

**Ground Source Heat Pump Installation,
Troubleshooting and Repair Technician
Course Outline**

21 Hours: 11 hours theory/12 hours lab activities

- **Introduction to Ground Source Heat Pumps (2 hours theory, 2 hours lab and quiz)**
 - GSHP Concept
 - The Case for GSHP
 - Brief History
 - Operation
 - Materials
 - Components
 - Performance
 - Advantages of GSHP Efficiency
 - Domestic Hot Water and Desuperheaters
- **Ground Source Heat Exchangers (1 hour theory)**
 - General Rules for Constructing GSHEXs
 - Pipe types and uses
 - Thermal Resistance
 - Pressure Ratings
 - Head Loss
 - Flow Capacities
 - Flushing Flow Rates
 - Designing the GSHEX
 - Open loop wells
 - Closed loop vertical wells
 - Closed loop horizontal
 - Slinky
 - Pond
 - Soil considerations
 - Rocks
 - Test Wells
- **High Density Polyethylene Pipe Fusion (2 hours theory, 3 hours lab)**
 - Pipe
 - Fittings
 - Fusion Methods
 - Butt fusion
 - Socket fusion
 - Sidewall fusion

- Fusion equipment
- Demonstration and hands-on practice, butt and socket fusion
- **Selecting the GSHP Equipment (1 hour theory)**
 - 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
- **System Installation (2 hours theory, 2 hours lab)**
 - Site evaluation
 - Site Plan
 - Installation Equipment
 - Pipe installation
 - Grouting materials
 - Grouting installation
 - Header/Manifold
 - Tie-In to GSHP
 - Desuperheater tie in
 - Restoration
 - Documentation
- **System Commissioning and Startup (2 hours theory, 2 hours lab)**
 - 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
 - Performance check
 - Servicing
- **Troubleshooting (1 hour theory, 1 hour lab)**
 - Water side
 - Refrigerant Side
 - Air Side

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