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Air-Conditioning, Heating Systems, and Combustion Appliances

Definitions

- *Primary Heat Source:* The primary system is generally understood to be the unit (or system of units) most relied upon to provide heating/cooling throughout the season. These systems may or may not be centralized but do provide the majority of the heating for the home.
- *Secondary Heat Source:* Secondary systems or unit are employed only in extreme weather or as backup to the primary system and do not provide heat to the entire dwelling.

Action/Allowability

Category Decisions: Perform a full DOE-approved energy audit prior to deciding how to categorize the cost of heating/cooling system repair or replacement. If the measure is an approved WAP expenditure and the audit justifies the costs with a Savings to Investment (SIR) equal to or greater than 1.0, the measure must be performed, and costs charged as an Energy Conservation Measure (ECM). If the measure is not an eligible ECM, the measure may be charged as a Health and Safety (H&S) measure if there is a documentable imminent threat to the occupant's health and safety and it is included in the DOE-approved Grantee Annual Health and Safety (H&S) Plan.

The following applies when a primary space conditioning system does not qualify as an ECM and will be considered for replacement, repair, or installation with H&S funds. Treat vented gas- and liquid-fueled space heaters, and wood, coal, or pellet fired furnace and boiler systems the same as other combustion furnaces in terms of safety testing, repair, and replacement.

Required:

- Replace, repair, or install primary heating systems when existing primary heating systems are unsafe, inoperable, or nonexistent. No home may be left without a safe primary heating system after weatherization where climate conditions require heating (i.e., all climate zones except zone 1 as defined by ASHRAE). If unable to meet this requirement, deferral is required.
- No DOE-funded weatherization work is permitted if the completed dwelling unit will be heated with an unvented combustion space heater as the primary heat source. The primary heat source must be replaced with a vented unit prior to or by weatherization. The replacement unit must be sized to heat the entire dwelling unit.
- Unsafe secondary units, including space heaters, must be repaired, or removed and disposed of, or deferral is required. Secondary unvented space heaters are considered unsafe if they:
    - are not listed and labeled as meeting ANSI Z21.11.2;
    - have an input rating of more than 40,000 BTU/hour;
    - are in a bedroom and have an input rating of more than 10,000 BTU/hour;
    - are in a bathroom and have an input rating of more than 6,000 BTU/hour;
    - are operating in an unsafe manner (e.g., high carbon monoxide (CO) readings, too close to combustible materials, lack sufficient combustion air volume);
    - or are not permitted by the Authority Having Jurisdiction (AHJ).

- DOE WAP Grantees must comply with the Manufactured Home Construction and Safety Standards which mandates that:
- All fuel-burning appliances in manufactured homes except: ranges, ovens, illuminating appliances, clothes dryers, solid fuel-burning fireplaces and solid fuel-burning stoves, must be installed to provide for the complete separation of the combustion system from the interior atmosphere of the manufactured home (i.e., to draw their combustion air from outside), and be vented to outside the dwelling.
- All appliances installed by or left in place after weatherization in manufactured homes must meet these standards, including secondary heating sources. If an occupant will not allow the removal of an unsafe combustion appliance from the home, deferral is required.
- Repair or replace combustion gas venting to ensure proper combustion gas venting to outside the dwelling for all combustion appliances, including but not limited to gas dryers and refrigerators, furnaces, vented space heaters, and water heaters.
- If weatherization installs an appliance that is vented into a masonry chimney, the chimney must be lined in compliance with the International Fuel Gas Code (IFGC) or local AHJ if more stringent.
- Install adequate combustion air for all combustion appliances left after weatherization.
- If permits are required for heating/cooling system work, they must be secured and are a program operation cost if the installation is an ECM or may be included in the H&S cost if installed as a H&S measure.
- If unsafe conditions relating to existing combustion appliances require remediation to safely perform weatherization and cannot be remedied by repair or tuning, replacement is an allowable H&S measure unless prevented by other guidance herein.
- Documentation justifying the replacement with a cost comparison between replacement and repair must be maintained in the client file.

Allowable:

- Replace, repair, or install primary air conditioning in homes where current occupants meet Grantee's definition of *"at-risk"*.
- Grantee must provide definition of "at risk" " if the Grantee allows H&S A/C measures within its service territory.
- *Minor* repairs on electric space heaters as defined by the Grantee's H&S plan.
- Repair or removal of primary and secondary solid fuel heating appliances.
- Replacement of unsafe *primary* solid fuel heating appliances.

Prohibited:

- Using DOE WAP H&S funds for replacement or installation of secondary heat sources.

Testing/Inspection

Required:

- Verify that primary heating systems are present, operable, and performing correctly.
- Conduct combustion appliance testing and visual inspection of all combustion appliances and their related venting.
- Depressurization and spillage testing is required for all Category 1 appliances pre- and post-weatherization and before leaving the home on any day when work has been done that could affect draft (e.g., air or duct sealing, adding exhaust ventilation).

- CO testing is required for all combustion appliances, regardless of venting type.
- Verify proper clearances for all combustion venting types
- Visually inspect the entirety of solid fuel-fired appliance installations (e.g., wood stoves, coal stoves, pellet stoves, fireplaces) including the venting system to ensure it adheres to the applicable code or local authority having jurisdiction. Appliances must be inspected pre- and post-weatherization.
- Conduct pre- and post- weatherization worst case CAZ depressurization testing in spaces having a fireplace or woodstove. Since there is no consensus method for verifying safe operation of fireplaces and woodstoves, Grantees can propose testing policies and limits. If the Grantee does not propose a policy and fireplaces or woodstoves are left operational, the vent must meet national or local codes, or the home cannot be weatherized.
- Safety inspections related to space heaters, fireplaces, and woodstoves must include, but not be limited to, verification of adequate floor protection, and code-compliant clearances to walls and other combustible materials.

Occupant Education

Required:

- Appropriate use and maintenance of units.
- Provide all paperwork and manuals for any equipment installed by weatherization.
- Discuss and provide information on proper disposal of bulk fuel tanks when not removed as part of the weatherization work.
- Where combustion equipment is present, provide combustion safety and hazards information including how to recognize depressurization, dangers of CO poisoning, and fire risks associated with combustion appliance use.

Asbestos – Confirmed and/or Presumed Asbestos Containing Material

Action/Allowability

Required:

- When suspected friable Asbestos Containing Materials (ACM) are present, including vermiculite, assume they contain asbestos and take precautionary measures to prevent disturbing it during the audit and work unless testing determines otherwise.
- Grantees must have written policy included in their H&S plan for:
- Identifying and managing suspected ACM that provides for reasonable and necessary precautions to prevent asbestos contamination in the home.
- Addressing blower door testing where suspected friable ACM is present (as defined by EPA), including vermiculite.

Allowable:

- Temporary removal and reinstallation of ACM siding to perform an ECM (e.g., wall insulation).
- *Limited* encapsulation or removal of suspected ACM on small surfaces (pipes, ductwork, furnaces, other small, covered surfaces, etc.) by an appropriately trained asbestos control professional if necessary to safely weatherize the dwelling as defined by the Grantee's H&S Plan.

Prohibited:

- Using DOE WAP H&S funds for general abatement/removal/or replacement of asbestos siding, thermal system insulation (TSI) or Transite, or vermiculite.

Testing/Inspection

Required:

- Visually inspect all surfaces (i.e., walls, floors, ceilings, roofs) for suspected ACM prior to drilling or cutting.
- Assume asbestos is present in suspect materials unless testing reveals otherwise.

Allowable:

- Sample collection and testing of suspected ACM conducted by an Asbestos Hazard Emergency Response Act of 1986 (AHERA) certified tester.
- Baseline indoor environmental asbestos sampling.
- Grantee must define action levels for testing results.

Occupant Education

Required:

- Formally notify the occupant, and landlord if applicable, in writing:
- of suspected ACMs that are present and what precautions will be taken to ensure the occupants' and workers' safety during weatherization;
- of results if testing was performed;
- not to disturb suspected ACM;
- When deferral is necessary due to asbestos, occupant, or landlord if applicable, must provide documentation that a certified professional performed the remediation before work continues.

Biologicals and Unsanitary Conditions

Action/Allowability

Required:

- Deferral where conditions (odors, bacteria, raw sewage, rotting wood, etc.) in the home pose a health risk to occupants and/or weatherization workers or may be worsened by weatherization activities (e.g., air sealing) and will not be resolved by weatherization.

Allowable:

- *Limited* remediation of conditions that may lead to or promote biological concerns and unsanitary conditions (e.g., repairing leaking sewage pipe) as defined in the Grantee's H&S Plan
- *Limited* cleaning of the workspace to protect the health and safety of workers and occupants as defined in the Grantee's H&S Plan.

Testing/Inspection

Required:

- Sensory inspection of interior, exterior, attics, and subspaces of the dwelling.

Prohibited:

- Using DOE WAP H&S funds for testing of materials for biological contaminants.

Occupant Education

Required:

- Inform occupant in writing of observed biological and unsanitary conditions.

Building Structure and Roofing

Action/Allowability

Allowable:

- *Minor* repairs to building structure or roofs as defined by the Grantee's H&S plan.

Prohibited:

- Using DOE WAP H&S funds for *major* repairs as defined by Grantee's H&S Plan.
- Using DOE WAP H&S funds for building rehabilitation.

Testing/Inspection

Required:

- Visual inspection of building structure and roofing for damages that compromise building durability and to verify that portions of the home where weatherization will occur are safe for entry and performance of assessments, work, and inspections.

Prohibited:

- Using DOE WAP H&S funds for any testing/evaluation of structural materials by a third-party.

Occupant Education

Required:

- Notify occupant in writing of structurally compromised areas.

Code Compliance

Action/Allowability

Allowable:

- Correction of preexisting code compliance issues triggered by weatherization measures being installed in a specific room or area of the home. If the installation of a weatherization measure triggers the correction of a preexisting code compliance issue, and is paid for with WAP funds, the specific code requirements with reference to the weatherization measure(s) that triggered the code compliance issue must be documented in the occupant file.

Prohibited:

- Using DOE WAP H&S funds for correction of preexisting code compliance issues not directly related to the installation of specific weatherization measures in the home.
- Using DOE WAP funds for work on condemned properties and properties where H&S conditions exist that cannot be corrected under this guidance.

Testing/Inspection

Required:

- Visual inspection.

Occupant Education

Required:

- Inform occupant in writing of observed code compliance issues when it results in a deferral.

Electrical

Action/Allowability

Required:

- Provide sufficient over-current protection and damming prior to insulating building components containing knob and tube wiring, as required by the AHJ.

Allowable:

- *Minor* electrical repairs (e.g., junction box covers, improper splices) to protect the occupant or workers from electrical hazards within the living area or in the immediate area where weatherization activities will occur, as defined by the Grantee's H&S plan.

Prohibited:

- Using DOE WAP H&S funds for *major* electrical repairs as defined by the Grantee's H&S plan.

Testing/Inspection

Required:

- Visual inspection for presence and condition of knob-and-tube wiring.
- Evaluate knob-and-tube wiring for safety prior to work.
- Check for alterations that may create an electrical hazard.

Allowable:

- Voltage drop and voltage detection testing.

Occupant Education

Required:

- Provide occupant with written documentation of any electrical hazards identified that will not be addressed by weatherization
- Provide information to occupant on over-current protection, overloading circuits, and basic electrical safety/risks if conditions warrant.

Fuel Leaks

Action/Allowability

Required:

- When a gas leak is found on the utility side of service, the utility service must be contacted, work must be temporarily halted, and the leak must be repaired before work may proceed.
- Fuel leaks that are the responsibility of the occupant (vs. the utility) must be repaired before installing weatherization measures in the home.

Allowable:

- Replacement or repair of leaking bulk fuel tanks and/or lines if connected systems will remain after weatherization.
- Replacement of flexible appliance gas connectors that are not compliant with current fuel gas codes.

Prohibited:

- Using DOE WAP H&S funds to repair leaks that are the responsibility of the utility to correct.
- Environmental cleanup resulting from bulk fuel leaks using DOE WAP H&S funds.

Testing/Inspection

Required:

- Test all exposed gas lines, fittings, valves, and connections for fuel leaks from utility connection to the appliance throughout the home.
- Test all gas appliances for fuel leaks at all connections, valves, fittings, and burners.
- Conduct sensory inspection of all bulk fuels lines and storage tanks to determine if leaks exist.

Prohibited:

- Using DOE WAP H&S funds for environmental testing of soil or water.

Occupant Education

Required:

- Inform occupants in writing of fuel leak testing results, including specific location if fuel leaks are detected.

Gas Ovens/Stovetops/Ranges

Action/Allowability

Allowable:

- *Limited c*leaning or repair of ovens/ranges/stovetops as defined by the Grantee's H&S plan.

Prohibited:

- Using DOE WAP H&S funds for replacement of gas ovens/ranges/stovetops.

Testing/Inspection

Required:

- Test gas ovens for CO.
- Grantee H&S plan must define action levels and resulting actions.
- Visually inspect cooking burners and ovens for operability and flame quality.

Occupant Education

Required:

- Inform occupants of the importance of using exhaust ventilation when cooking and the importance of keeping burners and broilers clean to limit the production of CO.

Hazardous Materials

Action/Allowability

Required:

- Hazardous Waste Materials generated by weatherization work (e.g., refrigerant, asbestos, lead, mercury, CFL lighting bulb/ballasts, etc.) must be disposed of according to all local and federal laws, regulations, and guidelines, as applicable. Costs specifically related to disposal may be charged as a H&S expense.
- Subgrantees must document disposal requirements in contract language with the responsible party.
- *Limited* removal of pollutants that pose a risk to workers is required (e.g., flammable liquids, hazardous chemicals, and other air pollutants) as defined the Grantee's H&S Plan.
- If removal cannot be performed or is not allowed by the occupant, the unit must be deferred.

Allowable:

- *Limited* removal of pollutants that pose a risk to the occupant as defined in the Grantee H&S Plan.

Prohibited:

- Using DOE WAP H&S funds for Lead, Asbestos, and Radon abatement.

Testing/Inspection

Required:

- Sensory inspection.

Prohibited:

- Using DOE WAP H&S funds for any testing for hazardous materials other than that specifically permitted in the asbestos, lead, and radon sections of this document.

Occupant Education

Required:

- Inform occupant in writing of hazards associated with hazardous waste materials being generated/handled in the home.
- Inform occupant in writing of observed hazardous condition and associated risks.
- Provide occupant written materials on safety issues and proper disposal of household pollutants.

Injury Prevention of Occupants

Action/Allowability

Allowable:

- *Minor* repairs and installations (e.g., repairing stairs, replacing handrails, etc.) as defined by the Grantee's H&S plan.

Prohibited:

- Using DOE WAP H&S funds for *major* repairs, as defined by the Grantee's H&S Plan.

Testing/Inspection

Required:

- Visually inspect for dangers that would prevent weatherization.

Occupant Education

Required:

- If identified hazardous conditions will not be corrected during weatherization, inform occupant in writing of observed hazards and associated risks utilizing the "Hazard Identification Notification Form" required by WPN 22-7.

Lead Based Surface Coverings (Paint, Varnishes, Roofing, etc.)

Action/Allowability

Required:

- Subgrantees must comply with EPA's Lead; Renovation, Repair and Painting Program (RRP) rules when working in pre-1978 housing unless testing confirms the work area to be lead free. This includes, but is not limited to:
- Client file documentation including the Certified Renovator's certification; any training provided on-site; description of specific actions taken; lead testing and assessment documentation; and photos of site and containment set up. Include the location of photos referenced if not in file.
- Certification and training requirements of the RRP rule.
- Job site set up and cleaning verification by a Certified Renovator.
- Only those costs directly associated with lead safe work practices for surfaces directly disturbed during weatherization activities are allowable WAP H&S expenses.

Prohibited:

- Using DOE WAP H&S funds for lead abatement.
- Using DOE WAP H&S funds for purchase, resourcing, or maintenance of X-ray Fluorescence (XRF) devices.

Testing/Inspection

Allowable:

- Testing to determine the presence of lead on surfaces that will be disturbed by WAP measure installation is allowed with EPA-approved testing methods.
- Alternatively, if EPA-approved testing is not conducted, the Subgrantee may assume lead is present and work in compliance with EPA RRP rules.

Occupant Education

Required:

- Follow pre-renovation education requirements per EPA RRP rules.

Mold and Moisture

Action/Allowability

Allowable:

- *Limited* water damage repairs that can be addressed by weatherization workers are allowed when necessary to weatherize the home and to ensure the long-term stability and durability of the measures as defined in the Grantee's H&S plan.
- Source control (i.e., correction of moisture and mold creating conditions) when necessary, to weatherize the home and to ensure the long-term stability and durability of the measures. Source control is independent of latent damage and related repairs. Source control includes, but is not limited to site drainage, gutters, down spouts, extensions, flashing, sump pumps, dehumidifiers, landscape, leaking roofs, vapor retarders, moisture barriers, etc.
- Window and door repairs are allowed with H&S funds to resolve a bulk water intrusion issue that is the cause of visible biological growth and in compliance with the most current program notice (WPN 19-5 at the time of this guidance).

Prohibited:

- Using DOE WAP H&S funds for mold cleanup.
- Using DOE WAP H&S funds for window and door replacements.

Testing/Inspection

Required:

- Visual assessment for moisture or mold damage including exterior drainage.

Allowable:

- Diagnostics such as material moisture content, or relative humidity measurements at the audit and/or final inspection.

Prohibited:

- Using DOE WAP H&S funds for mold testing of any type.

Occupant Education

Required:

- Provide occupant written notification of identified mold/moisture hazards and information regarding the associated hazard.

Occupant Pre-existing or Potential Health Conditions

Action/Allowability

Required:

- When a person's health may be at risk and/or WAP work activities could constitute an H&S hazard, the occupant is required to take appropriate action based on severity of risk.
- Deferral, if occupant risk cannot be mitigated.

Allowable:

- Occupant temporary relocation costs on a *case-by-case* basis.
- Grantee must define the allowable costs, relocations options, procedure for this *case-by-case* determination, and what documentation is required from the client if DOE WAP funds are used for this purpose.

Testing/Inspection

Required:

- Screen occupants for known or suspected health concerns either as part of initial application for weatherization, during the audit, or both.
- This is done utilizing the "Occupant Pre-existing or Potential Health Condition Screening Form" required by WPN 22-7.

Occupant Education

Required:

- Inform occupant in writing of any known risks and provide pre-weatherization screening form.
- Provide occupant with Subgrantee point of contact information in writing.

Pests

Action/Allowability

Required:

- Deferral of homes where infestation of pests cannot be reasonably removed or poses H&S concern for workers.

Allowable:

- *Limited* pest removal is allowed only where infestation would prevent weatherization as defined by Grantee's H&S Plan.
- Screening of windows and points of access and incorporating pest exclusion into air sealing practices to prevent intrusion.

Testing/Inspection

Allowable:

- Visual assessment of presence and degree of infestation and risk to worker.

Occupant Education

Required:

- Inform occupant in writing of observed conditions and associated risks.

Radon

Action/Allowability

Required (when applicable):

- Cover exposed dirt floors within the pressure/thermal boundary with a sealed soil gas retarder
- Cover sump well/pits with airtight covers
- Implement ventilation as required by ASHRAE 62.2-2016

Allowable:

- In homes where radon may be present, work scope may include additional precautionary measures based on *EPA Healthy Indoor Environment Protocols for Home Energy Upgrades*.
- Other precautions may include, but are not limited to, sealing any observed floor and/or foundation penetrations, isolating the basement from the conditioned space, and ensuring crawl space venting is installed and operable.

Prohibited:

- Using DOE WAP H&S funds for radon mitigation.

Testing/Inspection

Allowable:

- Grantees may allow *limited* radon testing as defined in the Grantee's H&S Plan.

Occupant Education

Required:

- Provide all occupants EPA's A Citizen's Guide to Radon and inform them of radon related risks.
- Occupants must sign an informed consent form prior to receiving weatherization services.

Safety Devices: Smoke and Carbon Monoxide Alarms, Fire Extinguishers

Action/Allowability

Required:

- Install CO alarms in every home where alarms are not present or are inoperable in compliance with ASHRAE 62.2-2016 which references NFPA 720 (note: NFPA 720 has been incorporated into NFPA 72).

Allowable:

- Install smoke alarms where the AHJ requires them if alarms are not present or are inoperable.
- Replace functional smoke alarms and carbon monoxide alarms if they are beyond the manufacturer's stated lifetime (usually 10 years).
- Replace functional smoke or CO alarms batteries if designed to be replaceable.
- Provide fire extinguishers where solid fuel burning equipment is present.

Prohibited:

- Using DOE WAP H&S funds for replacement of functional smoke or CO alarms that are not beyond the manufacturer's stated lifetime.

Testing/Inspection

Required:

- Verify operation and age of installed alarms.

Occupant Education

Required:

- Provide occupant with verbal and written information on use of newly installed devices and the potential risks of not properly maintaining these devices.

Ventilation and Indoor Air Quality

Action/Allowability

Required:

- Install ventilation as required by ASHRAE 62.2 - 2016. If occupant refuses ventilation as required by ASHRAE 62.2, the home must be deferred.

Allowable:

- Grantee may choose to request a variance to ASHRAE implementation. If so, they must provide scientific justification specific to their housing stock and local considerations in their Annual Plan submittal for DOE to consider during plan review. Plans lacking sufficient justification or containing inadequate justification (as determined by DOE), shall not be approved, and must be amended.
- Grantees may voluntarily elect to adopt the most recent version of ASHRAE 62.2 as soon as they are prepared to implement the Standard. They must include notification of this in their H&S Plan.
- Homes in Climate Zone 1, that are designed to have free movement of air between the indoors and outdoors and where no effort is being made through weatherization to establish an air barrier are NOT required to meet the ventilation requirements outlined in ASHRAE 62.2, except in any room that may be enclosed and contain a source of water or combustion.

Testing/Inspection

Required:

- ASHRAE 62.2 evaluation to determine required post-weatherization ventilation.
- Measure fan flow of existing fans and of installed equipment to verify performance.

Occupant Education

Required:

- Provide occupant with information on function, use, and maintenance (including location of service switch and cleaning instructions) of ventilation system and components.
- Provide occupant with equipment manuals for installed equipment.
- Include disclaimer that ASHRAE 62.2 does not account for high polluting sources or guarantee indoor air quality.

Water Heaters (*see Combustion Appliances for combustion related requirements*)

Action/Allowability

Allowable:

- *Limited case-by-case* replacement of water heaters if the water heater poses a life-safety risk to occupants (e.g., leaking primary tank, high CO measurements). Grantee must define "limited case-by-case" replacements if they utilize DOE H&S funds for this measure.
- *Minor* safety repairs of water heaters (e.g., T&P valve piping, backflow prevention devices, expansion tanks) as defined by the Grantee's H&S plan.
- Replace, repair, or install primary water heater heaters when existing primary water heater is unsafe, inoperable, or nonexistent.

Testing/Inspection

Required:

- Visual inspection of all water heaters and related piping for safety and leaks
- See *Combustion Appliances* section for related combustion safety testing requirements.

Occupant Education

Required:

- Appropriate use and maintenance of units.
- Provide all paperwork and manuals for any installed equipment.
- Where combustion equipment is present, provide combustion safety and hazards information including how to recognize depressurization, dangers of CO poisoning, and fire risks associated with combustion appliance use.

Worker Safety

Action/Allowability

Required:

- Adherence to all federal, state, and local worker safety regulations (e.g., OSHA, EPA).

Allowable:

- *Minor* repairs and installations (e.g., repairing stairs, replacing handrails, etc.) as defined by the Grantee's H&S Plan, are allowable when necessary to safely weatherize the dwelling.
- Equipment purchases to protect the health and safety of the worker (e.g., Personal Protective Equipment (PPE), jobsite cleaning supplies)

Prohibited:

- Using DOE WAP H&S funds for *major* repairs as defined by the Grantee's H&S Plan.

Testing/Inspection

Allowable:

- Environmental and surveillance testing required by OSHA regulation.

Occupant Education

- Not applicable.