

Connecticut Technical High School System
Connecticut State Department of Education

HEATING and COOLING
APPRENTICESHIP
INFORMATION PACKET

Covering the following licenses:

S-2 HEATING and COOLING

S-4 HEATING MECHANIC

S-6 LIMITED HEATING MECHANIC

S-8 LIMITED HEATING MECHANIC

S-10 LIMITED HEATING and COOLING

B-2/B-4 OIL BURNER SERVICER/INSTALLER

D-2 WARM AIR HEATING and COOLING

D-4 REFRIGERATION MECHANIC

SM-2 SHEET METAL

The following section, XI Apprentice Responsibilities, is taken from the Apprentice Work Training Standards (Sec. 31-51d-1 to 12) of the Connecticut State Labor Department, which have been adopted by the State Apprenticeship Council as the basic standards of approval for an Apprentice Program. You should have seen them before; however, they are repeated here because of their importance.

XI. Apprentice Responsibilities

- A.** To make every effort to understand the apprenticeship program and abide by all rules established by the program sponsor.
- B.** To attend regularly and complete the required hours of instruction in subjects related to the trade.
- C.** To maintain records as may be required of work experience and related instruction.
- D.** To conform to safe working procedures as instructed to assure their own safety as well as the safety of fellow workers.
- E.** To perform diligently and faithfully the work of the trade.

**CONNECTICUT TECHNICAL HIGH SCHOOL SYSTEM
APPRENTICE RELATED INSTRUCTION LOCATIONS & STAFF**

NAME	LOCATION	PHONE #	FAX #
Robert J. Martin	25 Industrial Park Rd. Middletown 06457	860-807-2221	860-807-2196
Byron Waterman Regional Assistant Principal	W.F. Kaynor THS 43 Tompkins St. Waterbury 06708	203-596-4302	203-596-4121
Assigned Apprentice Schools:			
Jaime Rivera-Murillo	Henry Abbott THS Hayestown Ave. Danbury 06810	203-797-4460	203-797-4382
Sam Brown	W.F. Kaynor THS 43 Tompkins St. Waterbury 06708	203-596-4302 x305	203-596-4121
Marty Sparano	W.F. Kaynor THS 43 Tompkins St. Waterbury 06708	203-596-4302 x305	203-596-4121
Keith Bishop	Oliver Wolcott THS 75 Oliver St. Torrington 06790	860-496-5300 x539	860-496-9022
Ken Wooley	Oliver Wolcott THS 75 Oliver St. Torrington 06790	860-496-5300	860-496-9022
Walter Grant	Ella Grasso THS 189 Fort Hill Rd. Groton 06340	860-441-0309	860-446-9895
Mary Lunt	Norwich THS 590 New London Tpke. Norwich 06360	860-889-8453	860-886-4632
Gilda Puccio	Norwich THS 590 New London Tpke. Norwich 06360	860-889-8453	860-886-4632
Jean Jordan Regional Assistant Principal	H. H. Ellis THS 613 Upper Maple St. Danielson, CT 06239	860-774-8511	860-779-1563
Assigned Apprentice Schools:			
Cynthia Kisner	H. C. Wilcox THS Oregon Road Meriden 06451	203-238-6260	203-238-6602
Bruce McKechnie	Howell Cheney THS 791 W. Middle Tpk. Manchester 06040	860-649-5396	860-649-5263
Bob Lombardi	A.I.Prince THS VTSS/25 Industrial Park Rd. Middletown 06457	860-951-7112 860-807-2215	860-951-1529 860-807-2196
Frank Sesto	E.C. Goodwin THS 735 Slater Rd. New Britain 06457	860-827-7693	860-827-7862
Kathy Burr	H. H. Ellis THS , Danielson 613 Upper Maple St. Danielson, CT 06239	860-774-8511	860-779-1563
Eric Hilversum	Vinal THS 60 Daniels St. Middletown 06457	860-344-7100	860-344-2622
Gary Kelman Regional Assistant Principal	200 Great Meadow Road Stratford 06615	203-381-9250	203-381-0764
Assigned Apprentice Schools:			
Edward Leavy Jr.	Bullard Havens THS 500 Palisade Ave. Bridgeport 06610	203-579-6888	203-579-6904
Thomas Grace	Bullard Havens THS 500 Palisade Ave. Bridgeport 06610	203-579-6888	203-579-6904
Mary Ann Viscio	Eli Whitney THS 71 Jones Road, Hamden 06604	203-397-4031	203-397-4129
Phil Simeone	Eli Whitney THS Bullard Havens VTS 500 Palisade Ave. Bridgeport 06610	203-397-4031	203-397-4129
Keith Stadler	J.M. Wright THS P.O.Box 1416, Stamford 06904	203-324-7363	203-324-1196
Suzanne Ucci	Emmett O'Brien THS 141 Prindle Ave. Ansonia 06401	203-732-1832	203-735-6236
Ben Russell	Bristol Technical Education Ctr 431 Minor ST. Bristol 06010	860-584-8433	860-584-0795
Allen Meyerhoff			

Towns Served:

Ansonia	East Norwalk	Monroe	Riverside	Stratford
Beacon Falls	Easton	New Canaan	Seymour	Trumbull
Bridgeport	Fairfield	Norwalk	Shelton	Weston
Cos Cob	Greenwich	Old Greenwich	South Norwalk	Westport
Darien	Huntington	Oxford	Stamford	Wilton
Derby	Milford			

Department of Consumer Protection

Section 20-330 of the Connecticut General Statutes

"Heating, piping and cooling work" means (A) the installation, repair, replacement, maintenance or alteration of any apparatus for piping, appliances, devices or accessories for heating systems, including sheet metal work, and (B) the installation, repair, replacement, maintenance or alteration of air conditioning and refrigeration systems, boilers, including apparatus and piping for the generation or conveyance of steam and associated pumping equipment and process piping. Heating, piping and cooling work does not include solar work or medical gas and vacuum systems work. For the purposes of this subdivision, "process piping" means piping or tubing that conveys liquid or gas that is used directly in the production of a product for human consumption;

"Sheet metal work" means the installation, erection, replacement, repair or alteration of duct work systems, both ferrous and nonferrous

S-1 Unlimited Contractor

The holder of this license may do all heating, piping and cooling work as defined in Section 20-330 of the General Statutes.

S-2 Unlimited Journeyperson

The holder of this license may do the same work as the S-1 licensee, but only while in the employ of a contractor licensed for such work.

S-3 Limited Contractor

The holder of this license may perform the installation, repair, replacement, maintenance or alteration of any apparatus for piping, appliances, devices or accessories for heating systems, boilers, including apparatus and piping for the generation or conveyance of steam associated pumping equipment and oil burner installation and servicing (excluding sheet metal work, air conditioning and refrigeration systems). This license also covers the installation of hot, chilled and condensed water as well as steam piping in air conditioning systems.

S-4 Limited Journeyperson

The holder of this license may perform the same work as the S-3 licensee, but only while in the employ of a contractor licensed for such work

S-5 Limited Contractor

The holder of this license may perform only work limited to hot water or steam heating systems for buildings not over three stories high with total heating load not exceeding 500,000 BTU's and steam pressure not exceeding 15 pounds, but does not cover the installation or servicing of oil burners of any size.

S-6 Limited Journeyperson

The holder of this license may perform the same work as the S-5 licensee, but only while in the employ of a contractor licensed for such work.

S-7 Limited Contractor

The holder of this license may perform only work limited to hot water or steam heating systems for buildings not over three stories high with a total heating load not exceeding 500,000 BTU's and steam pressure not exceeding 15 pounds. This license also covers the servicing and installation of oil burners handling up to five gallons per hour, as well as gas piping for the work covered by this license.

S-8 Limited Journeyperson

The holder of this license may perform the same work as the S-7 licensee, but only while in the employ of a contractor licensed for such work.

S-9 Limited Contractor

The holder of this license may perform only work limited to hot water or steam heating systems for buildings not over three stories high with total heating load not exceeding 500,000 BTU's, steam pressure not exceeding fifteen pounds, and/or cooling installations up to 35 tons per systems. This license also covers the installation or servicing of oil burners handling up to five gallons per hour as well as LP gas supplied by gas containers and/or natural gas piping for work covered by this limited license.

S-10 Limited Journeyperson

The holder of this license may perform work only while in the employ of a licensed contractor and only limited to hot water or steam heating systems for buildings not over three stories high with total heating load not exceeding 500,000 BTU's, steam pressure not exceeding fifteen pounds, and/or cooling installations up to 35 tons per systems. This license also covers the installation or servicing of oil burners handling up to five gallons per hour as well as LP gas supplied by gas containers and/or natural gas piping for work covered by this limited license.

B-1 Limited Contractor

The holder of this license may perform only work of installing, servicing or repairing gas or oil burners for domestic and light commercial installations. A domestic or light commercial burner shall be considered as one consuming five gallons or less per hour.

B-2 Limited Journeyperson

The holder of this license may perform the same work as the B-1 licensee, but only while in the employ of a contractor licensed for such work.

B-3 Limited Contractor

The holder of this license may perform the installing, servicing or repairing of any gas or oil fire burners.

B-4 Limited Journeyperson

The holder of this license may perform the same work as the B-3 licensee, but only while in the employ of a contractor licensed for such work.

D-1 Limited Contractor

The holder of this license may perform only work limited to installation, replacement, repair, maintenance or alteration of any warm air, air conditioning and refrigeration system, including necessary piping for the conveyance of heating or cooling media and associated pumping equipment. This license does not include the installation or servicing of oil burners of any size.

D-2 Limited Journeyperson

The holder of this license may perform the same work as the D-1 licensee, but only while in the employ of a contractor licensed for such work.

D-3 Limited Contractor

The holder of this license may perform only work limited to the installation, repair, replacement, maintenance or alteration of all refrigeration systems included in food storage, air conditioning or special process systems.

D-4 Limited Journeyperson

The holder of this license may perform the same work as the D-3 licensee, but only while in the employ of a contractor licensed for such work.

SM-1 Limited Sheet Metal Contractor

The holder of this license may perform only work limited to the installation, erection, replacement, repair or alteration of any duct work system, both ferrous and nonferrous for ductwork systems of any size an type, excluding pneumatic conveyance systems which are covered under sections 20-3325(a), (b), (c), and (d) of these regulations.

SM-2 Limited Sheet Metal Journeyperson

The holder of this license may perform only work limited to the installation, erection, replacement, repair or alteration of any duct work system, both ferrous and nonferrous for ductwork systems of any size an type, excluding pneumatic conveyance systems which are covered under sections 20-3325(a), (b), (c), and (d) of these regulations. The holder of this license may perform such work only while in the employ of a contractor license for such work.

Booklist for Heating and Cooling/ Sheet Metal Apprentice Students:

For Math Courses (A0001, A0006):

- Applied Mathematics, R. Jesse Phagan, Goodheart-Wilcox Company, Inc., ISBN 1-56637-117-1
- Workbook: Applied Mathematics, R. Jesse Phagan, Goodheart-Wilcox Company, Inc., ISBN 1-56637-118-x

For Blueprint Reading (A0031):

- Blueprint Reading for Construction, Residential and Commercial by Walter C. Brown © 1990. The Goodheart-Wilcox Company, Inc. ISBN 0-87006-825-3.

For Building Trade Safety (A0099):

- Annotated Dictionary of Construction Safety and Health, by Charles D. Reese ISBN 1-56670-514-2

For All S-2, S-4, S-8 Apprentices:

- Modern Refrigeration and Air Conditioning by Althouse, Turnquist and Bracciano, Goodheart-Wilcox Company, Inc. ISBN 1-59070-280-8
- Residential Oil Burners, 2nd Edition, by Herb Weinberger Delmar Publishing, ISBN 0-7668-1828-4
- Sheet Metal by Leo Meyer, American Technical Publishers ISBN 0-8269-1907-3
- International Mechanical Code Book 2003

For All S-10, B-2, B-4 Apprentices:

- Modern Refrigeration and Air Conditioning by Althouse, Turnquist and Bracciano Goodheart-Wilcox Company, Inc. ISBN 1-59070-280-8
- Residential Oil Burners, 2nd Edition, by Herb Weinberger Delmar Publishing, ISBN 0-7668-1828-4
- International Mechanical Code Book 2003

For All SM-2 Apprentices:

- Modern Refrigeration and Air Conditioning by Althouse, Turnquist and Bracciano Goodheart-Wilcox Company, Inc. ISBN 1-59070-280-8
- Sheet Metal by Leo Meyer, American Technical Publishers ISBN 0-8269-1907-3
- International Mechanical Code Book 2003

S-2 HEATING and COOLING APPRENTICESHIP
COURSE SEQUENCE AND PREREQUISITES

Related Instruction- 720 Hours

OJT - 8000 Hours

The following courses are 36 hours each.	Course number	Semester	Prerequisites
FIRST YEAR COURSES:			
Basic Math Computations	A0001	1	
Blueprint Reading	A0031	1	
Building Trade Safety	A0099	1	
Oil Burner Fundamentals	A0783	2	
HVAC Fundamentals	A0780	2	
SECOND YEAR COURSES:			
Refrigeration Fundamentals	A0781	1	
HVAC Math	A0006	1	A0001
Electrical Fundamentals	A0782	1	
HVAC Sheet Metal Theory I	A2901	2	
Heating Fundamentals	A0784	2	
THIRD YEAR COURSES:			
Heating- Hydronic and Steam	A0789	1	A0784
Refrigeration, Commercial/Domestic	A0721	1	A0781
Air Conditioning	A0785	1	
HVAC Sheet Metal Theory II	A2902	2	A2901
SMACNA	A2906	2	
FOURTH YEAR COURSES:			
EPA Refrigerant Standards	A0787	1	
Special Refrigeration Systems	A0788	1	A0781, A0721
Forced Air Heating and Cooling	A0790	1	A0784, A2901
International Mechanical Code	A0729	2	
NFPA Standards	A0730	2	

S-4 HEATING MECHANIC APPRENTICESHIP
S-6 LIMITED HEATING MECHANIC APPRENTICESHIP
S-8 LIMITED HEATING MECHANIC APPRENTICESHIP
COURSE SEQUENCE AND PREREQUISITES

Related Instruction- 576Hours

OJT - 8000 Hours

The following courses are 36 hours each.	Course number	Semester	Prerequisites
FIRST YEAR COURSES:			
Basic Math Computations	A0001	1	
Blueprint Reading	A0031	1	
Building Trade Safety	A0099	2	
HVAC Math	A0006	2	A0001
SECOND YEAR COURSES:			
HVAC Fundamentals	A0780	1	
Electrical Fundamentals	A0782	1	
Heating Fundamentals	A0784	2	
Basic Welding Theory	A2100	2	
THIRD YEAR COURSES:			
Oil Burner Fundamentals	A0783	1	
Special Piping and Installation	A0709	1	
Heating- Hydronic and Steam	A0789	2	A0784
Oil Burner Installation and Design	A0786		A0783
FOURTH YEAR COURSES:			
International Mechanical Code	A0729	1	
Electric Arc, Mig and Tig Welding	A2102	1	
Oil Burner Servicing	A0791	2	A0783, A0786
NFPA Standards	A0730	2	

S-10 LIMITED HEATING and COOLING APPRENTICESHIP
COURSE SEQUENCE AND PREREQUISITES

Related Instruction- 612 Hours

OJT - 6000 Hours

The following courses are 36 hours each.	Course number	Semester	Prerequisites
FIRST YEAR COURSES:			
Basic Math Computations	A0001	1	
Blueprint Reading	A0031	1	
Building Trade Safety	A0099	1	
HVAC Math	A0006	2	
HVAC Fundamentals	A0780	2	
Refrigeration Fundamentals	A0781	2	
SECOND YEAR COURSES:			
Oil Burner Fundamentals	A0783	1	
Electrical Fundamentals	A0782	1	
Heating Fundamentals	A0784	1	
Air Conditioning	A0785	2	
Oil Burner Installation and Design	A0786	2	A0783
Heating- Hydronic and Steam	A0789	2	A0784
THIRD YEAR COURSES:			
EPA Refrigerant Standards	A0787	1	
Forced Air Heating and Cooling	A0790	1	A0784
International Mechanical Code	A0729	2	
NFPA Standards	A0730	2	
Oil Burner Servicing	A0791	2	A0783, A0786

SM-2 SHEET METAL APPRENTICESHIP
COURSE SEQUENCE AND PREREQUISITES

Related Instruction- 576 Hours

OJT - 8000 Hours

The following courses are 36 hours each	Course number	Semester	Prerequisites
FIRST YEAR COURSES:			
Basic Math Computations	A0001	1	
Building Trade Safety	A0099	1	
HVAC Math	A0006	2	A0001
Basic Welding Theory	A2100	2	
SECOND YEAR COURSES:			
Blueprint Reading	A0031	1	
HVAC Sheet Metal Theory I	A2901	1	
Electric Arc, Mig and Tig Welding	A2102	2	
HVAC Sheet Metal Theory II	A2902	2	A2901
THIRD YEAR COURSES:			
HVAC Sheet Metal Theory III	A2903	1	A2901, A2902
HVAC Sheet Metal Layout I	A2904	1	
SMACNA	A2906	2	
HVAC Sheet Metal Layout II	A2905	2	A2904
FOURTH YEAR COURSES:			
Forced Air Heating & Cooling	A0790	1	A2901
International Mechanical Code	A0729	1	
HVAC Sheet Metal Layout III	A2907	2	A2904, A2905
NFPA Standards	A0730	2	

B-2 OIL BURNER SERVICER/INSTALLER APPRENTICESHIP
(Residential/Light commercial)
COURSE SEQUENCE AND PREREQUISITES

Related Instruction- 288Hours

OJT - 2000 Hours

The following courses are 36 hours each.	Course number	Semester	Prerequisites
FIRST YEAR COURSES:			
Basic Math Computations	A0001	1	
Building Trade Safety	A0099	1	
Oil Burner Fundamentals	A0783	2	
Electrical Fundamentals	A0782	2	
SECOND YEAR COURSES:			
Heating Fundamentals	A0784	1	
Oil Burner Installation and Design	A0786	1	A0783
NFPA Standards	A0730	2	
Oil Burner Servicing	A0791	2	A0783, A0786

B-4 OIL BURNER SERVICER/INSTALLER
APPRENTICESHIP(unlimited)
COURSE SEQUENCE AND PREREQUISITES

Related Instruction- 360Hours

OJT - 4000 Hours

The following courses are 36 hours each.	Course number	Semester	Prerequisites
FIRST YEAR COURSES:			
Basic Math Computations	A0001	1	
Blueprint Reading	A0031	1	
Building Trade Safety	A0099	1	
Oil Burner Fundamentals	A0783	2	
Electrical Fundamentals	A0782	2	
SECOND YEAR COURSES:			
Heating Fundamentals	A0784	1	
Oil Burner Installation and Design	A0786	1	A0783
NFPA Standards	A0730	2	
International Mechanical Code	A0729	2	
Oil Burner Servicing	A0791	2	A0783, A0786

D-2 WARM AIR HEATING and COOLING APPRENTICESHIP
COURSE SEQUENCE AND PREREQUISITES

Related Instruction- 432Hours

OJT - 4000 Hours

The following courses are 36 hours each.	Course number	Semester	Prerequisites
FIRST YEAR COURSES:			
Basic Math Computations	A0001	1	
Blueprint Reading	A0031	1	
Building Trade Safety	A0099	1	
HVAC Math	A0006	2	A0001
Electrical Fundamentals	A0782	2	
HVAC Fundamentals	A0780	2	
SECOND YEAR COURSES:			
HVAC Sheet Metal Theory I	A2901	1	
Air Conditioning	A0785	1	
Heating Fundamentals	A0784	1	
Forced Air Heating and Cooling	A0790	2	A0784 A2901
International Mechanical Code	A0729	2	
NFPA Standards	A0730	2	

D-4 REFRIGERATION MECHANIC APPRENTICESHIP
COURSE SEQUENCE AND PREREQUISITES

Related Instruction-360Hours

OJT - 4000 Hours

The following courses are 36 hours each.	Course number	Semester	Prerequisites
FIRST YEAR COURSES:			
Basic Math Computations	A0001	1	
Blueprint Reading	A0031	1	
Building Trade Safety	A0099	1	
Refrigeration Fundamentals	A0781	2	
Electrical Fundamentals	A0782	2	
SECOND YEAR COURSES:			
HVAC Fundamentals	A0780	1	
EPA Refrigerant Standards	A0787	1	
Refrigeration, Commercial/Domestic	A0721	2	A0781
International Mechanical Code	A0729	2	
Special Refrigeration Systems	A0788	2	A0781, A0721

Heating and Cooling

Table of Contents

Course: Basic Math Computations **A0001** **36 Hours**

- A. Computations Using Real Numbers
- B. Computations Using Fractions
- C. Computations Using Decimal Fractions
- D. Base, Rate, and Portion
- E. Computation of Area and Volume
- F. Units of Measurements

Course: Blueprint Reading **A0031** **36 Hours**

- A: Application of Building Codes and Standards
- B: Introduction to Blueprint Reading
- C: Alphabet of Lines and Symbols
- D: Orthographic Projection Drawings
- E: Construction Dimensions and Construction Materials
- F: Reading Plot Plans and Contour Maps
- G: Footings, Foundations and Floor Blueprint
 Structural Steel, Framing Blueprints
- H: Plumbing System Blueprints
- I: H.V.A.C. System Blueprints
- J: Electrical Systems Blueprints

Course: Building Trade Safety **A0099** **36 Hours**

- A. Introduction to Building Trade Safety
- B. Identify Potential Danger
- C. Safety and Protective Equipment (PPE)
- D. Hand Tool Safety
- E. Ladder Safety
- F. Lock-out / Tag-out
- G. Portable Electrical Tools and Equipment
- H. Identify Hazardous Material, Using a Material Safety Data (M.S.D.S.)
- I. Lifting Objects
- J. Assured Grounding
- K. Trenches

Course: Oil Burner Fundamentals **A0783** **36 Hours**

- A. Combustion Process
- B. Oil Burners
- C. Pumps and Nozzles
- D. Oil Burner Controls
- E. Control Circuit Wiring

Course: HVAC Fundamentals **A0780** **36 Hours**

- A. Fundamentals of Refrigeration
- B. Refrigeration Tools and Materials
- C. Refrigerants

Course: Refrigeration Fundamentals **A0781** **36 Hours**

- A. Basic Refrigeration Systems
- B. Compressions Systems and Compressors
- C. Refrigeration Controls

Course: HVAC Math **A0006** **36 Hours**

- A. Direct Measure
- B. Computed Measure-Area
- C. Computed Measure-Volume
- D. Formulas
- E. Duct Calculations
- F. Trigonometry
- G. Graphs

Course: Electrical Fundamentals **A0782** **36 Hours**

- A. Electrical-Magnetic Fundamentals
- B. Electric Motors
- C. Electric Circuits and Controls

Course: HVAC Sheet Metal Theory I **A2901** **36 Hours**

- A. Air Distribution, Measurement and Cleaning

Course: Heating Fundamentals **A0784** **36 Hours**

- A. Heating and Humidification Systems

Course: Heating-Hydronic and Steam **A0789** **36 Hours**

- A. Steam Heating Systems
- B. Hot Water Heating Systems
- C. Domestic Hot Water

Course: Refrigeration, Commercial/Domestic **A0721** **36 Hours**

- A. Commercial Systems
- B. Commercial Systems- Applications
- C. Servicing and Installing Commercial Systems
- D. Commercial Systems- Heating Loads and Piping
- E. Domestic Refrigerators and Freezers
- F. Servicing & Installing Small Hermetic Systems

Course: Air Conditioning **A0785** **36 Hours**

- A. Fundamentals of Air Conditioning
- B. Cooling and Dehumidification Systems
- C. Central Air Conditioning and Heat Pumps

Course: HVAC Sheet Metal Theory II **A2902** **36 Hours**

- A. Sheet Metal Tools and Machinery
- B. Safety in a Sheet Metal Shop
- C. Types of Sheet Metal

Course: SMACNA **A2906** **36 Hours**

- **Basic Duct Construction standards, including symbols, duct design and performance requirements**
- **Pressure classes including water gage, sealant classes, transverse joints and longitudinal seams**
- **Fitting construction including elbows, vane requirements & supports, offsets & transitions, and branch connections**
- **Flexible duct including grill and register connections, canvas connectors, and flexible duct supports**
- **Round and Oval duct including construction standards, pressure gages for round duct and tee's and laterals**
- **Hangers and support systems including hanger selection, minimum requirements, trapeze loads, riser supports and unit supports**
- **Functional Standards including stability, leakage, vibration and noise generation and transmission**
- **Fibrous glass duct construction including requirements & restrictions, fitting and pipe construction, reinforcement, hangers and supports, accessory connections and health and safety**
- **Fire and Smoke Dampers including terminology and applications, codes and regulations, fire damper installation, breakaway connections, fibrous glass duct installation, fire damper styles and access doors**
- **Radiation dampers including ceiling assemblies, heat stop and installation**

Course: EPA Refrigerant Standards **A0787** **36 Hours**

- A. Refrigerants**
- B. Refrigerant Recovery/Recycling/Reclaiming**
- C. EPA Certification Exams**

Course: Special Refrigeration Systems **A0788** **36 Hours**

- A. Absorption Systems**
- B. Special Refrigeration Systems and Applications**

Course: Forced Air Heating and Cooling **A0790** **36 Hours**

- A. Basic heating and Air Conditioning Systems**
- B. Air Distribution, Measurement and Cleaning**
- C. Air Conditioning & Heating Control Systems**
- D. Air Conditioning Systems- Heating & Cooling Loads**

Course: International Mechanical Code **A0729** **36 Hours**

- A. Administration of the International Mechanical Code**

Course: NFPA Standards **A0730** **36 Hours**

- A. Administration of the National Fire Protection Association Standards (NFPA 31, 54, 85, 90A, 90B & 96)**

Course: Oil Burner Installation and Design **A0786** **36 Hours**

- A. Air Delivery System**
- B. Oil Tank Installation**
- C. Warm Air Heating Systems**

Course: Oil Burner Servicing **A0791** **36 Hours**

- A. Ignition System
- B. Electrical Equipment
- C. Service Procedures-Burner Not Operating (BNO)
- D. Service Procedures-Improper Operation
- E. Annual Tune-up
- F. Combustion Efficiency Testing
- G. Improving Combustion Efficiency

Course: Basic Welding Theory **A2100** **36 Hour**
(Still in draft)

Sheet Metal Table of Contents

Course: Basic Math Computations **A0001** **36 Hours**

- A. Computations Using Real Numbers
- B. Computations Using Fractions
- C. Computations Using Decimal Fractions
- D. Base, Rate, and Portion
- E. Computation of Area and Volume
- F. Units of Measurements

Course: Building Trade Safety **A0099** **36 Hours**

- A. Introduction to Building Trade Safety
- B. Identify Potential Danger
- C. Safety and Protective Equipment (PPE)
- D. Hand Tool Safety
- E. Ladder Safety
- F. Lock-out / Tag-out
- G. Portable Electrical Tools and Equipment
- H. Identify Hazardous Material, Using a Material Safety Data (M.S.D.S.)
- I. Lifting Objects
- J. Assured Grounding
- K. Trenches

Course: HVAC Math **A0006** **36 Hours**

- H. Basic Geometric Definitions
- I. Roots and Powers
- J. Formulas
- K. Perimeter and Area
- L. Lateral area, surface area and volume
- M. Pythagorean Theorem
- N. Trigonometric functions, sines, cosines and tangents

Course: Basic Welding Theory **A2100** **36 Hour**
(Still in draft)

Course: Blueprint Reading **A0031** **36 Hours**

- A: Application of Building Codes and Standards**
- B: Introduction to Blueprint Reading**
- C: Alphabet of Lines and Symbols**
- D: Orthographic Projection Drawings**
- E: Construction Dimensions and Construction Materials**
- F: Reading Plot Plans and Contour Maps**
- G: Footings, Foundations and Floor Blueprint**
Structural Steel, Framing Blueprints
- H: Plumbing System Blueprints**
- I: H.V.A.C. System Blueprints**
- J: Electrical Systems Blueprints**

Course: HVAC Sheet Metal Theory I **A2901** **36 Hours**

- A. Air Distribution, Measurement and Cleaning**

Course: Electric Arc, Mig & Tig Welding **A2102** **36 Hours**

Course: HVAC Sheet Metal Theory II **A2902** **36 Hours**

- A. Sheet Metal Tools and Machinery**
- B. Safety in a Sheet Metal Shop**
- C. Types of Sheet Metal**

Course: HVAC Sheet Metal Theory III **A2903** **36 Hours**

- A. Sheet Metal Materials**
- B. Fasteners**
- C. Patterns and cutting metal**
- D. Punching, drilling & riveting**

Course: HVAC Sheet Metal Layout I **A2904** **36 Hours**

- A. Folding edges and making seams**
- B. Turning, Burring and Raising**
- C. Forming, Crimping, Beading and Grooving**
- D. Soldering**

Course: SMACNA **A2906** **36 Hours**

- Basic Duct Construction standards, including symbols, duct design and performance requirements
- Pressure classes including water gage, sealant classes, transverse joints and longitudinal seams
- Fitting construction including elbows, vane requirements & supports, offsets & transitions, and branch connections
- Flexible duct including grill and register connections, canvas connectors, and flexible duct supports
- Round and Oval duct including construction standards, pressure gages for round duct and tee's and laterals
- Hangers and support systems including hanger selection, minimum requirements, trapeze loads, riser supports and unit supports
- Functional Standards including stability, leakage, vibration and noise generation and transmission
- Fibrous glass duct construction including requirements & restrictions, fitting and pipe construction, reinforcement, hangers and supports, accessory connections and health and safety
- Fire and Smoke Dampers including terminology and applications, codes and regulations, fire damper installation, breakaway connections, fibrous glass duct installation, fire damper styles and access doors
- Radiation dampers including ceiling assemblies, heat stop and installation

Course: HVAC Sheet Metal Layout II **A2905** **36 Hours**

- A. Drawing for pattern drafting
- B. Making and notching simple patterns
- C. Parallel line development
- D. Triangulation

Course: Forced Air Heating and Cooling **A0790** **36 Hours**

- A. Basic heating and Air Conditioning Systems
- B. Air Distribution, Measurement and Cleaning
- C. Air Conditioning & Heating Control Systems
- D. Air Conditioning Systems- Heating & Cooling Loads

Course: International Mechanical Code **A0729** **36 Hours**

- A. Administration of the International Mechanical Code

Course: HVAC Sheet Metal Layout III **A2907** **36 Hours**

- A. Radial line development
- B. Sheet metal in the building trades
- C. Short method pattern development
- D. Projects

Course: NFPA Standards **A0730** **36 Hours**

- A. Administration of the National Fire Protection Association Standards (NFPA 31, 54, 85, 90A, 90B & 96)