelled more than three feet from the leaking fitting.

c. ***Clogged or Disconnected Flue*:** A clogged or disconnected flue that cannot be fixed, causing significant spillage of combustion products into a heated space or working area of the technician.

d. ***Back drafting or Spillage under Natural Conditions*:** Any combustion appliance that back drafts or has combustion gas spillage from the flue or vent connector under natural conditions. Refer to Section III, Subsection C: Combustion Appliance Zone (CAZ) and Carbon Monoxide Testing for additional information.

e. ***Cracked Furnace Heat Exchanger*:** Any visually identified cracked heat exchanger leaking combustion products in combination with carbon monoxide or others.

f. ***Other Hazards*:** Any other situation or combination of situations which the technician or supervisor judges hazardous to the health of the client or others (e.g. ambient indoor CO above 70 ppm as compared to outside).

6. Non-Emergency: One-day Follow-up Required

Some situations may not warrant discontinuing testing or shutting down the heating system, but are serious enough to require attention within twenty-four hours. The client must be

notified of any issues and of any methods used to address the situation. Examples of this type of situation are:

a. ***Cracked Heat Exchanger*:** Visually identified cracked heat exchanger that is leaking combustion products, with no carbon monoxide indications.

b. ***Spillage*:** Spillage but no carbon monoxide indications inside the thermal boundary.

c. ***Propane or Natural Gas Leak*:** Combustible gas can be smelled, but not more than three feet from the leaking fitting for propane and not more than two feet away from the leaking fitting for natural gas.

d. ***Carbon Monoxide*:** Measured carbon monoxide levels must comply with standards set in Section II, Subsection B, Topic 1: Carbon Monoxide (CO) and/or Section III, Subsection C, Topic 3: Measuring Spillage and CO Under Worst Case Depressurization and there must be an adequate draft and no spillage.

e. ***No Limit Switch*:** A furnace with no limit switch that poses a safety issue or a limit switch that is disconnected.

7. Non-Emergency: Five-day Follow-up Required

All other safety related follow-up must begin within five days unless the system or service can be shut-off until repairs are made. The client must be notified of any issues and of any methods used to address the situation until repairs can be made. Examples of this type of situation are:

a. ***Draft*:** Unacceptable draft with spillage outside the thermal boundary.

b. ***Propane or Natural Gas Leak*:** Gas can be detected by a combustible gas leak detector but not prominently by smell.

c. ***Limit*:** A furnace limit switch that does not shut the gas off by 225° F.

d. ***Suspicion of a Cracked Furnace Heat Exchanger*:** A cracked heat exchanger is suspected, but there are no other apparent problems with the furnace.

e. ***Back drafting or Spillage under Worst Case Depressurization Conditions*:** Any combustion appliance that back drafts or has combustion gas spillage from the flue or vent connector under worst-case depressurization conditions. Refer to Section III, Subsection C: Combustion Appliance Zone (CAZ) and Carbon Monoxide Testing for additional information.

Note: In the event of a Health and Safety Emergency on a home that requires Section 106 review, performing the emergency measures prior to SHPO approval may be required. This is allowed as long as no other measures are addressed without the

required SHPO approval. See Section XIII, Subsection A, Topic 4: Emergency Situation Undertakings for more information

8. Blower Door Safety

a. Do not conduct a depressurization blower door test while a wood stove, fireplace or a vented space heater is operating. If one of these appliances is operating, it **will not** be considered sufficient reason for never conducting a blower door test. Weatherization personnel are expected to shut down the appliance to conduct the test or revisit the dwelling at a time when the appliance is not operating.

b. Do not conduct a depressurization blower door test when any combustion appliance is operating. Standard practice is to positively shut off conventionally vented combustion appliances before the blower door test is conducted. A procedure should be in place to ensure that the appliance is returned to the pretest condition. Exceptions to appliance shut down include:

(1) Direct-vent (sealed combustion appliances)

(2) Unvented gas appliances, such as most gas ranges.

c. For homes that contain vermiculite or friable asbestos, refer to Section II, Subsection B, Topic 10: Hazardous Conditions and Materials, Subtopic e, Detail 2 for further information.

9. Moisture

All homes should be checked for previous or existing moisture problems. Every client must receive the EPA booklet: *A Brief Guide to Mold, Moisture and Your Home*. Repair of moisture problems that might result in health problems for the client, damage the structure over the short- or long-term, or diminish the effectiveness of the weatherization measures, must be done before the weatherization job is completed. Major drainage issues beyond the scope of the Weatherization Assistance Program or homes with conditions that may create a serious health concern should be deferred.

Limited water damage repairs that can be addressed by weatherization workers and correction of moisture and mold creating conditions are allowed when necessary in order to weatherize the home and to ensure the long-term stability and durability of the measures. Mold cleanup is generally not an allowable Health and Safety cost. Where severe mold and moisture issues cannot be addressed, deferral is required. Severe mold issues would include, but are not limited to moldy areas larger than about 10ft², mold in HVAC system or mold caused by sewage or other contaminated water. Moldy areas less than a total of 10 ft² can be remediated if it inhibits the installation of an ECM. The cost must be included in the ECM and the ECM must remain cost-effective.

Testing for high moisture in a material is an allowable health and safety expense. However, testing for mold is not an allowable health and safety expense. The agency must notify the

client when mold is found and provide the client with notification and disclaimer on mold and moisture awareness.

a. The moisture assessment section of the Auditor Field Form must be filled out along with special attention to the following:

   (1) Evidence of condensation on windows and walls indicated by stains or mold.

   (2) Standing water, open sumps, open wells, dirt floors, water stains, etc. in basements. Also, check to see if firewood is stored in the basement and/or whether laundry is hung to dry during the winter months.

   (3) Leaking supply or waste pipes.

   (4) Attic roof sheathing shows signs of mold or mildew.

b. Identification of existing or potential moisture problems shall be documented in the client file.

c. If existing moisture problems are found, the home should be deferred until the source of the moisture can be substantially reduced or effective mechanical ventilation can be added to remove the moisture. In some cases, air sealing must be done in order to reduce the source of the moisture (e.g. sealing off crawl spaces from the house, or sealing attic leakage to eliminate condensation on the roof deck).

g. Because air tightening may cause an increase in relative humidity, client education should include information about moisture problems and possible solutions.

h. In the course of weatherization, low-cost measures that help reduce the humidity levels in the house should be installed. Examples of these activities are venting dryers, venting existing bath or kitchen exhaust fans to the outdoors or installing moisture barriers on dirt floors.

i. A dwelling that is in compliance with ASHRAE 62.2 is no guarantee that moisture will not be a problem in that home.

j. Whenever site conditions permit, exposed earth must be covered with a vapor barrier, except for mobile homes or site built homes with a vented crawlspace in which the floor above the crawl space is the thermal and pressure boundary.

   (1) For crawl spaces, install a 6-millimeter or thicker (no more than 0.1 perm) polyethylene vapor barrier on the earthen floor. When seams exist, they should overlap at least 12 inches and the seams sealed with a durable sealant compatible with the barrier. The polyethylene should extend 6 inches up and be sealed to the crawl space wall. One hundred percent of the exposed crawl space floor will be covered, where possible.

(a) Care will be taken to prevent punctures during installation.

(b) When vapor barrier or other weatherization measures are installed in a crawl space, then a lockable access will be provided if access to the crawl space is from the exterior.

(c) When vapor barrier or other weatherization measures are installed in a crawl space, then a durable, easily seen sign will be installed inside the crawl space at all accesses providing the following information:

- Those entering the crawl space will be cautioned not to damage the air barrier, ground moisture barrier, insulation, and mechanical components specific to the crawl space type.
- Anyone entering the crawl space will be alerted that immediate repairs are needed in case of damage.
- Language prohibiting storage of hazardous and flammable materials will be provided on site.

(d) When vapor barrier or other weatherization measures are installed in a crawl space, then the clients will be educated on the crawl space system and how to maintain it; as follows:

- Occupants will be given written documentation that describes components of the system, maintenance requirements, and health and safety considerations at a minimum. Information will be provided in simple terms using text and pictures.

- Documentation may be provided electronically.

- Literacy levels and language of occupants will be considered in selecting appropriate materials.

(2) For basements, install a 6-millimeter or thicker (no more than 0.1 perm) polyethylene moisture barrier on the floor. When seams exist, they should overlap at least 12 inches and the seams sealed with a durable sealant compatible with the barrier. The polyethylene should extend 6 inches up and be sealed to the basement wall. The sub-grantee may lay rolled roofing on top of this polyethylene to provide a safe walkway for clients. Talk with clients about where this rolled roofing should be placed and try to minimize the amount used.

k. In homes that do not have a sump pump installed, it **is** an allowable expense to install a sump pump into a home. If a sump pump is present but not working, it is also allowable to replace a sump pump as a health and safety measure. All sump pumps must be in a sealable pit/container with a lid to help minimize soil gases and excess moisture.

10. Hazardous Conditions & Materials

a. A Hazard Identification and Notification Form (Attachment 2.5) must be completed at every home. One signed copy must be left with the client and one signed copy must be placed in the client's file.

b. If any testing is performed to identify or quantify hazardous materials (asbestos, lead, radon, etc.), the client (and landlord/property manager, if applicable) must be notified in writing of the results of the tests.

c. Sub-grantees should minimize or restrict the use of materials that may be hazardous to the client, however if the sub-grantee must utilize hazardous materials, including chemicals, such use must be discussed with the client prior to using.

d. A sensory inspection (visual/olfactory) for volatile organic compounds (VOCs) and flammable liquids. If VOCs or flammable liquids are detected, which would make weatherization impossible, impractical, inhibit the installation of significant weatherization measures, or would pose a hazard to weatherization workers, the home should be deferred.

e. The installation of hazardous materials that must be used for effective weatherization must be used in well-ventilated areas.

f. Radon Procedures:

(1) All clients must be provided with and sign a copy of the *Radon Informed Consent Form* (Attachment 2.12) prior to any work being performed on the home. If a client will not sign the form, the home must be deferred.

(2) All clients must be provided a hard copy of the *EPA Consumer's Guide to Radon Reduction*, available at https://www.epa.gov/sites/default/files/2016-12/documents/2016_a_citizens_guide_to_radon.pdf

(3) In homes where radon may be present, precautions should be taken to reduce the likeliness of making radon issues worse. This may include installing a vapor barrier, sealing floor/foundation penetrations, capping open sump pump pits, installing crawlspace venting or improving existing venting, mechanical ventilation, isolating basement (air sealing) from the living space, etc.

(4) DOE allows radon testing in areas where there is a high radon potential (zone 1). The following ten northwestern and one southeastern counties are in zone 1 which are in the EPA's high potential for indoor radon levels where testing is allowed as a health

and safety expense; Cass, Jackson, Clay, Clinton, Platte, Buchannan, Andrew, Nodaway, Holt, Atchison and Iron counties. If testing is performed, it will be done in accordance with the Environmental Protection Agency (EPA) Healthy Indoor Environment Protocols for Home Energy Upgrades and the results will be provided to the client.

g. Asbestos Procedures:

(1) Prior to performing work or conducting blower door tests, the energy auditor must conduct an inspection for materials suspected of containing asbestos if there is the possibility that they may be disturbed during the weatherization testing or work.

(2) If it is determined that friable asbestos is present in a dwelling, a blower door test must not be performed. If vermiculite is present in a dwelling and has not returned a negative test for asbestos, a depressurization blower door must not be performed; however, a pressurization blower door test may be performed.

(3) Decisions on approaches to weatherization work where asbestos is present shall be based on the judgment of the most qualified individual available to the sub-grantee.

(a) If suspected asbestos containing materials (ACM) are in good condition, do not disturb.

(b) If suspected ACM is damaged (e.g., unraveling, frayed, breaking apart) but will not be disturbed by weatherization activities, avoid the area and any contact with the suspected ACM. Clients should be informed of the ACM and should be instructed not to disturb suspected asbestos containing material.

(c) For suspected ACM that must be disturbed as part of the retrofit activity, contact an AHERA certified asbestos professional for abatement or repair in accordance with federal, state, and local requirements; only a licensed or trained professional may abate, repair, remove, or encapsulate ACM.

(4) Asbestos siding cannot be cut or drilled. Removal of siding is allowed to perform energy conservation measures. Only the siding necessary to perform the weatherization measures may be removed. If the asbestos siding is removed and disposed of, then disposal is an allowable health and safety expense. Asbestos siding must be disposed of in accordance with local ordinances and landfill protocol. Sub-grantees must contact associated landfills for disposal procedures prior to disposal.

(5) When major energy saving measures might be sacrificed as a result of suspected asbestos containing materials, the sub-grantee must have the suspected material tested for asbestos content. This testing is an allowable health and safety expense or may be included as a part of the cost of the associated energy conservation measures. EPA standards are; if a material has less than or equal to one percent asbestos, the material is considered to be below the hazardous threshold and therefore weatherization may

proceed as if asbestos is not present. If the material contains greater than one percent asbestos, the material may be encapsulated by an AHERA asbestos control professional. Containing the asbestos is an allowable health and safety expense.

(a) Any potential asbestos-containing material that is tested for the presence of asbestos must be collected on-site by an AHERA certified professional. The certified professional must be listed on the Missouri Department of Natural Resources' Asbestos Building Inspector List: http://dnr.mo.gov/env/apcp/asbestos/inspectors/index.php.
If the sub-grantee has the potential asbestos containing materials tested, the sub-grantee must formally notify the client by mail if the tests results are positive for asbestos and the notification shall be signed by the client.

(b) The testing results from suspected asbestos containing materials must be kept in the client file.

(c) Homes containing vermiculite must be evaluated for the installation of insulation. If insulation has a SIR of 1.0 or greater, then the vermiculite must be tested for asbestos. If the vermiculite contains greater than one percent asbestos, then the insulation must be removed from the computerized audit and work order.

(6) All sub-grantee workers must wear high quality respirators when working with suspected ACM's.

(7) When materials containing asbestos are worked with, the asbestos materials should be dampened with water whenever possible to reduce the risk of airborne asbestos fibers.

(8) When working around ACM's, do not:

- Dust, sweep, or vacuum asbestos containing debris
- Saw, sand, scrape, or drill holes in the material
- Use abrasive pads or brushes to strip materials

(9) Sub-grantees may use abatement contractors to remove and/or dispose of ACM's with prior written authorization from the Missouri Weatherization Program Administrator however; removal of vermiculite, which has been tested to contain greater than one-percent asbestos, is not allowed.

h. Confined Space (attic and crawlspace) Procedures

(1) Attic and crawlspaces are covered under the OSHA confined space regulations. All work in crawlspaces and attics must comply with OSHA confined space regulation 1926.1200.

(2) A home that contains a permit required confined space in which weatherization measures are to be performed must be deferred pending the remediation of the hazard(s) creating a permit required confined space.

Examples:

(a) If loose electrical wiring in an attic is creating an electrical hazard, which causes the attic to meet the requirements of a permit required confined space; work must be deferred until the electrical hazard is remediated. Remediation could include switching off the breaker associated with the wiring allowing for weatherization work to be completed without the electrical hazard.

(b) If a sewer leak in a crawlspace creates an atmospheric hazard, which causes the crawlspace to meet the requirements of a permit required confined space; work must be deferred until the atmospheric hazard is remediated. Remediation would likely require deferral of all work on the home until the client is able to have the sewer leak fixed.

11. Electrical Safety

a. Minor upgrades and repairs to knob and tube wiring, when necessary for weatherization measures and where the health or safety of the occupant is at risk are allowed as a health and safety measure. Knob and tube wiring cannot be replaced as a health and safety.

(1) A contractor, assessor, auditor, or similar will inspect and assess the house to identify knob and tube wiring.

(2) A non-contact testing method will be used to identify live wiring.

(3) If live knob-and tube wiring is to remain in an attic and the attic is to be insulated, the knob and tube wiring will not be covered or surrounded. A dam that does not cover the top will be created to separate insulation from the wire path. Any insulation must be kept at least three inches from the wiring.

(4) If any live knob and tube wiring is to remain in the dwelling, the walls of the dwelling must not be insulated unless a certified electrician inspects the building and provides a letter, on company letter head, that no knob and tube wiring is present in the exterior walls of the home.

(5) Live knob and tube wiring may be replaced with WAP funds in attics and walls provided that the cost of the replacement, when added to the cost of the attic or wall insulation, has an SIR of 1.0 or greater. Knob and tube wiring may also be replaced as an incidental repair tied to attic or wall insulation, but the cost of replacing knob and tube wiring cannot be split between an incidental repair and being included as part of the cost of the associated ECM. Knob and tube wiring cannot be replaced as a health and safety measure.

(a) When replaced, knob and tube wiring will be replaced with new appropriate wiring by a licensed electrician in accordance with local codes. Any remaining knob and tube wiring will be rendered inoperable in accordance with local codes. If knob and tube wiring has been deactivated and the dwelling has been rewired with approved electrical cable, the attic may be insulated without special precaution.

b. Replacing an electrical service panel is not an allowable measure. Minor electrical repairs, other than knob and tube wiring, are allowed as a health and safety measure when the occupant is at risk. Minor upgrades and repairs are allowed when necessary to perform specific weatherization measures.

c. Ground-fault circuit interrupter (GFCI**)** devices should be tested to ensure that they are working properly in dwelling bathrooms and kitchens.

12. Lead-safe Weatherization

Lead-based paint dust and other residues are hazards that Weatherization workers are likely to encounter in older homes. HUD estimates that four million homes have significant lead-based paint hazards. Furthermore, Weatherization work may directly disturb lead-based paint, possibly creating hazardous conditions. DOE's policy is that Weatherization workers must be aware of the hazard and conduct Weatherization activities in a safe work manner to avoid contaminating homes with lead-based paint dust and debris, and to avoid exposing the occupants, themselves and their families to this hazard. Presence of lead based paint in pre-1978 homes will be assumed unless testing confirms otherwise. The protocols used to safe guard people from lead-based paint hazards are called Lead Safe Weatherization (LSW**)**. Deferral is required when the extent and condition of lead-based paint in the house would potentially create further health and safety hazards.

Compliance is required with EPA's Renovation, Repair, and Painting (RRP) Rule. To comply with EPA's RRP Rule requirements renovations must be performed by Certified Renovation firms. Each sub-grantee must become a Certified Firm. To become a Certified Firm, sub-grantees and renovation firms must submit an application to EPA and pay a fee. Sub-grantees are also reminded that compliance with any other state/local requirements are the sub-grantees' responsibility to research and to include in their curriculum. The EPA, RRP published rule (40 CFR Part 745) and the proposed changes to this rule (Federal Register/Vol. 75, No. 87/May 6, 2010) will be complied with, to be superseded by any subsequent final rulemaking or any more stringent state or federal standards. The Certified Firm responsibilities as detailed by the RRP rules are:

- Ensure overall compliance with the RRP rule.
- Ensure that all renovation personnel are Certified Renovators or have been trained on the job by Certified Renovators.
- Assign a Certified Renovator to all jobs.
- Meet pre-renovation education requirements.

- Meet recordkeeping requirements.

Certified Renovators will be a required position for pre-1978 job sites, which have not been certified as lead free. The Certified Renovators must be trained and receive their credential at an EPA-accredited training facility and be onsite at all LSW sites to perform the mandated functions of the Certified Renovator. Sub-grantees will be required to provide documentation of the Certified Renovator credentials, ensuring they are qualified to perform the specific functions of the Certified Renovator. The Certified Renovator responsibilities as detailed by the RRP rules are:

- Perform work and direct LSW practices.
- Provide on the job training to non-certified workers.
- Keep a copy of the initial and/or refresher training certificates on site.
- When requested, use EPA recognized test kits or collect paint chip samples for laboratory lead analysis to identify lead based paint.
- Be physically present while posting signs, containing work areas and cleaning work areas.
- Be available by telephone when offsite.
- Maintain the containment to keep dust and debris within the work area.
- Implement the cleaning certification procedure.
- Prepare and maintain required records.

a. Lead Safe Weatherization should be performed by Weatherization agencies when all of the following criteria are true:

(1) The dwelling was constructed pre-1978, and

(2) The dwelling has not been certified to be lead-based paint free, and

(3) Either, the total amount of disturbed lead-based painted surface exceeds six square feet per room of interior surface, twenty square feet of exterior surface or a window or door will be replaced.

b. Lead Safe Weatherization protocol should include the following:

(1) Weatherization sub-grantees will provide a copy of the pamphlet, “Renovate Right: Important Lead Hazard Information for Families, Child Care Providers and Schools” Pamphlet, to inform the household of the potential risk of the lead hazard exposure.

(2) Sub-grantees are required to have the client sign a form confirming receipt of the lead pamphlet.

(3) Weatherization workers are required to be trained in LSW. This training may take place on the job site by a Certified Renovator. This training is an allowable use of DOE funds. Documentation of the training must be available onsite and follow all applicable EPA rules.

(4) For all pre-1978 homes that are not exempt from LSW based on the work being performed, documentation in the client file must include:
- Copy of Certified Renovator certification;
- Documentation of any lead safe work training provided on-site;
- description of specific lead safe work actions taken, if any;
- documentation of lead testing and assessment when performed;
- photos of site and containment setup (or reference to location of digital pictures) if lead safe work performed

13. Mercury

When new thermostats are installed as a weatherization measure, identify, remove and dispose of any mercury-containing thermostats. Mercury-containing thermostats must be either recycled or disposed of in accordance with Environmental Protection Agency (EPA) and department regulations, which require that mercury-containing thermostats be recycled or disposed of as a hazardous waste.

Thermostat Recycling Corporation is a non-profit organization that lists collection sites or can have a subgrantee become a collection site, which collects mercury-containing thermostats for proper recycling. More information may be found at www.thermostat-recycle.org.

14. Pest Infestation

Pest removal is allowed only where infestation would prevent weatherization. Infestation of pests may be cause for deferral where it cannot be reasonably removed or poses health and safety concern for workers. Screening of windows and points of access is allowed to prevent intrusion.

a. The agency must first assess the situation and the severity of the infestation. If the infestation cannot be easily corrected, then the home must be deferred. If the infestation is not severe, the pests can be easily eradicated and entry holes plugged, then it is an allowable health and safety expense, given that the costs are within reason. Reasonable costs for pest infestation remediation should be less than $600. If the cost is higher than $600, contact the department prior to remediation. For example, if there is a squirrel getting into the attic, and the agency can easily get the squirrel out and repair the entry holes into the attic to prevent re-entry, then it would be a health and safety expense. On the other hand, if the attic is infested with bats the subgrantee must contact the Department for next steps, then the home should be deferred until the bats can be removed, entry hole repaired and any waste material removed from the attic.

b. The agency must notify the client of any infestation and inform them of the hazards associated with the pest.

15. Additional Safety

a. Special precautions must be taken if the occupant of the home has respiratory ailments, allergies, is pregnant or has unique health concerns. Subgrantees should try to protect all clients from inhalable particles, such as paint or insulation dust, during the weatherization process. When the occupant is identified as having a health risk which may be affected by any part of the weatherization process, the agency must ensure the client takes appropriate action to protect them self from the hazard. It is not the responsibility of the agency to remove and or relocate the occupant from the home to allow for weatherization; however, it is the responsibility of the agency to assure the occupant is protected, or has taken adequate precautions to protect themselves. If the client has a health risk, which may be exacerbated by the weatherization measure, and the client refuses to take the appropriate precautions, such as leaving the home during weatherization, then the home may be deferred.

b. At a minimum, auditors and crewmembers should inform property owners of safety problems, code problems and other health and safety issues. Minor repairs and installation may be conducted only when necessary to effectively weatherize the home; otherwise, these measures are not allowed. For problems that are life threatening, or otherwise serious, the subgrantee supervisor should contact the jurisdiction having responsibility for the observed problem.

c. The auditor should be cognizant of fire hazards and address them only when necessary to perform weatherization. If the agency identifies a fire hazard that is not related to a weatherization measure, the agency may not make the repair; however, the agency must notify the client of the fire hazard.

d. Fire extinguishers may be installed as a health and safety measure whenever the client is using a solid fuel source of heat such as wood, wood pellets, etc. A maximum of one fire extinguisher per floor may be installed by the agency. All fire extinguishers installed by the agency must be mounted.

e. All materials replaced or removed from a client's property must be disposed of according to the manufacture's specifications and appropriate federal guidelines, as well as all applicable codes and ordinances.

C. Mechanical Ventilation/ASHRAE 62.2 Standards

A Subgrantee is responsible for complying with the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) Standards 62.2-2013. Work should be deferred on any home that cannot be brought in compliance or client will not allow to be brought in compliance with ASHRAE 62.2 Standards as it relates to the Missouri State Plan.

1. General Guidelines

a. All clients who have a mechanical ventilation installed must be provided a copy of Attachment 3.6- Ventilation for You and Your Home.

b. All homes will be required to comply with ASHRAE 62.2 standards to the fullest extent possible as determined within these standards.

c. All existing exhaust fans that do not vent to the exterior of the building must be vented to the exterior of the building. Herein venting to the exterior of the building requires that the vent exhaust directly to the outdoors. Exhaust air shall not discharge into an attic, soffit, crawl space or other areas inside the building shell.

(1) No more than 6 feet of flexible tubing per ventilation fan may be used on ventilation system ductwork installed by the subgrantee. Existing ventilation fans are not required to have new ductwork installed, given the existing ducting is vented to the exterior of the building.

(2) All ventilation system ductwork installed by the subgrantee, which is outside the thermal boundary, must be insulated to a minimum R-8 value. Bubble wrap (foil faced or non-foil faced) should not be used to comply with the minimum R-8 value required for ventilation system ductwork, as bubble wrap applied to the surface of ductwork only provides a value of R-1.0 to 1.1.

(3) A backdraft damper must be present or will be installed between the outlet side of installed fans and the exterior.

(4) The terminations of all ventilation ductwork installed by the subgrantee must include screen material with no less than ¼ inch and no greater than ½ inch hole size in order to prevent pest entry. The installation of the screen must not inhibit damper operation or restrict airflow.

(5) All ventilation ductwork installed by the subgrantee must terminate a minimum of 3 feet from any operable opening to houses and a minimum of 10 feet from any mechanical intake.

(6) If any mechanical ventilation installed by the subgrantee shares a common exhaust duct with one or more additional exhaust fan, each fan shall be equipped with a backdraft damper to prevent the recirculation of exhaust air from one room to another through the exhaust ducting system.

(a) Exhaust fans shall not share a common exhaust duct with a dryer.

(b) Exhaust fans in separate dwelling units shall not share a common exhaust duct.

d. Garages that are attached to the thermal boundary space of a home must be isolated to prevent the migration of contaminants from the garage into the home prior to commencing weatherization work. An attached garage are those which are in direct contact with or within the thermal boundary of the home, fully enclosed on all sides when

all windows, doors and points of egress are closed and be readily available for the storage of a motorized vehicle, excluding the accumulation of personal belongings.

(1) To be considered isolated, all joints, seams, penetrations, and other sources of air leakage through wall and ceiling assemblies separating the garage from the residence shall be caulked, weather stripped, wrapped or otherwise sealed to limit air movement. Doors between garages and habitable spaces shall have weather stripping, door sweep, and threshold installed if not present to prevent air leakage and pollutant entry.

(2) If supply vents or return grills are located in the garage, these vents/ grills must be permanently removed and sealed. (For detailed guidelines, see SWS 6.6188.1)

(3) All supply and return air ductwork located in garages shall be sealed or removed, unless the ductwork cannot be accessed due to safety restrictions. When removing the ductwork, the supply run feeding the register will be truncated as near to the supply plenum as possible. A return duct located in the garage will be removed in the same manner. All holes in the duct system created by removal will be patched with sheet metal and sealed with mastic.

(4) If no wall is present to separate a tuck-under garage from a conditioned basement, a wall may be constructed as a Health and Safety measure to comply with ASHRAE 62.2 standards.

(5) An overhead garage door shall be removed and replaced with a wall and walk through exterior door when a garage has previously been converted to a conditioned space and the overhead door is still present. If the occupant/owner will not allow the garage door to be removed, the garage must be removed from the conditioned space or the home deferred.

e. All supply and return air ductwork located outside of the thermal boundary shall be sealed, unless the ductwork cannot be accessed due to safety restrictions. Ductwork may be considered sealed if the ductwork is encased by existing duct insulation or the ductwork meets the duck leakage standards given in Section IV, Subsection F, Topic 2: Duct Leakage Standards.

f. All clothes dryers, both gas and electric, must be vented to the exterior of the building. Every attempt to vent the dryer to the exterior of the home must be made. If it is not possible to vent the dryer to the outside, please consult the department for guidance.

g. A basement or crawl space with exposed earthen floors, where a 6 mil polyethylene vapor barrier cannot be installed or only partially installed, must be considered outside of the thermal boundary of the home.

h. A ventilation fan manual of operation designed by the subgrantee shall be provided to the client. The manual must include operation instructions and the basic maintenance

required for all retrofit or installation/replacement ventilation systems and the appropriate ventilation system settings to comply with ASHRAE 62.2.

i. The handout "Ventilation for You and Your Home" (Attachment 3.6) should be given out to every client that has mechanical ventilation installed or retrofit to comply with ASHRAE 62.2 Standards.

j. Whole house fans and kitchen range recirculating fans are not considered in the ASHRAE 62.2 Standards. Whole house fans and kitchen range recirculating fans shall not be measured and cannot be used to comply with ASHRAE 62.2.

k. Care needs to be taken when determining how infiltration reduction will be performed on the home. Points of infiltration to allow for fresh air to enter the home should remain in direct connection to the exterior of the home, such as around doors and windows. Fresh air infiltrating into the home should not be drawn from the attic, crawl space or other undesirable location, as these locations have a higher likelihood of drawing undesirable sources of air into the home.

l. The retrofit of an existing ventilation fan or the installation/replacement of a ventilation fan to comply with ASHRAE 62.2 must be considered a health and safety measure.

m. If a home situation, configuration or compliance within a home is not otherwise covered within Section II, Subsection C: Mechanical Ventilation/ASHRAE 62.2 Standards, contact the department for further guidance.

2. Inspection of Existing Ventilation

a. All existing exhaust fans in the kitchen and bathrooms must be tested to measure the actual cubic feet per minute (CFM) of airflow that is being exhausted. CFM measurements must be taken on all existing fans during both the initial audit and final inspection. The manufacturers CFM rating of the fan cannot be used to determine the actual CFM flow of the fan.

b. Any exhaust fans that are not in the kitchen or bathrooms should also be tested to measure the actual CFM of airflow that is being exhausted and considered in the ventilation requirements.

c. The actual CFM shall be taken directly from the test results of a commercially available fan flow meter or by using a pitot tube or a custom-built box to simulate a fan flow meter.

(1) Pitot Tube Procedure:

(a) Connect Pitot tube to channel A on DG700.

- Connect bottom port to input and side port to reference.
- Must have a positive reading when measuring Pascal.

(b) Take a single reading in the center of the duct and multiply the reading by 0.9.

(c) Divide that answer by 250 to convert Pascal to inches of water column (IWC).

(d) Take the square root of the IWC times 4,005. This is the FLOW VELOCITY.

(e) Determine the Cross Sectional Area of the duct in **square feet**.

- Round Ducts: $A = \pi r^2$
- Square Ducts: A= height x width

(f) FLOW VELOCITY times CROSS SECTIONAL AREA = CFM

(2) Custom Built Box Procedure:

(a) Construct a box to simulate a fan flow meter when measuring fan intakes that the commercially available fan flow meter will not fit. The box will have a specific size hole similar to the opening in a fan flow meter.

(b) A hose will connect the box to the input of a manometer.

(c) The square root of the pressure difference in Pascal as read on the manometer times the square inches of the hole in the box = CFM. CFM = (√pressure difference in Pascal on manometer) * (sq. inches of hole in measuring device).

d. It must be determined and documented during the testing of the existing exhaust fans if the fan is rated for continuous use or is rated as an intermittent use fan. If it cannot be determined if a fan is rated for continuous use, the fan shall be considered to be an intermittent rated fan.

e. It must be determined and documented during the inspection of the exhaust fans if the bathroom or kitchen has an operable window. To be considered an operable window, the window must be in such a condition that the window may be readily opened by the client and provide a minimum 1.5 square feet of opening.

3. Required Ventilation Determination

After the on-site information has been collected, the determination of what measures need to be taken to comply with ASHRAE 62.2, if any, shall be determined using the digital ASHRAE 62.2 Form (See Attachment 2.9). Contact the DE for a digital copy of Attachment 2.9.

For multi-family buildings, refer to Section XI, Subsection X, for additional information on how to determine the required ventilation.

a. A digital copy of the ASHRAE 62.2 Form should be completed during the initial audit before any weatherization measures are installed to determine the estimated compliance for the ASHRAE 62.2 Standards.

b. A digital copy of the ASHRAE 62.2 Form must be completed during the final inspection. Before the home may pass final inspection, the home must be re-evaluated using a digital copy of the ASHRAE 62.2 Form with the actual exhaust fan(s) CFM and post blower door results from the final inspection. The home must be compliant based upon the results of the updated ASHRAE 62.2 Form and a copy of the digital form must be printed and included in the client file and uploaded into MoWAP.

c. On the Existing Home Information section of the ASHRAE 62.2 Form, please enter the information based on the following definitions:

(1) Living Space: Enter the square footage of all above and below grade - finished areas of the home.

(2) Volume: Enter the volume in cubic footage of all areas within the thermal boundary of the home.

(3) Total Structure Height: Enter the average height in feet between the average grade of the building and the highest ceiling of the thermal boundary of the building.

(4) Final Inspection CFM50: Enter the actual CFM_{50} of the home as determined from the blower door test taken during the final inspection. This number must match the final blower door reading from the Final Inspection Form (See Attachment 2.1).

(a) After the initial audit is performed, the target infiltration reduction that is entered into NEAT/MHEA shall be entered as the Final Inspection CFM_{50}. See Section IV, Subsection D: Target Infiltration Reduction for additional information.

(b) Homes where a blower door test cannot be performed due to health and safety concerns (i.e. vermiculite, friable asbestos, etc.), must have zero (0) entered as the Final Inspection CFM_{50} of the home.

(5) Location: Select the city location with the nearest proximity to the home that is being evaluated. This selection uses the climate data available for that location.

d. The kitchen exhaust fan in each home must be entered into the ASHRAE 62.2 Form.

(1) If the kitchen does not have an exhaust fan, the exhaust fan is not vented to the exterior of the building shell or the actual CFM of the exhaust fan could not be measured, the measured kitchen fan flow rate will be entered into the ASHRAE 62.2 Form as zero (0).

(2) The volume of the kitchen shall be determined by the useable footprint of the kitchen times the average ceiling height of the kitchen.

e. All bathrooms and their exhaust fans, or lack of, must be entered into the AHSRAE 62.2 Form.

(1) If a bathroom does not have an exhaust fan, the exhaust fan is not vented to the exterior of the building shell or the actual CFM of the exhaust fan could not be measured, the bathroom fan flow rate will be entered into the ASHRAE 62.2 Form as zero (0).

(2) A bathroom is considered to be any room containing a bathtub, shower, spa or similar source of moisture. If a bathroom is not used as a bathroom, the source of moisture may be permanently removed with signed written consent of the client. If a room other than a kitchen, that does not meet the given definition of a bathroom, has an exhaust fan, this fan shall be entered into the ASHRAE 62.2 Form the same as a bathroom. The measured flow rate of the fan should be entered; however, “NO” should be selected in the ‘Does this bathroom exist?’ section of the form.

f. The necessary CFM of ventilation that is required at a home to comply with ASHRAE 62.2 Standard shall be given in the ‘Continuous Mechanical Ventilation Needed’ box of the ASHRAE 62.2 Form.

g. Homes that are determined to require 15 CFM or less " Continuous Mechanical Ventilation Needed' as determined by the ASHRAE 62.2 Form, are exempt and will not require the retrofit of an existing ventilation fan or the installation/replacement of a ventilation fan to comply with ASHRAE 62.2 standards. However, if there are signs of moisture issues or excessive indoor pollutants, mechanical ventilation should be installed.

4. Retrofit of Existing Ventilation

To comply with ASHRAE 62.2, the retrofit of an existing fan may be done. This retrofit may include repairing an existing fan to operate properly or by converting an existing intermittent fan to run at an interval that will allow compliance with ASHRAE 62.2.

a. The exhaust fan retrofit must provide adequate ventilation as determined by the ASHRAE 62.2 Form.

b. When an existing intermittent fan is converted to run at a designated interval to comply with ASHRAE 62.2, the existing fan must:

(1) run at a minimum of ten percent of the time per day; AND

(2) be converted to operate without occupant intervention.

d. A readily accessible, dedicated system shut off must be provided to the occupant. If the exhaust fan is supplied by a dedicated circuit, then a circuit breaker may be considered as a readily accessible system shut off.

(1) Existing exhaust fans that are converted to meet the ASHRAE 62.2 standards are not required to comply with the sone sound requirements.

(2) Controls to the ventilation system must be labeled as to their function, unless that function is obvious, such as toilet exhaust fan switches.

5. Installation and Replacement of Ventilation

To comply with ASHRAE 62.2, the installation of a ventilation fan or replacement of an existing exhaust fan may be done to comply with ASHRAE 62.2.

a. Ventilation fans that are installed or replaced must provide adequate ventilation as determined by the ASHRAE 62.2 Form.

b. The installation of ventilation fans is not limited to kitchens or bathrooms. Ventilation fans that are installed in utility rooms or non-occupied spaces, such as unfinished basements or crawl spaces within the thermal boundary, and draw air from these areas must have a permanent and adequate path of passive air transfer to the occupied spaces of the home.

c. When a ventilation fan is installed or replaced to comply with ASHRAE 62.2 whole house ventilation:

(1) The ventilation fan must be designed to continuously operate without occupant intervention.

(2) The ventilation fan must be designed to operate with a sound rating of 1.0 sone or less. Exceptions to this are remote mounted fans and systems using HVAC air handlers. In order for this exemption, remote mounted fans must be mounted outside the thermal boundary or in a non-occupied space, and there must be at least four feet of ductwork between the fan and the intake grill.

(3) The ventilation fan must run at a minimum of ten percent of the time per day.

(4) A readily accessible system shut off must be provided to the occupant.

(a) If the exhaust fan is supplied by a dedicated circuit, then a labeled circuit breaker may be considered as a readily accessible system shut off. The dedicated circuit may include other minor electrical draws such as existing bathroom lights and receptacles.

(b) The readily accessible system shut off switch for ASHRAE fans may be located within the fan housing. The fan must have an adjustment switch that allows the

CFM to be turned to zero. If a client is not capable of accessing this location, a typical wall mounted switch should be installed and labeled.

(5) Controls to the ventilation system must be labeled as to their function, unless that function is obvious, such as toilet exhaust fan switches.

d. When an intermittent use exhaust ventilation fan is installed or replaced but is not used to comply with ASHRAE 62.2 whole house ventilation (for example, a standard bathroom fan or kitchen range hood installed):

(1) Exhaust fans in bathrooms must have a minimum rating and performance of 50 CFM. The ventilation fan must be designed to operate with a sound rating of 3.0 sone or less during operation.

(2) Exhaust range hoods in kitchens must have a minimum rating and performance of 100 CFM. Other kitchen exhaust fans, including downdraft exhaust fans, must have a minimum rating and performance of 300 CFM. All kitchen exhaust fans and range hoods must be designed to operate with a sound rating of 3.0 sone or less at the lowest setting that complies with the minimum required CFM.

e. If a supply ventilation fan is installed at a home, it is highly recommended to install an exhaust ventilation fan that exhausts the same CFM of air that the supply ventilation fan is supplying to the home to alleviate potential moisture issues.

f. All installed exhaust ventilation must be vented to the exterior of the building. Venting to the exterior of the building requires that the vent exhausts directly to the outdoors. Exhaust air shall not discharge into an attic, soffit, crawl space or other areas inside the building shell.

6. Inspection of Installed Ventilation

All installed ventilation systems must be tested during the final inspection, along with all other existing ventilation fans, and re-evaluated to ensure compliance with ASHRAE 62.2 Standards. Newly installed ventilation systems that are located in the kitchen and/or bathroom must be entered into the ASHRAE 62.2 Form as they are measured at the final inspection. If compliance is not obtained, the subgrantee must take the necessary steps to ensure compliance with ASHRAE 62.2. See Section II, Subsection C, Topic 2: Inspection of Existing Ventilation for testing ventilation fans.

D. Required Minimum Subgrantee Deferral Policy

There are some situations in which a subgrantee should not weatherize an otherwise eligible unit. In order to deal with these situations, each subgrantee must, adopt and adhere to this minimum deferral policy. When implemented, this policy allows weatherization staff to defer a dwelling unit due to conditions or circumstances that may be outside of the scope of the WAP or hazardous to the health and safety of the occupants or weatherization workers. A subgrantee

may choose to expound on this minimum policy and develop a subgrantee specific deferral policy to meet the needs of the service area. If the policy is expounded upon, documentation of this expounded policy must be located at the subgrantee office and applied equally and without discrimination to all homes addressed in the subgrantee's service area.

The following is the required minimum deferral policy. It is intended to list the more common conditions and situations a subgrantee may encounter while preparing to deliver weatherization services. This list is not intended to be all inclusive of those instances in which a subgrantee may choose not to weatherize a unit. In some instances, corrective measures by the client/owner may allow program services to proceed. In addition, the subgrantee may use alternative funding that is not administered by the department, to assist the client with corrective measures to allow the home to be weatherized. Health and safety remediation completed by another non-for-profit organization coordinated with weatherization work is allowable. Health and safety remediation with private or for-profit organizations need to be reviewed by the department on a case-by-case basis for allowance.

1. Required Minimum Deferral Policy

A subgrantee must withhold weatherization services under the following conditions:

a. A single-family dwelling unit is vacant.

b. A dwelling unit is for sale or in foreclosure.

c. A dwelling unit is scheduled for demolition.

d. A dwelling unit is found to have structural problems that would make weatherization impossible, impractical, or would inhibit the installation of significant weatherization measures. Structural problems include, but are not limited to:

(1) Dwelling unit(s) lacking proper interior sheathing (drywall, paneling or lathe and plaster) on ceilings or exterior walls.

(2) Dwelling unit(s) lacking exterior sheathing (siding, sheathing, brick, etc.) that is designed and sold for exterior use. If the product manufacturer recommends paint or other finish to be applied to the exterior sheathing, this finish must be applied prior to weatherization.

(3) A mobile home that is improperly installed (for example inadequate supports, not level, not anchored down, etc.).

(4) The dwelling unit or parts thereof are being remodeled and this remodeling would inhibit or alter the installation of any weatherization measures.

(5) Unsafe wiring found in the dwelling, that cannot be corrected as a part of weatherization and would inhibit the installation of weatherization measures or pose a threat to the health or safety of the crew, subcontractor or client.

(6) Major water or moisture issues found in the dwelling unit that cannot be corrected as a part of weatherization. These would include, but are not limited to plumbing leaks, roof leaks, and standing water in foundation areas.

(7) Severe mold issues that are beyond the scope of weatherization. These would include, but are not limited to moldy areas larger than a total of 10ft², mold in HVAC system or mold caused by sewage or other contaminated water.

(8) The extent and condition of lead based paint in the home would potentially create further health and safety hazards. It should be noted that weatherization services where proper lead safe protocol can be followed, would not create further health and safety hazards and, therefore, not require deferral.

(9) The dwelling unit is deemed by the auditor to pose a threat to the health or safety of the crew, subcontractor or client and will not be remediated by weatherization work or another program in conjunction with weatherization.

e. A dwelling unit is uninhabitable (for example, a burned out apartment), condemned or there are "red tagged" health and safety conditions that cannot be corrected as a part of weatherization.

f. The client is uncooperative with the weatherization subgrantee, either in demanding that certain work be done, refusing priority work which is needed but the refused work is not deemed as a legitimate refusal by the subgrantee, by being physically or verbally abusive to the work crew or subcontractor, or by being unreasonable in allowing access to the unit. Every attempt should be made to explain the program and the benefits of the work.

g. Obvious discrepancies are found between the information supplied by the client on the application and observed conditions at the time of weatherization. The subgrantee must resolve these discrepancies before weatherization work can continue.

h. If at any time the subgrantee determines that the client is no longer eligible or subgrantee personnel believe that circumstances may have changed, the unit shall not be weatherized until updated information can be obtained from the client.

i. There is an infestation of rats, bats, roaches, reptiles, insects or other vermin.

j. There are existing health or safety hazards, to the weatherization workers, that must be corrected before weatherization services may begin. These may include, but are not limited to:

(1) There are animals on the premises that are not appropriately contained.

(2) The presence of animal feces and/or other excrement.

(3) Unvented space heaters are present in the home and the unvented space heater regulations outlined in Section III, Subsection G, Topic 2 cannot or will not be met.

(4) Excessive garbage, trash or debris that may pose a health and safety risk or would prevent the installation of weatherization measures.

(5) Hoarding which would prevent the installation of weatherization measures.

k. Diagnostic tests cannot be performed at the initial audit. Reasons for this would include the dwelling unit lacking fuel or electric at the time or lack of cooperation from the client. A non-operable heating system, however, is not grounds for deferral. Agencies may choose to defer rental properties without operable heating systems where the local jurisdiction requires the property to be equipped with a safe heating system as a requirement to rent the unit. If agencies choose this option, they must include language in their deferral policy stating this policy.

l. There are illegal drugs or illegal activities occurring on the premises.

m. The eligible household members move from the dwelling unit where weatherization activities and services are in progress. In such a case, the subgrantee must determine whether to complete the work and the circumstances must be documented in the client file. It is recommended to contact DE prior to making this determination.

n. The client will not sign the Missouri Radon Informed Consent Form prior to starting work.

2. Documentation

In the event that a subgrantee defers a dwelling unit, the subgrantee must notify the client and owner/authorized agent in writing. The notification needs to be signed by the client, a copy of the signed notification shall be provided to the client, and a copy kept in the client file. Alternatively, a certified letter with the notification may be mailed to the client and a copy of the notification and return receipt shall be kept in the client file. If the client cannot be notified in writing as described above, contact the department for further guidance. All correspondence justifying the decision to defer the dwelling unit must be kept in the client file.

The notification must include the following items:

a. The nature and extent of the problem(s) and how the problem(s) relate to the determination to defer the unit.

b. Any and all corrective actions required before weatherization services can be considered.

c. A time limit for correcting problems so that weatherization services may be rescheduled. A minimum period of 30 days for correction of the problems must be provided; however, more time may be granted depending on the circumstances.

d. The right of appeal and the name of the subgrantee staff to whom the appeal should be directed.

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Section III: Mechanical Systems and Combustion Appliances

All homes with combustion appliances shall be tested to determine if the carbon monoxide levels exceed those limits set by the National Standard Work Specifications (SWS). Combustion appliances include any appliance, water heater, wood stoves, furnace/heating system (including freestanding kerosene, natural gas or propane space heaters) or lighting that has a flame or burns fuel in an open or enclosed chamber. Gas fired clothes dryers may be excluded from this requirement; however, the clothes dryer must be properly vented to the outside of the home. Except as noted, this includes all active combustion heating systems and appliances whether they are primary, secondary, off-peak or dual-fuel systems.

The mechanical systems audit includes all of the following: carbon monoxide test, worst-case depressurization of all combustion appliance zones, spillage evaluation, and draft measurement (optional). Combustion safety test results must be acted upon appropriately according to the combustion safety action levels, see Section III, Subsection C: Combustion Appliance Zone (CAZ) and Carbon Monoxide Testing for additional information. As applicable, every combustion appliance will be checked for a safe flue pipe, chimney or vent, adequate combustion air and gas leaks. Whenever an appliance fails any of the combustion safety tests, appropriate repairs must be completed or specified in the weatherization work scope. For homes with unvented space heaters see Section III, Subsection G, Topic 2: Unvented Space Heaters for additional information.

A complete mechanical systems audit is required on every home during the initial audit and as part of the final inspection. Diagnostic equipment needs to be calibrated per manufacturers' instructions. All relevant information must be recorded on the Mechanical Systems Audit Form and all combustion tests performed with a combustion gas analyzer must have the associated printout from the combustion gas analyzer attached to the Mechanical Systems Audit Form (i.e. Bacharach tapes, etc.). The procedure includes collecting general information; interviewing the client; collecting and recording mechanical systems information; visual and diagnostic inspection of the venting and distribution system and combustion analysis and diagnostic tests for gas/oil-fired equipment.

For all combustion systems, fuel switching as either an Energy Conservation Measure or a Health and Safety Measure is not allowable, unless written approval is obtained from the department.

The following sections describe the actions that should occur on specific combustion systems to include additional safety tests, best practices and remedies for combustion related problems.

A. Primary and Secondary Heating and Cooling Systems

1. Primary Heating and Cooling Systems

a. Only one (1) heating system may be considered the primary heating system for a home. Only this primary system may be replaced as a cost effective or health and safety measure.

(1) If a home contains more than one heating system, the system that is original to the home or the system that heats the largest percentage of the home should be considered the primary heating system.

(2) If the home was designed and originally constructed to have multiple heating systems, only one of the multiple heating systems may be considered the primary system.

(a) If the home is a converted duplex that was designed and originally constructed with two heating systems, both of the heating systems may be considered the primary systems and be evaluated for replacement as ECMs. Only one system may be replaced as a health and safety measure and only if neither existing heating system is a safe and operable heating system.

(3) Independent radiant heating units (baseboard heaters, radiant ceiling strips, etc.) should be considered cumulatively as a single heating system.

(4) Electrical portable space heaters cannot be considered a primary heating system upon the completion of a home. If a home only contains electrical portable space heaters, a safe primary system must be addressed as a part of weatherization or the home must be deferred. If a primary system is addressed as a health and safety measure, then the electric portable space heaters may remain as an emergency backup.

b. Only one (1) central cooling system may be considered the primary cooling system for a unit. Only this primary system may be replaced as a cost effective or health and safety measure.

(1) If a home contains more than one central cooling system, the system that is original to the home or the system that cools the largest percentage of the home should be considered the primary cooling system.

(2) If a home has a working central air conditioner and room air conditioners, the working central air conditioning system will be considered the primary cooling system.

(3) If a home is cooled only by room air conditioners, each of these room air conditioners may be evaluated for replacement as a cost effective measure.

c. Multi-family buildings that have separate heating and/or cooling systems for each unit should have the separate heating and cooling systems for each unit considered to be the primary systems.

2. Secondary Heating and Cooling Systems

a. Secondary heating systems are any heating systems located within the residence that are not the primary heating system and not emergency backup heat. Emergency backup heating systems and decorative heating systems (i.e. gas fireplaces) are not considered secondary heating systems.

b. Secondary cooling systems are any additional cooling systems to the primary central cooling system. For example, all room air conditioners are secondary if a central air conditioner is present in the home.

c. Replacement of secondary heating and cooling systems as cost effective measures or health and safety measures are not allowed.

d. Secondary heating systems may have repairs and clean and tunes performed as health and safety measures. These repairs and clean and tunes must adhere to all other guidance pertaining to these repairs and clean and tunes.

e. Secondary heating and cooling systems need to be entered into the computerized audit for proper energy modeling and determination of cost effective measures.

B. Combustion Heating Systems

1. Natural Gas and Propane Systems

a. General Information

Gas is the primary combustible fuel used in heating or appliance systems in Missouri homes. Natural gas and propane systems are basically the same, differing only in the orifice sizes of their burners. The word “gas” used here means either natural or propane gas. The following inspection and maintenance practices should be performed on all gas-fired furnaces, boilers, water heaters and space heaters. The goal of the measures is to reduce carbon monoxide (CO), stabilize system combustion and ensure system safety.

(1) Gas leaks and piping problems should be checked at the beginning of the inspection process to ensure inspector and client safety before the appliance is run for testing. Testing should stop if a hazardous leak is detected. For any gas leak, refer to Section II, Subsection B, Topic 5: Emergency Situations, Immediate Follow-Up Required, Topic 6: Non-Emergency, One-Day Follow-Up Required and Topic 7: Non-Emergency, Five Day Follow-Up Required for additional information. Gas and piping procedures include the following:

(2) Test all accessible gas piping in the home for leaks using an electronic leak detector and/or soap bubbles. Electronically located leaks should be verified with soap bubbles. All located leaks must be repaired.

(3) Inspect the gas piping system for any potential hazards.

(a) If a flexible connector is badly kinked, corroded or shows signs of physical wear it should be replaced.

(b) Flex connectors of the soldered two-piece type or those manufactured in 1973 or before are to be replaced.

(c) Only American Gas Association (AGA) approved materials should be used in the gas piping system. This includes but is not limited to piping, fittings, valves, and flex connectors.

(d) Only black iron pipe should be used as piping for natural gas systems.

(e) Black iron pipe, galvanized pipe or copper tubing can be used on propane systems.

(f) Inspect to make sure that flex connectors or soft copper tubing do not extend through a knockout hole into the cabinet of an appliance. Exception: semi rigid tubing and listed connectors shall be permitted to extend through an opening in an appliance housing, cabinet or casing where the tubing or connector is protected against damage.

(g) Ensure that flex connectors are entirely in the same room as the appliance it serves and have a shut off valve on the inlet of the connector.

(h) Assure that flex connectors used outdoors are rated for such use.

(i) Install sediment traps on systems that do not have them if the piping system is to be altered in any way.

(j) Assure that the piping system is properly supported.

(k) Repair any problems with the gas piping system.

(4) Visually inspect for soot, burned wires and other evidence of flame rollout.

(5) Inspect the burners for dust, debris, misalignment, and other flame interference problems.

(6) Inspect the heat exchanger for leaks using the following methods:

(a) Visually inspect the heat exchanger, shining a bright light on one side and looking for light traces on the other using a mirror to peer into tight locations. Observations of rust at exhaust ports and at the vent connector and flame

impingement on the heat exchanger during firing are red flags for heat exchanger problems.

(b) Observe flame movement, change in chimney draft, or change in CO reading as blower is turned on and off.

(c) To test for cracks using a combustion gas analyzer, simply watch the O_2/ CO_2 readings and the CO reading when the blower comes on - usually several minutes after the burner(s) ignite. Typically, the O_2/ CO_2 or CO readings will stabilize within 30 to 60 seconds after ignition. If a crack is present, when the blower energizes, ambient air (at 20.9% O_2) may be blown through the crack in sufficient quantities to raise the O_2 (or decrease the CO_2) reading on the combustion analyzer). Repeat this procedure to ensure conclusions.

(d) Test for a crack using a combustion gas analyzer to test for any CO in the nearest supply vent register to the blower motor.

(e) Employ chemical detection techniques, following manufacturer's instructions.

(f) Use techniques recommended by the Gas Appliance Manufacturer's Association (GAMA).

Action: Any primary heating system with a cracked heat exchanger must be replaced if weatherization is to proceed on the home. Non-primary systems should be removed from the home when practical. (Refer to Attachment 1.1)

(7) Assure that all 120-volt wiring connections are enclosed in covered electrical boxes. Furnaces and boilers should have dedicated circuits.

(8) Determine that the pilot is burning (if equipped) and that the main burner ignition is satisfactory.

(9) Sample the undiluted combustion gases (before draft diverter and may require multiple tests in multi-cell exchanger) with a calibrated combustion gas analyzer during operation. After performing test, attach associated combustion gas analyzer printout to Attachment 2.5 (Mechanical Systems Audit Form).

(10) Test the pilot safety control for complete gas valve shutoff when pilot is extinguished.

(11) Check the thermostat's heat-anticipator setting. The setting should match the measured current in the 24-volt control circuit.

(12) Check venting system for proper size and pitch. See NFPA 54 – Fuel Gas Code for reference.

(13) Check venting system for obstructions, blockages or leaks.

(14) Measure the chimney draft downstream of the draft diverter.

(15) Test to ensure that the high-limit control shuts-down the system when temperature rises within 10 percent of 200 degrees Fahrenheit.

(16) Observe flame characteristics: if soot, CO, or other combustion problems are present a clean and tune may be appropriate

Action: A clean and tune and/or appropriate repairs must be included in the weatherization work scope whenever: CO is greater than the combustion action levels given in Table III-1, visual indicators of soot or flame roll-out exist, burners are visibly dirty, measured draft is low or nonexistent, the appliance has not received regular service for two or more years or the auditor determines a clean and tune is appropriate to ensure safe and efficient operation; unless the heating system is being replaced as an ECM.

b. Forced Air Systems

Forced air systems are the most common type of heating system. Leaky ducts and airflow are common problems with heating systems. A gas system should receive maintenance services every 2 to 4 years; however, they are often neglected in low-income homes creating inefficient and unsafe systems. Diagnostics and actions to remedy problems with such systems are described below.

(1) Measure heat rise after 5 minutes of operation. Heat rise is supply air temperature minus return air temperature. The heat rise should be compared to manufacturer specifications, given on the furnace data plate, with the lower end of this range being preferable for energy efficiency. Manufacturers' recommendations should be followed when practical to obtain. A typical range for heat rise is 30 – 70 degrees.

(2) Forced air systems should be a closed duct system, meaning the supply air and return air should only be delivered and returned from the intentionally heated areas of the house. Air intentionally entering the return system from an unheated area of the house is not acceptable. For additional information refer to Section II, Subsection C, Topic 1: General Guidelines, and Section V, Subsection B, Topic 1: Ductwork Inspection, Cleaning, and Sealing.

c. Hydronic Systems

The following standards refer to hydronic systems commonly found in single-family homes. **Hydronic systems are generally more complex and must be tested and evaluated by HVAC professionals experienced in their operation**. Weatherization should not proceed until a safe system is assured. Observe the following standards for servicing hydronic heating systems in single-family structures.

(1) Hot Water Space-Heating

Hot water heating is generally a little more efficient than forced-air heating and considerably more efficient than steam heating. The most significant energy wasters are off-cycle flue losses stealing heat from stored water and operating at too high a water temperature. Boilers are more dangerous than furnaces, so checking their limit controls and pressure tank are important safety procedures. HVAC professionals must evaluate the following safety and efficiency checks for potential improvements:

(a) Check operation of a 30-psi-rated pressure-relief valve and replace or add one if necessary. Note signs of leakage or discharges and find out why the relief valve is discharging.

(b)Ensure that boilers are equipped with a pressure and temperature relief valve and a safety discharge pipe. The discharge shall be piped to drains by gravity to within 18 inches of the floor or to an open receptor. The discharge should be made of rigid metal pipe or approved high temperature plastic pipe and cannot have threads on the end of the pipe.

(c) Check for leaks on the boiler, its fittings or on any of the distribution piping connected to the boiler. High-limit control should deactivate boiler at 200° F or less.

(d) Make sure that the pressure tank is not waterlogged; this could cause pressure-relief valve discharge. Test pressure tank for its rated air pressure – often 15 psi.

(e) Lubricate circulator pump if necessary.

(f) Repair water leaks in the system.

(g) Boiler should not have low-limit control for maintaining a minimum boiler-water temperature, unless the boiler is heating domestic water in addition to space heating.

(h) Bleed air from radiators and piping through air vents in elbows or radiators. Most systems have an automatic fill valve. If there is a manual fill valve for refilling system with water, it should be open to push water in and air out, during air purging.

(i) Consider installing electric vent dampers on atmospheric gas- and oil-fired high-mass boilers to prevent significant heat loss up the vent stack.

(j) Consider installing reset controllers on larger boilers to regulate water temperature, depending on outdoor temperature.

(k) Clean fire side of heat exchanger of noticeable dirt.

(l) Vacuum and clean fins of fin-tube convectors if you notice dust and dirt there.

(m) Verify that all hot water boilers have a pressure tank to control pressure and prevent system damage from water's expansion.

(n) Insulate all supply piping, passing through unheated areas, with foam pipe insulation, at least one-inch thick, rated for temperatures up to 200° F.

(2) Steam Heating

Steam heating is less efficient than hot water heating because a steam boiler heats water to its boiling point before making any steam or doing any space heating. Higher temperature heating systems are less efficient than lower temperature ones. Steam boilers are also more hazardous because of the steam pressure. For these reasons heating-system replacement with a hot water or forced air system should be considered.

If the steam-heating system must remain, operate it at the lowest steam pressure that will heat the building. This may be near 0 psi on the boiler pressure gauge. Large buildings need higher steam pressures but smaller ones can operate at little or no measurable steam pressure. Traps and air vents are crucial to operating at a low steam pressure. Electric vent dampers will reduce off-cycle losses for both gas- and oil-fired systems. HVAC professionals must perform the following safety checks and efficiency checks for possible improvement regarding steam systems:

(a) Steam boilers should be equipped with high-pressure limits and low water cut off controls. Verify that high-pressure limit control is set at or below 10 psi.

(b) Ensure that boilers are equipped with a pressure and temperature relief valve and a safety discharge pipe. The discharge shall be piped to drain by gravity to within 18 inches of the floor or to an open receptor. The discharge should be made of rigid metal pipe or approved high temperature plastic pipe and cannot have threads on the end of the pipe.

(c) Verify that flush valves on low-water cutoffs are operable and do not leak.

(d) On steam boilers with externally mounted low water cut off, verify the function of the control by flushing the low-water cutoff with the burner operating. Combustion must cease when the water level in the boiler drops below the level of the float.

(e) Verify steam vents are operable and that all steam radiators receive steam during every cycle. Unplug vents as necessary. Add vents to steam lines and radiators as needed to achieve this goal.

(f) Check steam traps with a digital thermometer or listening device to detect any steam escaping from radiators through the condensate return. Replace leaking steam traps or their thermostatic elements. Repair leaks on the steam supply piping or on condensate return piping.

(g) Consider a flame retention burner and electric vent damper as retrofits for steam boilers.

(h) Clean fire side of heat exchanger if noticeable dirty.

(i) Drain water out of blow-down valve until water runs clear.

(j) Check with owner about chemicals added to boiler water to prevent corrosion. Add chemicals if necessary.

(k) All steam piping, passing through unconditioned areas, should be insulated to at least R-3 with insulation rated for steam piping.

2. Oil Systems

a. General Information**:**

Oil-fired furnaces, boilers or water heaters are not encountered frequently in the Missouri Weatherization Program. These units are generally more complex and **must be tested and evaluated by HVAC professionals experienced in their operation.** In addition, oil burners require annual maintenance to retain the desired operation, efficiency and safety characteristics. Weatherization should not proceed until a safe system is assured. In consideration of the limited encounter with oil systems, the following tests and best practices must be considered to achieve a minimum standard or oil burner safety:

(1) Inspect fuel lines and storage tanks for leaks and repair all identified leaks as appropriate.

b. Inspect burner and appliance for signs of soot, overheating, fire hazards or wiring problems.

c. Assure that all 120-volt wiring connections are enclosed in covered electrical boxes. Each oil furnace or boiler should have a dedicated electrical circuit.

d. Inspect heat exchanger and combustion chamber for cracks, corrosion, or soot buildup.

e. Inspect to see if flame ignition is instantaneous or delayed. Flame ignition should be instantaneous except for units where the blower runs for a while to purge the system before ignition.

f. Sample undiluted flue gases with a smoke tester following the smoke-tester instructions. Compare the smoke residue left by the gases on the filter paper with the manufacturer’s smoke-spot scale to determine smoke number.

g. Analyze the flue gas for O_2 or CO_2, temperature, CO, and steady-state efficiency. Sample undiluted flue gases between the barometric draft control and the appliance.

h. Fuel oil containers need to be visually inspected for leaks. Leak repairs and/or remediation will require DE approval prior to being performed.

3. Wood and Solid Fuel Systems

a**.** Wood/Coal Stoves and Fireplaces:

Whenever possible, ask the client to start the wood or coal stove after the use of any blower door testing has been completed. With the stove operating, check around the solid-fuel appliances for carbon monoxide (CO) emissions. If there are any indications of CO leaking from the stove into the ambient air, repairs should be made to correct the problem. Weatherization should not proceed until appropriate repairs are made allowing safe operation of the stove or fireplace.

If a solid fuel (such as coal, pellet or wood) fireplace vent does not meet code, then a depressurization test in the space containing the fireplace must be done. If the depressurization is greater than -5 pa, then the fireplace must be decommissioned, sealed (preferably with foam board) or the home deferred.

b. Maintenance, repair, or replacement of a primary indoor solid fuel heating unit is allowed where occupant health and safety is a concern. Maintenance and repair of secondary solid fuel heating units is allowed as a health and safety measure. Replacement of a secondary solid fuel heating unit is **not** allowed.

c. All venting systems and installations shall comply with the latest edition of NFPA 211*, Standard for Chimneys, Fireplaces, Vents, and Solid Fuel-Burning Appliances*.

d. The client shall be notified of any unsafe conditions.

C. Combustion Appliance Zone (CAZ) Spillage and Combustion Analysis

A combustion appliance zone (CAZ) is any space where a vented combustion appliance is located. Spillage and Combustion Analysis testing must be completed with the CAZ in a state of worst-case depressurization. Direct vented (sealed-combustion) appliances and power vented water heaters are not required to be tested under worst-case conditions; however, combustion analysis testing is still required if it can safely be done. Additionally, a worst-case spillage test is not required on combustion appliances located in a non-conditioned CAZ that is well vented to the exterior. Worst-case depressurization is achieved by determining the largest CAZ depressurization due to the combined effects of exhaust appliance operation, air handler (generally the furnace blower) fan operation and door positioning. A base pressure must be measured and recorded in order to compare subsequent pressure measurement.

A recommended protocol for completing all of the combustion safety tests for vented appliances follows. This step-by-step procedure is recommended to guide technicians through a complete combustion safety analysis safely and efficiently:

1. Measuring Base Pressure

Start with all exterior doors and windows closed. Close the doors of any interior room that does not have an appliance exhausting to the exterior or a central forced air return. Close all CAZ doors. All fires in woodstoves and fireplaces must be completely extinguished. Any fireplace damper should be closed. Outdoor openings for combustion air should remain open. Set all combustion appliances to the pilot setting or turn off the service disconnect. Combustion appliances include boilers, furnaces, space heaters and water heaters. Turn off all exhaust fans and dryer. With the home in this configuration, measure and record the baseline pressure of the CAZ with reference to (WRT) the outside. Compare this measurement with subsequent pressure measurements to determine the greatest depressurization achievable.

2. Establishing Worst Case

a. Close the CAZ door and close all interior doors to rooms that do not have an appliance exhausting to the exterior or a forced air return vent. Measure and record the pressure in the CAZ WRT outside.

b. Turn on all exhaust equipment including dryers, non-recirculating range hoods, and exhaust fans. Do not operate a whole house fan. Measure and record the pressure in the CAZ WRT outside with the CAZ door(s) closed.

c. Turn on air handler(s). Measure and record the pressure in the CAZ WRT outside with the CAZ door(s) closed.

(1) If the pressure in the CAZ becomes more negative WRT outside with the air handler on, the air handler shall remain on during the spillage and combustion analysis testing.

(2) If the pressure in the CAZ becomes more positive WRT outside with the air handler on, the air handler shall be turned off during the spillage and combustion analysis testing of any water heater located in the CAZ.

d. Open interior doors to the CAZ. Measure and record pressure in the CAZ WRT outside.

(1) If the pressure in the CAZ becomes more negative WRT outside with the CAZ door(s) open, the door(s) shall remain open during the spillage and combustion analysis testing.

(2) If the pressure in the CAZ becomes more positive WRT outside with the CAZ door(s) open, the door(s) shall remain closed during the spillage and combustion analysis testing.

3. Measuring Spillage and CO at Worst Case Depressurization

a. While the home is in worst case, fire the appliance with the smallest Btu capacity first, test for spillage at the draft diverter with a flame or smoke test. If a combustion appliance spillage exceeds two minutes during testing, specify measures to mitigate. If spillage exceeds two minutes under the worst-case condition, go on to Topic 4 below. If spillage does not exceed 2 minutes, you may choose to conduct a draft test. If done, test the draft after the diverter or first elbow and fire all other connected appliances simultaneously. Avoid testing draft near elbows where turbulence in the flue may affect draft test results.

(1) Spillage should be tested on all natural draft furnaces (70%) and water heaters at the draft diverter.

(2) Spillage for a draft induced (80%) furnace, commonly vented with a natural draft furnace, may be tested at the water heater and/or the combustion analysis hole in the flue.

(3) Spillage for a draft induced (80%) furnace that is not commonly vented with an atmospheric drafting water heater, should be tested at the combustion analysis hole in the flue.

b. Test for CO in the undiluted flue gases of the gas appliances after 5 minutes of burner operation or at steady state. If CO levels exceed the combustion action levels given in Table III-1, service will be provided to reduce CO to below these levels (unless CO measurement is within manufacturer specifications). For gas oven CO levels, see Section III, Subsection I, Topic 2: Natural Gas or Propane Oven Testing Instructions and Action Levels.

Table III-1. Combustion action levels.

Appliance	CO Action Level
Central Furnace	400 CO(O)
Boiler	400 CO(O)
Floor Furnace	400 CO(O)
Gravity Furnace	400 CO(O)
Direct Vent Wall and/or Space Heater	400 CO(O)
Atmospherically Drafting Wall and/or Space Heater	200 CO(O)
Water Heater	200 CO(O)
Oven	225 CO (as measured)

4. Measuring Spillage and CO at Natural Conditions

If spillage is found in the first draft hood at worst case after 2 minutes, turn off the exhaust fans and open the interior doors with the first appliance operating and test again for CO and spillage under "natural conditions". Repeat the process for each appliance, allowing the vent to cool between tests. Refer to Section II, Subsection B, Topic 5: Emergency Situations, Immediate Follow-Up Required, Topic 6: Non-Emergency, One-Day Follow-Up Required and Topic 7: Non-Emergency, Five Day Follow-Up Required for additional information whenever a tests must be performed under natural conditions.

Note: If draft tests are conducted, vent draft pressure may be measured at steady-state operating conditions (generally after 5 minutes of run time and distribution fan operating when applicable) for all natural draft heating and hot water appliances. Draft test location should be approximately 1-2 feet downstream of the appliance draft diverter. The test hole must be sealed with an appropriate plug after the test. If draft pressure tests are taken, the acceptable draft test results are calculated using the table below:

Table III-2

Acceptable Draft Test Ranges	
Outside Temperature (degree F)	**Draft Pressure Standard (Pa)**
<10	-2.5
10-90	(T_out / 40) – 2.75
>90	-0.5

Note: Most appliances will spill upon startup with a cold chimney. Document the amount of time it takes for spillage to stop and a draft to be established. Any appliance that continues to spill flue gases beyond 2 minutes has failed the spillage test.

When a chimney is shared by multiple appliances, the appliance with the smallest Btu input rating should be tested first and remaining appliances tested in order of increasing input rate. Induced draft heating systems should be checked for spillage at the location where the combustion analysis was performed. If a chimney is shared between an induced draft heating system and a natural draft water heater, spillage should be checked at the water heater draft diverter.

5. Ambient CO

Monitor ambient CO at all times during the test procedure and refer to Section II, Subsection B, Topic 1: Carbon Monoxide (CO) if any ambient CO is detected inside the home.

6. Daily Combustion Appliance Zone (CAZ) Test

A worst-case CAZ test must be performed each day before leaving a home where work has been done that could affect draft on remaining gas appliances. Please note that this test is only the worst-case spillage test, not a full combustion test and therefore only a manometer is

needed for the test. Attachment 2.8: *Daily Combustion Appliance Zone (CAZ) Test Form* must be filled out every day that work is completed at every home; however, for an all-electric home or homes with gas appliances that do not require a spillage test, the form only needs to be filled out at the end of the first day.

D. Combustion Air Supply

1. Atmospheric Combustion Appliances

a. Combustion appliances need a source of combustion air while they are operating. If the CAZ contains less than a volume of 50 cubic feet of indoor space for every 1,000 Btu of appliance input rating, it is defined as a "confined space" by the National Fire Protection Association (NFPA). If any combustion appliance within the CAZ does not pass spillage tests, steps must be taken to correct the spillage situation. Often, spillage issues can be corrected by introducing additional combustion air. Please refer to the latest edition of NFPA 31, *Standard for the Installation of Oil-Burning Equipment*; NFPA 54, *National Fuel Gas Code*; or NFPA 211, *Standard for Chimneys, Fireplaces, Vents, and Solid Fuel-Burning Appliances* for corrective measures.

b. If the CAZ contains or is properly connected with a volume of 50 cubic feet or more of indoor space for every 1,000 Btu of appliance input rating, it is defined as an "unconfined space" by the National Fire Protection Association (NFPA). In this case, no corrective action is required, unless an appliance in the CAZ fails the worst-case spillage test, in which case, corrections must be made.

c. Modern weatherization techniques can create a situation referred to by the NFPA as unusually tight construction. When this situation occurs, the whole house may not supply adequate combustion air to assure complete combustion and proper draft of appliances. Remedies for this situation may include direct vent (sealed combustion) appliances, mechanical ventilation, and other methods referenced by the above-sited NFPA methods for introducing combustion air.

2. Direct Vent and Combustion Air

a. Many new combustion appliances are designed for direct out-door-air supply to the burner. These include most condensing furnaces, mobile home furnaces, some mobile home water heaters, many space heaters, and some non-condensing furnaces and boilers. Some appliances give installers a choice between indoor and outdoor combustion air. Outdoor combustion air is required, unless against manufacturer specifications, in order to prevent the depressurization problems, combustion-air deficiencies, and draft problems common in atmospheric, open-combustion systems.

b. The dedicated combustion-air intake of sealed combustion (direct-vent) appliances must be inspected. The air intake for the combustion air should be physically connected to the appliance body and it must pull air from outside the building, unless drawing combustion air from outside is in direct violation of manufacturer specifications.

E. Heating System Repair and Replacement

1. General Information

a. Homes that have an unsafe heating system must have a safe heating system installed if any weatherization is to occur. Weatherization work on all units shall not commence until unsafe heating systems are addressed.

b. Heating system replacement is not allowed when no fuel is present to perform the necessary combustion tests. If post weatherization combustion safety tests cannot be performed due to lack of fuel then the final inspection must be delayed and the home cannot be submitted for reimbursement until the appliances are tested.

c. A heating system has exceeded its useful and operational life expectancy when it reaches at least one of the following conditions:

(1) The heating system is inoperable and cannot be cost-effectively repaired or restored to efficient, operational and safe condition

(2) A structural degradation of the heating system has rendered it inoperable, potentially unsafe and not cost-effective to repair

(3) The heating system has been condemned by a utility or gas supplier (i.e. "Red Tagged").

(4) The heating system has been identified as having a faulty and/or cracked heat exchanger. The existence of a faulty or cracked heat exchanger must be documented by either a visible crack or hole, or through an approved diagnostic process specifically designed to identify cracked heat exchangers (proof of diagnostics must be included in the client file). Heating systems with a crack in the heat exchanger must be replaced prior to any weatherization work being done.

d. Electric resistance heating systems are not eligible for replacement as an energy efficiency measure, except when being replaced with a heat pump, refer to Section III, Subsection L, Topic 2: Air Conditioner and Heat Pump Replacement.

(1) All homes with electric furnaces must be evaluated for replacement of the heating system with a heat pump.

(2) A site-specific heating system replacement may be authorized by the department on a case-by-case basis.

e. New heating appliances must be installed in accordance with manufacturer specifications, 2012 *IRC* G2427.8, and additional applicable codes.

(1) Replacements of combustion heating systems, as an energy efficiency measure, will be limited to natural gas, propane and oil-fired systems.

(2) When replacing or installing a combustion forced air furnace, it is required to install sealed-combustion, direct-vent, high efficiency condensing units.

(a) Oil-fired heating systems must be direct vent (sealed combustion) units; however, a direct vent oil-fired forced air furnace with an AFUE of 85 percent or greater is in compliance with the WAP.

(b) Package units are not required to be sealed combustion/direct vent units.

(c) Installed vented space heaters must be, at a minimum, direct vent, sealed combustion units that draw combustion air from outside the building shell.

(3) When installing a condensing unit, the combustion air needs to be drawn from outside the building envelope, unless drawing combustion air from outside is in direct violation of manufacturer specifications.

(4) When replacement equipment is installed, venting will be assessed to ensure that other existing equipment is not adversely affected. If other equipment is adversely affected, measures will be taken to address the existing equipment(s) venting.

(5) A site-specific heating system replacement may be authorized by the department on a case-by-case basis.

(6) New central forced air HVAC systems will have minimum MERV 6 filtration with no air bypass around the filters. Filter sizes need to be of common size in order for clients to be able to easily obtain replacement filters.

(7) New central forced air HVAC systems shall not have installed plenums made of wood or other organic materials that could be a food source for mold.

(8) Condensate drain lines will be run to an appropriate drain or to the exterior of the building shell.

(9) Condensate drain lines will be insulated with a minimum 1 inch of insulation with a vapor retarder when there is potential for condensation or freezing of the drain line.

(10) All new HVAC systems will be installed in a manner that will ensure optimal efficiency of the unit.

f. To determine the steady state efficiency for a non-working heating system, or in the case of a non-existent heating system, determine what the existing or previous system was and refer to Section XI, Subsection C, Topic 4: Heating Tab.

g. A heating appliance may also be replaced if the current system is a gravity flow furnace, or boiler converted from coal and the SIR is calculated at one or greater to include all costs associated with replacement, including removal of the old system. Refer to Section XI, Subsection C, Topic 4: Heating Tab for information on replacement evaluation.

h. Sizing calculations should meet general HVAC sizing calculations such as Manual J or approved computerized load calculations. Sizing should account for lower heating loads resulting from insulation and air-sealing work.

i. The assumption that older furnaces and boilers are inefficient should not be made until testing them. If combustion test results show high levels of carbon monoxide a clean and tune must be performed before a heating system may be replaced as a health and safety measure. After a clean and tune is performed, additional combustion tests are required to determine if the levels of carbon monoxide still warrant replacement as a health and safety measure, with results of the combustion tests documented in the client file. Refer to Table III-1 for carbon monoxide action levels.

j. Before deciding to replace a heating system as a health and safety measure, every effort to repair and retrofit the existing system should be made. Replacement parts like gas valves and controls for older heating units are commonly available. Repair is defined as any work needed to ensure efficient operation. Repair items include replacing blower motors and pumps, fixing vent connectors and chimneys, or other activities required to bring the heating appliance up to safe and operable condition. All repairs that are not considered to be cost effective must be performed as a health and safety measure.

k. Heating appliances may be replaced when the cost of repair, retrofit or a combination of both exceeds 2/3 of estimated replacement costs.

   (1) The replacement cost must have a Savings to Investment Ratio (SIR) of one or greater or the replacement must be reported under health and safety.

   (2) In some instances, it may be necessary for the heating contractor to repair a heating appliance before it can be tested for efficiency. If estimated repairs or retrofits are more than 2/3 the cost of replacement, then replacement is eligible for health and safety. Estimate the repair and retrofit costs, then compare them to replacement cost before proceeding.

l. If a heating system is to be replaced as a health and safety measure, documentation must be present in the client file denoting the justification for the health and safety replacement.

m. If a forced air heating system is being replaced on a site built home and the heating system is located outside of thermal boundary, then duct insulation must be evaluated in NEAT to be installed on all ductwork outside the thermal boundary.

n. The replaced heating system must be removed from the home and properly disposed, thereby permanently eliminating the heating system from being able to be used at another home.

2. Emergency Services

Subgrantees may provide emergency services to clients who are without a sufficient heat source according to Missouri State WAP Operational Manual Section 2, Subsection III, Part B: Emergency Services. These services may require the repair or replacement of the heat source when the client faces a health-threatening situation directly related to insufficient heat in the home. The subgrantee must verify that these conditions exist at the clients' home. The client must be eligible for the WAP and on the subgrantee waiting list to receive services. Maximum cost limits will be followed, as with services to other clients.

F. Heating System Modifications

Allowable retrofits or modifications include; flame retention burners, intermittent electronic ignition devices, automatic vent dampers, thermally actuated vent dampers and ductwork repairs.

G. Space Heaters

1. Vented Space Heaters:

Vented gas- and liquid-fueled space heaters should be treated the same as furnaces in terms of repair and replacement, as well as combustion appliance safety testing. This applies to vented, natural gas-fired space heaters, vented propane-fired space heaters, and oil-fired space heaters.

2. Unvented Space Heaters:

Separate guidance applies to electric space heaters and unvented gas- and liquid-fueled space heaters.

a. Electric Space Heaters

DOE will not permit any DOE-funded weatherization work on electric space heaters. DOE will not preclude the use of other funding sources for the replacement or major repair of electric space heaters, but the department does not encourage it because of:

- The high cost of electricity as compared to fossil fuels;
- Lower output ratings (size);
- Risk of fire hazards; and
- Inadequate electrical systems in older homes frequently cannot safely carry the power required to operate an electric heater.

Work on such systems may make local agencies liable for inadequate electric wiring and damages that may result. The sub-grantee should remove all stand-alone electric space heaters or collect a signed waiver from the client if removal is not allowed.

b. Unvented Gas and Liquid Fueled Space Heaters

(1) It is not permitted to use DOE-funds on weatherization work where the completed dwelling unit is heated with an unvented gas- and/or liquid-fueled space heater as the primary heat source. This policy applies to unvented natural gas-fired space heaters, unvented propane-fired space heaters and unvented kerosene space heaters. This policy is consistent with the IRC and the IFGC.

(2) Occupant will be educated on potential hazards of unvented combustion appliances (primary or secondary) within a living space.

(3) Failure to remove unvented space heaters serving as primary heat sources has the potential to create hazardous conditions and therefore the home must be deferred or the unvented space heater must be removed and replaced with a vented primary heating system. The replacement may be part of the weatherization work scope.

(4) All unvented space heaters will be removed except when used as an emergency backup source in a site-built home when it can be confirmed that the unit meets *ANSI* Z21.11.2 standards.

(a) A maximum of one (1) unvented space heater will be allowed to remain inside the thermal boundary of any site-built dwelling.

(b) No unvented space heaters will be allowed to remain in mobile homes, even as an emergency heat source.

(c) No unvented space heaters will be allowed to remain in a bedroom, bathroom, or storage closet.

(d) No unvented space heater with an input rating in excess of 40,000 Btu/hour will be allowed to remain.

(e) No unvented space heaters will be allowed to remain in a room with a volume that is less than 50ft³ for every 1000 Btu/hour input rating. If the input rating cannot be determined, it will be assumed to be 40,000 Btu/hour.

(f) Any unvented space heater that is allowed to remain in a home must be equipped with an oxygen-depletion sensing safety shut-off system.

(5) Units that are not being operated in compliance with *ANSI* Z21.11.2 standards must be removed. These units should be removed before the retrofit but, may remain until a replacement heating system is in place.

(6) If an unvented space heater is to be left in a home, the client must sign an agency-developed waiver acknowledging that the client understands the potential health and safety risks associated with the use of the unvented heater and that the heater will only be used as an emergency backup heat source.

(7) DOE funds may only be used to replace the primary heating source. DOE funds may not be used to replace unvented space heaters to be left in the weatherized dwelling unit as emergency backup heating sources. DOE will not preclude the use of other funding sources to replace emergency backup space heaters with code-compliant units.

(8) All Unvented Space Heaters that are removed, must be removed by agency staff or subcontractors and disposed of properly. Removed heaters may not be left for the client.

(9) Refer to Weatherization Program Notice 08-4 and 11-6 for additional information regarding space heater policy.

H. Mobile Home Systems

There are many characteristics that mobile home heating systems and those generally installed in site-built structures have in common. The general test procedures for gas or oil should be followed as described above. There are some differences that need recognition for proper testing and operation. Final combustion testing will be conducted at project completion to ensure compliance with the above specifications.

1. General Characteristics

a. Mobile home combustion systems have been sealed combustion systems since the early 1970s, in that the air for combustion comes from outside the conditioned space and vent gases move the combustion products to the outside air. These systems do not have draft diverters or barometric draft controls. Many of these mobile home systems have concentric venting flues with combustion air entering the system through the outer wall channel and the vent gas exiting through the inner passage. Generally, these are metal flue pipes. If the mobile home heating system is sealed combustion, even if the flue pipe is metal, a worst-case spillage test is not required. Combustion analysis may be completed at the termination. If a hole is drilled in a concentric flue, care must be taken to ensure both drill holes are sealed following the test of the combustion system.

b. Gas furnaces are either the older atmospheric sealed combustion type or the newer fan-assisted mid-efficiency models; however, some older less-efficient models had draft fans too.

c. The majority of mobile home systems will be down flow furnaces, designed specifically for mobile homes.

d. Gas-fired systems for mobile homes generally come with kits allowing conversion between natural gas and propane. The weatherization auditor should be alert to the possibility of the wrong orifice installed in the system.

e. Return air is generally admitted to the furnace through a large opening in the furnace rather than through return ducts.

2. System Repair or Replacement

a. Mobile home furnaces must be replaced with furnaces designed and listed for use in a mobile home and must be a sealed combustion, direct vent appliance with an AFUE of 90 percent or higher.

b. Mobile home furnaces may be replaced when any of the following is observed:

(1) The furnace has a cracked heat exchanger. There are some models that will allow replacement of the heat exchanger. The replacement may be considered when determined by the agency to be unsafe or cost-effective.

(2) Repair and retrofit exceed 2/3 the cost of the replacement.

(3) The furnace is not operating and not repairable.

c. The following additional items should be considered regarding replacement:

(1) Follow manufacturer’s installation instructions carefully.

(2) Make sure the furnace base exactly matches the new furnace or allow for a new base.

(3) The furnace base should be attached firmly to the duct and all seams sealed between the base and the duct with mastic and fabric tape before installing the furnace.

(4) Provide any additional support underneath the furnace with additional strapping or other material that will provide the support, as necessary.

(5) Account for any difference in the method of supplying combustion air.

(6) Install a new flue that is manufactured specifically for the new furnace.

(7) In the event the new flue does not exactly line up, install an offset pipe provided by the manufacturer for this purpose or enlarge the opening to allow the new chimney to remain vertical.

(8) Properly install the vent cap.

I. Gas Ranges and Ovens

Gas range cook tops and ovens are often significant generators of CO in a kitchen. Frequent causes of CO production are from over firing, dirt buildup and foil installed around the burners. Ovens are prone to produce CO regardless of condition. The following tests and recommended actions are relevant to gas range and oven safety:

1. Natural Gas or Propane Stovetop Burner Testing:

Although not required, it is recommended to test each stovetop burner separately using a digital combustion gas analyzer by holding the probe about 8 inches above the flame for 2 minutes. Specify a clean and tune if the flame has any discoloration, flame impingement, or an irregular pattern or if burners are visibly dirty, corroded, or bent. Clean and adjust burners producing more than 25 ppm. Burners often have an adjustable gas control or orifice.

2. Natural Gas or Propane Oven Testing Instructions and Action Levels:

a. Remove any items/foil in or on the oven

b. Make sure self-cleaning features are not activated and set the oven to the highest setting.

c. Test the oven for CO in the oven vent, before dilution air.

d. After 5 minutes of operation, check for steady state. Record the steady state CO reading and the ambient air CO level. A clean and tune will be conducted if CO in the flue gas in the oven vent exceeds 225 ppm (as measured, not air free), at steady state.

(1) Sub-grantees may defer a home when an oven exceeds these CO limits until the client corrects the issues.

(2) If a sub-grantee does complete a clean and tune and the oven still exceeds the CO limits, an exhaust hood venting to the exterior of the home must be present or installed prior to completion of the home.

e. Replacement of gas ovens is not an allowable weatherization expense.

J. Dryers

1 General Requirements

Gas dryers are generally not significant producers of CO when the burner is firing. No specific tests are required. The Weatherization auditor may conduct any appropriate tests that could remedy a safety concern.

2. Dryer Venting Requirements

a. All dryer vents must be vented directly to the exterior of the building shell, which does not include unconditioned spaces such as attics and crawl spaces that are ventilated with the outdoors.

b. Uninsulated dryer ducts cannot pass through unconditioned spaces, such as attics and crawl spaces. If dryer ducts are installed as part of the weatherization process and are to pass through unconditioned areas, the ducts must be insulated to R-8.

c. Dryer vents should be as short as practical and made of rigid sheet metal or semi-rigid sheet metal.

d. Agency installed dryer vents must be rigid or semi-rigid metal. Flexible, foil or plastic venting material will not be used.

e. Dryer ducts exceeding 35’ in duct equivalent length will have a dryer booster fan installed. This maximum duct equivalent length will be reduced 5 feet for every 90º elbow and 2½ feet for every 45º elbow.

f. Ducts will be appropriately connected and sealed.

g. Dryer vent pipe should not be installed with sheet metal screws or other intrusive fasteners that will collect lint and block the vent gases.

h. A termination fitting manufactured for use with dryers will be installed. A backdraft damper will be included with the termination fitting.

K. Water Heaters

1. General Requirements

In addition to the general gas combustion requirements described above, water heaters must meet the following specifications:

a. Inspect the existing water heater for health and safety hazards. A water heater lacking a pilot access door or a pressure and temperature relief discharge pipe may be considered a health and safety issue. A water heater lacking a pressure or temperature relief valve shall be considered a health and safety issue. Water heaters shall be inspected for adequate combustion air and a safe and proper flue gas venting system (refer to the National Fuel Gas Code – NFPA 54).

b. Documentation stating reasoning for the repair or replacement shall be located within the client file.

2. Water Heater Repairs

Water heaters may be repaired as a health and safety measure if the water heater has high carbon monoxide, a leaking water tank creating a moisture problem, insufficient draft, pulls combustion air from a bedroom or bathroom, is working but unsafe or on a case-by-case basis with Department approval.

3. Water Heater Replacement

a. Replacement of any water heater due to the water heater not being operational is allowed. Replacement water heaters must be rated for the application and type of structure that they are being installed in.

b. Electric water heaters may only be replaced as a health and safety measure, only if the tank of the water heater is leaking, creating a moisture problem and cannot be repaired or on a case-by-case basis with department approval.

c. Gas water heaters may be replaced as a health and safety measure if the cost of the repairs exceeds two-thirds the cost of replacement, if the tank of the water heater is leaking, creating a moisture problem and cannot be repaired, has a draft issue or high C/O production that cannot be corrected (within reason for labor and materials), or on a case-by-case basis with Department approval.

d. Gas water heater replacements should be either direct-vented or power-vented and ENERGY STAR qualified. Best practice for installation is to provide a dedicated electrical outlet that the vent fan of the direct-vent or power-vent water heater can be plugged into without the need of any extension cord. Case-by-case approval to replace an existing naturally drafting water heater with like-kind equipment must be submitted for prior review.

e. A water heater installed by the sub-grantee must have a pressure and temperature relief valve installed in compliance with P2803 of the 2012 IRC and according to manufacturer specifications. A discharge pipe will be installed in accordance with P2803.6.1 of the 2012 IRC. The discharge pipe should terminate no more than 6 inches above the floor or as specified by local codes. The discharge pipe must be made of rigid metal pipe or approved high temperature plastic pipe and cannot have threads on the end of the pipe.

f. A replaced water heater will have an emergency drain pan installed if leakage would cause damage to the home and in accordance with P2801.5 of the 2012 IRC. A drain line will be connected to tapping on pan and terminated in accordance with P2801.5.2 of the 2012 IRC.

g. When replacing a water heater, a potable water expansion tank will be installed on the cold-water side. A direct connection with no valves between the storage tank and expansion tank will be installed in accordance with the 2012 IRC, authority-having jurisdiction, and according to manufacturer specifications.

4. Water Heater Insulation General Requirements and Temperature settings

a. Water heaters should be insulated to at least R-11 unless the water heater label gives specific instructions not to insulate or water heater is already insulated.

b. Water heater insulation must not obstruct draft diverter, pressure relief valve, thermostats, high limit switch, plumbing pipes or access plates.

c. Adjust water temperature to a maximum of 120°F with clients' approval, unless the client has an older automatic dishwasher without its own water-heating booster. In this case, the maximum setting is 140°F.

5. Gas-Fired Water Heater Insulation

a. Keep insulation at least 2 inches away from the access door to the burner.

b. Insulation should be cut away from the water heater's gas valve and drain valve to provide ample clearance for access.

c. Do not insulate the tops of gas fired water heaters.

6. Electric Water-Heater Insulation

a. The installation of water heater blankets on electric water heaters may be evaluated for installation unless this will void the warranty of the water heater.

b. With client permission, set both upper and lower thermostat to keep water at 120°F before insulating water heater.

c. Insulation may cover the water heater's top if the insulation will not obstruct the pressure relief valve.

d. Access holes should be cut in the insulation for the heating element thermostats, or better, thermostat location should be marked with a permanent marker to preserve the insulation's integrity until the access is needed.

7. Water Heater Blankets

a. Water heaters should be insulated with the following materials:

(1) Fiberglass batt insulation with a protective covering is the preferred material for the water heater blanket; however, other appropriate materials may be used if designed for such purpose or approved by the LIWAP Program Administrator.

(2) Water heaters should be insulated to at least R-11 with an external insulation blanket, unless the water heater label gives specific instructions not to insulate or the water heater is already insulated properly.

(3) A water heater blanket must be secured to the water heater with at least two (2) straps. The installed straps must be securely connected, and not excessively pressing the water heater blanket.

b. Installation

(1) The water heater tank must be inspected to determine the type of water heater (gas, electric, other), and whenever possible, the amount of existing insulation.

(2) If there are signs that the water heater is leaking, this problem must be solved before insulation is added.

(3) Water heaters outside the living space, including mobile home water heaters in exterior closets, must be insulated if the total existing tank insulation is less than R-11.

8. Water Heater Pipe Insulation

a. The first 6 feet of inlet and outlet piping will be insulated in accordance with manufacturer specifications.

b. Interior diameter of pipe sleeve must match exterior diameter of pipe and cover over all elbows, unions and other fittings to same thickness as pipe.

c. Keep pipe insulation at least 6 inches away from draft hood and/or single wall metal flue pipe. Clearance from "B" vent should be maintained per vent manufacturer's specifications.

d. Do not insulate pipes below the draft diverter.

L. Air Conditioners and Heat Pumps

1. Air Conditioner and Heat Pump Repair

a. All repairs and tune-ups must be performed by a qualified technician with EPA Section 608 Technician Certification, except the cleaning of evaporative and conditioning coils when there is no potential to release refrigerant. A copy of the Section 608 Technician Certification must be kept on file by the sub-grantee and available for review, as needed.

b. Tune ups to improve the efficiency of the central air conditioner, heat pump and room air conditioner units must have a SIR of 1.0 or greater to be considered an energy efficiency measure.

c. An air conditioner tune up includes all of the following: replace or clean existing air filters; check and clean condensate trough and drain; clean evaporator (indoor) and condenser (outside) coils; straighten bent or flattened coil fins if necessary; ensure unobstructed air flow to the condenser coil; check for proper refrigerant charge and adjust, if necessary; remove dust and dirt from fan blades; examine and oil motor and fan bearings; inspect and/or tighten electrical connections and contacts; check for blockages or leaks in the supply and return ducts.

d. Tune ups that do not have an SIR of 1.0 or greater and repairs will be considered a health and safety measure and may only be completed if the client has **a letter from a board certified physician, certified nurse practitioner or certified physician's assistant stating thata functioning air-conditioning unit is a medical necessity to sustain the occupant's quality of life, *OR* someone in the household is age 60 or older.** If the tune up does not have an SIR of 1.0 or greater and no letter is provided, the tune up is not eligible.

(1) The installation of a compressor/condenser unit, also known as an outside unit, for a central air conditioner or heat pump is not allowable as a repair and is considered to be a replacement.

(2) Repairs to room air conditioners that exceed two thirds of the estimated replacement cost may be replaced instead of repaired. These replacements of room air conditioners that do not have a SIR of 1.0 or greater are health and safety measures and may only be replaced if the client has a letter from **a board certified physician, certified nurse practitioner or certified physician's assistant stating that a functioning air-conditioning unit is a medical necessity to sustain the occupant's quality of life, *OR* someone in the household is age 60 or older.**

2. Air Conditioner and Heat Pump Replacement as an ECM

a. Replacements for energy efficiency are limited to central air conditioners, heat pump units and room air conditioners (also known as a window unit).

b. Replacements are limited to units that have a previously installed central air conditioner or room air conditioner. **Heat pumps must be evaluated to be installed in homes as an energy efficiency measure given the home has an existing electric furnace or an existing heat pump**.

(1) Room air conditioning units cannot be used to cost test the replacement of a central air conditioning unit and central units cannot be used to cost test the replacement of

room air conditioning units, unless approved on a case-by-case basis by the Department.

(2) Only one room air conditioner can be replaced for each room air conditioner currently installed.

(3) The window encasing a replacement room air conditioner must be weatherized to prevent air infiltration and heat loss.

c. Energy efficiency replacements must have an SIR of 1.0 or greater. The life span of the replacement is to be figured as 15 years.

d. The electrical wiring that is present in the home must be able to accommodate the installation of the new replacement air conditioner or heat pump. If the current wiring is inadequate, it must be upgraded to the manufactures' specifications. All electrical system upgrades resulting from the air conditioner or heat pump replacement, must be included in the SIR of the replacement unit.

e. Only new Energy Star certified air conditioners and heat pumps may be installed.

(1) See the following links for information regarding Energy Star qualifications:

- Room Air Conditioners: http://www.energystar.gov/index.cfm?c=roomac.pr_crit_room_ac
- Central Air Conditioners: http://www.energystar.gov/index.cfm?c=airsrc_heat.pr_crit_as_heat_pumps
- Heat Pumps: http://www.energystar.gov/index.cfm?c=airsrc_heat.pr_crit_as_heat_pumps

(2) All split system central air conditioners and heat pumps that are installed or retrofit need to have an electronically commutated motor or an equivalent as the air handler motor. If a permanent-split capacitor motor is present, it must be replaced with an electronically commutated motor or equivalent. The electronically commutated motor must be included as part of the cost of the central air conditioner and/or heat pump.

(3) On all split system central air conditioners and heat pump replacements or installations, the A-coil and line set must be sized to match the compressor unit to reach the desired efficiency.

(4) EXCEPTION: Energy Star qualified central air conditioners and heat pumps are not required to be installed in mobile homes due to the lack of available equipment rated for installation in mobile homes. As more equipment becomes available, this exception will be re-examined.

f. Replacements for central units must be properly sized using the post-weatherization characteristics of the home based upon HVAC sizing calculations such as Manual J or approved computerized load calculations.

g. Replacements of heat pumps and central air conditioners shall be performed by a qualified technician with EPA Section 608 Technician Certification. A copy of the Section 608 Technician Certification must be kept on file by the sub-grantee and available for review, as needed.

h. New central forced air HVAC systems will have minimum MERV 6 filtration with no air bypass around the filters.

i. When central air conditioner or heat pumps are replaced, all liquid refrigerant lines must be insulated to a minimum of R-4.

j. Condensate drain lines will be run to an appropriate drain or to the exterior of the building shell.

k. Condensate drain lines will be insulated with a minimum 1 inch of insulation with a vapor retarder when there is potential for condensation or freezing of the drain line.

l. All central air conditioners, heat pumps and room air conditioners that have been replaced must be decommissioned according to the Clean Air Act of 1990; Section 608, as amended by Final Rule 40 CFR 82, May 14, 1993. This includes existing central and window units replaced by heat pump installation. Replaced units cannot be returned to service by sale, barter, or given away for free. Written documentation/certification that the central air conditioner, heat pump or room air conditioner unit has been properly decommissioned must be included in the Client File.

3. Air Conditioner and Heat Pump: Health and Safety Replacement or Installation

a. Replacement of a non-functioning heat pump may be completed as a health and safety measure. Replacement of non-functioning central air conditioners and room air conditioners may be done as a health and safety measure provided that the occupant can provide; **a letter from a board-certified physician, certified nurse practitioner or certified physician's assistant stating that a functioning air-conditioning unit is a medical necessity to sustain the occupant's quality of life, *OR* someone in the household is age 60 or older.** If a home has one or more working central air conditioner, room air conditioner or heat pump unit, replacement or repair as a health and safety measure cannot be performed.

(1) Replacement of central air conditioners and heat pumps, for health and safety, are limited to units that have an existing central air conditioner or heat pump. If the replacement or installation of an air conditioner is necessary as a health and safety measure, the sub-grantee may elect to install a single Energy Star certified room air

conditioner in a home in lieu of replacing an existing central air conditioner or heat pump.

(2) Installation of a single Energy Star certified room air conditioner may be done as a Health and Safety measure in any home that does not have an existing or working room air conditioner, central air conditioner or heat pump unit. Installation of a central air system that is compatible with an existing ducted HVAC system may be completed as a H&S measure based on the initial auditor's recommendation, given **a letter from a board certified physician, certified nurse practitioner or certified physician's assistant stating that a functioning air-conditioning unit is a medical necessity to sustain the occupant's quality of life, *OR* someone in the household is age 60 or older.**

The room air conditioner must be installed in a regularly occupied space. The central air system must be evaluated to maximize efficiency and meet the Energy Star requirements for ECM replacement.

b. All health and safety replacements must abide by the guidelines outlined in Section III, Subsection L: Air Conditioners and Heat Pumps.

c. All documentation pertaining to the health and safety replacement or installation (i.e. Dr. Letter, etc.) must be included in the Client File**.**

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Section XII: Miscellaneous

A. Prioritization of Weatherization Measures

1. All 'Mandatory' measures listed in Table XI-2 must be evaluated for installation as outlined in Section XI, Subsection B, Topic 3: Library Measures Tab.

2. Any 'Option by Agency' measure listed in Table XI-2 may be evaluated for installation as outlined in Section XI, Subsection B, Topic 3: Library Measures Tab.

3. Once evaluated measures are determined to be cost-effective by the computerized audit, the measures should be installed based on cost-effective prioritization.

4. Measure skipping of cost-justified major measures is not permitted at any time. A “Major Measure” is defined as follows: A high priority measure, which if skipped, would result in “partial” weatherization of a unit. Major measures are as follows: air sealing, duct sealing of ducts outside the thermal boundary, attic insulation, wall insulation and floor or belly insulation.

5. If it is determined at any time prior to the beginning of work on the home that for legitimate reasons an approved measure cannot be installed, the computerized audit must be re-run to remove the measure which could not be installed. Therefore, it is imperative that the initial auditor correctly evaluate the home so that measures, which cannot be installed for legitimate reasons, are not evaluated for installation.

6. If work has started on the home, and it is determined that a measure is unable to be installed for legitimate reasons, all other weatherization measures should be installed and a comprehensive explanation of why the measure was skipped should be included in the client file. If a client declines a measure based on a legitimate health concern, alternate materials should be researched that can be used to complete the ECM and protect the client's health. If an alternative material cannot be found, the measure may be skipped and measures with a lower SIR may be installed. Be sure to document why the measure was not installed.

7. If subgrantee staff or contractors are not adequately trained or equipped to perform certain measures, the measures cannot be skipped. When priority measures cannot be installed due to lack of trained staff or equipment, standard procedures should be to postpone the job until adequate training and/or equipment are acquired.

8. All Health and Safety measures should be installed prior to installing ECM's. The inability to install health and safety measures will require the deferral of the home since a home cannot be considered complete without having ECM's installed.

9. A signed and dated, agency developed, Change Work Order must be included in the client file whenever:

materials should not be entered as incidental repair costs under the funding source breakdown in MoWAP.

F. Material Standards

1. Only weatherization materials that are listed in the most current Appendix A - Standards for Weatherization Materials in DOE 10 CFR Part 440, or that meet or exceed the standards prescribed in Appendix A, shall be installed as weatherization materials. Materials shall be installed according to state and local codes. Materials shall be installed according to manufacturers' instructions unless specified otherwise.

2. All weatherization measures installed need to be installed in such a fashion to stay in place or remain intact for the duration of the lifespan of the measure, as evaluated in NEAT/MHEA.

3. Surfaces must be appropriately cleaned, prior to installing caulking or adhesive-backed materials.

4. All exposed wood and raw edges, located either within the interior of the home or on the exterior of the home that have been installed or modified by WAP efforts shall have a primer or sealant applied in such a manner that the client can finish the wood to match surrounding wood surfaces. All finish coat paint used to cover primed or sealed surfaces should be supplied by the homeowner.

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ATTACHMENT E TO WEATHERIZATION PROGRAM CONTRACT
NO. FCT/R 25-26
BID FORM - TO BE COMPLETED BY CONTRACTOR
REQUEST FOR QUOTATION

BUYER: CAASTLC, Inc.
ADDRESS: 2709 Woodson Road
Overland, MO. 63114

CONTRACTOR: _____
ADDRESS: _____
_____

Keith Robinson (314) 446-4417
TELEPHONE: (314) 863-0015 TELEPHONE: Dale Hickman (314) 446-4442
DATE: June 9, 2025
DATE & TIME OF BID CLOSING: **Wednesday, June 25, 2025, 5:00 p.m.**
IMPORTANT: NOTE MINIMUM MATERIAL SPECIFICATIONS ON ATTACHMENT C. WORKMANSHIP MUST CONFORM TO STANDARDS IN ATTACHMENT D.

The Quantity shown in each bid line is based on the work to complete one (1) home for the twelve (12) month period of July 1, 2025, through June 30, 2026. It is anticipated that approximately 99 homes will be completed during the contract period of July 1, 2025, through June 30, 2026.

Please break down each line item by material and labor and use the indicated quantity to establish a line-item price to be in effect for the twelve (12) month period of July 1, 2025, through June 30, 2026.

CAASTLC, Inc. reserves the right to choose more than one Contractor to perform the work under this contract.

CONTRACTOR NAME: _____ AUTHORIZED SIGNATURE: _____

	BID FORM: HVAC & MECHANICAL	**RFQ#: FCT/R 25-26**			**CAASTLC**	
		DATE: June 9, 2025			**USE**	
					ONLY	
	ITEM		**COSTS**			**Weighted**
#	DESCRIPTION	MATERIAL $	LABOR $	TOTAL $	**FREQUENCY x**	**Total**
	EnergyStar Qualified Equipment					
	Gas Forced Air Furnace Minimum equipment warranty: 5 yr parts, 20 yr heat exchanger; use MERV 6 filters. Includes gas piping transition to coil/plenum connection & adaptation to cold air drop. Include T.E.S.P. testing. (total external static pressure)					
1a	95% afue - 40-60k Btus			$ -	50	$0.00
1b	95% afue - 61-80k Btus			$ -	50	$0.00
1c	95% afue - 81-100k Btus			$ -	30	$0.00
1d	95% afue - 101-120k Btus			$ -	10	$0.00
2	Vent PVC out thru roof (upcharge to new install) - pictures of installation and Flue Gas Analyzer printout to accompany invoice			$ -	10	$0.00
3	ECM blower motor (upcharge to new install)			$ -	30	$0.00
	Electric forced air resistance furnace 100 % afue (5 yr warranty):					
4a	up to 15 kW			$ -	1	$0.00
4b	16-30 kW			$ -	1	$0.00
	Air source heat pump with back-up strip heat with ECM blower motor (5 year warranty)(min. 15 SEER a/c with energy star cert.) with 454B					
5a	9 hspf - 2 ton			$ -	10	$0.00
5b	9 hspf - 2.5 ton			$ -	20	$0.00
5c	9 hspf - 3 ton			$ -	10	$0.00
5d	9 hspf - 3.5 ton			$ -	10	$0.00
5e	9 hspf - 4 ton			$ -	1	$0.00

Company Name: Authorized Signature:

	BID FORM: HVAC & MECHANICAL	**RFQ#: FCT/R 25-26**			**CAASTLC**	
		DATE: June 9, 2025			**USE**	
					ONLY	
	ITEM		**COSTS**			**Weighted**
#	DESCRIPTION	MATERIAL $	LABOR $	TOTAL $	**FREQUENCY x**	**Total**
5f	9 hspf - 4.5 ton			$ -	1	$0.00
	Gas steam boiler (5 yr warranty). Include expansion tank, backflow preventer, pressure regulator valve					
6	92% afue			$ -	1	$0.00
	Gas water boiler (5 yr warranty). Include expansion tank, backflow preventer, pressure regulator valve					
7	92% afue			$ -	10	$0.00
	Air conditioner - central split system with 5 year warranty. Energy star certified with ECM blower motor. With 454B					
8a	15 SEER - 2 ton			$ -	10	$0.00
8b	15 SEER - 2.5 ton			$ -	20	$0.00
8c	15 SEER - 3 ton			$ -	10	$0.00
8d	15 SEER - 3.5 ton			$ -	10	$0.00
8e	15 SEER - 4 ton			$ -	1	$0.00
8f	15 SEER - 4.5 ton			$ -	1	$0.00
9a	Window air conditioner - Install with electric present. Energy star certified. Weatherize window to prevent air leakage. Up to 10kbtu			$ -	10	$0.00
9b	Window air conditioner - Install with new electric. Energy star certified. Weatherize window to prevent air leakage. Up to 10kbtu			$ -	10	$0.00
	Gas water heater (DHW) - gas power vent (6 yr warranty). Includes gas & flue piping, expansion tank, & (floor pan with drain if required).					

Company Name: Authorized Signature:

	BID FORM: HVAC & MECHANICAL	**RFQ#: FCT/R 25-26**			**CAASTLC**	
		DATE: June 9, 2025			**USE**	
					ONLY	
	ITEM		**COSTS**			**Weighted**
#	DESCRIPTION	MATERIAL $	LABOR $	TOTAL $	**FREQUENCY x**	**Total**
10a	30 gallon - short or tall			$ -	10	$0.00
10b	40 gallon - short or tall			$ -	30	$0.00
10c	50 gallon - short or tall			$ -	10	$0.00
	Electric water heater (DHW) - 6 yr warranty. Includes electric work, water piping, expsansion tank, & (floor pan with drain if required).					
11a	30 gallon - short or tall			$ -	1	$0.00
11b	40 gallon - short or tall			$ -	10	$0.00
11c	50 gallon - short or tall			$ -	1	$0.00
12	Whole home water Pressure Regulator (reducing) Valve - per local codes. (may be required for water heater install to pass inspection)			$ -	20	$0.00

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		DATE: June 9, 2025			USE	
					ONLY	
	ITEM		COSTS			Weighted
#	DESCRIPTION	MATERIAL $	LABOR $	TOTAL $	FREQUENCY x	Total
	CLEAN & TUNE (see associated field forms for complete procedures)					
13	Clean and Tune, Gas Heating System [each] (includes adding or replacing air filter(1), belt(s), and thermocouple if needed.)			$ -	200	$0.00
14	Clean and Tune, Oil Heating System [each] (includes adding or replacing air filter(1), belt(s), oil filter and nozzle if needed.)			$ -	1	$0.00
15	Clean and Tune, Electric Heating System			$ -	10	$0.00
16	Clean and Tune, Gas Space Heater [each] (includes adding or replacing thermocouple if needed)			$ -	20	$0.00
17	Clean and Tune, Oil Space Heater [each] (includes adding or replacing oil filter and nozzle if needed)			$ -	1	$0.00
18	Clean and Tune, Gas Water Heater [each] (includes adding or replacing thermosouple if needed)			$ -	50	$0.00
19	Air Conditioner Tune-up [each] (includes 1lb refrigerant charge; replacing air filter(1), if necessary)			$ -	50	$0.00
20	Service call - Travel to and from plus one hour of work			$ -	100	$0.00
21	Labor - Subsequent charge per hour - general			$ -	200	$0.00

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		DATE: June 9, 2025			**USE**	
					ONLY	
	ITEM		**COSTS**			**Weighted**
#	DESCRIPTION	MATERIAL $	LABOR $	TOTAL $	**FREQUENCY x**	**Total**
	THERMOSTATS					
22	Standard Programmable thermostat for air source heat pump with emergency heat			$ -	10	$0.00
23	Programmable thermostat for air source heat pump with emergency heat WITH outdoor temperature and humidity sensors (i.e. Redlink). Auto-switch capable from H.P. to strip heat			$ -	30	$0.00
24	Programmable thermostat - gas or electric heat & cool w/ fan			$ -	50	$0.00
25	Thermostat, heat only - digital			$ -	1	$0.00
26	Thermostat, heat and cool w/ fan - digital non-programmable			$ -	10	$0.00
27	Move existing thermostat			$ -	10	$0.00
28	Wireless thermostat kit (applicable when running wire is impractical)			$ -	1	$0.00
	FURNACE REPAIR					
29	Fan/limit control			$ -	20	$0.00
30	Universal Gas valve			$ -	30	$0.00
31	Smart Universal Gas valve			$ -	10	$0.00
32	Replace furnace blower motor - ECM			$ -	20	$0.00
33a	Replace furnace control (circuit) board - OEM			$ -	10	$0.00
33b	Replace furnace control (circuit) board - Universal			$ -	20	$0.00
34a	Pilot assembly, complete. Standing pilot			$ -	10	$0.00
34b	Pilot assembly, complete. Electronic ignition pilot			$ -	10	$0.00
35	Replace burner tube(s) - per furnace			$ -	1	$0.00
36a	Install emergency disconnect switch for furnace/air handler			$ -	10	$0.00
36b	Replace emergency disconnect switch for furnace/air handler (bad switch)			$ -	10	$0.00
37	Replace/Install pressure switch or safety switch			$ -	20	$0.00
38	Replace high-limit switch			$ -	20	$0.00

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		DATE: June 9, 2025			**USE**	
					ONLY	
	ITEM		**COSTS**			**Weighted**
#	DESCRIPTION	MATERIAL $	LABOR $	TOTAL $	**FREQUENCY x**	**Total**
39	Replace/Install door panel safety switch			$ -	20	$0.00
40	Replace furnace igniter - universal replacement			$ -	40	$0.00
41	Replace furnace flame sensor			$ -	30	$0.00
42	Transformer - low voltage			$ -	1	$0.00
43	Replace furnace inducer motor			$ -	20	$0.00
	VENTING					
	Vent pipe, single wall - per linear foot:					
44a	3"			$ -	50	$0.00
44b	4"			$ -	50	$0.00
44c	5"			$ -	30	$0.00
44d	6"			$ -	20	$0.00
45	Vent pipe, double wall (Type B) (includes elbows and connectors)			$ -	30	$0.00
	Install flue-liner:					
46a	3"			$ -	1	$0.00
46b	4"			$ -	50	$0.00
46c	6"			$ -	10	$0.00
47a	Chimney/Flue Cap - 3 to 4"			$ -	20	$0.00
47b	Chimney/Flue Cap - 5 to 6"			$ -	10	$0.00
47c	Chimney/Flue Cap - Over 6"			$ -	1	$0.00
48	Screened Cap for Fireplace chimney			$ -	1	$0.00
49	PVC intake pipe for furnace per unit			$ -	20	$0.00
50	Combination Tee (swivel tee) for natural draft appliances - Size to be specified			$ -	20	$0.00

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		DATE: June 9, 2025			USE	
					ONLY	
	ITEM		COSTS			Weighted
#	DESCRIPTION	MATERIAL $	LABOR $	TOTAL $	FREQUENCY x	Total
	Boiler / Water Heater Repair					
51	Replace Thermocouple **NOTE: (thermocouple is included with a Clean&tune)**			$ -	20	$0.00
52	Replace water heater pressure relief valve			$ -	30	$0.00
53	Install water heater pressure relief tube			$ -	30	$0.00
54	Water heater control valve			$ -	1	$0.00
55	Install/Replace Water shut-off valve at water heater			$ -	10	$0.00
56	Install expansion tank on water heater up to 50 gallons with needed hardware			$ -	10	$0.00
57	Boiler expansion tank			$ -	1	$0.00
58	Boiler auto fill			$ -	1	$0.00
59	Boiler check valves			$ -	1	$0.00
60	Water heater burner assembly			$ -	1	$0.00
61	Replace diverter on water heater			$ -	10	$0.00
62	Water heater spillage alarm			$ -	1	$0.00
63	Water heater spillage kill switch			$ -	1	$0.00
	Gas Piping					
64	Install/replace black iron gas pipe - per linear foot including all connectors			$ -	100	$0.00
65	Gas shut-off valve			$ -	50	$0.00
66	Flex gas line alt. for dryer/ovens - 1/2 or 3/4" to be specified			$ -	20	$0.00
67	Install gas dirt leg			$ -	30	$0.00

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		DATE: June 9, 2025			USE	
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	ITEM		COSTS			Weighted
#	DESCRIPTION	MATERIAL $	LABOR $	TOTAL $	FREQUENCY x	Total
	A/C Repair					
68a	Replace a-coil - 1.5 ton			$ -	1	$0.00
68b	Replace a-coil - 2 ton			$ -	10	$0.00
68c	Replace a-coil - 2.5 ton			$ -	20	$0.00
68d	Replace a-coil - 3 ton			$ -	10	$0.00
68e	Replace a-coil - 3.5 ton			$ -	10	$0.00
68f	Replace a-coil - over 3.5 ton			$ -	10	$0.00
69	Clean a/c indoor coil			$ -	30	$0.00
	*NOTE: cleaning a/c indoor coil is included in an a/c tune-up					
70	Replace/Repair a-coil pan			$ -	10	$0.00
71	Replace a/c capacitor			$ -	10	$0.00
72	Replace a/c contactor			$ -	1	$0.00
73	Replace a/c condenser fan motor			$ -	10	$0.00
74	Charge a/c refrigerant per pound - R22			$ -	20	$0.00
75	Charge a/c refrigerant per pound - 410A			$ -	20	$0.00
76	Charge a/c refrigerant per pound - 454B			$ -	3	$0.00
77	Replace a/c filter drier			$ -	10	$0.00
78	Clean/clear a/c condensate drain plug			$ -	30	$0.00
79	Replace a/c condensate drain line			$ -	30	$0.00
80	replace AC line-set insulation wrap per 6' (UV-rated for exterior)			$ -	10	$0.00
81	Install condensate pump, including tubing to drain			$ -	50	$0.00

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		DATE: June 9, 2025			USE	
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	ITEM		COSTS			Weighted
#	DESCRIPTION	MATERIAL $	LABOR $	TOTAL $	FREQUENCY x	Total
	DUCTWORK					
82	Install filter rack on furnace (must have filter slot cover)			$ -	50	$0.00
83	Replace cold air drop - appropriately sized for system with covered filter slot			$ -	20	$0.00
84	Install magnetic cover for filter slot opening			$ -	200	$0.00
85	6" round ductwork - Smooth Rigid - per linear foot including all elbows and connectors			$ -	50	$0.00
86	8" round ductwork - Smooth Rigid - per linear foot including all elbows and connectors			$ -	20	$0.00
87	Damper (volume control) in supply run			$ -	10	$0.00
88	Duct insulation (minimum R8 - fiberglass, foil faced) - per sq ft			$ -	50	$0.00
89	Duct mastic - seal connections [per connection] (include mesh tape)			$ -	100	$0.00
90	Sheet metal - per sq ft. Installed and sealed per the SWS			$ -	50	$0.00
91	Duct board with sealant - Seal exterior wall duct cavities - per sq ft.			$ -	50	$0.00
92	Replace/install supply register			$ -	30	$0.00
93	Replace/install return air grille/non-closeable register			$ -	30	$0.00
94	Replace/install floor rated return air grate			$ -	1	$0.00
95	Leave extra air filters on site (per filter, min. MERV 6) - size will be specified on work order			$ -	200	$0.00

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	ITEM		COSTS			Weighted
#	DESCRIPTION	MATERIAL $	LABOR $	TOTAL $	FREQUENCY x	Total
	ALARMS / CAZ TESTING / MAKE-UP AIR					
96	Install Kidde C3010D 10-year battery digital carbon monoxide alarm or equivalent with the following specifications: 1) Over 40 decibel alarm; 2) alarms at 30ppm; and 3) long life battery to provide 10-years coverage. Not energystar			$ -	200	$0.00
97	Add combustion air grilles: 1" square net free area per 1000 Btu input			$ -	30	$0.00
98	Automatic makeup air damper (tied to air handler fan control, timer or pressure sensor) 6" or 8" supply, not energystar			$ -	10	$0.00
99	Exterior make up air for combustion appliances per local codes. Typical 6" high & low, air from outdoors, with screens			$ -	10	$0.00

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	ITEM		COSTS			Weighted
#	DESCRIPTION	MATERIAL $	LABOR $	TOTAL $	FREQUENCY x	Total
	Energystar Qualified Ventilation (Fan Installs Include Air-seal around housing & Restoring surrounding insulation)					
100	Install new exhaust fan - minimum 50 CFM on demand, <1 sone; including wiring to appropriate junction box. Must be vented to exterior through rigid insulated vent pipe - R8 or greater - location to be specified			$ -	50	$0.00
101	Install new exhaust fan - minimum 100 CFM on demand, <1 sone; including wiring to appropriate junction box. Must be vented to exterior through rigid insulated vent pipe - R8 or greater - location to be specified			$ -	20	$0.00
102	Replace existing bathroom exhaust fan - minimum 50 CFM on demand, < 1sone. Must be vented to exterior through rigid insulated vent pipe - R8 or greater			$ -	20	$0.00
103	Replace existing kitchen exhaust fan - minimum 100 CFM on demand. Must be vented to exterior through rigid insulated vent pipe - R8 or greater			$ -	20	$0.00
104	Install programmable exhaust fan control switch to allow for automatic intermittent or continuous operation.			$ -	30	$0.00
105	Install balanced ERV - up to 70 cfm per ASHRAE 62.2, with controls. Includes required parts, penetrations and ducting per manufacturers recommendations, Use Broan, Fantech or approved equivalent, to be UL listed, HVI approved, Sone ~ 1.0, with a continuously lubricated motor. Controls, accessories, ducting, wiring and installation included, per local building codes. Demonstrate filter cleaning to owner and leave behind printed how-to and when instructions.			$ -	50	$0.00

	BID FORM: HVAC & MECHANICAL	**RFQ#: FCT/R 25-26**			**CAASTLC**	
		DATE: June 9, 2025			**USE**	
					ONLY	
	ITEM		**COSTS**			**Weighted**
#	DESCRIPTION	MATERIAL $	LABOR $	TOTAL $	**FREQUENCY x**	**Total**
106	Install balanced ERV - up to 130 cfm per auditor's ASHRAE 62.2 instructions. Use Broan, Fantech or approved equivalent, to be UL listed, HVI approved, Sone ~ 1.0, with a continuously lubricated otor. Controls, accessories, ducting, wiring and installation included, per local building codes. Demonstrate filter cleaning to owner and leave behind printed how-to and when instructions.			$ -	30	$0.00
107	Install 50 cfm single speed energy star continuous rated fan; <1 sone (62.2 compliant).			$ -	20	$0.00
108	Replace existing exhaust fan with new 62.2 rated variable speed continuous ≤ 1.0 sone, exhaust fan appropriately sized - up to 110 cfm (+/-) - for the size and ACH of the home per auditor ASHRAE 62.2 instructions, with on demand/kill switch. Panasonic Whisper Green, Delta GBR or approved equivalent. Includes all controls, wiring, ducting and installation, per local building codes.			$ -	100	$0.00
109	Install exhaust fan with new 62.2 rated variable speed continuous ≤ 1.0 sone, exhaust fan appropriately sized - up to 110 cfm (+/-) - for the size and ACH of the home per auditor ASHRAE 62.2 instructions, with on demand/kill switch. Panasonic Whisper Green, Delta GBR or approved equivalent. Includes all controls, wiring, ducting and installation, per local building codes.			$ -	100	$0.00
110	Add GFCI / new circuit wiring as needed (beyond typical) for 62.2 fan install.			$ -	10	$0.00
111	Add light to ASHRAE 62.2 exhaust fan installation/replacement work order.			$ -	30	$0.00

	BID FORM: HVAC & MECHANICAL	**RFQ#: FCT/R 25-26**			**CAASTLC**	
		DATE: June 9, 2025			**USE**	
					ONLY	
	ITEM		**COSTS**			**Weighted**
#	DESCRIPTION	MATERIAL $	LABOR $	TOTAL $	**FREQUENCY x**	**Total**
112a	Install ASHRAE 62.2 continuous rated kitchen range hood - Up to 36" black or white in color. Air king ECQ306 or equivalent. Venting & electric present.			$ -	10	$0.00
112b	Install ASHRAE 62.2 continuous rated kitchen range hood - Up to 36" black or white in color. Air king ECQ306 or equivalent with new venting & electric.			$ -	1	$0.00
113	Install programmable exhaust fan control switch. i.e. Air Cycler Smart Exhaust or approved equivalent to allow for automatic intermittent or continuous fan operation. Must be ASHRAE 62.2 compliant; not energystar			$ -	50	$0.00

	BID FORM: HVAC & MECHANICAL	RFQ#: FCT/R 25-26			CAASTLC	
		DATE: June 9, 2025			USE	
					ONLY	
	ITEM		COSTS			Weighted
#	DESCRIPTION	MATERIAL $	LABOR $	TOTAL $	FREQUENCY x	Total
	CONTRACTOR GRAND TOTAL	0	0	0		
	Note on Bid:					
	CAASTLC will utilize a multiplier effect on each item to emphasize measures according to their relative work order frequency. The use of the multiplier lessens the effects of utilizing extremely low pricing on infrequently utilized measures in order to reduce the overall bid. The multiplier effect, indicated on each item, is as follows: high frequency measures (multiplier 200) down to infrequent measures (multiplier 1). The multiplier will be applied to the bid price and then the totals will be computed indicating the lowest bid as the one with the lowest cost after the multiplier effect. CAASTLC's use of these multiplier numbers are in no way guarantees of quantity to be ordered from the contract once awarded.						
	MEASURE FREQUENCY					
	total of x 200					
	Total of x100					
	Total of x50					
	total of x 30					
	Total of x20					
	total of x 10					
	Total of x1					
	Weighted Grand Total					$0.00

Company Name: Authorized Signature:

CAASTLC
Community Action Agency of St. Louis County, Inc.

CONTRACTUAL REQUIREMENTS PURSUANT TO THE WEATHERIZATION PROGRAM
CONTRACT NO. FCT/R 25-26

ARTICLE I: GENERAL

These Contractual Requirements and Attachments A, B, C, D, & E shall together constitute the "Contract".

AWARD – The right is reserved, as the interest of Community Action Agency of St. Louis County, Inc. (hereinafter "CAASTLC") may require, to reject any or all bids. This Contract shall be awarded to that responsive and responsible bidder whose bid conforming to the provisions outlined herein will be most advantageous to CAASTLC, as determined by firm fixed price. (See Attachment A).

BOND – A Performance Bond or Irrevocable Letter of Credit will be required of the winning bidder prior to the signing of this Contract. (See Attachment A.)

The Contractor shall perform Weatherization services in the homes of CAASTLC clients (hereinafter "clients") as outlined in the attached PY25/26 Missouri Weatherization Work Standards (hereinafter "Attachment D"). The estimated number of homes to be weatherized under this Contract shall be 99 for a total estimated sum of $424,500.00 dollars. CAASTLC shall have the Contractor perform Weatherization services on an as-needed basis only and makes no promises or guarantees as to the number of homes to be weatherized or the amount to be paid under this Contract.

The Contractor agrees that CAASTLC and/or CAASTLC clients shall not be liable for the debts of the Contractor, or any other firm or organization affiliated with the Contractor in the fulfillment of the terms of this Contract.

The term of this Contract runs from July 1, 2025, through June 30, 2026. All homes must be completed by the end of the contract period. The Contractor assures, promises, and guarantees that all jobs will be completed to the satisfaction of CAASTLC and the State of Missouri, Department of Natural Resources, Division of Energy (hereinafter "DNR/DE") within the terms and conditions of this Contract.

The Contractor agrees to perform weatherization measures and understands final inspection must be performed by CAASTLC personnel during established CAASTLC working hours, Monday through Friday.

_____ _____

Company Name Authorized Signature

DNR/DE's Weatherization Assistance Program is not a party to the bid or this Contract and shall be held harmless in any dispute arising from the bid or this Contract.

INSURANCE REQUIREMENTS - The successful bidder (hereinafter "Contractor") agrees to carry appropriate insurance as required in Attachment A during the period of this Contract and will provide CAASTLC with a Certificate of Insurance on all required coverage prior to signing of this Contract. The Contractor agrees to save and hold harmless CAASTLC and its employees, elected and non-elected officials.

Any notice to any Contractor from CAASTLC relative to any part of this Contract will be in writing and considered delivered when said notice is mailed at any level, regular or certified, or, if delivered in person, upon receipt of said notice. Any notice to Contractor shall be sent to:

Contractor's name: _____
Attn: Contractor's Contact Name & Title

_____
Contractor's address & zip code:

_____

_____

Any notice to CAASTLC shall be sent to:

CAASTLC, Inc.
Attn: Keith Robinson, Director of Weatherization & Support Services
2709 Woodson Road
St. Louis, MO 63114

PRIMARY, SECONDARY, TERTIARY, ETC. CONTRACTORS

The Contractor agrees that CAASTLC may choose to award the Weatherization services to primary, secondary, tertiary, etc., contractors. The lowest and best bidder will be the primary contractor, the second lowest and best bidder will be the secondary contractor, the third lowest and best bidder will be the tertiary contractor, etc. CAASTLC will always go to the primary contractor each time Weatherization services are needed and will utilize the primary contractor unless one of the following conditions applies:

_____ _____
Company Name Authorized Signature

a. The primary contractor cannot provide the services in the time frame requested by CAASTLC. In such event, CAASTLC may award the work to the next lowest bidder (secondary contract). If the next lowest bidder (secondary contract) cannot provide the services in the time frame requested by CAASTLC, CAASTLC may award the work to the third lowest bidder (tertiary contract). If at any time the primary (or secondary, tertiary, etc.) has eight (8) or more outstanding work orders in which the work for the subject homes has not been completed in the time frame requested by CAASTLC then all subsequent work orders will be awarded to the next lowest bidder until such time as the primary (or secondary, tertiary, etc.) contractor has completed the work for the eight (8) or more outstanding work orders.

b. CAASTLC has been receiving unsatisfactory services applicable to the primary (or secondary, tertiary, etc.) contractor's work performance. In such an instance, CAASTLC will identify the problem(s) and give the contractor a period of no longer than twenty (20) calendar days for such contractor to correct the identified problem(s). After an attempt has been made to do this and the problem(s) have not been corrected, the contract will be terminated.

c. If in the opinion of CAASTLC a potential conflict of interest exists with the primary contractor (or secondary, tertiary, etc.) on a given project, CAASTLC may award the contract to the next lowest bidder (secondary contractor).

The Contractor recognizes that circumstances may arise in which CAASTLC discovers, after award of the primary contract, that the primary contractor cannot provide services in the requested time frame, performs in an unsatisfactory manner or has a conflict of interest. In these situations, CAASTLC may cancel the contract with the primary contractor and may award a contract to the second-lowest bidder (secondary contract). If CAASTLC discovers these kinds of issues with the secondary contractor, CAASTLC shall cancel the contract with the secondary contractor and may award a tertiary contract.

ARTICLE II: RESPONSIBILITY FOR MATERIALS AND SUPPLIES

Except as otherwise provided in this Contract, the Contractor shall be responsible and bear all risks for loss and damage to materials and supplies required by this Contract. The Contractor shall also be responsible for removing from the worksite any material and/or supplies and/or articles to be furnished under this Contract that have been rejected due to non-conformity or lack of adherence to bid specifications.

Except as otherwise specifically stated in this Contract, or any Amendments to this Contract, the Contractor shall provide and pay for all materials, labor, and all other expenses necessary for the complete performance of the work to be done under this Contract.

(1) The Contractor shall have a competent superintendent to supervise the work at all times during the progress of this Contract. The Contractor shall also provide a

staff adequate to coordinate and expedite the work and to ensure compliance with all Contract requirements.

(2) The Contractor shall lay out the work and be responsible for all measurements, quantity estimates and site-specific ordering of the work executed under this Contract. The Contractor shall be responsible for any errors resulting from its work. The clients are to be contacted before work is begun on their homes. No work is to be performed unless the client or his/her adult representative is on the premises.

The activities of the Contractor's staff and associates shall be fully coordinated with the activities of CAASTLC. As the work of the Contractor's staff and associates progresses, advice on matters of immediate concern to CAASTLC and related to the specific scope of work covered by this Contract, shall be made available to CAASTLC during the period of this Contract.

The Contractor agrees to protect, indemnify and save harmless CAASTLC from all liabilities, attorneys' fees, costs, expenses and damages arising out of:

(1) Failure by the Contractor to comply with all applicable Federal, State and local laws and regulations pertaining to the services, materials and/or supplies and/or articles ordered, and labor expended pursuant to this Contract.

(2) All claims, suits, actions, costs, counsel fees, damages, judgments or decrees by reason of any person or persons being injured or property being damaged or destroyed by any fault, negligence or defect, latent, or otherwise, in the material or articles purchased or their design, or during or as a result of the work or services to be performed pursuant to this Contract.

ARTICLE III: MATERIALS INSPECTION, ACCEPTANCE AND APPROVALS

CAASTLC shall furnish work orders to the Contractor for homes approved and appraised for weatherization services with address and directions to said homes. Included with each work order will be instructions for work to be performed on the home as well as estimated material and labor costs. Any materials *not* bid in the Request for Quotation must be approved in writing prior to installation by authorized Weatherization Personnel.

MATERIALS AND WORKMANSHIP - All materials used shall conform to the standards in the Material Specifications specified in Attachment C and Contractor shall produce, upon request by CAASTLC, documentation verifying that any material that was bid conforms to the minimum material specification listed in this document. All workmanship must comply with the Standards and Guidelines as required in Attachment D.

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Company Name Authorized Signature

All materials shall be installed in the quantities ordered, per the job specification sheet provided by CAASTLC on each job. All materials must be new and approved by CAASTLC prior to their use. Preference will be shown for recycled building insulation materials (see federal specifications).

Substitution is defined as an item that materially conforms to the specifications listed but is physically or technically different from the item bid. Substitution shall only be made with the advanced written consent of CAASTLC. Any product provided that does not meet the listed specifications shall be replaced by the Contractor at no expense to CAASTLC. If the Contractor is unable to make an acceptable adjustment or replacement, CAASTLC shall interpret this as a breach of contract and may seek damages for default.

Approval of any materials and supplies shall not constitute a waiver of CAASTLC's right to demand full compliance with this Contract. Materials, supplies and accessories may be rejected for cause even though such articles have been given prior approval. CAASTLC has the option to use materials in inventory. The Contractor will be paid the line item labor cost of bid material.

Any material, other than unusable material, removed from the house must be reinstalled in or on the house at no cost to the client or CAASTLC unless replaced with equal or better quality material by order of CAASTLC. *Any material that is removed from the house and not reinstalled shall* be *left with the client with the exception of lead paint materials that must be removed to comply with lead safe work practices.* New materials listed on a job order that are not installed at the client's request or for acceptable reasons provided by the Contractor will be removed from the premises and the cost of that material and its installation will be subtracted from the total job cost.

The Contractor has the right to accept or re-measure all work orders; however, CAASTLC will not be liable for mis-measurements by the Contractor.

All work performed with funding administered by the DNR/DE Weatherization Assistance Program must meet the objectives and specifications outlined in the Standard Work Specifications for Home Energy Upgrades, and the Missouri Weatherization Program Technical Manual. These specifications can be found at: https://sws.nrel.gov/ and https://energy.mo.gov/sites/energy/files/Technical%20Manual%202017%20%28Final%20with%20attachments-A%29.pdf. All work will be inspected and validated by a certified CAASTLC Quality Control Inspector before being submitted for reimbursement.

The Contractor shall comply with the National Fuel Gas Code for all work performed on gas systems, gas-fired systems, the Underwriters Laboratories Oil Code for work performed on oil-fired systems, manufacturer's guidelines, and where applicable, all local/city codes, regulations and standards.

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Company Name	Authorized Signature

The Contractor shall notify CAASTLC of any unsafe or dangerous conditions concerning the heating system being serviced. The existence of these conditions or problems may have been undetectable or overlooked by the CAASTLC auditor.

CAASTLC shall also have access to all areas of the Contractor's business premises during regular business hours as well as the business premises of subcontractor(s), if any, for the purpose(s) of ensuring compliance with any and all relevant Federal and/or State laws and/or regulations.

Contractor shall inform CAASTLC when work cannot be performed as indicated, when the homeowner refuses the work, or the service called for does not match the job site.

For any Energy Recovery Ventilator (ERV) installed, the Contractor shall provide filter cleaning training to the client by physically demonstrating to the client how to clean the ERV filter and shall provide printed instructions on cleaning the ERV filter to the client.

Contractor shall complete a Daily Combustion Appliance Zone (CAZ) Test Form every day that work is completed at every home; however, for an all-electric home, this form need only be filled out at the end of the first day.

CLEAN & TUNE AND GENERAL REPAIRS:

CAASTLC will perform diagnostic tests on the furnace and prepare a Work Order indicating the work to be performed. The contractor shall clean, inspect, and tune the combustion area, flue, and air handling systems for increased efficiency and provide general repairs indicated by the CAASTLC auditor on the work order. (See Exhibits A, B, C, D and E). If the CAASTLC auditor notices any components or functions which are questionable, they will be noted on the work order. If additional work is needed, but not specified on the work order, the Contractor must receive CAASTLC approval before proceeding. No additional work will be paid without prior authorization from CAASTLC. Contractor is responsible for returning completed work orders to CAASTLC and notifying CAASTLC when jobs are complete.

HEATING, VENTILATION, AND AIR CONDITIONING (HVAC) SYSTEMS REPLACEMENT:

The Contractor shall obtain and install new materials needed to complete the designated HVAC replacement, in compliance with the Technical Specifications section. If additional work is needed, but not specified on the work order, the Contractor must receive CAASTLC approval before proceeding. No additional work will be paid without prior authorization from CAASTLC. Contractor is responsible for returning completed work orders to CAASTLC and notifying CAASTLC when jobs are complete.

COMPLETION AND FINAL INSPECTION – For Clean & Tune and General Repairs work the Contractor shall have five (5) business days from the date of the work order issuance in which to complete each job. For HVAC Replacement work the Contractor shall complete this service within ten (10) days from the issuance of the work order by CAASTLC.

_____	_____
Company Name	Authorized Signature

The Contractor shall notify CAASTLC in writing, or verbally as to the date when work will be completed and ready for inspection and request final inspection of work by returning the completed work order and invoice within five (5) calendar days of completion of the work. Should CAASTLC, upon final inspection, find improperly completed work by the Contractor, the Contractor must correct any and all such deficiencies from the date of issuance of the re-work order within three (3) business days. The Contractor shall notify CAASTLC in writing of the completion of any rework in order to arrange for a CAASTLC inspector to make a timely re-inspection. Further, the Contractor shall make all necessary corrections in materials and/or workmanship that may be required by the Missouri Department of Natural Resources.

The Contractor agrees to inspection of work by DNR/DE monitors in order to establish inspection standards set by Federal and State Regulations. The Contractor also agrees to correct any deficiencies at no extra cost on a client's home deemed sub-standard during DNR/DE monitor periodic inspection visits.

Further, CAASTLC will require prompt replacement or correction of rejected items or deficient workmanship.

WAIVER OF LIENS - The Contractor agrees that CAASTLC and/or any clients of CAASTLC shall not be liable for debts of the Contractor or any other person, firm or organization affiliated with the Contractor in the fulfillment of the terms and conditions of this Contract. The Contractor does hereby waive and release any and all liens and claims or rights to liens on all work performed pursuant to this Contract, under the Statutes of the State of Missouri relating to Mechanic's Liens, on account of materials and labor heretofore furnished by the undersigned for buildings and real estate to receive work under this Contract. CAASTLC may require the Contractor to supply signed lien waivers from any of its suppliers to CAASTLC prior to beginning the work for any job under this Contract. Under no circumstance will any lien ever be placed on any client home.

ACCIDENT PREVENTION AND CLEAN-UP - The Contractor shall exercise proper precaution at all times for the protection of persons and property. The safety provisions of all applicable laws, building and construction codes shall be observed. During the installation, the Contractor shall keep all work clean and safe. Upon completion of work under this Contract, all areas will be cleaned appropriately and made ready for use by the dweller and all unused materials and waste will be removed by the Contractor.

All work shall be done to the satisfaction of CAASTLC. No trash shall be left on the premises and the work shall be done in a neat manner and shall show the workmanship expected of a professional contractor. The work shall fulfill all requirements of this Contract to be acceptable.

WARRANTY - The Contractor warrants that items ordered to specifications will conform to any drawings, samples or other descriptions furnished or adopted by CAASTLC. The Contractor also warrants that items not covered by specifications (see Attachment C) will be fit and sufficient for the purpose intended, and that all items will be new, merchantable, of good quality

and workmanship, free from defect, and in conformance with this Contract and all Attachments hereto.

Except for latent defects, notice of any defects or non-conformity to the Material Specifications or Work Standards must be given by CAASTLC to the Contractor within one (1) year after acceptance. Contractor shall correct or replace the defective workmanship or non-conforming item(s), at the Contractor's expense. Any and all items required to be corrected or replaced shall be subject to the provisions of this Article.

CLEAN & TUNE AND GENERAL REPAIRS:

The Contractor warrants that all materials installed shall be free of defect in materials and workmanship for a period of twelve (12) months from the date of installation. Should any material prove defective within twelve (12) months from the date of installation, the contractor agrees to replace the defective material with new, non-defective materials at no cost to CAASTLC or the client within five (5) working days from the date that contractor is notified by CAASTLC of any such defect. Warranty documents and all pertinent information will be given to the client by the contractor upon completion of the installation. The Contractor agrees no additional material or labor costs will be charged to CAASTLC thereof.

HEATING, VENTILATION, AND AIR CONDITIONING (HVAC) REPLACEMENT:

All equipment and/or components installed by the Contractor shall be free of defects in materials and workmanship for twelve (12) months from the date of installation. Any HVAC equipment provided shall have a minimum manufacturer's warranty of 5 years parts and 20 years on a gas-fired furnace heat exchanger. Should any material or component prove defective within one year of invoice, the contractor agrees to replace the defective materials/components with equal or better new equipment or components with the same warranty period, at no cost to CAASTLC or the client, within ten (10) working days from the date that the contractor is notified by CAASTLC of such defect. Warranty documents and all pertinent information will be given to the client by the contractor upon completion of the installation. The Contractor agrees no additional material or labor costs will be charged to CAASTLC thereof.

ARTICLE IV: NON-COMPLIANCE WITH MATERIAL SPECIFICATIONS AND/OR WORK STANDARD

Should the Contractor fail to perform in compliance with Article III, CAASTLC may terminate this Contract, in whole or in part, in accordance with the "Termination" clause of this Contract as specified in Article VI.

Should the Contractor determine that a material and/or supply change is necessary for the completion of the work performed pursuant to this Contract, and such change is mutually agreed upon by the Contractor and CAASTLC, Article V shall prevail.

_____ _____

Company Name Authorized Signature

CAASTLC expressly retains all other rights or remedies provided by law for any violation of this clause, and no action by CAASTLC shall constitute a waiver of any rights or remedy.

ARTICLE V: AMENDMENTS, ASSIGNMENTS AND WAIVER(S)

AMENDMENTS: The scope of work to be done under this Contract shall be subject to modifications and supplementation upon the written Amendment to this Contract by the duly authorized representatives of the contracting parties with or without out notice to sureties. If such an AMENDMENT causes an increase or decrease in the cost of or the time required for the performance or any part of the work under this Contract, or affects any other provision of this Contract, Contractor may request an equitable adjustment be made in the price, not to exceed the general cost limitations as specified by DNR/DE for PY25/26.

Further, CAASTLC shall make the necessary changes for any other provisions in this Contract as may be affected. Any and all changes shall serve as a written AMENDMENT to this Contract. No AMENDMENT shall proceed without notice to the Contractor or its designee.

Any claim by the Contractor for adjustments under this clause shall be asserted in written form within fifteen (15) calendar days from the date of receipt of the written AMENDMENT provided, however:

That CAASTLC, if it decides that the facts justify such action, may receive and act upon such claim asserted at any time prior to payment under this Contract.

Any action taken by the Contractor which affects any provision of this Contract, including price, whether or not accomplished with the concurrence of CAASTLC, shall not entitle the Contractor to any equitable adjustment in accordance with this clause unless such action has been specifically directed by a written AMENDMENT issued by CAASTLC or its designated and duly authorized representative. Nothing in this provision shall excuse the Contractor from proceeding with this Contract as amended.

The Contractor shall maintain such records and accounts, including property, personnel, and financial records as are deemed necessary by CAASTLC or the Director of DNR/DE to assure a proper accounting for all project funds, both federal and non-federal shares. These records will be made available for audit purposes to CAASTLC, DNR/DE, or the Comptroller General of the United States and/or authorized representative(s) and will be retained for five (5) years after the expiration of this Contract unless permission in writing to destroy them is granted by both CAASTLC and the Director of DNR/DE.

The Contractor agrees to display on business vehicles magnetic signs that read "Weatherization Work funded by the Missouri Department of Natural Resources".

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Company Name Authorized Signature

ASSIGNMENT OF CONTRACT: The Contractor shall not assign any interest in the contract and shall not transfer any interest, whatsoever, in the same (whether by assignment or novation/substitution), without the written consent of CAASTLC.

WAIVER(S): Failure of CAASTLC to insist on performance of any of the Contract requirements and/or Attachments hereto shall not be construed as a waiver of such Contract requirements, and/or Attachments and the same shall remain in full force and effect for the duration of this Contract.

Non-fulfillment of any terms and conditions of this Contract, including those by attachment or reference, shall be deemed a breach of Contract, and CAASTLC shall seek full remedies as the law and this Contract provide, including forfeiture of performance bond or other assurance of performance. A written warning shall first be given to the Contractor stating the grounds for possible termination and the date this Contract will be terminated if problems are not corrected, with such date being no longer than twenty (20) calendar days from the date of the written warning. If a correction is not then effected by such date, this Contract will be terminated with a written notice to the Contractor stating the effective date and the reason for the termination.

Repair Damage: Any and all damages to a home during the weatherization process shall be repaired within five (5) calendar days of the damage occurring and at no expense to CAASTLC or client. The Contractor further agrees and assures that CAASTLC and DNR/DE shall be "Held Harmless" for any and all acts or damage caused by the activities of the Contractor.

Contractor shall obtain a signed release from homeowner stating all repairs have been completed, and further agree that CAASTLC and DNR/DE shall be “Held Harmless” for any and all repair work performed by the Contractor.

Incidents of property damage, as a result of the Contractor's methods of operation and/or negligence may result in disqualification of the Contractor for future bids and termination of this Contract at the discretion of CAASTLC.

In the event of the institution of any bankruptcy proceedings by or against the Contractor or under any provision of the U.S. Bankruptcy Act or for the appointment of a receiver, trustee or a general assignment for the benefit of creditors of either party, CAASTLC shall be entitled to terminate this Contract without further cost or penalty. Furthermore, CAASTLC shall in no way waive any rights it may have as a potential creditor in bankruptcy should Contractor owe any obligation under this Contract at the time of such filing.

Failure by the Contractor to pay suppliers of material and/or labor will be reason to terminate this Contract.

Any breach of Contract by Contractor will result in loss of standing to bid on future CAASTLC contracts for a period of two (2) years. If CAASTLC must seek a new contract following default

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Company Name Authorized Signature

or termination of this Contract, the original Contractor shall be responsible for the cost of re-bid and any and all additionally incurred costs which are above the original Contract prices.

The bid/Contract may be invalidated by CAASTLC and/or DNR/DE. The Contractor acknowledges that funds expended for the purposes of this Contract are appropriated by State and/or Federal sources and, therefore, this Contract shall automatically terminate without penalty or termination costs if such funds are not appropriated. In the event that funds are not appropriated for this Contract, the Contractor shall not prohibit or otherwise limit CAASTLC's right to pursue and contract for alternate solutions and remedies as deemed necessary by the State or Federal agency for the conduct of its affairs. The requirements stated in this paragraph shall apply to any amendment or the execution of any option to extend the life of this Contract.

The Contractor warrants that no person, selling agency, or other organization has been employed or retained to solicit or secure this contract upon an agreement or understanding for a commission, percentage, brokerage, or contingent fee. For breach or violation of this warrant, CAASTLC shall have the right to annul this contract without liability or, in its discretion, to deduct from the compensation, or otherwise recover the full amount of such commissions, percentage, brokerage, or contingent fees.

If the Contractor is unable or unwilling to comply with any additional conditions as may be lawfully imposed by DNR/DE on the grant of Contract under which CAASTLC is performing the program for which the Contractor’s work is rendered, the Contractor shall have the right to terminate this Contract by giving at least twenty (20) calendar days written notice to CAASTLC. This paragraph does not release the Contractor from completing work already assigned and accepted before the additional conditions were imposed. If the Contractor terminates this Contract for any reason other than that stated in this paragraph, it shall be considered a breach of Contract.

Notwithstanding the above, the Contractor shall not be relieved of liability to CAASTLC for damages sustained by CAASTLC by virtue of any breach of this Contract by the Contractor, and CAASTLC may withhold any reimbursement to the Contractor for the purpose of set-off until such time as the exact amount of damages due CAASTLC from the Contractor is agreed upon or otherwise determined.

However, the Contractor shall not be liable for such excess cost where the failure upon which the termination is based has arisen out of causes beyond the control of the Contractor and without the fault or negligence of the Contractor.

Neither party shall be liable for delays or defaults during the performance of this Contract due to Acts of God, the public enemy, riots, strikes, fires, explosions, accidents, governmental actions of any kind or any other causes of a similar nature beyond the control of and without the fault of the Contractor.

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Company Name	Authorized Signature

The rights of and the authority of CAASTLC provided in this Article shall be in addition to and in accordance with any other rights, provided by law or as specified herein.

Disputes on Quality and Quantity of Work: In the event of a dispute between CAASTLC and Contractor over quality and quantity of materials and work performed, the Contractor understands he is responsible for replacing materials at no additional cost or additional labor cost. If Contractor does not agree to these terms, he will relinquish payment for disputed materials and labor.

The Contractor may appeal to CAASTLC's CEO for a final determination of CAASTLC's position regarding work and acceptable corrections to be made.

ARTICLE VI: TERMINATION

General - The performance of work pursuant to this Contract may be terminated by CAASTLC in whole or in part, whenever CAASTLC determines in its sole discretion that such termination is in the best interest of the program or CAASTLC.

ARTICLE VII: EQUAL EMPLOYMENT OPPORTUNITY

Discrimination in Employment Prohibited. The Contractor will not discriminate against any employee employed in the performance of this Contract, or against any applicant for employment in the performance of this Contract because of race, creed, color, sex, age, handicap, or national origin. The Contractor will take affirmative action to ensure that applicants are employed and that employees are treated during employment without regard to their race, creed, color, sex, age, handicap, or national origin. This requirement shall apply to, but not be limited to, the following: employment, upgrading, demotion or transfer, recruitment or recruitment advertising, layoff or termination, rates of pay or other forms of compensation; and the selection for training, including apprenticeship. CAASTLC and Contractor shall abide by the requirements of 41 CFR §§ 60-300.5(a) and 60-741.5(a). These regulations prohibit discrimination against qualified individuals on the basis of protected veteran status or disability, and require affirmative action by covered prime contractors and subcontractors to employ and advance in employment qualified protected veterans and individuals with disabilities. In the event that the Contractor signs any Contract which would be covered by Executive Order 10925 (March 6, 1961) or Executive Order 11114 (June 22, 1963), the Contractor shall include the Equal Employment Opportunity clause specified in Section 301 of Executive Order 10925, as amended.

1 **Executive Order 11246.** The Contractor will comply with all provisions of Executive Order 11246 of September 24, 1965, as amended by Executive Order 11375 and supplemented by Department of Labor regulations (41 CFR, Part 60), and of the rules, regulations and relevant orders of the Secretary of Labor.

2. **Requested Information.** The Contractor will furnish all information and any reports pertaining to employment as requested by CAASTLC.

3. **Non-Compliance.** In the event of the Contractor's non-compliance with the Equal Employment Opportunity clause of this Contract or with any such laws, regulations, or orders, this Contract may be canceled, terminated or suspended in whole or in part in accordance with Article VI entitled "**TERMINATION**".

ARTICLE VIII: COPELAND ANTI-KICKBACK ACT AND CONFLICT OF INTEREST

The Contractor must provide assurance of compliance with the Copeland Anti-Kickback Act (18 USC 874) and 29 CFR, Part 3.

No official or employee of CAASTLC or official or employee of the Contractor or its governing body, or any public official of the State of Missouri who exercises any functions or responsibilities in the review or approval of the undertaking or in the fulfillment of the obligations of the terms and conditions of this Contract shall, prior to the completion of the term of this Contract, voluntarily acquire any personal interest, direct or indirect, in this Contract, proposed Contract, or Contract Subject.

Conflict of Interest: The Contractor shall in no manner contract or solicit monies or services from clients assisted under this program while performing services, during the one year warranty of services, or as a result of performing services for CAASTLC. The Contractor will not represent his company as directly affiliated with CAASTLC other than as a hired contractor independent from CAASTLC.

Client Relations: The Contractor may not in any way allow employees of the company to engage in activities or make statements that would be, or might become uncomplimentary to CAASTLC, DNR/DE, or infringe upon the rights of the clients.

Contractor agrees to abide by CAASTLC's conflict of interest policy and will make CAASTLC aware of any relationship which exists between the Contractor and any household member of a home which has been awarded to the Contractor. The Contractor covenants that it has no interest and shall not acquire any interest, direct or indirect, which would conflict in any manner or degree with the performance of the specified services. The Contractor further covenants that in the performance of this Contract, no person having any such known interest shall be employed.

ARTICLE IX: REGULATIONS CONCERNING SUBCONTRACTORS

None of the work or services specified in this Contract shall be subcontracted by the Contractor without the prior written consent of CAASTLC and DNR/DE. Approval to subcontract shall in no

way release the Contractor of its responsibility to fulfill all terms and obligations under this Contract. The Contractor shall be as fully responsible for the acts and omissions of its subcontractors and of persons directly or indirectly employed by them, as the Contractor is for the acts and omissions of persons directly employed by it.

Contractor shall provide and shall ensure any subcontractor(s) used in the completion of this Contract shall provide the following:

A. The availability of group-rate health insurance. The Contractor/subcontractor(s) does not have to pay for employee health insurance coverage but must make available a policy from which an employee may select health insurance coverage.

B. Compliance with all applicable Missouri 'Wage and Hour regulations. Contractor/subcontractor(s) must submit a self attestation letter to the sub-grantee which states the Contractor/subcontractor(s) shall remain in compliance with all aspects of Missouri's Wage and Hour rules and regulations.

C. Occupational Health and Safety Administration (OSHA) 10-Hour construction safety course training. All Contractor/subcontractor(s) weatherization workers, supervisors, and other personnel responsible for on-site weatherization activities must be certified as having completed OSHA 10-Hour construction safety course training. The Contractor/subcontractor(s) shall provide a self-attestation that all such weatherization workers, supervisors, and other personnel have completed the training. Further, the Contractor/subcontractor(s) shall provide a copy of each worker's OSHA card or certification of completion for the 10-hour training to the sub-grantee.

D. Workers' Compensation and Unemployment Insurance. Contractor/subcontractor(s) must provide all employees with workers' compensation and unemployment insurance as applicable under state and federal laws and regulations.

ARTICLE X:

The Contractor will comply with standards that may be prescribed pursuant to the following:

1. State and Federal Environmental Laws:

    a. The Federal Clean Air Act, 42 U.S.C. 7606, as amended, prohibiting award of assistance by way of grant, loan, or contract to non-complying facilities.

    b. The Federal Water Pollution Control Act, 33 U.S.C. 1368. as amended, prohibiting award of assistance by way of grant, loan, or contract to non-complying facilities.

c. The National Environmental Policy Act of 1969, 42 U.S.C. 4321, et seq., as amended, particularly as it relates to the assessment of the environmental impact of federally assisted projects.

d. The National Historic Preservation Act of 1966, 16 U.S.C. 470 et seq., as amended, relating to the preservation of historic landmarks.

e. Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, 42 U.S.C. 4601 et seq., 4651 et seq., relating to acquisition of interest in real property or any displacement of persons, businesses, or farm operations.

f. The Hatch Act, 5 U.S.C. 1501 et seq., as amended, relating to certain political activities of certain state and local employees.

g. The Archeological and Historic Preservation Act of 1974 (Public Law 93-291) relating to potential loss or destruction of significant scientific, historical, or archaeological data in connection with federally assisted activities.

h. The Wild and Scenic Rivers Act of 1968 (16 U.S.C. 1271 et seq.) related to protecting components or potential components of the national wild and scenic rivers system.

i. The flood insurance purchase requirements of Sec. 102(a) of the Flood Disaster Protection Act of 1973 (Public Law 93-234) which requires Subgrantees in a special flood hazard area to participate in the program and to purchase flood insurance if the total cost of insurable construction and acquisition is $10,000 or more.

j. The Privacy Act of 1974, P.L. 93-579, as amended, prohibiting the maintenance of information about any individual in a manner which would violate the provision of the Act.

k. The Missouri Clean Water Law, Sections 644.006 to 644.141, RSMo.

l. The Missouri Hazardous Waste Management Law, Section, 260.350 to 260.430, RSMo.

m. The Missouri Solid Waste Management Law, Sections 260.200 to 260.245, RSMo.

n. The Missouri Air Conservation Law, Sections 643.101 to 643.190, RSMo.

_____ _____

Company Name Authorized Signature

o. Public Law 93-348 regarding the protection of human subjects involved in research, development and related activities supported by this award of assistance.

p. Earthquakes – Seismic Building and Construction Ordinances, Sections 319.200 – 319.207. RSMo (Cum. Supp. 1990), relating to the adoption of seismic design and construction ordinances by certain cities, towns, villages and counties.

q. The Laboratory Animal Welfare Act of 1966 (P.L. 89-544), 7 U.S.C. Section 2131 et seq., pertaining to care, handling, and treatment of warm-blooded animals held for research, teaching, or other activities supported by this award of assistance.

r. The Lead-Based, Paint Poisoning Prevention Act (42 U.S.C. 4801 et seq.) which prohibits the use of lead paint in construction or rehabilitation of residence structures.

s. The Contractor understands it must follow lead-safe practices introduced by DNR/DE, HUD, and the EPA. This regulation applies when the following conditions exist in a home:

- Built before 1978.
- Dwelling has not been certified as lead-based paint free.
- Amount of disturbed lead-based painted surfaces exceeds two square feet per room of interior surfaces or twenty square feet of exterior surface or 10% of a small component, e.g., door or window.

2. Laws and regulations related to nondiscrimination:

a. Title VI of the Civil Rights Act of 1964 (P.L. 88-352) which prohibits discrimination on the basis of race, color or national origin.

b. Section 504 of the Rehabilitation Act of 1973, as amended (29 U.S.C Section 794), which prohibits discrimination on the basis of disability.

c. Drug Abuse Office and Treatment Act of 1972 (P.L. 92-255), as amended, relating to nondiscrimination on the basis of drug abuse.

d. Comprehensive Alcohol Abuse and Alcoholism Prevention, Treatment and Rehabilitation Act of 1970 (P.L. 91- 616), as amended, relating to nondiscrimination on the basis of alcohol abuse or alcoholism.

_____ _____

Company Name Authorized Signature

e. Section 523 and 527 of the Public Health Service Act of 1912 (42 U.S.C. Sections 290 dd-3 and 290 ee-3), as amended, relating to confidentiality of alcohol and drug abuse patient records.

f. Age Discrimination Act of l975, as amended (42 U.S.C. §§ 621-634), which prohibits discrimination on the basis of age;

g. Title VII of the Civil Rights Act of 1964 found at 42 U.S.C. §2000(e) et.seq. which prohibits discrimination on the basis of race, color, religion, national origin, or sex.

h. Title VIII of the Civil Rights Act of 1968 (42 U.S.C, § 3601 et seq.), as amended, relating to nondiscrimination in the sale, rental or financing of housing.

i. Chapter 213 of the Missouri Revised Statutes which prohibits discrimination on the basis of race, color, religion, national origin, sex, age, and disability.

j. The Americans with Disabilities Act (P.L. 101-336) 42 U.S.C. Section 12101 et seq., relating to nondiscrimination with respect to employment, public services, public accommodations and telecommunications.

k. Any other nondiscrimination provisions in the specific statute(s) under which application for federal assistance is being made.

l. The requirements of any other nondiscrimination statute(s) which may apply to the application.

m. Title IX of the Education Amendments of 1972, as amended (U.S.C §§ 1681-1683 and 1685-1686) which prohibits discrimination on the basis of sex.

3. The following additional requirements apply to projects that involve construction:

a. The Davis-Bacon Act, as amended, 40 U.S.C. Section 276a et seq., respecting wage rates for federally assisted construction contracts in excess of $2,000.

b. The Copeland (Anti-Kickback) Act, 18 *U.S.C.* § 874, 40 U.S.C. § 276c.

c. The Contract Work Hours and Safety Standards Act, 40 U.S.C. Section 327 et seq.

d. Convict labor shall not be used on construction projects unless by convicts who are on work release, parole, or probation.

e. The Lead-Based Paint Poisoning Prevention Act (42 U. S. C. § 4801 et seq.) which prohibits the use of lead paint in construction or rehabilitation of residence structures.

_____ _____

Company Name Authorized Signature

f. Trafficking Victims Protection Act of 2000, Section 106, as amended (22 U.S.C. 7104(g) relating to termination of contract award based should any employee of the department, recipient or Sub-recipient violate this act.

g. Missouri House Bill 1549, 1771, 1395 & 2366 -Illegal Aliens and Immigration Status Verification -This bill changes the laws regarding illegal aliens and immigration status verification. Effective January I, 2009, no business entity or employer shall knowingly employ, hire for employment, or continue to employ an unauthorized alien to perform work within the State of Missouri.

h. Federal Funding Accountability and Transparency Act of 2006 (S. 2590) - Requires information on federal awards be made available to the public via a single searchable website. Federal awards include grants, sub-grants, loans, awards, cooperative agreements and other forms of financial assistance. House Resolution 2646, Amended 09/30/2008.

i. Illegal Immigration - Missouri Statutes - As per HB 1549, 1771, 19395 & 2366 - Section 67.307 2. Any municipality that enacts or adopts a sanctuary policy will be ineligible for moneys provided through grants administered by any state agency or department until the policy is repealed or is no longer in effect.

j. Unauthorized Aliens – Missouri Statutes – RSMo 285.525 – 285.550 Effective January 1, 2009- Effective January 1, 2009, and pursuant to RSMo 285.530 (1) no business entity or employer shall knowingly employ, hire for employment, or continue to employ an unauthorized alien to perform working within the State of Missouri.

k. The Byrd Anti-Lobbying Amendment (31 U.S.C. 1352).

l. Human Trafficking. No business entity or employer may engage in severe forms of trafficking in persons during the period of time that this award is in effect; procure a commercial sex act during the period of time that this award is in effect; or use forced labor in the performance of this award or subawards under this award. The department has the right to terminate unilaterally: (1) implement section 106(g) of the Trafficking Victims Protection Act of2000 (TVPA), noncompliance that are available to the subgrantee under this award.

3. Information on Statutory Authorization

Public Improvement, Recreation/Education, Bruce Watkins, RSMO. 253.220
http://www.moga.mo.gov/statutesIC200-29912530000220.HTM

Soil Conservation Research, RSMO. 278.080
http://www.moga.mo.gov/statutes/C200-299/2780000080.HTM

_____ _____

Company Name Authorized Signature

Cost Share Program, RSMO. 278.080
http://www.moga.mo.gov/statutesIC200-299/2780000080.HTM

Disbursements to Soil Districts, RSMO. 278.080, 278.120
http://www.moga.mo.gov/statutes/C200-299/2780000080.HTM
http://www.moga.mo.gov/statutes/C200-299/2780000120.HTM

Soil Conservation Expenditure Loans, RSMO. 278.080
http://www.moga.mo.gov/statutes/C200-299/2780000080.HTM

Soil Conservation Demonstrations, RSMO. 278.080
http://www.moga.mo.gov/statutes/C200-299/2780000080.HTM

Recovered Materials Market Development, RSMO. 260.335
http://www.moga.mo.gov/statutes/C200-299/2600000335.HTM

Water Pollution Control Loans, RSMO. 644.122
http://www.moga.mo.gov/statutesIC600-699/6440000122.HTM

Energy Set-Aside Program, RSMO. 640.665
http://www.moga.mo.gov/statutesIC600-699/6400000665.HTM

Public Improvement Expenditures, MO Botanical Garden & Jefferson Landing, RSMO.253.220
http://www.moga.mo.gov/statutes/C200-299/2530000220.HTM

Storm Water Grants, RSMO. 644.031
http://www.moga.mo.gov/statutesIC600-699/6440000031.HTM

Wastewater Treatment Grants, RSMO. 644.026
http://www.moga.mo.gov/statutes/C600-699/6440000026.HTM

Rural Water and Sewer Grants, RSMO. 644.026
http://www.moga.state.mo.us/statutes/C600-699/6440026.HTM

Outdoor Recreation Sub-Grants, RSMO. 258.083
http://www.moga.mo.gov/statutes/C200-299/2580000083.HTM

Information on Statutory Authorization Energy Conservation - Schools/Hospitals, RSMO. 640.653
http://www.moga.mo.gov/statutes/C600-699/6400000653.HTM

Energy Conservation - Local Governments/Non-Profit, RSMO. 640.653
http://www.moga.mo.gov/statutesIC600-699/6400000653.HTM

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Waste Management Grants, RSMO. 260.335
http://www.moga.mo.gov/statutes/C200-29912600000335.HTM

Environmental Grants, RSMO. 260.273-342
http://www.moga.mo.gov/STATUTES/C260.HTM

Historic Preservation Sub-Grants, RSMO. 253.408-415
http://www.moga.mo.gov/STATUTES/C253.HTM

Clean Air Act Grants and Sub-Grants, RSMO. 643.010-190
http://www.moga.mo.gov/STATUTES/C643.HTM

The Contractor will comply with the requirements of the Occupational Safety and Health Act of 1970 (29 CFR 1900-1999 et seq.), which provides job safety and health protection for workers by promoting safe and healthful working conditions, in all work performed by its staff and associates under the Contract.

MONITORING – CAASTLC or DNR/DE, may monitor all work in progress.

REGISTRATION – The Contractor must be registered and maintain good standing with the Missouri Secretary of State's Office and other regulatory agencies, as may be required by law or regulations.

ARTICLE XI: DURATION

This Contract shall commence on July 1, 2025, and be in full force and effect until June 30, 2026, provided, however, that termination proceedings may be initiated according to Article VI.

If appropriate and cost effective, this Contract period may be extended for one (1) year. The Contractor must have met all performance standards, as determined by CAASTLC, in order for this Contract to be renewed. Any such renewal will be on a percentage-type basis and must be mutually agreed to in writing and signed and dated by both parties.

ARTICLE XII: PAYMENTS

Payments under this Contract shall be made in accordance with the firm prices stated in Attachment E.

Credit for the completed work shall be provided when all weatherization work (including any rework) for the job has passed final inspection by CAASTLC. Upon passing final inspection, CAASTLC shall make every reasonable effort to provide payment for completed work within forty-five (45) days, however, contractor is advised that payment may take up to ninety (90) days pending release of funds from DNR/DE.

_____	_____
Company Name	Authorized Signature

No interest shall be paid from funds administered by DNR/DE for any reason.

A written invoice for each job completed must be submitted for payment on the Contractor's letterhead. The invoice must include the following information: company name, contact information, dates of service, job number and/or client's name, quantity of material and labor by unit, description of service with individual measures documented (as defined by NEAT/MHEA), and costs broken out by material and labor. In addition, for all HVAC equipment, hot water heaters, and refrigerators, invoices must include the make, model number and serial number of the equipment. No "miscellaneous" amounts will be paid. If insulation was included, R-factor of insulation installed must be shown.

ARTICLE XIII: ENTIRE AGREEMENT

This Contract constitutes and represents the complete and entire agreement between CAASTLC and the Contractor and supersedes all previous communications and representations.

Any modifications of this Contract shall not be binding unto CAASTLC, unless made in writing and in accordance with Article V entitled "**AMENDMENTS, ASSIGNMENTS AND WAIVER(S)**".

1. **Choice of Law**. This Contract shall be construed according to the laws of the State of Missouri.

2. **Compliance with Applicable Laws**. The Contractor agrees that all work shall be performed in strict compliance with all applicable laws, ordinances, OSHA guidelines, EPA's Lead, Renovation, Repair, and Painting Final Rule (RRP), rules and regulations, of federal, state, county or municipal governments or agencies, now in force or that may be enacted hereafter. The final inspection report of CAASTLC shall not be deemed to be a warranty or representation that all such laws, ordinances, rules, and regulations have been complied with by the Contractor.

Section two (2) of this Article includes but does not limit the specific provisions of the Fair Labor Standards Act of 1938, as amended.

SIGNATURE OF BIDDER - The signature of the Contractor indicates that it understands and will comply with these Contractual Requirements and with all provisions of the entire bid package, including the cover letter and all Attachments. Further, in compliance with the above, the undersigned offers and agrees that if its bid is accepted by CAASTLC, to furnish any or all of the materials, supplies, and services under this Contract as well as complete the work within the time specified.

_____ _____

Company Name Authorized Signature

STATE PLAN - The Missouri State Weatherization Plan, Program Year 2025, shall be adhered to in its entirety.

THEREFORE, IN WITNESS WHEREOF, the parties hereto, have caused this Contract to be duly executed this _____ day of _____, 2025.

_____	CAASTLC, Inc.
(Contractor Name)	
By: _____	By: _____
(Signature)	
Title: _____	Title: Chief Executive Officer

_____	_____
Company Name	Authorized Signature

Work Order and Procedure for Gas Furnace Clean & Tune

Home Owner Name: _____ Agency Name: CAASTLC, Inc.

Address: _____ Address: 2709 Woodson Rd.

City, State, Zip: _____ City, State, Zip: St. Louis, MO 63114

Phone No. _____ Phone No. _____

Job No. _____ Date Work Order Sent: _____

Auditor/Inspector Name:

_____ *is hereby authorized to complete a clean and tune as prescribed below. Submit completed work order and invoice by* _____ *to receive payment.*

I. CLEAN

A. Combustion Area

Auditor	Contractor	N/A	
___	_____	___	1. Brush down all dirt, soot, and rust from heat exchanger sections.
___	_____	___	2. Brush down and vacuum all flue passageways within the furnace.
___	_____	___	3. Remove burner assembly and brush down to remove dirt, soot, loose rust, and clean all flame ports. Inspect for defects.
___	_____	___	4. Clean gas orifices and assure proper size.
___	_____	___	5. Brush down and vacuum remainder of combustion chamber so that it is free of dirt, soot, and loose rust.
___	_____	___	6. Clean pilot orifices and test thermocouple, replace thermocouple if necessary.

B. Flue

___	_____	___	7. Inspect flue pipe from furnace to chimney for rust, weak spots, and leaks, blockage and cap.
___	_____	___	8. Clean and vacuum flue pipe and reinstall in a secure manner. (Seal around flue/chimney connection if necessary.

C. Air Handling/Distribution

___	_____	___	9. Clean and vacuum heat exchanger if accessible.
___	_____	___	10. Remove blower assembly to clean and remove any dirt, grease, and foreign matter. Clean and vacuum return air cabinet.
___	_____	___	11. Clean and vacuum all supply/return registers and immediate duct openings.
___	_____	___	12. Inspect air filter, replace air filter(s) if necessary. If permanent type, clean as per manufacturer's recommendation. SIZE: _____ x _____ x _____
___	_____	___	13. Clean air conditioning coil, where applicable.

II. Tune

A. Combustion

___	_____	___	14. Adjust gas input pressure to 3.5" W.C. (natural gas) or 10.5" W.C. (liquefied petroleum gas) in the manifold and then clock meter (if possible) to assure the input is within 10% of rate input. NOTE: If gas pressure is correct and clocked input is more than 10% lower than rated input, check orifices for proper size. If furnace is over firing and gas pressure is correct then change to lower orifice size.
___	_____	___	15. Adjust primary air shutter to obtain highest CO2 and O2 in the flue (before diverter) without making CO while still maintaining a steady blue flame with slight yellow tips. There must not be any lifting or floating flames.

Auditor	Contractor	N/A	
___	_____	___	16. Adjust pilot flame just high enough to activate the thermocouple & ignite burner w/o delay.
___	_____	___	17. On furnaces with electronic pilot ignition, pilot should ignite without delay. When pilot is proven, burner should ignite without delay.
___	_____	___	18. Test igniter to assure that it will lock out after 1st or 2nd attempt to ignite pilot.
___	_____	___	19. Measure amperage of gas valve and any other low voltage equipment on the control circuit and set thermostat heat anticipator to match.
___	_____	___	20. Level thermostat, and, if necessary, calibrate thermostat and thermostat thermometer to within 1 degree at 72 degree setting.

B. Air Handling/Distribution

___	_____	___	21. Check blower and motor bearings, lubricate as needed.
___	_____	___	22. Check belt condition and adjust for proper tension, replace if worn or cracked.
___	_____	___	23. If stack temperature is above 450 degrees, increase blower speed to deliver more heat and lower stack temperature. Stack temperature should not be lower than 350 degrees. If so, decrease blower speed or adjust blowers to obtain greater temperature rise at the supply plenum. NOTE: This may not work on all furnaces.
___	_____	___	24. Set fan switch (if possible) so that blower comes on a 110 degrees and goes off at 100 degrees. Set limit no higher than 200 degrees if limit is adjustable.
___	_____	___	25. Balance supply distribution for homeowner's comfort, where applicable.

Comments:

Contractor Certification

Final Stack Temperature _____ Draft _____ CO _____ Ppm

Clock Input _____ Seconds _____ Btu/hour Temperature Rise

Anticipator Setting _____ Measured Amperage _____

I certify that the work specified above has been completed and that all requirements have been met.

_____ _____

Signature of Contractor *Date*

Auditor Certification

Final Stack Temperature _____ Draft _____ CO _____ Ppm O_2 _____

Temperature Rise _____ Call Back Required ☐ Yes ☐ No

I certify that the work specified above has been completed by the contractor.

_____ _____

Signature of Auditor/Inspector *Date*

Work Order and Procedure for Boiler Clean & Tune

Home Owner Name:		Agency Name:	CAASTLC, Inc.
Address:		Address:	2709 Woodson Rd.
City, State, Zip:		City, State, Zip:	St. Louis, MO 63114
Phone No.		Phone No.	
Job No.		Date Work Order Sent:	
		Auditor/Inspector Name:	

_____ *is hereby authorized to complete a clean and tune as prescribed below. Submit completed work order and invoice by* _____ *to receive payment.*

I. CLEAN

A. Combustion Area

Auditor	Contractor	N/A	
___	_____	___	1. Brush down all dirt, soot, and rust from heat exchanger sections.
___	_____	___	2. Brush down and vacuum all flue passageways within the boiler.
___	_____	___	3. Remove burner assembly and brush down to remove dirt, soot, loose rust, and clean all flame ports. Inspect for cracks in tubes.
___	_____	___	4. Clean gas orifices and assure proper size.
___	_____	___	5. Brush down and vacuum remainder of combustion chamber so that it is free of dirt, soot, and loose rust.
___	_____	___	6. Clean pilot orifices and test thermocouple, replace thermocouple if necessary.

B. Flue

___	_____	___	7. Inspect flue pipe from boiler to chimney for rust, weak spots, and leaks, blockage and cap.
___	_____	___	8. Clean and vacuum flue pipe and reinstall in a secure manner. (Seal around flue/chimney connection if necessary.

C. Distribution

___	_____	___	9. Inspect and purge relief valve.
___	_____	___	10. Inspect circulator pump for safe and effective operation, paying close attention to couplings and motor conditions.
___	_____	___	11. Purge expansion tank and radiators as needed.
___	_____	___	12. Check condition of water. If it is rusty or has high level of sludge, then drain, flush, and refill the system.
___	_____	___	13. Check operation of radiator valves.

II. Tune

A. Combustion

___	_____	___	14. Adjust gas input pressure to 3.5” W.C. (natural gas) or 10.5” W.C. (liquefied petroleum gas) in the manifold and then clock meter (if possible) to assure the input is within 10% of rate input. NOTE: If gas pressure is correct and clocked input is more than 10% lower than rated input, check orifices for proper size. If furnace is over firing and gas pressure is correct then change to lower orifice size.
___	_____	___	15. Adjust primary air shutter to obtain highest CO2 and O2 in the flue (before diverter) without making CO while still maintaining a steady blue flame with slight yellow tips. There must not be any lifting or floating flames.

Auditor	Contractor	N/A	
___	_____	___	16. Adjust pilot flame just high enough to activate the thermocouple & ignite burner w/o delay.
___	_____	___	17. On boilers with electronic pilot ignition, pilot should ignite without delay. When pilot is proven, burner should ignite without delay.
___	_____	___	18. Test igniter to assure that it will lock out after 1st or 2nd attempt to ignite pilot.
___	_____	___	19. Measure amperage of gas valve and any other low voltage equipment on the control circuit and set thermostat heat anticipator to match.
___	_____	___	20. Level thermostat, and, if necessary, calibrate thermostat and thermostat thermometer to within 1 degree at 72 degree setting.

B. Air Handling/Distribution

___	_____	___	21. Bleed all radiators to ensure no air is in the system (hot water system).
___	_____	___	22. Lubricate circulator pump as needed.
___	_____	___	23. Check operation of zone control valves if any. Lubricate as needed.
___	_____	___	24. Check each radiator for output.
___	_____	___	25. Balance supply distribution for homeowner's comfort, where applicable.

Comments:

Contractor Certification

Final Stack Temperature _____ Draft _____ CO _____ Ppm

Clock Input _____ Seconds _____ Btu/hour Temperature Rise

Anticipator Setting _____ Measured Amperage _____

I certify that the work specified above has been completed and that all requirements have been met.

_____ _____

Signature of Contractor *Date*

Auditor Certification

Final Stack Temperature _____ Draft _____ CO _____ Ppm O_2 _____

Temperature Rise _____ Call Back Required ☐ Yes ☐ No

I certify that the work specified above has been completed by the contractor.

_____ _____

Signature of Auditor/Inspector *Date*

Work Order and Procedure for Oil Furnace Clean & Tune

Home Owner Name: _____ Agency Name: CAASTLC, Inc.

Address: _____ Address: 2709 Woodson Rd.

City, State, Zip: _____ City, State, Zip: St. Louis, MO 63114

Phone No. _____ Phone No. _____

Job No. _____ Date Work Order Sent: _____

Auditor/Inspector Name:

_____ *is hereby authorized to complete a clean and tune as prescribed below. Submit completed work order and invoice by* _____ *to receive payment.*

I. CLEAN

A. Combustion Area

Auditor	Contractor	N/A	
___	_____	___	1. Brush down all dirt, soot, and rust from heat exchanger sections.
___	_____	___	2. Brush down and vacuum all flue passageways within the furnace.
___	_____	___	3. Remove burner assembly; clean and align ignition electrodes.
___	_____	___	4. Clean blast tube and flame head.
___	_____	___	5. Replace nozzle with same size or lower size if derating is possible or desirable.
___	_____	___	6. Brush down and vacuum remainder of combustion chamber so that it is free of dirt, soot and loose rust.
___	_____	___	7. Replace oil line filter cartridge.

B. Flue

___	_____	___	8. Inspect flue pipe from furnace to chimney for rust, weak spots, and leaks, blockage and cap.
___	_____	___	9. Clean and vacuum flue pipe and reinstall in a secure manner. (Seal around flue/chimney connection if necessary.
			10. Clean and check barometric damper for proper operation.

C. Air Handling/Distribution

___	_____	___	11. Clean and vacuum heat exchanger if accessible.
___	_____	___	12. Remove blower assembly to clean and remove any dirt, grease, and foreign matter. Clean and vacuum return air cabinet.
___	_____	___	13. Clean and vacuum all supply/return registers and immediate duct openings.
___	_____	___	14. Inspect air filter, replace air filter(s) if necessary. If permanent type, clean as per manufacturer's recommendation. SIZE: _____ x _____ x _____
___	_____	___	15. Clean air conditioning coil, where applicable.

II. Tune

A. Combustion

___	_____	___	16. Seal all joints, cracks and openings that would allow air to infiltrate into the combustion area of the furnace.
___	_____	___	17. Adjust barometric damper so that a reading of .02-.04" W.C. at the breech is obtained.
___	_____	___	18. Adjust primary air shutter to obtain highest CO2 in the flue (before barometric damper) with a smoke of 0 to 2 while still maintaining a steady flame. (0.1 on flame retention burners.)

Auditor	Contractor	N/A	
___	_____	___	19. Measure amperage of primary control and set thermostat heat anticipator to match.
___	_____	___	20. Level thermostat, if necessary, calibrate thermostat and thermostat thermometer to within 1 degree at 72 degree setting.

B. Air Handling/Distribution

___	_____	___	21. Check blower and motor bearings, lubricate as needed.
___	_____	___	22. Check belt condition and adjust for proper tension, replace if worn or cracked.
___	_____	___	23. If stack temperature is above 550 degrees, increase blower speed to deliver more heat and lower stack temperature.
			24. Stack temperature should not be lower than 250 degrees. If so, decrease blower speed or adjust blower to obtain greatest temperature rise at the supply plenum. NOTE: This may not work on all furnaces.
			25. Set fan switch (if possible) so that blower comes on a 120 degrees and goes off at 100 degrees. Set limit no higher than 200 degrees if limit is adjustable.
___	_____	___	26. Test fan and limit control for proper operation.
___	_____	___	27. Balance supply distribution for homeowner's comfort, where applicable.

Comments:

Contractor Certification

Final Stack Temperature _____ Draft _____ CO _____ Ppm Smoke No. _____

I certify that the work specified above has been completed and that all requirements have been met.

_____ _____

Signature of Contractor *Date*

Auditor Certification

Final Stack Temperature _____ Draft _____ CO _____ Ppm O_2 _____

Smoke No. _____ Call Back Required ☐ Yes ☐ No

I certify that the work specified above has been completed by the contractor.

_____ _____

Signature of Auditor/Inspector *Date*

Exhibit D

Work Order and Procedure for Gas Water Heater Clean & Tune

Home Owner Name:		Agency Name:	CAASTLC, Inc.
Address:		Address:	2709 Woodson Rd.
City, State, Zip:		City, State, Zip:	St. Louis, MO 63114
Phone No.:		Phone No.:	
Job No.:		Auditor/Insp.:	

_____ Is hereby authorized to complete a clean and tune as prescribed below.

Submit completed work order and invoice by: _____ to receive payment

I. CLEAN

A. Combustion Area

Auditor	Contractor	N/A		
			1	Clean burner assembly - brush down to remove dirt, soot, loose rust, and clean all flame ports. Inspect for defects.
			2	Brush down and vacuum remainder of combustion chamber so that it is free of dirt, soot, and loose rust.
			3	Clean and test thermocouple, replace thermocouple if necessary.

B. Flue

			4	Inspect flue pipe from water heater to chimney for rust, weak spots, and leaks, blockage and cap. Ensure proper rise/run and secure diverter if necessary.
			5	Clean and vacuum flue pipe and reinstall in a secure manner. (Seal around flue/chimney connection if necessary).

II. TUNE

A. Combustion

			6	Adjust gas input pressure to 3.5" W.C. (natural gas) or 10.5" W.C. (liquefied petroleum gas) in the manifold and then clock meter (if possible) to assure the input is within 10% of rate input. NOTE: If gas pressure is correct and clocked input is more than 10% lower than rated input.

B. Inspection

			7	Inspect tank, pressure relief valve, drain valve, and water supplies for leaks. Inform agency auditor listed above if leaks exist for further instruction.
			8	Inspect for adequate combustion air - refer to National Fuel Gas Code - NFPA 54
			9	Inspect for backdrafting at water heater start-up and furnace start-up
			10	Test flue for proper draft and throat for Carbon Monoxide - record results

Comments: _____

_____

_____

_____

_____

Contractor Certification

Final Throat Temperature_____ Draft_____ CO_____

Spillage yes / no _____ seconds

I certify that the work specified above has been completed and that al requirements have been met.

_____ _____

Signature of Contractor Date

Auditor Certification

Final Throat Temperature_____ Draft_____ CO_____

Spillage yes / no _____ seconds

I certify that the work specified above has been completed and that al requirements have been met.

_____ _____

Signature of Auditor/Inspector Date

Exhibit E

Work Order and Procedure for Air Conditioner Tune-up

Home Owner Name:		Agency Name:	CAASTLC, Inc.
Address:		Address:	2709 Woodson Rd.
City, State, Zip:		City, State, Zip:	St. Louis, MO 63114
Phone No.:		Phone No.:	
Job No.:		Auditor/Insp.:	

_____ Is hereby authorized to complete an A/C tune-up as prescribed below.

Submit completed work order and invoice by: to receive payment

Auditor	Contractor	N/A		
			1	Check and clean condensate trough, drain plug, and drain hose
			2	Clean evaporator coil (inside) and condenser (outside)
			3	Straighten bent or flattened coil fins if necessary
			4	Ensure unobstructed air flow to the condenser coil
			5	Check for proper refrigerant charge and adjust if necessary
			6	Remove dust and dirt from fan blades
			7	Examine and oil motor and fan bearings
			8	Inspect and/or tighten electrical connections and contacts
			9	Check for blockages or leaks in the supply and return ducts
			10	Remove blower assembly to clean and remove any dirt, grease, and foreign matter. Clean and vacuum return air cabinet.
			11	Inspect air filter, replace air filter(s) if necessary. If permanent type, clean as per manufacturer's recommendation. SIZE: _____X_____X_____
			12	Check blower and motor bearings, lubricate as needed.
			13	Balance supply distribution for homeowner's comfort, where applicable.

Comments: _____

_____

_____

Contractor Certification

Pressure Readings_____ P.S.I. Temp. Difference_____

Supply_____ Return_____

I certify that the work specified above has been completed and that all requirements have been met.

_____ _____

Signature of Contractor Date

Auditor Certification

I certify that the work specified above has been visually checked and A/C is operating properly.

_____ _____

Signature of Auditor/Inspector Date

Attachment 2.8

Missouri Weatherization Assistance Program

Daily Combustion Appliance Zone (CAZ) Test Form

Client Name:	Job #:	Date:

General Information

This Daily CAZ Test Form must be completed at the end of each day, regardless of the type of work performed, at all homes where a CAZ test is required. All electric homes or homes with combustion appliances that do not require a CAZ test must have this form completed the first day of work only.

Appliances in the home: ___ All Electric Combustion Appliances that do not require a CAZ test ☐ One or more Combustion Appliances that require CAZ Testing

If there are one or more combustion appliances in the home that require a CAZ test, proceed with the form.

List all Work performed at the home today _____

Test Steps (refer to Technical Operation Manual for details)		Test Results
1. Was work performed on the home today that could potentially affect the drafting appliances?		YES / NO
• If YES, Proceed to the test Steps below, if NO, Proceed to Signature at bottom of page.		
2. Visually inspect combustion appliances and venting before proceeding.		
3. Are any combustion appliances natural draft or mechanically assisted draft? If YES, proceed with Daily CAZ Test Step 4. If NO, no spillage testing is necessary.		YES / NO
4. Close all exterior doors and windows. Close all interior doors to rooms without exhaust fans or forced air returns. Close all CAZ doors.		
5. Set combustion water heaters to pilot and turn off heating/cooling systems. Turn off all exhaust fans and dryers. Extinguish all fires and close fireplace dampers. Outdoor openings for combusiton air should remain open.		
6. Measure and record baseline pressure of CAZ with reference to (WRT) outdoors.		Pa
7. Turn on all exhaust fans and clothes dryers. Measure and record the pressure of CAZ WRT outdoors.		Pa
8. Turn on air handler(s). Measure and record the pressure of the CAZ WRT outdoors.		Pa
9. With the air handler on, is the pressure in the CAZ more negative WRT outdoors than in step #6 and #7? If YES, the air handler is to remain on. If NO, the air handler is to be turned off.		YES / NO
• Is the air handler on or off?		ON / OFF
10. Open interior doors to the CAZ. Is the pressure in the CAZ more negative WRT outdoors? If YES, the CAZ doors remain open. If NO, the CAZ doors are to be closed.		YES / NO
• Are the interior CAZ doors open or closed?		OPEN / CLOSED
11. Measure and record pressure of CAZ with reference to (WRT) outdoors. **This is the greatest depressurization achieved.**		Pa
12. What are the dominant forces causing depressurization?		
13. Fire the appliances, check ambient CO and test for spillage, starting with the appliance with the smallest BTU. Does the appliance spill after 2 minutes?		
a. Appliance 1 description:	Ambient CO:	YES / NO
b. Appliance 2 description:	Ambient CO:	YES / NO
c. Appliance 3 description:	Ambient CO:	YES / NO
14. If appliance spills after 2-minutes during Step 13, re-test under natural conditions. Does the appliance spill after 2 minutes under natural conditions?		
a. Appliance 1 description:	Ambient CO:	YES / NO
b. Appliance 2 description:	Ambient CO:	YES / NO
c. Appliance 3 description:	Ambient CO:	YES / NO
15. If dwelling has other combustion appliance zones, repeat steps 1-14 and complete an additional CAZ form for each location.		
16. Return dwelling, exhaust fans, and combustion appliances to normal settings.		
17. Before a home can be left for the day, all appliances must pass the Daily CAZ Test or actions must be taken to make the appliances safe until further action can be taken. Do all appliances pass spillage under greatest depressurization achieved? If NO, complete the Additional Actions Taken section below.		YES / NO

Aditional Actions Taken: *These are the actions taken if an appliance does not pass spillage under the greatest depressurization (step 13).*

Signature of Tester:		**Affiliation of Tester:**	
Printed Name of Tester:		**Client Signature*:**	

** Client signautre is not required, but is highly recommended when any additional actions are taken.*

August 2023

CAASTLC

Community Action Agency of St. Louis County, Inc.

WEATHERIZATION PROGRAM

QUALIFICATIONS STATEMENT FOR HEATING CONTRACTORS
(FCT/R 25-26)

CONTRACTOR Name: _____

Address: _____

Zip Code: _____ Telephone: _____

Contact person: _____ Title: _____

Type of business (check & complete the one section that applies)

1) ____ Sole Proprietorship

Name of owner: _____

2) ____ Partnership

Names of all partners: _____

_____

_____

3) ____ Corporation

Board Chairperson: _____

Chief Executive Officer: _____

Financial Director: _____

Procurement Director: _____

Length of time in business: _____

If the owner, partners, or principals of the corporation have been involved in another similar business, please describe:

_____

_____

_____

Total No. Employees: _____ Approximate current assets: $_____

Current amount of liability insurance: _____

Has the business ever been involved in any type of bankruptcy proceedings? _____

If Yes, Please explain: _____

_____

_____

Name of bank, contact person & phone number: _____

_____

_____

Qualifications Statement for FCT/R 25-26 Page 2

Please give at least two references for whom work has been completed in the last year.

1) Name: _____
Address: _____
Telephone: _____ Type of work done: _____

2) Name: _____
Address: _____
Telephone: _____ Type of work done: _____

Please show the qualifications of your main installer(s) servicemen below. Attach additional sheets as necessary, including copies of any training or professional certificates or diplomas, if available.

1) Name: _____ Years Experience: _____
Formal Training: _____
_____

2) Name: _____ Years Experience: _____
Formal Training: _____
_____

3) Name: _____ Years Experience: _____
Formal Training: _____
_____

Person authorized to submit bids:

Name: _____ Title: _____

I certify that the above information is true and complete to the best of my knowledge.

_____ _____
AUTHORIZED SIGNATURE DATE

CAASTLC

Community Action Agency of St. Louis County, Inc.

Contractor Self-Attestation

Contractor Name: _____
Contractor Address: _____
City, State, Zip Code: _____

_____ hereby attests that it is in compliance with
(Contractor Name)
all aspects of Missouri's Wage and Hour rules and regulations and that all such weatherization workers, supervisors, and other personnel have completed the OSHA 10-Hour construction safety course training.

Signature: _____

Title: _____

Date: _____

CAASTLC

Community Action Agency of St. Louis County, Inc.

CAASTLC WEATHERIZATION 2025-26 RFQ

PRE-BID CONFERENCE:

The meeting link for this Conference will be available on CAASTLC's homepage (https://www.caastlc.org/) the day of the Conference and the login attendee ID and password for this Conference are as follows:

Topic: Pre-Bid Conference
Time: Jun 25, 2025, 09:00 AM Central Time (US and Canada)

Join Zoom Meeting
https://us02web.zoom.us/j/83703797239?pwd=PmtHNtZx5QdmH43KB8qpBaNyFbt90V.1&jst=1

Meeting ID: 837 0379 7239
Passcode: 14!Hd0L.
One tap mobile
+13126266799,,83703797239#,,,,*01341885# US (Chicago)
+13092053325,,83703797239#,,,,*01341885# US

Dial by your location
+1 312 626 6799 US (Chicago)
+1 309 205 3325 US
+1 305 224 1968 US
+1 646 558 8656 US (New York)
+1 646 931 3860 US
+1 301 715 8592 US (Washington DC)
+1 386 347 5053 US
+1 507 473 4847 US
+1 564 217 2000 US
+1 669 444 9171 US
+1 669 900 9128 US (San Jose)
+1 689 278 1000 US
+1 719 359 4580 US
+1 253 205 0468 US
+1 253 215 8782 US (Tacoma)
+1 346 248 7799 US (Houston)
+1 360 209 5623 US
Meeting ID: 837 0379 7239
Passcode: 01341885

Find your local number: https://us02web.zoom.us/u/kcYNPpUnfj

RFQ explanation and questions answered.