Request for Certification as
PTCS Duct System Trainers, and
Certification System Operators
For New and Existing Homes

Oregon Department of Energy

BACKGROUND

The Oregon Department of Energy (ODOE) began working with duct efficiency in manufactured homes in 1989 with the Super Good Cents Program, now managed regionally by ODOE as the Northwest Energy Efficient Manufactured Home Program (NEEM). ODOE, together with Montana Department of Environmental Quality, Idaho Department of Water Resources Energy Division and WSEO (now WSU Energy Extension Program), pioneered specifications for making crossover connections structurally sound and sealed. Research and trouble-shooting on over 100,000 energy efficient manufactured homes built since 1989 has resulted in better duct performance. Beginning in 2004 all manufacturers are using mastic on duct connections and ODOE is training plant crews to test duct tightness on each home in the plant. Currently four of Oregon's builders have adopted duct testing procedures, and several others are actively considering or developing their own duct testing programs. Recent field research conducted by ODOE finds that homes setup in the field consistently demonstrate duct leakages well below PTCS allowed levels

ODOE began promoting site-built duct efficiency in 1994 with its involvement in the RCDP (Residential Construction Demonstration Program) duct efficiency project. During that period, ODOE acquired its first Duct Blaster, trained its staff in testing and remediation, and worked with builders to incorporate efficient duct practices into new construction.

ODOE was part of the state group that developed and created Performance Tested Comfort Systems, Inc. (now doing business as Climate Crafters) in 1997 and 1998 with support from the Northwest Energy Efficiency Alliance. An ODOE staff person serves as a PTCS Inc. Board member.

In 1998 ODOE launched its Performance Checked duct systems program under Oregon's Residential Energy Tax Credit Program (RETC). The program's technical specifications meet or exceed PTCS requirements in all aspects. See exhibit A, attached.

Since 1998, ODOE has certified over 200 technicians and performance testers from over 50 companies. In 2003, ODOE processed about 700 tax credit applications and expects to process over 1,000 applications for duct sealing tax credits for 2004.

Training in the state is largely provided by the marketplace, often with assistance from local utilities. Several individuals who worked with ODOE and/or Oregon's Energy Extension Program are certified by ODOE to conduct duct sealing training. ODOE currently is developing a stand-alone tax credit training module to allow any PTCS-qualified trainer to deliver performance testing training using any approved PTCS training curriculum. ODOE will be

responsible for delivering training and contractor certification to do work under the tax credit program.

PURPOSE

The purpose of this proposal is to integrate the PTCS system with the Oregon tax credit programs for new and existing homes, Energy Star Homes Northwest (ESHNW), and the Northwest Energy Efficient Manufactured-home Program (NEEM).

ODOE is already operating as the certifying and quality assurance organization for ESHNW in Oregon as the Oregon NW BOP Provider. As part of the ESHNW Quality Assurance process, ODOE staff performs leakage tests on homes' ductwork.

ODOE provides in-plant quality assurance, and on-site problem home resolution for the NEEM program in Oregon; both processes involve routine duct performance testing.

ODOE anticipates that economies can be obtained by combining the PTCS testing and quality assurance with the on site testing and quality assurance required for the NW BOP, Northwest Energy Efficient Manufactured Home Program, and Oregon Residential Energy Tax Credit Program. Rather than having a separate tester travel to the site and perform tests, the same tester can perform all tests at the same time, thus maximizing the operational efficiency of testing and Quality Assurance activities.

STRATEGY

ODOE trains, certifies, and maintains agreements with each Performance Testing (PT) contractor. Each PT contractor is an independent contractor. The agreement provides for:

- Standards of Conduct
- Quality assurance for work done. Quality assurance is performed by ODOE staff or its agent using performance testing protocols for duct sealing and depressurization tests.
- Suspension and de-certification based on negative quality assurance findings and/or unwillingness to correct issues.
- Maintenance of records of tested homes including owner, location, contractor, test results and other required data.

For new PT contractors, ODOE will:

- Certify PT contractors to administer PT duct leakage and house depressurization tests during training sessions having scope and duration that comply with RTF requirements.
- Perform initial technician follow-up field visits per the RTF specifications.

For existing contractors, working under the auspices of Oregon's RETC Program or other RTF approved performance testing programs, ODOE will:

- Recognize all certified contractors that have met the training, testing and initial technician follow-up requirements for their given program. If a contractor has met all requirements except for follow-up field visits, ODOE will be able to provide these visits, so that the requirements may be fulfilled. The cost for these follow-up visits and any required tax credit program specific training will be as mutually agreed between ODOE and said contractor.

QUALITY ASSURANCE COMPONENT
Reviews include:

- File/data review (QC), for complete and accurate information
- Site review (QA), to confirm performance test results, and inspect sealing materials/techniques

File/Data Review
Incoming data will be screened for reasonableness and data will be tracked to assess whether data is reliable. This manual review is performed on 100 percent of jobs received, and any questions or possible problems are communicated to the technician for clarification.

Site review
A technician will fail a review when:

- Submitted data is incomplete or shows misrepresentation of participation or results
- Duct leakage test either fails to meet PTCS specifications or differs by more than the larger of 15% or 50 CFM50
  Exception: when either review or certification test was conducted during difficult weather conditions, additional latitude may be merited
- Air handler net depressurization of any zone served by the system or containing system components exceeds -3 Pascals WRT outdoors
  Exception: when either review or certification test was conducted during difficult weather conditions
- Duct sealing materials or methods do not meet PTCS specifications

For the Energy Star Homes Northwest program, ODOE or its agent will:

- Perform Quality Assurance on randomly sampled certified ESHNW homes. Homes will be selected for QA in accordance with the ESHNW Quality Assurance plan.
- Homes applying for Oregon tax credits also will be subject to the quality assurance process of that program.

For the NEEM program, ODOE or its agent will:

- Perform Quality Assurance on a quarterly basis in each Oregon-based manufactured housing plant. Quality Assurance will be administered per the NEEM in-plant inspection protocol, and any defects will result in further screening of homes and re-working of duct sealing processes in the plant.
- Performance test duct systems as appropriate during problem home inspections. Tests will be applied per the NEEM problem home protocol.
- Performance test duct systems on a random sample of NEEM certified homes sited in Oregon on a periodic basis as part of overall NEEM program Quality Assurance and home performance assessment efforts. Such samples are sized to provide “fleet average” home performance information.
- Accomplish additional field testing to meet research goals and assist the industry with process improvement efforts.
- Homes applying for Oregon tax credits also will be subject to the quality assurance process of that program.

For the Oregon Residential Energy Tax Credit Program, ODOE or its agent will:

- Provide for Quality assurance for tax credit applications received. Quality assurance is to be performed by ODOE staff or independent contractors under ODOE direction, using PTCS compliant protocols for duct sealing and zonal depressurization tests.
- Draw a periodic home sample of sufficient size to determine the rate of compliance with program specifications to within 5 percent with 90 percent confidence.

TRAINING

Trainer Qualifications

Trainers of PTCS Duct Systems shall at a minimum meet the following minimum standards. Certification of new trainers shall be through a training process, which shall include the following provisions:

Minimum Trainer Standards:

1. Minimum two (2) years experience in duct system testing and remediation and combustion zone depressurization testing, or conducting quality assurance inspections for duct tightness programs using these tests.
2. Minimum two (2) years experience teaching building science concepts to energy professionals, trades people, or design professionals.

Proposed Lead Trainers and Qualifications

Brady Peeks and Tom Hewes will be ODOE's lead trainers. Qualifications are stated below.

Training Curriculum

The curriculum, originally developed by ODOE and the Oregon Energy Extension Service, is shown in the Handbook and materials that will be circulated at the RTF meeting when this application is reviewed. The RTF already has reviewed this curriculum in Ecos Consulting's proposal.

Training duration shall meet or exceed RTF requirements.

TECHNICIAN CERTIFICATION

Technicians and contractors will be deemed Certified when they have:

- Actively participated in the duct sealing and testing training
- Proven competency in PTCS performance tests in the field
- Passed the Oregon Department of Energy duct sealing and testing competency test with a minimum score of 70%
- Entered into an agreement with ODOE that acknowledges the requirements of the Oregon Residential Energy Tax Credit Program.

Certification Tests

Field Demonstrated

Technician shall perform accurate measurements, adhere to PTCS protocols, accurately record measurements on accepted forms, and evaluate whether PTCS specifications have been met in a field location for the following PTCS tests:

- Total duct leakage

- Duct leakage to outside
- Air handler induced pressure effects test (a.k.a. Combustion appliance zone (CAZ) depressurization test)

Written exam:
Technician shall score at least 70% on a written test that covers the following:
- Basic understanding of air leaks and air pressure dynamics
- Performance testing standards
- PTCS material and installation specifications
- Air handler induced pressure effects/Combustion safety testing
- PTCS quality assurance program
- Proper clerical and reporting requirements

De-certification
Technicians will be decertified for any of the following:
- Quality doesn't improve after receiving notice
- Technician falsifies reported data
- 15% or more of their certified systems fail the QA or QC reviews

DATA MANAGEMENT
ODOE will track and maintain files of all PTCS certifications and quality assurance tests performed on duct and HVAC systems in new Energy Star Northwest homes, and in all homes utilizing Oregon's tax credit program. ODOE tracks and maintains files of all NEEM home inspections in the factory and in the field, including duct testing data.

ODOE will apply its substantial data management experience and capability to data acquisition, quality review and management. Data Management for Energy Star Homes Northwest will be under the direction of Brady Peeks. Both Tom Hewes and Brady Peeks have data management responsibilities for the tax credit program.

Experience
ODOE houses data on all NEEM homes produced regionally since 1989. Since 1999, the NEEM Program has been tracking and reporting Energy Star labeled homes to EPA.

ODOE maintains database records for all duct sealing tax credit applications received under the RETC program.

ODOE collects duct testing data collected by Verifiers in Energy Star Northwest homes via a regional web-based recording system.

Data Sharing
ODOE is prepared to follow regional protocols for testing and data collection and to share its PTCS data to the maximum extent possible with the RTF and other entities working in Oregon to facilitate consistent regional application of the PTCS specifications.

TRAINER QUALIFICATIONS

Trainer: Tom Hewes

Mr. Hewes is a Residential Energy Analyst on the staff of the Oregon Department of Energy. Mr. Hewes has been involved in duct efficiency efforts since the BPA regional residential heating system efficiency project (RCDP III and RCDP IV) begun in 1991. As the Oregon manager of RCDP III and IV, Mr. Hewes worked directly with Portland and Eugene HVAC contractors to retrofit and pre and post test over 20 existing homes and monitor over 10 new homes in that pilot. Mr. Hewes was directly involved in the writing of all phases of the statewide program as well as performing the training of HVAC contractors, recruiting contractors and testing over 100 homes in Oregon since 1991. Mr. Hewes worked with many statewide utilities to develop duct projects. Mr. Hewes has trained and consulted with low income weatherization and housing projects in duct testing protocols and program design in Oregon. Mr. Hewes was program manager for a $2 million regional program funded by the Northwest Energy Efficiency Alliance that demonstrate and commercialized Performance-Tested Comfort Systems, including duct systems. Along with the Oregon State University Extension Energy Office, he developed the specifications and contractor training and certification program for Oregon's Residential Energy Tax Credit for premium-efficiency duct systems. He is the manager of the Northwest Energy Efficient Manufactured Home (NEEM) program, a regional program involving 23 manufacturing plants in the four Northwest states and California. He is directly involved with development of specifications, in-plant training, compliance with utility, state, national codes in Oregon's 10 HUD code/modular plants and California's 4 HUD code plants. His responsibilities include: revising and implementation the duct sealing specification requiring mastic for the regional NEEM program.

Trainer: Brady Peeks

Energy Analyst

- Technical lead for regional NEEM Program
- Technical lead and trainer for Oregon Residential Energy Tax Credit Program for performance checked ducts
- Project manager of Energy Star Homes Northwest certification program for Oregon

Research

- Manager and co-researcher, field monitoring of high efficiency heat pumps installed to tax credit specifications, Dept. of Energy Building America Program 2004 - 2005.
- Co-researcher, leakage rates of manufactured home duct systems built to 2004 NEEM duct sealing specifications, Dept. of Energy Building America Program 2005.
- Development of Quality Assurance Program for Energy Star Homes Northwest program, 2004.

Trainer in Residential Energy Efficiency and Conservation, Oregon Department of Energy

- Duct leakage testing and mastic sealing training for HVAC technicians, 2001 to present.
- Energy efficiency in residential remodeling, 2002 to present.
- NEEM specification trainer, 2001 to present.
- Verifier trainer for Energy Star Homes Northwest Program, 2004 to present.

Exhibit A.

Oregon Department of Energy Premium Efficiency Duct System Standards

Performance Checked Duct Sealing Eligibility and Air-tightness Requirements, October 30, 2003

New Construction. Performance checked duct systems in new homes shall meet the following standards.

- A new home is defined as a home occupied by its original owner for less than one year.
- Based on the approved protocol for testing Total Duct Leakage, total duct leakage in new construction shall not exceed 0.06 cfm50 x floor area served by the system in square feet, or 75 cfm50, whichever is greater; or
- Based on the approved protocol for testing Duct Leakage to Outside, duct leakage to outside shall not exceed 0.06 cfm50 x floor area served by the system in square feet, or 75 cfm50, whichever is greater.
- Systems shall be continuously ducted. Building cavities shall not be used to transport conditioned air to or from the air handler.
- Each part of the system shall be mechanically attached and air sealed, to adjacent components.
- Return air ducts or passive pressure relief grilles shall be installed in each zone and on each level. Bathrooms, kitchens and rooms 75 square feet or less are exempt.
- Duct systems shall be designed, sized and installed using recommended industry standards so that calculated heating and/or cooling loads are delivered to each zone.
- Based on the approved protocol for testing Forced Air System Effects, forced air system operation shall not de-pressurize any zone served by the system or containing the system's air handling equipment by more than 3 Pascals with reference to Outside over ambient conditions. Manufactured homes tested as sections at the factory are exempt.

New Duct System in an Existing Home. Performance checked new duct systems in existing homes shall meet the following standards.

- Based on the approved protocol for testing Duct Leakage to Outside, duct leakage to outside shall not exceed 0.10 cfm50 x the floor area served by the system in square feet; or
- Based on the approved protocol for testing Total Duct Leakage, total duct leakage shall not exceed 0.10 cfm50 x the floor area served by the system in square feet.
- Based on the approved protocol for testing Forced Air System Effects, forced air system operation shall not depressurize any zone served by the system or containing the system's air handling equipment by more than 3 Pascals with reference to Outside over ambient conditions.

Duct Repair/Duct Sealing. To certify existing ducts in existing homes as performance checked ducts, the following standards shall be met.

- Eligibility. Based on the approved protocol for testing Duct Leakage to Outside, before sealing, duct leakage to outside shall equal or exceed the lesser of 250 cfm50 or 0.15 cfm50 x the floor area served by the system in square feet. Exception: a system with return

ducting in an inaccessible building cavity, or using an inaccessible building cavity as a return air duct, may be tested for duct leakage to outside using the Split System Test provision described in the approved protocol for testing Duct Leakage to Outside that excludes return ductwork from the leakage test.

- After repairs, based on the approved protocol for testing Duct Leakage to Outside, duct leakage to outside shall be at least 50 percent less than it was before sealing measures were installed. Exception: a system with return ducting in an inaccessible building cavity, or using an inaccessible building cavity as a return air duct, may be qualified using the split system test that excludes return ductwork from the leakage test if a split system test was used to qualify the system for sealing.
- After repairs, based on the approved protocol for testing Forced Air System Effects, forced air system operation shall not de-pressurize any zone served by the system or containing the system's air handling equipment by more than 3 Pascals with reference to Outside over ambient conditions.

---

q:\hl\tom\rtf\meetings\2005\08 march\odoecertificationreqst2a.doc