



***GREEN
AUDITOR***

***GREEN
AWARENESS***



***Green
High
Efficiency
Training
House***

Hampden
ENGINEERING CORPORATION

GREEN PLANET HOME AUDIT



With today's limited supply and rising costs of producing and delivering energy, there is an increased demand for building **GREEN** buildings and retro-fitting existing buildings to be more environmentally friendly. By using recycled building materials, air tight construction, energy star rated appliances, modern refrigerants and HVAC controls along with multiple uses for recourses, we can greatly reduce the amount of energy being used by the home owner. To this end there is now a great need for highly trained auditors that have the capability to perform detailed inspections and make cost effective recommendations on improving a homes efficiency.

The Hampden **MODEL H-HEAT-1 Home Efficiency Auditor Training** facility will allow potential auditors to learn the proper techniques in performing a complete energy audit. Some of the areas covered are consistent data collection, insulation inspection, HVAC analysis, base load consumption, air leakage, energy usage, water usage, along with many more vital areas. Along with helping develop these skills the Hampden **MODEL H-HEAT-1** is provided with an intricate fault package. This fault package will create a realistic situation that will require the auditor to diagnose the problem and specify maintenance or repair.

The Hampden **MODEL H-HEAT-1** is a small scale **GREEN** building that is built on a movable skid and outfitted with modern components such as:

- ▶ Roof mounted solar collectors for domestic hot water
- ▶ 410A Air conditioning system
- ▶ Programmable digital thermostat
- ▶ Clear water, Gray water, Black water plumbing system
- ▶ Full electrical system
- ▶ Fault package
- ▶ Roof mounted solar collectors for electricity
- ▶ Variable speed, forced air heating system
- ▶ Fully insulated duct work
- ▶ Triple pane windows
- ▶ Finished walls and ceilings



House Dimensions: 10'L x 8'W x 9'H

1: Energy Audits and Customer Relations

- What is an Energy Audit?
 - Purposes of an Energy Audit
- The Energy Auditing Process
 - Screening and Surveys
 - Visual Inspection
 - Diagnostic Testing
 - Numerical Analysis
- Understanding Energy Usage
 - Baseload Versus Seasonal Use
 - Energy Indexes
- Electricity Peak Load
- Carbon Footprint
- The Work Scope and Contracts
 - The Work Scope
 - Contracts
- Work Inspections
 - In-Progress Inspections
 - Final Inspections
 - Quality Cntrl Vs. Quality Assurance
 - Energy-Auditing Bias and Ethics
- Customer Relations
 - Communication Best Practices
 - Customer Interview
 - Sales Best Practices
- Customer Education
 - Reducing Heating Consumption
 - Reducing Hot Water and Laundry Consumption
 - Reducing Cooling Consumption

2: Evaluating Insulation

- Infrared Scanning
- Evaluating Attic or Roof Insulation
 - Attics in Story-and-a-Half Homes
- Evaluating Closed Roof Cavities
- Walk-Up Stairways and Doors
 - Retractable Attic Stairways
- Evaluating Wall Insulation
- Thermal Boundary Decisions
 - Determine Floor/Foundation Ins.

3: Diagnosing Shell and Duct Air Leakage

- Air-Leakage Problems and Solutions
 - Driving Forces for Air Leakage
 - Safety Considerations for Air Sealing
 - Goals of Air-Leakage Testing
 - Air Sealing: Three Approaches
- Air-Leakage Testing
 - Blower-Door Testing
- Can't Reach Fifty
- Preparing for a Blower Door Test
- Blower Door Test Procedures
- Evaluating Ventilation Level
- Discovering Air-Leakage Trouble
- Air-Barrier Zone Pressure Diagnosis
 - When to Use Zone Pres. Diagnostic
- Benefits of Zone Pres. Diagnostics
- Primary Vs. Secondary Air Barriers
- Simple Zone Pressure Tests
- Using a Digital Manometer to Test Air Barriers
- Add-a-Hole Zone-Leakage Meas.
- Locating the Thermal Boundary

4: Evaluating Heating and Cooling Systems

- Heating System Replacement
 - Combustion Furnace Replacement
 - Combustion Boiler Replacement
 - Gas-Fired Heating Installation
 - Oil-Fired Heating Installation
- Gas Space-Heater Replacement
 - Space-Heater Operation
 - Un-vented Space Heaters
- Testing Gas Furnaces and Boilers
 - Furnace Efficiency Testing
- Critical Furnace-Testing Parameters
 - Measure BTU Input on Nat'l Gas Ap.
- Inspecting Gas Combustion Systems
- Oil-Burner Safety/Efficiency Service
 - Oil-Burner Inspection
 - Oil-Burner Testing
 - Oil-Burner Adjustment
 - Oil-Burner Maint./Visual Checks
- Wood Stoves
 - Wood Stove Clearances
 - Stove Clearances
 - Wood Stove Inspection
- Draft/ Venting/ and Combustion Air
- Essential Combustion Safety Tests
 - Leak-Testing Gas Piping
 - Carbon Monoxide (CO) Testing
- Worst-Case Testing for Atmospheric Venting Systems
- Worst-Case Depressurization/ Spillage/ and CO
- Improving Inadequate Draft
- Zone Isolation Testing for Atmospherically Vented Appliances
- Inspecting Venting Systems
 - Vent Connectors
- Chimneys
 - Masonry Chimneys
 - Manufactured Chimneys
 - Chimney Terminations
 - Metal Liners for Masonry Chimneys
- Special Venting Considerations (Gas)
 - Venting Fan-Assist. Furnaces/Boilers
 - Combustion Air
- Ducted Air Distribution
 - Evaluating Forced-Air Sys. Airflow
 - Evaluating Furnace Performance
 - Measuring Airflow
 - Troubleshooting Airflow Problems
 - Improving Duct Airflow
- Measuring Duct Air Leakage
 - Duct Air-Tightness Standards
- Measuring Duct Air Leakage with a Duct Blower
- Troubleshooting Duct Leakage
- Measuring House Pressure Caused by Duct Leakage
- Typical Duct Leak Locations
- Duct Insulation
- Hot-Water Space-Heating Distribution
 - Boiler Efficiency and Maintenance
 - Distribution System Improvements
- Steam Heating and Distribution
 - Steam System Maintenance
 - Steam System Energy Conservation
- Programmable Thermostat
- Electric Heat
 - Electric Baseboard Heat
 - Electric Furnaces
 - Electric Radiant Heat
 - Cent'l Heat-Pump Energy Efficiency
 - Room Heat Pumps
- Evaluating Central A/C Systems
 - Central Air-Conditioner Inspection
 - Air-Conditioner Sizing
 - Duct Leakage and System Airflow
 - Air-Conditioner Charge Checking

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GREEN EFFICIENCY TRAINING CURRICULUM - CONTINUED

5: Baseload Measures

- Water-Heating Energy Savings
 - Determining the Water Heater's Insulation Level
 - Water Heater Blankets
 - Measuring and Adjusting Hot Water Temperature
 - Water-Heater Pipe Insulation
- Water-Heater Replacement
 - Gas Storage Water Heaters
 - Water-Heater Replacement Decisions
- Tankless Gas Water Heaters
- Solar Hot-Water System Design
- Refrigerator Evaluation
 - Refrigerator Metering Protocol
- Lighting Improvements

6: Windows, Doors, and Exterior Insulation

- Window Shading
 - Exterior Window Treatments
 - Interior Window Shading Treatments
 - Landscaping for Shade
- Exterior Storm Windows
- Double Windows
- Window and Door Repair
 - Window Repair and Weatherstrip
 - Door Repair and Weatherstrip
- Window Replacement
- Replacement Window Specifications
- Window-Replacement Options
- Window Safety
- Exterior Insulation, Siding, and Windows

7: Health and Safety

- Pollutant Source Control.
 - Carbon Monoxide (CO)
 - Gas Range and Oven Safety
 - Smoke and Carbon Monoxide Alarms
 - Moisture Problems
- Crawl Space Moisture Control
- Lead-Safe Weatherization
- Electrical Safety
- Evaluating Home Ventilation Levels
 - ASHRAE 62-1989: Building
- Tightness Limits (BTL)
- ASHRAE 62.2-2007 Ventilation Standard
- Whole-House Ventilation Systems

8: Evaluating Mobile Homes

- Mobile Home General Auditing Tasks
 - Health and Safety
 - Repair Work
- Evaluating Mobile Home Insulation
 - Evaluating Belly Insulation
 - Evaluating Sidewall Insulation
- Specifying Furnace Replacement
- Evaluating Duct Air Leakage
 - Belly Return Air Systems
 - Belly Pressure Test
- Evaluating Shell Air Leakage
 - Air-Leakage Locations
- Specifying Water-Heater Replacement
- Evaluating Interior Storm Windows
- Considering Window Replacement
- Door Replacement Specifications



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