Precision and Performance in HVAC Systems Maintenance and Repair Training Course



14 - 18 Dec 2026

Cape town

4600 € (Per Person)

Ref: #INM4461_265680

Course Introduction / Overview:

Heating, ventilation, and air conditioning (HVAC) systems are the lifeblood of modern buildings, ensuring comfort and air quality in residential, commercial, and industrial spaces. This training course, offered by BIG BEN Training Center, is a comprehensive program designed to provide professionals with the in-depth knowledge and practical skills needed for the effective maintenance and repair of a wide range of HVAC systems. The curriculum dives deep into the fundamentals of thermodynamics, psychrometry, and the vapor compression cycle, building a strong theoretical foundation. We will then transition to hands-on applications, covering everything from system diagnostics and troubleshooting to the proper handling of refrigerants and advanced component replacement. Drawing upon the expertise found in foundational texts like "Modern Refrigeration and Air Conditioning" by Andrew D. Althouse, this program goes beyond simple repair. It emphasizes best practices for predictive and preventive maintenance, helping participants to extend equipment lifespan, improve energy efficiency, and ensure optimal system performance. Participants will learn how to identify the root cause of common and complex system failures, perform routine maintenance tasks like cleaning coils and checking refrigerant levels, and execute component replacements, including compressors and evaporator coils. Our training methodology incorporates real-world case studies and interactive problem-solving exercises, guaranteeing that participants are not just learning theory but are actively applying their knowledge. The course also addresses the latest industry trends, from smart HVAC controls and variable refrigerant flow (VRF) systems to sustainable and eco-friendly technologies, ensuring our graduates are prepared for the future of industry. BIG BEN Training Center is committed to equipping professionals with the expertise needed to excel in this essential field.

Target Audience / This training course is suitable for:

- HVAC technicians and engineers.
- Facility maintenance managers and supervisors.
- Building automation system specialists.
- Commercial property and plant managers.
- Maintenance and operations staff.
- Energy auditors and consultants.
- Government agencies and public sector employees are responsible for building maintenance.

Target Sectors and Industries:

- Commercial and residential real estate.
- Manufacturing and industrial plants.
- Healthcare and hospitality facilities.
- Educational institutions.
- Government agencies and municipal services.
- Data centers and technology companies.
- Retail and shopping centers.

Target Organizations Departments:

- Facilities Management.
- Engineering and Operations.
- Maintenance and Repair.
- Building Services.
- Health, Safety, and Environment (HSE).
- Energy Management.
- Quality Control.

Course Offerings:

By the end of this course, the participants will have able to:

- Conduct comprehensive HVAC system diagnostics to identify the root cause of performance issues.
- Perform preventive and predictive maintenance to ensure system longevity and efficiency.
- Master the techniques for safe refrigerant handling and recovery in compliance with regulations.
- Troubleshoot and repair common mechanical, electrical, and electronic faults in HVAC systems.
- Understand the principles of psychrometry, thermodynamics, and the refrigeration cycle.
- Select and replace various HVAC components, including compressors, coils, and thermostats.
- Implement strategies for improving indoor air quality and system energy efficiency.
- Apply industry best practices and safety protocols in all maintenance and repair tasks.

Course Methodology:

This course uses a dynamic and immersive training methodology to ensure a deep and lasting understanding of HVAC maintenance and repair. Our approach combines theoretical instruction with hands-on, practical application, moving beyond traditional lecture formats. We utilize detailed case studies drawn from real-world HVAC systems, allowing participants to analyze complex problems and propose effective solutions in a simulated environment. The program includes interactive sessions where participants can engage in group discussions and collaborative problem-solving exercises, fostering a shared learning experience. A core part of our methodology is the use of practical demonstrations and step-by-step guides for various repair and maintenance procedures, from refrigerant charging to electrical troubleshooting. Participants receive personalized feedback on their performance throughout the course, with opportunities to practice their newly acquired skills on diagnostic and repair simulations. This holistic approach ensures that graduates of the BIG BEN Training Center program are not only knowledgeable but are also fully confident and competent in applying their expertise in the field.

Course Agenda (Course Units):

Unit One: HVAC System Fundamentals and Diagnostics

- The principles of thermodynamics and the vapor compression cycle.
- Understanding psychrometry and its role in air conditioning.
- Identifying and interpreting system components.
- Systematic diagnostic procedures for HVAC systems.
- Using specialized tools for performance testing and analysis.
- Electrical troubleshooting and wiring diagrams.
- Refrigerant types, handling, and environmental regulations.

Unit Two: Preventive and Predictive Maintenance Strategies

- Creating and implementing a preventive maintenance schedule.
- Checking refrigerant levels and identifying leaks.
- Cleaning and inspecting condenser and evaporator coils.
- Lubricating motors and inspecting belts.
- Air filter maintenance and indoor air quality management.
- Using predictive maintenance tools for early fault detection.
- Logbook management and maintenance record-keeping.

Unit Three: Advanced Repair and Component Replacement

- Troubleshooting and replacing compressors.
- Repairing and replacing electrical components (capacitors, relays, contactors).
- Servicing and replacing expansion valves and metering devices.
- Repairing and replacing ductwork and insulation.
- Faulting in heating systems, including furnaces and boilers.
- Troubleshooting and repairing control boards and thermostats.
- Brazing and soldering techniques for HVAC piping.

Unit Four: Energy Efficiency and System Optimization

- The importance of SEER and EER ratings.
- Upgrading to energy-efficient components and technologies.
- Implementing smart thermostats and building automation systems.
- Optimizing airflow and duct pressure for maximum efficiency.
- Understanding variable refrigerant flow (VRF) and inverter technology.
- Performing a complete system energy audit.
- Sizing and selecting the right HVAC equipment for a building.

Unit Five: Safety, Regulations, and Emerging Technologies

- Safety protocols for working with high-voltage electricity and refrigerants.
- OSHA and EPA regulations for HVAC technicians.
- Personal protective equipment (PPE) and worksite safety.
- The role of HVAC in building fire and life safety systems.
- An overview of geothermal and solar-powered HVAC systems.
- Exploring smart HVAC controls and IoT integration.
- The future of HVAC: automation and sustainable practices.

FAQ:

Qualifications required for registering to this course?

There are no requirements.

How long is each daily session, and what is the total number of training hours for the course?

This training course spans five days, with daily sessions ranging between 4 to 5 hours, including breaks and interactive activities, bringing the total duration to 20 - 25 training hours.

Something to think about:

How will the growing adoption of smart building technologies and advanced data analytics fundamentally reshape the role of an HVAC technician from a repair specialist to a systems optimization and data analyst expert?

What unique qualities does this course offer compared to other courses?

This training course stands out by bridging the gap between foundational theory and practical, real-world application. Most programs focus on one or the other, but our curriculum provides a robust understanding of scientific principles, from psychrometry to thermodynamics, and immediately applies them through hands-on troubleshooting and repair scenarios. We don't just teach you how to fix a problem, we teach you how to understand why it happened. This deep insight, combined with instruction on modern technologies like variable refrigerant flow (VRF) and smart building systems, ensures participants are not just prepared for today's jobs but are also equipped for future industry demands. The course also heavily emphasizes preventive and predictive maintenance, moving beyond reactive repairs to a proactive approach that extends the lifespan and improves the efficiency of HVAC systems. The inclusion of academic references, such as the works of Andrew D. Althouse, provides a solid theoretical base, while our hands-on methodology guarantees practical mastery. This comprehensive approach, a hallmark of BIG BEN Training Center, cultivates well-rounded professionals who are capable of diagnosing complex issues and implementing forward-thinking solutions.