Ground Source Heat Pump Installation, Troubleshooting and Repair Technician
Course Outline
30 Hours: 15 Classroom/15 Lab Activities

- **Introduction to Ground Source Heat Pumps (2 hours, classroom)**
  - The Case for GSHP
  - GSHP Concept
  - Brief History
  - Operation
  - Materials
  - Components
  - Domestic Hot Water

- **Performance of GSHP (1 hour, classroom)**
  - Advantages of GSHP energy efficiency
  - Desuperheaters

- **Description of Ground Source Heat Exchanger (GSHEX) (1 hour classroom)**
  - Designing the GSHEX
    - Open loop wells
    - Closed loop vertical wells
    - Closed loop horizontal
    - Slinky
    - Pond
  - Soil considerations
  - Rocks
  - Ground Load Calculations
  - Test Wells

- **Pipe Types and Uses (3 hours, classroom/lab observation)**
  - Thermal Resistance
  - Pressure Ratings
  - Head Loss
  - Flow Capacities
  - Flushing Flow Rates

- **Selecting the GSHP Equipment (1 hour, classroom)**
  - Unitary Systems
  - Split Systems
  - Water to Air
  - Water to Air Split Type (Remote Condensing Unit)
  - Water to Water
  - Small Commercial System
Multiple Load Systems
Desuperheaters

**Installation (3 hours, classroom/lab observation)**
- Site evaluation
- Site Plan
- Installation Equipment
- Pipe installation
- Grouting materials
- Grouting installation
- Header/Manifold
- Tie-In to GSHP
- Desuperheater tie in
- Restoration

**Polyethylene Pipe Fusion (6 hours, classroom/lab activities, certification)**
- Pipe
- Fittings
- Fusion Methods
  - Sidewall fusion
  - Socket fusion
  - Butt fusion
- Fusion equipment
- Demonstration and hands-on practice, butt and socket fusion

**Commissioning (6 hours, classroom and lab activities)**
- System Flushing and Purging
- Antifreeze solutions
- Calculating system volume
- Calculating antifreeze quantity
- Adding antifreeze
- Pressurizing the system
- Pressure and flow verification
- Troubleshooting
- System Pre-Startup

**Startup Procedures (1 hour, classroom and lab activities)**
- Performance check
- Servicing

**Troubleshooting (6 hours, classroom and lab activities)**
- Water side
- Refrigerant Side
- Air Side

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