Standards and Installation Procedures

Home Energy Improvement Program

- Offers cash rebates
- Reduces energy bills
- Improves indoor comfort
- Better for the environment

Available for single-family, multifamily and manufactured homes.
Call 866.990.4347 for details.
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Prequalified Contractor Participating in Duke Energy Progress Home Energy Improvement Program (HEIP)

The following Program Standards and Installation Procedures document outlines the responsibilities of Prequalified Contractors participating in the HEIP Program sponsored by Duke Energy Progress (DEP). Contractors are required to adhere to these guidelines to be included in and remain on contractor lists made available to DEP customers. Honeywell Utility Solutions (Honeywell) is an implementation contractor hired by DEP to provide Program coordination and oversight.

Program Description

1. The Residential Home Energy Improvement Program (HEIP or Program) is an existing home energy efficiency (EE) program that provides incentives for HVAC maintenance and equipment replacements, duct testing and repair, and attic insulation with air sealing.

2. The Program will be available to all DEP residential customers that meet the HEIP eligibility criteria. Eligible DEP customers will receive cash incentives to defray the cost of specific energy efficiency measures that meet Program criteria and may also access financing offered and administered by a DEP/HEIP finance agent.

3. This Program will be provided through a network of independent prequalified contractors who will install the eligible energy efficiency measures in accordance with Program standards and guidelines. The Program will provide training, support and quality control for these participating trade allies.

4. Participating contractors will receive the following benefits from this Program:
   1. Increased sales and revenues through increased customer uptake
   2. Program standards, sales and technical training provided by implementer
   3. Marketplace differentiation through presence on prequalified contractor list
   4. Reduced sales costs through high-quality customer Program-driven leads
   5. Marketing support from high-visibility HEIP Program promotion

5. Various education and outreach strategies will be implemented to raise consumer awareness of the benefits and availability of energy efficiency improvements to customers’ homes.

6. To assist contractors on this mission, Honeywell, on DEP’s behalf, will provide:
   1. Logo/graphic identifier for contractor business cards, marketing materials, vehicles and uniforms.
   2. Window clings and Program brochures to hand out to customers/consumers.
   3. Application forms.
   4. Annual recognition program for top contractors. Contractors can promote the award through trade media and professional organizations.
   5. Honeywell will coordinate with DEP to make marketing resources and information available to participating contractors via the Web.

7. Participating customers will receive the following benefits, which will encourage greater participation:
   1. Cash incentives to reduce cost of Program measures
   2. Increased awareness of energy efficiency benefits through Program education
   3. Customer service through Program to assist customers in selecting EE measures
   4. Assurance of energy saving benefits through strict Program standards
   5. Assurance of quality installation through quality control program
   6. Assurance of quality service through prequalified contractor network
How the Program Works

- The Program will be actively marketed by DEP through several avenues that include: direct mail campaigns, utility website, participating contractor outreach and advertising, contractor associations.

- Honeywell and Advanced Energy will recruit and train interested HVAC/insulation and related home performance contractors to deliver the eligible HVAC, insulation and air sealing measures. As part of the prequalification process, all contractors who wish to participate will be required to be in business for at least one calendar year, provide proof of required license or certification and insurance, and enter into a Letter of Agreement or Prequalified Contractor Participation Agreement for participation in the Program.

- Contractors who agree to abide by Program rules and who meet Program requirements will be included in a prequalified contractor listing, which will be included on the DEP website and will be made available to customers upon request.

- Prequalified contractors will vie for selection by customers to complete Program-eligible measures.

- Prequalified contractors will have permission to promote HEIP Program measures in the marketplace and identify themselves as a prequalified contractor.

- Upon selection by the customer, prequalified contractors will complete the requested installation in accordance with all HEIP Program standards and guidelines and all state, federal and local codes and regulations.

- Prequalified contractors will assist the customer in completing an incentive application when requested.

- Prequalified contractors will provide written invoices with sufficient detail describing what was done. The invoice must list the installed cost of each measure for which a rebate will be applied.

- Upon receipt of the application, Honeywell will verify that the application is complete and accurate and will follow up with customers or contractors to resolve any discrepancies.

- Honeywell will conduct quality control inspections on installed measures. Inspections will be spread across all contractors, with new contractors and those who have had quality issues being inspected at a higher rate. Honeywell will address individual contractor problems with retraining and remediation of failing work (when possible).

- Upon approval of applications, incentive checks will be issued to participating customers for the value of the incentive earned for each qualifying measure up to the respective limits.
Contractor Letter of Agreement

- DEP/Honeywell will maintain a master list of contractors that have been prequalified for the Program by complying with all necessary eligibility requirements.
- Contractors participating in the HEIP Program are required to sign Prequalified Contractor Participation Agreement and Release and Indemnity documents as provided by DEP.
- Contractors participating in the HEIP Program are required to abide by the following requirements:
  1. Abide by all local, state and federal guidelines, applicable laws, building codes, regulations and licensing requirements.
  2. Adhere to Program guidelines and standards.
  3. Assist customers in completing applications for incentives when requested.
  4. Follow all DEP and HEIP Program marketing guidelines and requirements.
  5. Install all Program measures for maximum sustainable energy efficiency effectiveness.
  6. Use of the DEP name or logo and any Program marks by contractors must be authorized in writing prior to use.
  7. Allow their company name to appear on the DEP website on the Program's Prequalified Contractor List.
  8. Allow DEP and the Program to include the company name of the participating contractor on the Program Prequalified Contractor List and circulate the list to any DEP customer.

Note: Participation in the DEP HEIP Program is voluntary and may be terminated by either party at any time or for any reason without penalty.

Restrictions on Marketing and Use of DEP’s Name

HVAC companies and contractors may not use the name of the HEIP Program or DEP on any of such companies’ or contractors’ marketing materials without the prior written approval from DEP.

The contractor may not state or imply that DEP has endorsed or approved the contractor or its work. The contractor may not make any representations to its customers on behalf of DEP either orally or in writing.

Dispute Resolution

The Duke Energy Progress Home Energy Improvement Program™ team will take every possible step to ensure a high level of satisfaction with all aspects of the Program. If the customer and contractor cannot resolve the complaint, then the prequalified contractor should contact the Program® Hotline: 866.990.4347.
# Program Measures and Incentives

<table>
<thead>
<tr>
<th>Measures</th>
<th>Rebate</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>HVAC Audit</td>
<td>$100</td>
<td>A standard HVAC system tune-up and operational check as well as diagnostic testing using the Service Assistant tool to obtain pre- and post-tune-up efficiency data. Available once per unit's life.</td>
</tr>
<tr>
<td>HVAC Replacement</td>
<td></td>
<td></td>
</tr>
<tr>
<td>▪ Heat Pump/Central Air Conditioning</td>
<td>$300</td>
<td>15 SEER or higher. No maximum per household.</td>
</tr>
<tr>
<td>▪ Geothermal Heat Pump</td>
<td>$300</td>
<td>19 EER or higher. No maximum per household.</td>
</tr>
<tr>
<td>ENERGY STAR Qualified Room AC Units</td>
<td>$25</td>
<td>ENERGY STAR qualified units. Up to four (4) units per dwelling.</td>
</tr>
<tr>
<td>Heat Pump Water Heaters</td>
<td>$350</td>
<td>Must be ENERGY STAR qualified. Must have an EF of ≥ 2.</td>
</tr>
<tr>
<td>Duct Leakage Repair</td>
<td>$190</td>
<td>50% of the repair cost up to a maximum of $190 per unit. Duct system must be in unconditioned space to be eligible. No Maximum per household</td>
</tr>
<tr>
<td>Attic Insulation/Air Sealing</td>
<td>$500</td>
<td>$0.375 per square foot up to maximum of 1,333 square feet. Maximum $500 per home to reduce attic infiltration and bring insulation level up to at least R-30 (from a maximum of R-19).</td>
</tr>
</tbody>
</table>

**DEP residential account holders residing in DEP electric service territories in North Carolina and South Carolina are eligible for the Program. All customers participating in the Program must be on a DEP residential electric rate and reside in the DEP service territory.**

**The Program is open to owners and renters, but renters must obtain written permission from property owner/ landlord for incentive eligibility.**
**Tax Implications**

Paid incentives that exceed $600 are reported to the IRS on Form 1099. Incentive payments may have tax implications for participants who receive them. The recipient is responsible for any and all tax payments that may result from an incentive payment. Participants are encouraged to consult their accountants or tax experts to determine implications.

**Prequalified Contractor Eligibility Requirements and Participation Standards**

1. The applicant must have been in business as a weatherization/HVAC or home performance contractor for at least one year.
2. The applicant must provide current, valid proof of insurance.
3. The contractor must provide customer references from three projects of similar work scope to Program measures completed in the previous 12 months.
4. Contractors must maintain all licenses, permits, authorizations, etc. as required by state, federal and local regulations. Contractors are required to maintain a mechanical license to perform the HVAC Audit measure.
5. Contractors must have at least one representative attend all HELP mandatory training sessions.
6. Contractors should have the tools needed to verify that the work performed meets the installation standards contained in this document.
7. Contractors must provide high-quality work with high customer service standards. Work must be based on good building science, produce predictable savings and improve the energy efficiency, comfort, safety and durability of customers’ homes.
8. Contractors must provide a business phone number with an answering service and/or answering system available for participants.
9. Contractors must guarantee their work for a reasonable period, and all Contractors must agree to abide by the Home Energy Improvement Program Standards and Installation Procedures governing the technical quality of the work performed, customer health and safety, and customer service and complaint resolution.
10. Contractors should promote overall energy efficiency to customers. Contractors must present the most energy-efficient solution as a primary option to customers and provide relevant information to consumers on the value of energy-efficient measures.
11. Contractors must respond in a timely manner to all Program-related customer inquiries or bid requests.

**Work Flow Process**

Note: Each customer interaction is unique and may follow a slightly different course, but the Program process should generally flow as follows:

1. Homeowners contact the prequalified contractor(s) of their choice or respond to contractor marketing.
2. Contractor(s) go to the house, complete a proper evaluation and prepare a quote.
3. The homeowner selects a prequalified contractor of her/his choice.
4. Contractor completes the installation in accordance with all requirements prescribed by regulations (e.g. statutes, ordinances, codes, regulations and governing body requirements), the measure equipment manufacturer and the Home Energy Improvement Program.
5. Contractors must evaluate the impact of implemented measures on the performance and operation of any combustion appliances and on the health and safety of the occupants. If ANY potential health and safety issues are identified, contractor must take all reasonable steps possible to satisfactorily address the correction of the issue before identifying work as complete.
6. Contractor invoices customer for the full value of work completed, providing sufficient detail (make, model, size, R or U values, etc.) to allow Program to confirm measure eligibility.
7. If necessary, contractor assists customer in completion of rebate application.
Prequalified Contractor Responsibilities

In addition to adhering to all Program material and installation standards, the prequalified contractor must adhere to the following:

1. The prequalified contractor must determine that the participant is a DEP customer.
2. The prequalified contractor must determine if the dwelling is suitable for the recommended measure(s).
3. The prequalified contractor must leave the premises in “broom clean” condition after the installation.
4. The prequalified contractor must remove all waste materials from the property that were generated by the contractor activities. No debris; do not leave paper, wire, sheet metal, plastic or glass waste materials in the crawl space.
5. The prequalified contractor must assist the customer in completing the HEIP Program incentive application forms when requested.
6. The prequalified contractor must submit a detailed invoice for completed installations.
7. The prequalified contractor must have sufficient knowledge/understanding about the system/product being installed to complete proper installation and communicate proper operation to the customer.
8. The prequalified contractor must honor all service and warranty commitments made to participants. All consumer warranties are to be left with the homeowner in writing.

Quality Assurance Procedures and Corrections

The HEIP program implementation contractor, Honeywell, will conduct random quality control inspections of customer sites and contractor documentation on DEP’s behalf to ensure Program standards are being met and that prequalified contractors are abiding by all Program guidelines and standards. Prequalified contractors will cooperate and will provide all needed information to support this process as requested.

1. Honeywell will review all rebate applications received for completeness to verify the accuracy of the information provided and to verify that the equipment installed meets Program efficiency requirements.
2. DEP/Honeywell will perform on-site inspections of rebated efficiency measure installations on a regular basis.
3. Site inspections may occur either with a representative of the contractor present (usually at/toward the end of a project) or at some point after the job is completed (typically without the contractor).
4. Contractors will receive, in writing, the results of the inspection including any corrections needed to meet Program standards and the time allowed for completion if the inspector does not pass the inspection. The time frame for completion of corrective actions will vary depending on the severity of the problem.
5. Contractors must correct deficiencies identified during an inspection within the required response time and notify the participant and Honeywell upon completion.
6. Failure to correct deficiencies identified during an inspection within the required response time may result in a change in Contractor Participation Status. Possible downgrades in status include probation, suspension and/or termination from the Program.

Deficiency Remediation

- First QA failure

1. A corrective action request will be emailed to the contractor by HEIP, followed by a phone call to schedule a mandatory meeting with the installation leader. This meeting will occur within 10 business days of the corrective action request being received.
2. During this meeting, HEIP will review the program requirements and training materials and work with the installation leader to develop an action plan. The action plan will include:
   • How the contractor approaches and completes corrective action requests
   • Internal quality assurance measures the contractor currently utilizes or will implement to prevent future issues
   • Means of communication the contractor will utilize to convey information to the crew(s)
   • Procedure for transfer of guidelines to replacement when employee responsible is promoted or leaves
company
  • A copy of the plan kept on file with HEIP
3. HEIP will perform QA visits for the next five jobs performed by the contractor until the contractor
   meets guidelines for the measure.
  • If satisfactory, future jobs will go back into random selection for QA.
  • If deficiency is found, see “Second QA Failure” below.

- Second QA Failure
  1. Repeat of steps 1 and 2 from “First QA Failure.”
  2. Contractor is placed in Probationary status (see Prequalified Contractor Participation Status section
     for more information about Probationary status).
  3. During the second meeting, identify who/what is the cause of the repeat deficiency and provide input
     on how issue will be resolved.
  4. HEIP will perform QA visits for the next five to seven jobs performed by the contractor until guidelines are
     met for the measure.
     1. If satisfactory, future jobs will go back into random selection for QA.
     2. If deficiency is found, see “Third QA Failure” below.

- Third QA Failure
  1. Corrective action request emailed to contractor by HEIP.
  2. Contractor notified of placement in a Suspended status for the measure type found deficient for the
     third time (see Prequalified Contractor Participation Status section for more information about
     Suspended status). Suspension will last for six months.

Prequalified Contractor Participation Status

Participating contractors shall be classified in one of the following participation status designations. Each
classification shall be subject to limitations or requirements associated with that designation. DEP and the HEIP
Program Manager reserve the right to modify the definition, limitations and requirements of these statuses. DEP
and HEIP’s Program Manager retain sole judgment over determining a contractor’s progression into and through
each status designation.

Provisional – Reserved for all contractors during their first six months of Program participation. Provisional
contractors are entitled to all applicable Program benefits. Projects completed by contractors on Provisional
status will receive enhanced quality assurance/quality control oversight.

Full – Contractors, not operating under any of the other status designations described here, that have met
Program goals and provide quality services utilizing industry best practices shall have the status of Full
participant. Full participants are entitled to all applicable Program benefits.

Probationary – Contractors who have been found to be in violation of ethical standards or any Program
participation requirements, who have failed more than one inspection for the same job or who have repeatedly
failed inspections on the same grounds shall be placed on Probationary status. The probationary period will
not be less than 30 days; however, in the sole discretion and judgment of HEIP’s Program Manager, some
violations of ethical standards or Program participation requirements may be deemed to be sufficient grounds
for suspension or termination. During the probationary period, the Participating contractors shall:
  ➢ Be subjected to higher QA inspection levels
  ➢ Submit to the Program, in writing, an action plan of how the company will ensure that violations of this
    type are to be avoided in the future

Upon review of the action plan submitted and probationary period QA results, and prior to the end of the HEIP-
determined probationary period, HEIP will make a determination on the contractor’s participation status in the
future. This determination may include continued probation, Full participation status, suspension or termination.
During the probationary period the participating contractor will maintain eligibility for DEP customer incentives
and posting on HEIP’s duke-energy.com/heip website.
**Suspended** - Applies to participating contractors who were or are on Probationary status and have either 1) been unresponsive to or failed to adequately fulfill the terms of their probation, 2) been placed on probation twice in a month period or 3) as determined by HEIP’s Program Manager, engaged in practices that have put the public, or the Program, at risk.

Suspended contractors shall be removed from the DEP website until they return to either Full or Probationary status. A contractor with the status of Suspended is prohibited from representing himself/herself as a participating contractor or performing rebate-eligible work for DEP customers.

➢ The contractor may not submit any new applications for rebate during the suspended period. However, the contractor may, if approved by HEIP’s Program Manager, complete customer projects already submitted to the Program.

Suspended contractors may progress to Probationary status upon satisfactory completion of the specified remedial activities. Remedial activities may include:

➢ Notifying HEIP of rebate-eligible jobs for which a rebate could be applied so that on-site training may be conducted
➢ Other remedial action deemed appropriate by the Program Manager based on the nature of the violation

Nothing in this progression relieves the contractor of the responsibility to fulfill any outstanding obligations to the Program or Program customers. Failure to comply with the terms of the suspension will result in termination from the Program.

**Terminated** - Applies to contractors who:

➢ Have been on Suspended status for more than 30 days and have been unresponsive to or failed to adequately fulfill the terms of their suspension. Contractors in other statuses also may be terminated for violations of ethical standards or Program participation requirements or standards.

Contractors with this designation are prohibited from participation in the Program. Customers with pending or in-process jobs will be notified of the Contractor’s termination and offered such remedies as HEIP deems appropriate. Further, the officers and owners of a terminated contractor are prohibited from being or becoming officers or owners of any other current or subsequent Program contractor. Nothing in this process relieves the contractor of the responsibility to fulfill any remaining obligations to the Program or Program customers.
How to Apply – The Incentive Rebate Application Process

The process of applying for an incentive under the Program is designed to be simple and to involve as few steps as possible. The Program staff is available during normal business hours to help you with the application process.

- **Step 1: Verify customer and project eligibility.** Make sure that the customer is a Program-eligible residential electric customer of DEP and that your proposed project meets all Program requirements and standards.

- **Step 2: Obtain the Home Energy Improvement Program Rebate Application.** Download or obtain a printed form. Complete all the required information. Application forms can be downloaded from the “Contractor Details” link on the Contractor Tab of the Duke Energy Progress Home Energy Improvement Program website, which can be accessed through duke-energy.com/HEIP. Contractors may complete the form on behalf of their customers.

- **Step 3: Develop project cost estimates and plans that fit the customer’s needs and expectations.** Work with the customer to identify all aspects of the project, all related costs and the anticipated outcomes. Include energy and cost savings estimates wherever possible.

- **Step 4: Implement and complete the Program measures that make sense for that customer.** Financing is available through AFC First. Contact the Home Energy Improvement Program team for details.

- **Step 5: Retire replaced equipment.** Dispose of and recycle materials properly and remove all replaced equipment and systems from the retail market permanently.

- **Step 6: Submit the required documentation of project completion and costs within 90 days of project completion.** Submit completed incentive application form(s) along with the original paid invoices showing the costs for labor and materials for the covered work. If the project materials are included on several invoices it will be helpful if a summary sheet is included that totals the quantities and shows how the quantities match the quantities in the application. Do not submit unless all work is complete.

- **Step 7: Home Energy Improvement Program staff will review the request for payment and the final project documentation.** Program staff will verify that the home and the measure(s) meet Program eligibility criteria. A post-inspection may be required for verification purposes. Once this is completed, the incentive application will be approved.

- **Step 8: Homeowner will receive incentive rebate payment.** Incentive payments will be sent within four to six weeks from the time that all the documentation is received and the field inspection is complete.

All projects are subject to be chosen for independent (from the Duke Energy Progress Home Energy Improvement Program) measurement and verification (M&V) purposes. If so, customer will be contacted by a Duke Energy Progress Program representative.
Measure Installation Standards

Attic Air Sealing and Insulation

**Applicability** Program incentives will apply to only new attic or conditioned space ceiling insulation that is installed in conjunction with air sealing of the thermal boundary and in accordance with the following standards:

1. Air Sealing: All holes, cracks or other openings between the attic and the conditioned space must be blocked and sealed with durable air barrier materials, except where access is so restricted as to make it impractical.
2. Insulation shall be installed with no gaps or voids, no compression, no wind intrusion into the insulation and in contact with the air barrier of the conditioned space.

**Air Sealing Installation Requirements**
- All chases, shafts, dropped ceilings, open wall cavities and open soffits must be capped with a rigid air barrier and sealed with mastic, caulk or fire-rated foam.
- All open floor systems must be properly blocked and sealed with mastic, caulk or fire-rated foam.
- All gaps between drywall and top plates must be properly air sealed with mastic, caulk or fire-rated foam.
- All penetrations for wiring, plumbing, venting, piping, fans, fixtures and ducting must be sealed with mastic, caulk or fire-rated foam.
- All openings around or adjacent to combustion vents or chimneys must be properly capped with metal and air-sealed with fire-rated material.
- All HVAC and storage platforms must be properly capped and air-sealed with mastic, caulk or fire-rated foam. Alternatively, insulation installed beneath flooring in the attic may be dense-packed to completely fill each joist cavity to a minimum density of 3.5 pounds per square foot.
- All stairways must be properly backed, capped and air-sealed with mastic, caulk or fire-rated foam.
- All attic access doors/hatches/pull-downs must be weatherstripped.

**Insulation Installation Requirements**
The Contractor shall be responsible for ensuring that all attic insulation materials installed comply with the insulation manufacturer's requirements and these Program standards.

1. **Existing Insulation** – The attic site must have no more than R-19 equivalent insulation existing prior to the installation for the work to be eligible for incentives.
   a. The contractor is responsible for determining if the site can properly accommodate the additional insulation and that installation of additional insulation will not cause structural damage to residence.
   b. If applicable, the contractor must notify the customer of the steps needed to accommodate safe installation, make necessary steps to correct the site or verify that corrections have been made by the homeowner prior to installing the insulation.
2. **Existing Moisture** – Repairs of any existing leaks and adequate attic ventilation remediation must be provided if the existing insulation is found to be wet or damp. The insulation must be allowed to dry prior to installing additional attic insulation. If the insulation fails to dry after a reasonable period of time, it must be removed and replaced with new dry effective insulation.
3. **Exhaust Venting** – Range hood, clothes dryer and bathroom exhaust fans shall be vented to the outside in conjunction with adding attic insulation to prevent potential future moisture issues. The vent pipes shall not be vented through an existing attic ventilator unless the minimum required net free area for the attic would still exist without the use of that ventilator.
4. **Site Preparation** – The contractor shall be responsible for completing all preparation work involving the area to be insulated.
5. **Amount of Insulation to be Installed** – The amount of insulation to be installed is the quantity that will bring
6. **Vapor Retarders** - Improperly installed vapor retarders on existing batt or blanket insulation must be removed or corrected so that they are properly placed between the insulation and the conditioned space. Batt or blanket insulation with an attached vapor barrier shall not be installed over existing attic insulation.

7. **Attic Knee Walls** - Shall be insulated with batt, blanket or other non-collapsing insulation at or above the code-required R-value. Access hatches/doors in the knee wall shall be insulated to the same R-value as the surrounding knee wall. A rigid insulation board, such as a foam insulation board, shall be installed on the exterior surface of the wall, covering both the cavity insulation and the framing components of the wall.

8. **Attic Accesses and Pull-Down Stairways** - Must be insulated to R-30 with batt, blanket or rigid foam insulation stapled or glued to the top of the access covering, and weatherstripped. Suitable blocking materials must be placed around the perimeter of the access opening when loose-fill insulation is used. Cracks between wood trim or molding and ceiling finish materials around the perimeter of the opening shall be caulked.

9. **Can Lights** - A dam allowing insulation to be installed to full thickness must surround all non-IC-rated recessed can lighting fixtures, maintaining code-required distance from the fixture.

10. **Electrical Junction Boxes** - Improperly terminated or unprotected wiring connections shall be corrected by either:
    a. Installing a metal or approved plastic cover on the open electrical junction box
    b. Installing a junction box where one does not exist at an electrical connection

11. **Knob-and-Tube Wiring** - Insulation materials must not conceal or cover knob-and-tube wiring.
    a. Cellulose insulation must not contact knob-and-tube wiring.
    b. Insulation must not restrict heat dissipation in the free air space around knob-and-tube wiring or otherwise contribute to additional heat buildup.
    c. Contractors should refer any issues with respect to knob-and-tube wiring to a licensed electrical contractor.
    d. Mineral fiber insulation materials (fiber glass and rock wool) may contact knob-and-tube wiring but shall not conceal or cover the wiring.
    e. Blocking materials must be used with loose-fill insulation materials when the level of the insulation will exceed the wiring height.
    f. When batt or blanket insulation with an attached vapor barrier (or other facing) is installed, the facing shall not contact the electrical conductors. Batt or blanket insulation with double facings shall not be used for this application.

12. **Whole-House Attic Fans** - Loose-fill insulation materials must be prevented from falling into whole-house attic fans by installing acceptable blocking materials around the fan housing. Fan must be tested after insulation is installed to ensure there is no movement of insulation into the living space.

13. **Insulation Materials** - Additional installation standards will apply depending upon the material used:
    a. Loose-fill insulation materials must be installed in accordance with the manufacturer's coverage chart with no adjustments made for framing, such as joists, etc., at the specified weight per square foot and depth required to achieve a total of R-30.
    b. Batt and blanket insulation shall be cut and split to fit between any cross-bracing.
    c. Insulation materials such as organic cellular (polystyrene, polyurethane, etc.) may be used in certain applications, such as for cathedral ceilings, if prior permission from DEP is obtained.
    d. Radiant barrier insulated materials will only be counted toward insulation levels if they are ENERGY STAR qualified and are preapproved by the HEIP technical coordinator.

14. **Verification of Material Installed** - The contractor must document the following applicable information on a receipt (attic card; also referred to as the builder's statement) removed from the insulation bag or container,
or an equivalent card, and posted in an easily visible location near the attic access:

a. For batt, blanket or foam products – the coverage area in square feet and thickness, and the R-value of the insulation installed

b. For loose-fill insulation – the coverage area in square feet and thickness, the R-value and the number of bags

c. The attic card shall be signed and dated by the contractor. If attic insulation is installed in more than one area of the residence, the data for each area shall be entered on a separate attic card for each area.

15. **Furnaces Mounted in the Attic** - Insulation shall not block the combustion air to an attic-mounted furnace with a 3-inch clearance between the insulation material and the furnace housing. Blocking materials shall be installed around the furnace when loose-fill insulation is installed.

16. **Unfinished Floored Attics** - Insulation installed beneath flooring in the attic shall be dense-packed to completely fill each joist cavity to a minimum density of 3.5 pounds per square foot.

17. **Exterior Roof Insulation Systems** - An exterior roof insulation system may be installed in some cases. Ventilation between the insulating sheathing and the roof decking need not be provided when this type of insulation system is installed. Prior approval for this installation must be obtained from the HEIP Program staff and the customer.

18. **Un-Insulated Walls of Multilevel Dwellings** - Where un-insulated walls are separating conditioned areas from non-conditioned attic space, the walls must be insulated if the wall is accessible.

19. **Spray Foam Systems** - Spray foam installations can and do achieve both air sealing and insulation goals per Program standards. Spray foam jobs will be inspected for installation meeting manufacturer’s specs, proper depth and full coverage of the attic space. In cases where spray foam installations do not cover the entire attic space(s) traditional air sealing methods will be required.

**Attic Ventilation**

The attic must be properly ventilated to prevent the possible occurrence of condensation or moisture damage to the insulation materials or structure in accordance with local codes and accepted building science principles. The amount of ventilation shall comply with Section 604-4.2 of the U.S. (HUD)/ (FHA) Minimum Property Standards for One- and Two-Family Dwellings. The ratio of total ventilation net free area (NFA) to ceiling area (the entire attic floor area over both conditioned and non-conditioned spaces) must equal at least 1 square foot of ventilation net free area for each 150 square feet of attic floor area (1:150) or 1 square foot of ventilation net free area for each 300 square feet of attic floor area (1:300) if one of the following two requirements is met:

- **High and/or Low Ventilation With Vapor Barrier** - An effective vapor barrier with a moisture transmission rate of 1.0 perm or less is installed on the conditioned space side of the ceiling in combination with ventilators located in the upper portion of the attic space to be ventilated (high ventilation) or in the lower portion of the attic space to be ventilated (low ventilation), or both.

- **High and Low Ventilation** - At least 50 percent of the required net free area can be provided by ventilators located in the upper portion of the attic space to be ventilated at least 3 feet vertically above cornice or eave vents. The remaining 50 percent of the required net free area can be provided by ventilators located in the lower portion of the attic space to be ventilated, usually in the eave or cornice areas of the attic.

If more ventilation is needed, additional ventilation may be added in conjunction with the additional insulation to be eligible for incentives. Static roof ventilators are recommended when additional attic ventilation cannot be achieved by the addition of soffit, ridge or gable vents. Location should be selected so that natural air flow will not be restricted.

a. **Roof Vents in Lieu of Soffit Vents** - If low ventilation cannot be achieved by installing soffit vents, static roof vents shall be located as low as possible on the roof line to meet ventilation requirements.

b. **Rain Deflectors** - When static roof vents are installed low in the roof or are installed on a high-pitched roof having a slope of 45 degrees or greater, a rain deflector device with a minimum height of 4 inches, a width equivalent to that of the vent flashing, shall have a "curl" at the top to prevent water splash-over and must be installed from 4 to 10 inches above the vent cap if the vent does not
contain a built-in provision on the upper side that prevents water from entering the vent.

c. **Ridge Vents** - Ridge vents must be installed whenever possible to achieve high ventilation.

d. **Soffit Vents** - Soffit vents shall be installed with the sloped louvers pointing toward the house.

**Heat Pump Water Heater**

Applicability: The contractor shall be responsible for ensuring that the heat pump water heater installed complies with the manufacturer’s requirements and these program standards.

Heat Pump Water Heater (HPWH) Installation Requirements

- HPWH must be ENERGY STAR qualified equipment with an energy factor (EF) of 2.0 or greater.
- Contractors must ensure the home power supply corresponds to the HPWH power requirements and recommended over-current protection.
- HPWH must be located in an area with at least 700 cubic feet of free space around it. A louvered door may be used to increase access to free space.
- HPWH must be located in a clean, weather-protected area that will not get colder than 45 F or below manufacturer ambient temperature specification. HPWH must be level.
- HPWH must not be located where corrosive or flammable vapors are present.
- To limit noise from vibration, foam or rubber material must be used between the HPWH shell and any surface it touches (e.g., hurricane/earthquake straps, finished floors, shelving).
- Contractors should place the appliance at least 7 inches away from any finished wall surface.
- Contractors should install the HPWH in a location where sound transmission into the living space will be minimized.
- Contracto should install the HPWH in a location where the appliance can be serviced and maintained per manufacturer requirements (clearance for filter, temperature/pressure relief, drain, etc.).
- Contractors must incorporate a 6-inch or greater heat trap into the hot and cold water sides of the plumbing exiting the water heater.
- Condensate drain tubes must be connected and terminate to daylight.
- HPWH with multiple operation modes must be set to the most energy-efficient setting (e.g., energy saver mode).
- Gallon capacity guidelines detailing the recommended tank size for the number of household occupants for HPWH should be followed.
- Contractor should pay special attention to provide code-compliant drain discharge, maximum relief valve pressure and catch pan installation.
- Contractors should ensure optional exterior insulation blankets do not interfere with required venting and access for repair and the visibility of warning labels are not obstructed.
- Contractors should read the entire owner's manual before attempting to install or operate the HPWH. Safety and energy conservation are important factors to consider when selecting the water temperature setting. Contractors should not increase the water temperature setting above the manufacturer’s recommended levels during installation. Water temperatures above 125 F can cause severe burns instantly or death from scalding.

*All building codes (state and local) in cases where they do not match program standards.*
ENERGY STAR Window Unit HVAC Installation or Replacement

*Please note that HVAC window units are homeowner installed. There is no prequalified contractor requirement for this measure.

- This measure is homeowner installed.
- Installation should be conducted by following all manufacturer’s instructions in the unit’s product manual.

Duct Repair and Sealing

*Please note that duct replacement is eligible for the same rebate as duct sealing. See pages 17 and 18 for additional requirements.

Duct repairs and sealing must significantly reduce the leakage rate of conditioned air from the duct system. Repairs may be made based on diagnostic equipment-based pressure testing (such as a duct blaster or blower door with pressure pans) or on visual checks of the heating and air conditioning ducts and their connections to the operating system. Duct testing incentives will only be provided for equipment-based diagnostic pressure testing. Pressure testing of ducts is recommended, but not required, for the duct sealing incentive. The following procedures are requirements that must be met by the contractor:

- The majority of the duct system must be in unconditioned space, outside the thermal barrier of the home to be eligible for this incentive. Duct systems primarily within living space, encapsulated crawlspaces, or encapsulated attics are not eligible for this incentive.

- The entire duct system, from its connection to the heating and cooling system to each supply register and return, must be thoroughly inspected for air leakage or potential air leakage.

- The supply and return must be checked for unbalanced air flow. Reasonable efforts must be made to achieve a sustainable system air flow balance.

- Damaged or disconnected ducts must be reattached and repaired and flexible ducts that are tangled or crushed must be uncrimped and straightened out.

- Where leaks are detected, such connections must be sealed with bucket mastic, aerosol-based sealant, tape or other duct sealing materials and methods certified by UL 181 that are acceptable for use and that will retain adhesion over the life of the duct.

- Any non-insulated ducts in non-conditioned areas (such as crawl spaces, attics and garages) must be insulated. Where duct insulation has deteriorated or been damaged, replace with new duct insulation.

- Replacement ductwork and previously un-insulated ductwork shall be insulated to at least R-8.

- For cracks and/or gaps larger than ¼ inch, gaps must first be covered with a 2-inch-wide section of fiberglass tape, embedded in a bed of mastic sealant, and then the tape covered with additional mastic sealant to provide an airtight seal.

- Sections of loose metal ducts must be secured together with metal screws or other approved fasteners to ensure the duct sections remain connected.

- All supply registers and return grilles must be tightly sealed to the ducts.

- Air sealing around air handlers regardless of duct type should meet the UL 181A standard of either AF-100 tape, mastic plus fiberglass mesh or high-temperature caulk.

Caution: Combustion appliance venting - Contractor shall report to the customer any issues or concerns related to venting of combustion appliances. Repairs and sealing of ducts shall be suspended until such issues have been resolved.

Procedures for prioritizing duct sealing and repairs
1. Seal the largest leaks first including disconnected ducts, missing end-caps and other catastrophic holes.
2. Seal the areas of highest pressure first including all connections near the air-handler cabinet and supply and return plenums, flexible canvas plenum connectors and filter slot covers.
3. Seal return leaks that may contribute to negative pressures in the combustion appliance zone.
4. Seal all connections between duct sections, branches and where take-offs connect to the main trunk lines.
5. Seal take-off connections to register boots and boot connections to floors, walls and ceilings.

**Duct Replacement**

Replacement of the entire duct system will in some cases be more cost-effective than sealing and repairing the existing ductwork. **Duct replacement work is eligible for the same rebate as duct repair and sealing.**

The following standards apply to any duct replacement and to extensive repairs where applicable:

1. Duct design and installation shall be as recommended by Air Conditioning Contractors of America Manuals D, E, G, and L, Sheet Metal & Air-Conditioning Contractors National Association Inc. (SMACNA) manuals and/or the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) handbook, unless otherwise stated in these standards. Air distribution system design and installation shall provide air flow across the indoor heat pump refrigerant coil at a minimum of 400 cubic feet per minute per 12,000 BTUh of the equipment's Air-Conditioning, Heating and Refrigeration Institute (AHRI) certified cooling capacity.

2. The minimum air flow requirement of 400 cubic feet per minute per 12,000 BTUh in Duct System Design, Modification, and Installation section, item 1, does not apply to Packaged Terminal (PTHP), Self-Contained Through-The-Wall (SCTTWHP) Window Systems (WHP) or Free Delivery Split Heat Pumps (FDSHP). All other sections of these standards remain applicable unless otherwise noted.

3. If existing ducting does not meet these standards, reasonable efforts must be made to make appropriate corrections to bring ducts into compliance before installation is complete.

4. The long cross-section dimension on rectangular duct shall not exceed three times the shorter dimension unless prior approval is given by DEP.

5. All duct joints, seams and fittings, and return air pans in duct shall be sealed using acceptable materials and methods as described in the duct sealing section. All supply boots shall be sealed with reinforced mastic sealant or caulked (if needed) where they penetrate floors, side walls or ceilings.

6. Flexible vibration isolation connectors, or approved equal, shall be installed (as necessary) in sheet metal ductwork at the unit in both the supply and return. Ductwork shall be properly aligned at these connectors with no offset.

7. Ductwork shall not contact the ground.

8. Metal ductwork shall be installed in a workman-like manner in accordance with the acceptable practices given in the ASHRAE Handbook or the SMACNA "Low Pressure Duct Construction Standards" (latest revision) manual. Rectangular sheet metal ducts shall be a minimum of 28-gauge thickness and all seams and joints shall be mechanically fastened. All metal ducts shall be securely supported, hung or suspended by metal hangers, straps or brackets and the support material in contact with the duct, or external insulation, shall not be less than 3/4 inches wide. Duct hangers shall not be more than 10 feet apart for rectangular metal duct, or 12 feet for round duct. Supporting straps shall be installed within 2 feet of supply boots. All rectangular metal ducts 24 inches wide and wider shall be cross broken or beaded to provide additional support. The joints of round sheet metal duct shall be secured with screws.

9. All flexible ducts shall be listed as Class 1 air duct with a moisture impervious sleeve. Assembly shall be in strict accordance with details listed in the flexible ductwork manufacturer's and/or equipment supplier's applications manual or the SMACNA “Flexible Duct Performance Standards” and “Flexible Duct Installation Standards” (latest revisions).

10. All flexible ducts shall be sized to include allowances for the surface roughness of the flexible duct material. The methods outlined by the Air Conditioning Contractors of America (ACCA) Manual Q, the use of friction...
charts specifically for sizing flexible, vinyl-coated helix core ducts (provided by ACCA Manual D, ASHRAE guidebooks, etc.) and the use of duct sizing slide rules that provide the same information found on friction charts and are specifically for flexible, vinyl coated helix core ducts are recommended.

11. Flexible duct shall be installed in a manner that maintains the airflow integrity of the ducts with no crimps or sharp bends that will severely restrict airflow. Flexible air duct shall be supported at the manufacturer’s recommended intervals, but not to exceed a maximum distance of 10 feet. Supporting straps shall be installed within 2 feet of supply boots. Hanger material shall be not less than 1 inch wide and shall be suitable for use with flexible ductwork (without cutting ductwork). The maximum permissible sag shall be 1/2 inch per foot between the hangers. Collars shall be used to connect flexible duct and shall be a minimum of 2 inches in length. Collars shall be inserted into the flexible duct a minimum of 1 inch before fastening and sealed with a mastic sealant.

12. Any ductwork opening through a foundation wall or manufactured home bottom board material or skirting shall be sealed with sheet metal to prevent the loss of conditioned air and the entrance of animals, etc. This opening and external ductwork shall also be protected from the weather.

13. The minimum size of any branch supply duct or return shall be 4 inches in diameter, or equivalent. The maximum size of a branch duct to a supply outlet shall be 8 inches in diameter, or equivalent.

14. Supply and return air registers and grilles shall be of sufficient number, size and location to prevent objectionable drafts and noise and to provide balanced air circulation and temperature, designed for the specific application to permit proper diffusion of air along the outside perimeter. Average face velocity of each supply register shall not exceed 700 feet per minute or be less than 400 feet per minute. Return air registers and grilles sized for a maximum average face velocity of 500 feet per minute.

15. Branch duct takeoffs shall be more than 4 feet from the indoor supply side of the unit or the supplemental electric heater assembly. Readily accessible balancing or volume control dampers with outside locking devices shall be provided, as needed, in the supply branch ducts to regulate the air flow to each register. The balancing dampers should be located as close as possible to the supply trunk. Provisions (i.e., main trunk line volume control damper in the largest trunk, etc.) shall be provided, if needed, to regulate air flow where the main supply trunk divides. Supply branch ducts shall not originate from the end of the main supply trunk line.

16. The average temperature difference between any room or space within the conditioned structure (same level) shall not be more than 4 F.

17. Multi-zone duct systems utilizing dampering devices to control the flow of air and multiple thermostats (one per zone) shall be installed in accordance with manufacturer’s installation manuals.

18. Ductwork shall not be installed where it will be exposed in a living space without prior written approval from customers.

19. Heat pumps and central air conditioners installed in manufactured homes may use the existing ductwork or new, field-installed ductwork. For existing manufactured homes’ manufactured ductwork, only items 9, 10, 14 and 15 of the Duct System Design, Modification and Installation section shall apply. However, the average face velocity of each supply register shall not exceed 700 feet per minute or be less than 400 feet per minute.
HVAC Audit

The HVAC Audit will consist of a standard HVAC system tune-up and operational check as well as diagnostic testing using the Service Assistant tool to ensure the system is operating as recommended by the manufacturer. Some limitations do apply:

1. **HVAC Audit requires the use of the HVAC Service Assistant tool by Field Diagnostics (www.fielddiagnostics.com).** The contractor providing the HVAC Audit must maintain a mechanical license in the state in which the measure is completed. Technicians must obtain the refrigeration license that corresponds to the size of equipment being audited.

2. **A Pre-Efficiency Index (preEI) and Post-Efficiency Index (postEI) calculated by the tool must be submitted for each system. The postEI must be greater than the preEI to be eligible.**

3. **Duke Energy Progress customers may apply for a HVAC Audit incentive only once in the life of the HVAC system; there is an unlimited number of unique systems.**

4. **The system on which the HVAC Audit is performed must have been operating for at least one year in order to qualify for the incentive.**

5. **HVAC Audit can be completed on electric heat pumps and central air conditioners. Gas, oil and wood furnaces are not eligible for the incentive.**

6. **To promote accuracy of the efficiency testing, the outdoor temperature must be 60 F or greater.**

7. **Multi-family specific limitations (four or more units per dwelling):**
   - If the preEI reading is 90 percent or greater, the system is deemed ineligible for the incentive payment.
   - In cases where a third party will be receiving the incentive funds (i.e., the prequalified contractor performing the work), a signed and dated “Third-party Authorization Letter” must be submitted for each multi-family unit before the rebate can be processed. Contact HEIP for the letter template.
   - Unoccupied multi-family units are ineligible for the incentive.

System Check Requirements

1. Obtain a copy of the HVAC Audit Checklist PDF from the HEIP website to fill out while performing the measure.

2. Enter the site and HVAC system information into the Service Assistant tool and perform the “Audit” test (aka Pre-test) once the system gets to steady state (approximately 15 to 20 minutes) to obtain the initial diagnosis and efficiency data.

3. Check thermostat for calibration:
   - For single-stage units, set the thermostat in cooling mode and lower the set point to a temperature low enough to engage the cooling circuit. Check the thermostat space temperature reading against a calibrated thermometer, and calibrate the thermostat if a 2-degree or greater difference is present. Make sure the condenser fan, the evaporator fan and the compressor are all running.
   - For two-stage systems, make sure the stages come on in the proper sequence and at the programmed set points. If a humidity control is in place, make sure the proper staging is engaged for humidity control at the preset humidity levels.

4. Clean or replace air filter.

5. Inspect condensate drain:
   a) Clean, insulate or repair any plumbing components and traps, as necessary.
b) Check to ensure a secondary drain/float switch is in place.

c) Make sure all drains are free from obstruction and drain properly.

d) Inspect drain pan and accessible drain line for biological growth. Clean as needed to remove biological growth and ensure proper operation. Add algae tabs or strips as necessary. Ensure algae tabs or strips and cleaning agent are compatible with the fin and tube material.

6. Inspect evaporator coil.

If access is possible, follow the procedure below.

a) Make sure unit is not running and will not come on during inspection.

b) Check for evidence that the system is being run without a filter in place. Use a flashlight to look for debris such as pet hair, dust or organic material growth that could be restricting air flow or interfering with low side heat transfer.

c) Remove heavy debris. For stuck-on materials such as organic growth (mold or mildew) or smoke, a chemical cleaning agent should be applied according to the manufacturer's and cleaning product's recommendations. In most cases a spray-on, leave-on type cleaner will have to be used to prevent flooding of the return air compartment.

7. Inspect condenser fan motor:

a) Confirm the fan blade has a tight connection to the blower motor shaft.

b) Inspect the fan for free rotation.

c) Verify voltage and amp draw on condensing unit and compare to nameplate RLA.

d) Lubricate bearings as needed only if recommended by the manufacturer.

8. Inspect evaporator fan and motor:

a) Confirm that the fan or blower wheel has a tight connection to the blower motor shaft.

b) Inspect the fan for free rotation.

c) Verify voltage and amp draw on evaporator unit and compare to nameplate RLA.

d) Vacuum blower wheel and blower compartment to remove dust and debris.

e) Lubricate bearings as needed only if recommended by manufacturer.

9. Inspect all accessible refrigerant lines for leaks, kinks, crushed sections and restrictions. Ensure suction line is insulated.

10. Inspect condenser coil:

a) Brush the condenser coil fins to remove any heavy debris.

b) Use a fin comb or similar device to straighten any damaged or bent fins.

11. Clean Condenser Coil (if necessary):

a) Apply the appropriate cleaning agent to all condenser coil surfaces and let stand for a minimum of 10 minutes or for the cleaning product or manufacturer’s recommended time.

b) Rinse the coil thoroughly with water. Stubborn or impacted debris may require that the top panel be removed and the rinse applied from the inside out, opposite the direction of the condenser coil air flow.

12. Check refrigerant level:

a) Confirm the proper refrigerant levels as recommended by the manufacturer.

b) Test system for refrigerant charge.

c) Add replacement refrigerant as needed, as recommended by the manufacturer. Record amount of
refrigerant added or recovered.

13. Inspect ductwork for damage, leakage and sizing issues that may affect system performance.

14. Perform the “Repair” test (aka Post-test) with the Service Assistant tool to obtain the post repair/cleaning efficiency data and diagnosis.

15. Complete the HVAC Audit Checklist from the HELP website and submit a copy with the rebate application. Synchronize the Service Assistant tool with the FDSI contractor portal in order to upload the test data and qualify the HVAC system(s) for the Audit incentive.

HVAC System Replacements

Qualifications for HVAC Replacement Incentives

- Replacement system must have a minimum AHRI rated SEER of 15.0 for central air conditioners and air-source heat pumps or a minimum AHRI rated EER of 19.0 for geothermal heat pumps.
- The indoor coil must be matched so that the combination is rated by AHRI.
- Maximum cooling capacity shall be 60,000 BTU/h (5 tons) at AHRI conditions.
- All replacement systems must have a TXV refrigerant metering device installed.
- All installations must be installed in strict accordance with the manufacturer’s installation specifications.
- In addition to the manufacturer’s installation specifications, the contractor must ensure all systems installed:
  ➢ Have the correct size line set on split systems
  ➢ Are brazed with a nitrogen purge in the line set and indoor coil
  ➢ Have a vacuum of 500 microns drawn before releasing the factory charge

Allowable System Types

For a list of allowable heat pump types and relevant certification standards, please see Appendix A.

Central AC and Heat Pump Installation Standards

Below is a list of paragraphs applicable to all central air conditioner and heat pump installations, unless stated otherwise for specific systems. Following these paragraphs are additional standards applicable to specific heat pump types. Throughout the Installation Standards, references are made to industry standards. References to these standards are listed in Appendix B, References for Technical Standards.

- Codes – The contractor is responsible for compliance with all state and locally adopted public codes or regulations affecting work under these specifications. Where local codes or regulations require greater standards than those required in this section, local codes govern. Where local codes or regulations permit lower standards than those required by these specifications, the standards contained herein govern. DEP does not assume any responsibility for determining, interpreting or enforcing compliance with local codes and regulations. In addition, DEP does not interpret or determine local codes and regulations.
- Materials and Appliances – All equipment and materials shall be new (not previously used or installed) and of the quality specified in these standards.
- General Requirements – DEP reserves the right to waive portions of these standards if, after review of individual circumstances, a heat pump installation can otherwise meet the standards and intent of the Program.
- The latest Air-Conditioning, Heating and Refrigeration Institute directory listing will be used for capacity and efficiency ratings. The effective date for each publication of the directory will be no later than the first day of the month following the date of the directory. If an AHRI listing is not available for a particular pairing of indoor and outdoor units, the contractor will be responsible for contacting the manufacturer of the newly installed equipment and obtaining documentation showing the system installed meets the Program’s efficiency requirements.
All equipment must be safety tested and listed by either Applied Research Laboratories, ETL Testing Laboratories Inc. or Underwriters Laboratories. Additional laboratories may be accepted upon review by DEP. Performance shall be certified under the latest revision of Air-Conditioning, Heating and Refrigeration Institute or Association of Home Appliance Manufacturers guidelines. These standards are intended to apply to heat pumps installed in a single zone with independent controls.

**Equipment Requirements**

1. All heat pumps and central air conditioners installed must meet or exceed the minimum efficiency rating for the HEIP Program.
2. Contractor will perform an equipment sizing and thermal balance point calculation. Heat loss and heat gain calculation methods shall be based on the procedures contained in the Air Conditioning Contractors of America (ACCA) Manual J or Manual N (latest DEP-adopted revision) or the American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE) Handbook of Fundamentals (latest revision). The heat loss/heat gain calculation shall state (may be written in by dealer/contractor) the construction numbers and corresponding surface area (square feet), or linear feet if applicable, and the structure sensible and latent loads at design conditions. Design conditions shall be as follows:

   **Heating**  
   Indoor = 70 F dry bulb  
   Outdoor = Varies with locale

   **Cooling**  
   Indoor = 75 F dry bulb, 50 percent relative humidity (62-63 F wet bulb)  
   Outdoor = Varies with locale

   All cooling calculations shall allow for a 3 F maximum temperature swing.

3. The total cooling capacity of heat pumps and central air conditioners consists of the sum of the sensible and latent capacities at a given set of design conditions. All heat pump systems installed must be sized to provide at least 100 percent and not more than 125 percent of the sensible load requirements (BTUh) of the structure, and at least 100 percent of the latent load requirements (BTUh) of the structure (no maximum limit) to meet the summer design conditions listed under Equipment Requirements, item 2 (above).

4. The heat pump refrigeration system heating capacity, exclusive of resistance heaters, shall be sized to meet the heating requirements of the structure with a balance point not to exceed 35 F dry bulb outdoor temperature. However, the 35 F balance point may be exceeded upon prior approval by DEP. The adjustment factor (Cd) for solar and internal gains has a value of 1 when calculating the balance point for setting the outdoor thermostat(s).

5. Heat pumps and central air conditioners with multi-speed or variable-speed compressors and indoor blower motors must be sized within the cooling capacity range stated by equipment manufacturer. The duct system for multi-speed equipment shall be sized based on the cubic feet per minute volume recommended by the manufacturer.

6. The blower used in the dual-fuel heat pump installation (either the existing one or a replacement) shall be capable of providing the proper airflow, based on final duct design, for the fossil-fuel furnace and the heat pump. If the existing blower must be replaced, the installing contractor is responsible for selecting a blower that will satisfy the manufacturer’s requirements of both the furnace and the heat pump.

7. The split-type dual-fuel heat pump system must include the control unit specified by the heat pump manufacturer, located and mounted as specified by the heat pump manufacturer.

8. The variable-speed heat pump or air conditioner shall meet the required sensible and latent load of the structure at high speed and the capacity and airflow shall be determined with the variable-speed heat pump or air conditioner operating at high speed.

**Equipment Installation**

1. **Codes** – The contractor is responsible for the installation meeting all applicable codes (local, state and national). Codes supersede manufacturer’s specifications or DEP specifications. Where the manufacturer’s specifications require a greater standard than that required by DEP, the manufacturer’s specification governs. Unless otherwise required by these standards, the equipment shall be installed in accordance with the equipment manufacturer’s recommendations.

2. **Permit** – When an electrical and/or mechanical permit is required by code authorities or officials, a copy of
each appropriate permit will be made available to DEP and/or distributor personnel prior to or during final inspection.

3. **Common Ducts** – The air flow from two or more units shall not be connected in parallel to a common supply or return air duct system. Outdoor units shall not be installed where ductwork is necessary to connect to outdoor air through remote wall or roof openings.

4. **Clearances** – Outdoor units shall meet or exceed all clearances specified by the manufacturer’s published specifications. Unless the manufacturer’s specifications state a greater clearance allowance and are available at the time of inspection, a minimum of 4 feet of unobstructed air discharge flow from the unit and a minimum of 18 inches of air intake clearance shall be required.

5. **Protection** – Outdoor units shall be located so that roof or other drainage will not interfere with proper equipment operation. Outdoor units located on grades in or near parking areas, alleys or driveways shall be protected from damage by vehicles and shall be arranged so that vehicles or objects will not block or obstruct air intake or discharge. Outdoor units shall not be located within 4 feet of kitchen, laundry or other exhausts that could cause coil contamination.

6. **Service** – All units shall be located to allow service access for removal of any unit component without removing any piping, ductwork or other permanently installed fixtures or components.

7. All package units and the outdoor sections of split units shall be mounted on a level, one-piece pad resting on well settled ground with adequate provision for drainage and isolated from the building structure. The distance between the coil and grade level shall be 4 inches minimum, or the manufacturer’s requirement if different.

8. Indoor sections shall have suitable and permanent support to prevent transmission of objectionable noise or vibration generated by the equipment to the structure.

9. Sections containing the outdoor coil and/or compressor shall not be located in the attic.

### Thermostats

1. An equipment-compatible thermostat will be installed and properly leveled, calibrated as specified by the equipment manufacturer and appropriately located.

### Air Filters

1. All air filters shall be installed in the return air system in a location that is easily accessible for the homeowner to change. All return air must pass through the return air system. Filters shall not be installed in a package outdoor unit, attics or crawl spaces without prior approval from a DEP representative. When filter grilles are used, only one single filter shall be used per filter grille.

2. Electronic air cleaners should be the return air grille type and must have efficiency ratings based on National Bureau of Standards dust spot method using atmospheric dust and the ASHRAE Standard 52-76 for air cleaning devices. All air circulated by the system must pass through the electronic air cleaner.

### Refrigerant Piping Installation

1. Split systems shall, where feasible, use only new, appropriately insulated refrigerant line sets specified by the manufacturer not in excess of 50 feet. Excess tubing length shall not exceed 10 feet.

2. Refrigerant piping shall be supported properly to prevent excessive sagging, movement or vibration and limit lateral movement, but permit normal thermal expansion and contraction.

3. Refrigerant pipe passing through openings in the unit cabinet shall be installed to prevent wear or vibration through contact with the cabinet or components within the unit. Kinks or restrictions in the refrigerant line shall not exceed 25 percent of the cross-sectional area.

4. Refrigerant piping installed in the earth below a concrete slab shall be encased in conduit or a minimum of Schedule 40 polyvinyl chloride.

5. The linear, one-way length of refrigerant piping between the two sections of split units shall not
exceed the maximum distance specified in the manufacturer’s published literature. The compressor section shall not be more than 20 feet above or below the indoor unit.

6. Refrigerant vapor (suction) lines shall be continuously insulated and vapor sealed with a minimum thickness of 3/8 inch of foam rubber equivalent to 3/8 inch of AP Armaflex® insulation or equivalent and all seams sealed.

Electrical Requirements

1. The installing contractor shall comply with the manufacturer’s recommendations, the National Electrical Code and all local codes and ordinances. The residence shall have an electric service capable of supplying the existing lights, appliances and proposed heat pump and auxiliary electric loads. Where codes prohibit, electrical wiring shall not be located in the ductwork.

2. An electrical disconnect shall be provided within sight and within 50 feet of each piece of motor-driven equipment.

3. The equipment nameplate data shall determine the type (fuse or breaker) and size of the overcurrent protection to be used, as well as specify the size of the auxiliary heater installed.

4. The use of aluminum wire is permitted only if: (a) local code allows, (b) the use is approved by the equipment manufacturer, (c) it is properly sized, (d) it is connected with lugs UL-approved for aluminum and (e) it is coated with an approved material to eliminate corrosion.

5. Low-voltage (24-volt) field-installed wiring shall be a minimum of 18 AWG and shall be color coded so the identity of each conductor can be easily established. Splicing of conductors is not acceptable. All low-voltage wiring must be properly supported and protected from damage.

6. Either a manual emergency heat switch on the subbase or automatic controls (factory installed) within the heat pump shall be supplied to allow all of the auxiliary electric heaters to be electrically turned on during the heating season (under control of the indoor thermostat but with the compressor and outdoor thermostats bypassed) for use when the heat pump compressor or associated refrigeration equipment is inoperative.

Auxiliary Electric Heaters

1. Auxiliary electric heater assemblies shall be safety tested and listed for use with the manufacturer’s equipment and sized as follows:
   • Minimum – At 70°F indoor temperature and outdoor design conditions, the capacity shall be no less than the difference between the total calculated heat loss and the compressor output.
   • Maximum – At 70°F indoor temperature and outdoor design conditions, the capacity shall be no more than 100 percent of the total calculated heat loss. However, if 100 percent of the total calculated heat loss is less than 10 kW, the maximum allowable auxiliary heater bank capacity shall be either 10 kW or the manufacturer’s nearest nominal element size.

2. Emergency heat for water source heat pumps shall be sized in accordance with the maximum sizing requirements stated above.

3. The wattage of auxiliary heater stages shall not exceed 10 kW (nominal) per stage.

4. Auxiliary electric heaters, wood heaters or any other type heating device shall not be used to directly preheat the return air of an operating heat pump.

5. In no case (for normal heat pump operation) shall the auxiliary heater(s) be wired to energize during the first heating stage of the indoor thermostat.

6. For dual-fuel heat pump systems, no emergency heat function shall exist on the indoor thermostat of a dual-fuel heat pump installed under the Program. Thermostats and/or controls shall be designed to allow the heat pump to operate above the thermal balance point and allow only the fossil-fuel furnace to operate below the thermal balance point of the structure and not allow the fossil fuel and heat pump to operate at the same time.
Performance Assurance

1. The contractor must guarantee to the purchaser that the heat pump or central air conditioning system was properly installed to provide adequate and dependable comfort conditions during heating and cooling operations at the stated design temperatures and loads. This guarantee shall also include assurance of readily available and adequate service, service facilities and replacement components and parts. For a one-year period, running concurrently with the heat pump manufacturer's one-year product warranty, the contractor shall provide, without charge, replacement parts and service. The contractor shall in all cases ensure that the manufacturer's warranty is fully maintained during the entire period of any warranty coverage.

2. The contractor shall secure, in an easily visible location, a sticker showing his/her name, regular phone number, emergency service phone number (if applicable) and date of system startup. There shall be, either in the owner's possession or affixed near the unit, all installation and operating manuals and warranties, and the contractor or his/her representative shall instruct the owner on the complete operation of the heat pump system at the time of system startup.

Equipment-Specific Guidelines

Below are additional standards for the following specific heat pump types:

- Direct exchange ground source heat pumps (DXGS)
- Ground water source heat pumps (GWSHP)
- Earth coupled heat pumps (ECHP)

Direct Exchange Ground Source Heat Pumps (DXGS).

In addition to the requirements above, the following requirements apply specifically to DX ground source heat pump systems. Equipment Requirement section items 1 and 3 are not applicable. All other sections are applicable unless otherwise noted.

1. The replacement DXGS system must have an installed SEER of 19 or higher.

2. The DXGS heat pump refrigeration system heating capacity, exclusive of resistance heaters, may be sized to meet not more than 100 percent of the heating requirements of the structure at the heating design conditions (would eliminate the need for auxiliary electric heat). However, the DXGS heat pump total cooling capacity shall not be more than two times the total cooling load in any application.

3. If the DXGS heat pump refrigeration system heating capacity is less than 100 percent of the structure's heat load at design, auxiliary electric heaters shall be used, sized and installed in accordance with Auxiliary Electric Heaters section.

4. Emergency heat for DXGS heat pumps shall be sized in accordance with the maximum sizing requirements for auxiliary electric heaters in Auxiliary Electric Heaters section, item 3.

5. The compressor section of DXGS heat pumps may be installed in the attic with an auxiliary condensate pan installed beneath the section. A drain line for auxiliary condensate pan is not required.

6. Both the vapor and liquid lines shall be continuously insulated and vapor sealed with a minimum thickness of 3/8 inch of foam rubber equivalent to 3/8 inch of AP Armaflex, or equivalent. All refrigerant line insulation joints and seams shall be sealed with glue to prevent moisture penetration.

Ground Water Source Heat Pumps (GWSHP)

In addition to the requirements above, the following requirements apply specifically to ground water source heat pump systems:

1. Ground water source heat pump water-to-refrigerant heat exchangers must be of cupronickel metal.

2. To ensure constant water temperature and quality, ground water shall be the only water source allowed for ground water source heat pumps. The contractor is responsible for ensuring the well provides an adequate water flow for the ground water source heat pump based on the installation requirements.
3. A suitable, unobjectionable means of disposal of the ground water source heat pump discharge water shall be utilized. This may include a natural stream bed, dry well, body of water or a recharge system. The discharge cannot enter a septic tank, drainage field, sewer system or flow onto property of others.

4. The ground water source heat pump refrigeration system heating capacity, exclusive of resistance heaters, may be sized to meet not more than 100 percent of the heating requirements of the structure at the heating indoor design conditions stated in Equipment Requirements and the cooling indoor design conditions utilizing the manufacturer's published capacities for an entering water temperature (EWT) within 10 percent of the ground water temperature of the local area. The gallon-per-minute flow rate shall be within the range as specified by the manufacturer. A suitable means shall be provided by the contractor to determine the flow rate of the installed heat pump (i.e., flow meter or pressure/temperature test ports at the heat pump).

**Earth Coupled Heat Pumps (ECHP)**

In addition to the requirements above, the following requirements apply specifically to earth coupled heat pump systems:

1. The earth coupled heat pump refrigeration system heating capacity, exclusive of resistance heaters, may be sized to meet not more than 100 percent of the heating requirements of the structure at the heating indoor design conditions stated in Equipment Requirements section, item 2, utilizing the manufacturer’s published capacities for an entering water temperature of 40 F (heating).

2. The earth coupled heat pump shall also be sized to provide at least 100 percent of the sensible and latent load requirements at the cooling indoor design conditions stated in Equipment Requirements section, item 2, utilizing the manufacturer’s published capacities for an entering water temperature of 90 F (cooling); however, the total cooling capacity shall not be more than two times the total cooling load. The gallon-per-minute flow rate shall be within the range specified by the manufacturer.

3. The earth coil shall be sized and installed as recommended by the “Closed Loop/Ground-Source Heat Pump Installation Guide” and the “Ground Source Systems: Design and Installation Standard” by the International Ground Source Heat Pump Association. The earth coil design length shall satisfy the heat gain or heat loss, whichever is greater, for the structure.

4. Earth coils may be installed in either parallel or series. When parallel coils are used with a reduced header design or a reverse return header design, the total effective length of the individual loops shall be within 5 percent of each other to ensure balanced fluid flow through the loops.

5. Pipes entering the building through a foundation wall or floor shall be sealed and/or protected. The pipes shall be contained in a sleeve to protect them from chafing on the floor or wall as they expand and contract. If the possibility of ground water seepage through the opening exists, the area around the piping shall be protected and sealed.

6. Pipes for headers and manifold pipes shall be at least 2 feet below the ground surface.

7. The average depth of any horizontal coil circuit shall be a minimum of 4 feet below the ground surface with an average separation between earth coil trenches being at least 5 feet.

8. All entrenched piping shall be thoroughly backfilled with a fine, granular material suitable for backfilling to ensure complete soil contact with the pipe.

9. For vertical earth coils, the vertical boreholes shall be drilled and backfilled with grout as specified in the “Grouting Procedures for Ground Source Heat Pump Systems” by Oklahoma State University.

10. Vertical boreholes shall be separated at least 10 feet if bores are in a single row. For boreholes in a grid pattern, a minimum center spacing of 20 feet is required.

11. Only polybutylene pipe joined only by the socket heat fusion method, or high-density polyethylene joined only by socket or butt heat fusion methods, using proper fusion equipment as specified by the heat pump manufacturer, shall be used for earth coupled heat pump earth coils. Proper heater plate temperatures, heating times, and curing times for various grades, thickness and sizes of pipe shall be
maintained.

12. Pressure/temperature (P/T) test ports, such as “Pete’s Plugs” or equal, shall be installed at the “water-in” and “water-out” pipe connections on the heat pump.

13. Only bronze or stainless steel pumps shall be allowed with sufficient capacity to provide the design gallon-per-minute flow rate.

14. The system circulating pump(s) shall provide sufficient fluid velocity in the earth coil to result in turbulent flow (Reynolds number, R > 2,500). The calculation shall be made with viscosity and density of the fluid taken at the system’s designed lowest entering water temperature.

15. The contractor shall determine if antifreeze is required for the earth coil design. Calcium chloride or potassium acetate (GS4) shall not be used.

Technician Training

The HEIP Program requires that HVAC technicians providing Program installations for prequalified contractors are properly trained for the make and model of the qualifying equipment being installed, as well as the proper use of the equipment listed below, along with the technician’s EPA certification. The prequalified contractor must possess the proper EPA license to handle the refrigerant being removed and installed.

Required Air Conditioning Testing Equipment

Participating contractor personnel must be equipped with a dual input digital thermometer, at least three wire thermocouples and one pipe clamp thermocouple, accurate refrigerant gauges for both R-22 and R-410a and an accurate refrigerant scale to properly test installed equipment prior to completion.
Appendix A

Allowable Heat Pump Types and Relevant Certification Standards

<table>
<thead>
<tr>
<th>Type of Pump</th>
<th>Certification Standard</th>
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<tbody>
<tr>
<td>Air-source heat pumps</td>
<td>Standard 240</td>
</tr>
<tr>
<td>Packaged terminal heat pumps</td>
<td>AHRI Standard 380</td>
</tr>
<tr>
<td>Dual-fuel heat pumps</td>
<td>AHRI 240, AHRI 325, AHRI 330 or must be listed in the latest version of the Canadian Standards Association directory: CAN/CSA-C446-M90. American Gas Association, Gas Appliance Laboratory or Gas Appliance Manufacturer’s Association</td>
</tr>
<tr>
<td>Window/wall-mounted heat pumps</td>
<td>ANSI/AHAM RAC-1</td>
</tr>
<tr>
<td>Ground water source heat pumps</td>
<td>AHRI Standard 325</td>
</tr>
<tr>
<td>Direct-exchange ground source heat pumps</td>
<td>AHRI Standard 870</td>
</tr>
<tr>
<td>Earth coupled heat pumps</td>
<td>AHRI Standard 330 or CSA Performance of Ground and Water Source Heat Pumps CAN/CSA-C446-M90</td>
</tr>
</tbody>
</table>

Glossary:

AHRI – Air-Conditioning, Heating and Refrigeration Institute
ANSI – American National Standards Institute
AHAM – Association of Home Appliance Manufacturers
CSA – Canadian Standards Association
Appendix B

References for Installation Standards

1. ASHRAE Handbook of Fundamentals (Latest Revision); American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)
2. National Electrical Code (Latest Revision); National Fire Protection Association (NFPA)
3. Standards for Safety, UL-303, 465, 559 and 1096 (Latest Revision); Underwriters Laboratories Inc. (UL)
4. Manuals D, E, G, H, J and L; Air Conditioning Contractors of America (ACCA)
5. ASHRAE Standard 90-75; ASHRAE
7. Standard for Sound Rating of Outdoor Unitary Equipment, Standard 270 (Latest Revision); AHRI
8. Low Pressure Duct Construction Standards; Sheet Metal and Air Conditioning Contractors National Association (SMACNA)
9. Fibrous Glass Duct Construction Standards; SMACNA
10. Flexible Duct Performance Standards and Flexible Duct Installation Standards; SMACNA
11. Standard Mechanical Code (Latest Revision); Southern Building Code Congress International Inc.
12. Standard for Ground Water Source Heat Pumps, Standard 325 (Latest Revision); AHRI
13. Standard for Packaged Terminal Heat Pumps, Standard 380 (Latest Revision); AHRI
14. Standard for Desuperheater/Water Heaters Standard 470 (Latest Revision); AHRI
16. Directory of Certified Unitary Air-Source Heat Pumps (Latest Directory); AHRI
17. Directory of Certified Applied Air-Conditioning Products (Latest Directory); AHRI
18. Directory of Certified Room Air Conditioners; Association of Home Appliance Manufacturers (AHAM)
19. American National Standard ANSI/AHAM RAC-1 (Latest Revision); AHAM
20. American Society for Testing and Materials (ASTM) standard E-84 and C-553
21. Standards 90A and 90B (Latest Revision); NFPA
22. National Bureau of Standards Dust Spot Method using Atmospheric Dust (Latest Revision) and the American Society of Heating, Refrigerating and Air-Conditioning Engineers Standard 52-76, for Air Cleaning Devices (Latest Revision)