



Technical Training for Southern Nevada

Facilities Engineer Training Program



The **Facilities Engineer Training Program** provides a unique educational training opportunity, which is a combined effort between the **National Technical Institute (NTI)** and the **National Association of Power Engineers (N.A.P.E.)**

National Technical Institute • 301 Sunpac Ct. • Henderson, NV 89011
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This Facilities Engineer Training Program was created to provide the academic and hands on training so an individual will succeed as a Building \ Central Plant Engineer, Industrial Maintenance Technician, or an HVAC \ Refrigeration Technician.

In today's competitive industrial business environment, the demand for educated technical professionals is high and increasing steadily. These highly specialized technical professionals are becoming more vital to a company's bottom line, especially as buildings \ facilities become more advanced and energy prices continue to climb.

By joining forces, National Technical Institute (NTI) and the National Association of Power Engineers (N.A.P.E.) are in a unique position to fill the needs of today's Facility Engineer, Mechanical Maintenance, and Air Conditioning \ Refrigeration job markets by providing professional training that targets the needs of local casinos, manufacturing, and the industrial community as a whole. Specialized, comprehensive and hands-on training are offered to those desiring to enter or advance in the field of Facility Engineering and Mechanical Maintenance. Students completing the program will be trained in the skills necessary to exceed in the Facility Engineering field and will be prepared for various certifications through our affiliations with nationally recognized, 3rd party testing, and certification organizations. These professional organizations include the American Society of Power Engineers, the Environmental Protection Agency, and the North American Technician Excellence Organization.

The Facilities Engineer Training Program includes the following classes:

<u>Class Name</u>	<u>Hours</u>	<u>Tuition</u>	<u>Textbook Fee</u>
N.A.P.E. Boilers and Central Plant Operations	32	\$330.00	\$20.00
N.A.P.E. Pumps and Piping Systems	24	\$330.00	\$10.00
Blueprint Reading	8	\$125.00	None
Electrical I - Basic Electrical Theory	24	\$330.00	\$85.00 * See Note
Electrical II - Electrical Application	24	\$330.00	* See Note
Air Conditioning & Refrigeration Fundamentals	32	\$440.00	* See Note
EPA Certification Seminar & Exam	8	\$125.00	\$20.00
Advanced Air Conditioning	32	\$440.00	* See Note
Gas Heating Seminar	8	\$125.00	None
Heat Pump Seminar	8	\$125.00	None
Commercial Refrigeration	32	\$440.00	* See Note
TOTAL	232	\$3,140.00	\$135.00

NOTE — Modern Refrigeration and Air Conditioning textbook fee **\$85.00**. This one textbook is used for all the classes with an *

► The following classes are highly recommended but are not required ◀

Basic Industrial Maintenance	24	\$330.00	\$25.00
Introduction to Instrumentation & Controls	24	\$330.00	\$60.00
HVAC Troubleshooting	24	\$330.00	* See Note

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F101 N.A.P.E. Boilers and Central Plant Operations

Boiler Design, Classification and Construction

- Water-Tube
- Fire-Tube
- Cast Iron Sectional

Fixtures & Controls

- Safety Valves / Expansion Tanks
- Rheostats / Aquastats
- Water Level Control
- Low Water Cut-outs
- Pressure Sensors & Switches

Fuels

- Gases
- Natural & Methane
- Propane & Butane
- Specific Gravity & CTU Content

Burners & Control Systems

- Flame Safe-guard
- Flame Detection & Control
- Gas Trains
- Spark & Ignition Systems

Steam & Condensate Systems

- Basics of Valves
- Gate / Globe / Ball / Check / Non-return / Butterfly
- Ratings - SWP / WOG
- Heat & Water Table
- BTU / Sensible Heat / Latent Heat
- Specific Heat / Specific Gravity
- Pressure & Temperature Controls
- Saturated and Superheated Steam
- Condensate Piping / Steam Traps
- Heat Exchangers & Heat Transfer
- Steam Tables
- Gauge Glass & Water Columns

Combustion Fundamentals

- Draft – Chimneys
- Forced / Induced / Balanced
- Diverters / Barometric Dampers
- Perfect Combustion & Formulas
- Flue Gas Analysis & Tune-ups

F103 N.A.P.E. Pumps & Piping Systems

Classification of Pumps

- Centrifugal
- Positive Displacement

Fundamentals and Terminology

- Pump Curves / Flow and Head
- Static and Dynamic Head
- Horsepower, Current Flow and GPM
- Variable Speed Drive

Closed and Open Loop Systems

- Expansion Tanks
- Air Removal – Purging and Bleeding
- Circuit Setters & System Flow Balancing
- Circulating Systems

Booster Pumps

- Domestic
- Fire Systems

Chemical Pumps

- Diaphragm Metering Pumps
- Peristaltic Pumps

Hydronic Heating Systems

- Series Loop
- Direct Return
- Reverse Return
- Mono-flow or One Pipe
- In-Floor and Panel Systems
- Pumps or Zone Valve Use

Well Pumps, Sumps, & Sewage Lift Stations

- Well Pumps
- Sump Pumps
- Sewage Ejection Pumps
- Grinder Pumps
- Pneumatic Lift Stations

F104 Blueprint Reading

Types of Drawings

- Structural / Mechanical / Electrical
- HVAC / Plumbing / Landscape

Views and Sections

- Sectional Views and Enlargements
- Dimensions and Scales
- Geometric Characteristic Symbols
- Isometric Drawing and Views

E101 Electrical I - Basic Electrical Theory

Electrical Theory

- Ohm's Law
- Circuit Fundamentals
- Basic Electrical Math
- Single and Multi Phase Circuits

Electrical Circuits

- Series & Parallel Circuits
- Circuit Components
- Testing
- Electrical Test Equipment
- Schematics and Diagrams

Electric Motors

- Electric Motor Basics
- Motor Types and Construction
- Introduction to Electric Motor Testing

E102 Electrical II – Electrical Application

Circuits & Controls

- Diagrams and Schematics
- Electrical Control Systems
- Circuit Building Exercises

Electrical Devices

- Operational Controls
- Motor Controls
- Safety Controls
- Transformers
- Solenoids

Electric Motor Theory

- Maintenance
- Types of Electric Motors
- Starting and Running Circuits

A101 Air Conditioning & Refrigeration Fundamentals

Refrigeration Fundamentals

- Basic Refrigeration Cycle & Theory
- Pressure – Temperature Relationships
- Thermal Laws & Heat Transfer
- Refrigerants / EPA Regulations
- ARI Standards

Air Conditioning and Refrigeration Components

- Compressor Types & Technology
- Evaporators / Condensers
- Metering Devices – TXV & Cap Tubes

Refrigeration Tools and Proper Usage

- Manifold Gauge Set
- Vacuum Pumps
- Refrigeration Recovery Equipment
- Brazing and Soldering Equipment

Air Conditioning Technologies

- Absorption Cooling
- Atmospheric Cooling
- Evaporative Cooling

A103 EPA Certification Seminar & Exam

Refrigerant Usage and Handling Refresher

- Refrigerant Cycle
- EPA Rule 608 40-CFR Part 82, F - Review and Discussion
- Ozone Depletion Theory
- Legal Requirements Regarding the Use and Handling of Refrigerants Containing CFC's
- Proper Recovery and Recycling Techniques
- Refrigerant Disposal

Proctored Examination

- Pretest Review
- Proctored Examination (2 Hours)

A102 Advanced Air Conditioning

Advanced Air Conditioning Concepts

- Compressor Technology
- Commercial Air Conditioning Systems
- Data Room Systems
- Water Source Heat Pumps
- Low Ambient Controls

Air Distribution Systems

- Ducting Systems and Components
- Variable Air Volume Systems
- Constant Volume Systems
- Air Flow Calculations

Advanced Troubleshooting Techniques

- Superheat and Sub-cooling
- Troubleshooting Electrical Controls
- Microprocessors in Air Conditioning Systems

A104g Gas Heating Seminar

Introduction to Gas Heating

- Ignition Theory
- Combustion Theory
- Fuel Types and Considerations

Operational and Safety Controls

- Limit Controls
- Fan Cycling Controls
- Microprocessor Controls

Furnace Types and Design Consideration

- Air Flow Configuration
- Condensing vs Non-Condensing Systems
- Forced Combustion
- Package and Split Systems
- Furnace Testing and Troubleshooting

A104h Heat Pump Seminar

Introduction to Heat Pumps

- The Refrigeration Cycle
- Sequence of Operation
- Defrost Control Systems

Heat Pump Components

- Reversing Valves
- Accumulators
- Defrost Timers
- Supplemental Heat
- Bi-Flow Metering Devices

Troubleshooting Heat Pumps

- Defrost Systems
- Superheat and Sub-cooling
- Charging a Heat Pump
- Heat Pump Testing and Troubleshooting

A105 Commercial Refrigeration

Commercial Refrigeration Systems

- Ice Machines
- Walk-in Refrigerators and Freezers
- Reach-in Coolers
- Cascade Systems
- Sizing and Heat Load Calculation

Components of a Commercial Refrigeration System

- TEV and AEV's
- Defrost Systems
- Control Systems
- Piping Components & Considerations
- Refrigerant Types

Troubleshooting Commercial Refrigeration Systems

- Lab Troubleshooting Practice
- Superheat and Sub-cooling Measurements
- Charging a Refrigeration System

► ***The following classes are highly recommended but are not required*** ◀

A106 Basic Industrial Maintenance

Introduction to Industrial Maintenance

- Industrial Maintenance Tools and Safety Equipment
- Basic Mechanical Math
- Measuring Formulas and Equations
- Mechanical System Theory

Mechanical Systems

- Pump Systems
- Mechanical Drives
- Hydraulics and Pneumatics
- Air Handling Systems

Mechanical System Maintenance

- Belts, Pulleys & Sheaves
- Bearing Maintenance and Lubrication
- Mechanical Equipment Alignment and Adjustment

A107 Introduction to Instrumentation & Controls

Control System Overview

- Digital Input and Output Signals
- Analog Input and Output Signals
- Nature of Process Control

Control System Hardware

- Sensor Characteristics
- Process Measurements
- Transducers

Automated Control Systems

- Control Loops
- Introduction to PLC's
- Control System Terminology
- Math and Formulas for Controls

A108 HVAC Troubleshooting

Troubleshooting Theory

- What Makes a Good Troubleshooter
- Psychology of Troubleshooting

Electrical Circuit Review

- Simplifying Circuit Structure
- Choosing Where to Start
- Best Use of Test Instruments
- Making the Decision

Electrical Troubleshooting Lab

- Practice the Skills
- Practice the Techniques

Refrigeration Theory Review

- Reviewing What the Parts Do
- Clarifying Complex Systems

Mechanical Troubleshooting Lab

- Practice the Skills
- Practice the Techniques

Properties of Air

- Reviewing the Properties of Air
- Air Handling Systems

Air System Lab

- Practice the Measurements