

SHEET METAL: Level One

04101-08 Introduction to the Sheet Metal Trade (5 Hours)

Summarizes the history and development of the sheet metal trade, explains the benefits of apprenticeship training, and identifies career opportunities in the trade.

04102-08 Tools of the Trade (5 hours)

Describes the hand and power tools used in the sheet metal trade, including layout tools and cutting, bending, and forming machines. Includes safety and maintenance guidelines.

04103-08 Introduction to Sheet Metal Layout and Processes (7.5 Hours)

Introduces parallel line development, radial line development, and triangulation. Covers selection and use of layout, hand, and machine tools. Discusses how to transfer patterns, and how to cut, form, and assemble parts.

04104-08 Trade Math One (20 Hours)

Builds on trainees' basic math skills to solve trade-related problems. Covers calculations using denominate numbers, area and volume calculations, English-metric system conversions, basic geometry, and calculation of stretchouts.

04105-08 Fabrication One – Parallel Line Development (22.5 Hours)

Covers the steps involved in using the parallel line development method to lay out fittings and includes step-by-step procedures for selected fittings.

04106-08 Installation of Ductwork (15 Hours)

Addresses ductwork assembly, use of different types of sealants, using lifts, and installation of ductwork. Describes the types of fasteners (screws, nuts, bolts, and rivets), and supports used in an air distribution system. Discusses proper spacing of hangers, load ratings, and installation of hangers and support systems.

04107-08 Installation of Air Distribution Accessories (5 Hours)

Describes how air distribution accessories, such as louvers, dampers, and access doors, function as part of an air distribution system. Includes guidelines and checklists.

04108-08 Insulation (7.5 Hours)

Describes how to install fiberglass blanket and, foam, and pipe insulation using approved adhesives and fastening techniques. Also includes the fabrication and installation of fitting covers and preformed fitting covers.

04109-08 Architectural Sheet Metal (15 Hours)

Provides instruction in how to lay out and fabricate sheet metal components of a roof drainage system. Includes flashing, gutters, and downspouts.

SHEET METAL: Level Two

04201-08 Trade Math Two (20 Hours)

Demonstrates how to apply mathematical formulas to solve a variety of mathematical problems. Covers linear, area, volume, and angle measurement and percentages, ratios, and proportions. Provides practical instruction in using protractors, vernier calipers, and micrometers and in solving field measuring problems.

04202-08 Plans and Specifications (20 Hours)

Reviews how to read and interpret section, elevation, and detail drawings. Also covers other specifications and other sources of project information. Includes 17 construction drawings.

04203-08 Fabrication Two: Radial Line Development (55 Hours)

Introduces trainees to the principles of radial line development that are used to determine layouts for sheet metal fittings. Includes practice layout and fabrication tasks that allow trainees to develop and demonstrate their skills.

04204-08 Sheet Metal Duct Fabrication Standards (7.5 Hours)

Explains how to determine the various requirements for a duct system, including operating pressures, metal gauges, connectors, reinforcements, tie rods, and seams. Also reviews how to use standards, codes, and ordinances to design a duct system.

04205-08 Air Properties and Distribution (15 Hours)

Explains the properties of air and how these properties relate to one another. Teaches how to use the gas laws, psychrometric charts, and measuring instruments to evaluate air properties in an air distribution system.

04206-08 Bend Allowances (5 Hours)

Provides instruction and practice in determining proper bend allowances in sheet metal. Also reviews the interplay of different factors that affect the amount of bend allowance needed and the methods for calculating allowance.

04207-08 Soldering (15 Hours)

Identifies soldering tools, materials, and techniques. Also provides trainees with a wide range of soldering tasks for practice.

04208-08 Basic Piping Practices (7.5 Hours)

Reviews the methods for measuring, cutting, and joining selected types of pipe using fittings, hangers, and supports. Also reviews pipe materials and applications.

04209-08 Fiberglass Duct (20 Hours)

Reviews fiberglass duct as well as layout and fabrication methods. Also discusses closure, hanging, and support methods and how to repair major and minor damage to fiberglass duct.

SHEET METAL: Level Three

04301-09 Trade Math Three - Field Measuring and Fitting (15 Hours)

Describes the techniques used for field measuring and layout of ductruns and fittings. Also provides practice field measuring problems.

04302-09 Air Systems (10 Hours)

Reviews the operating principles, components, and applications of common all-air systems. Discusses constant volume systems, variable volume systems, variable temperature (VVT) systems, variable air volume (VAV) systems, and dual-duct VAV systems.

04303-09 Principles of Airflow (22.5 Hours)

Explains the basic principles of airflow and review how airflow is affected by duct size, shape, and fittings. Also reviews the components of an air distribution system.

04304-09 Louvers, Dampers, and Access Doors (20 Hours)

Discusses the different types of louvers, dampers, and access doors used in air distribution systems and reviews the standards that apply them.

04305-09 Comprehensive Plan and Specification Reading (30 Hours)

Provides a case-study approach to learning how to use building plans and specification to lay out, fabricate, and install HVAC systems. Allows trainees to proceed through the module as if they were working on an actual building project. Includes construction drawings.

04306-09 Fabrication Three - Triangulation (47.5 Hours)

Describes the principles of triangulation and how it can be used to measure ductrun fittings. Provides trainees with a variety of tasks to practice developing, laying out, and fabricating selected ductrun fittings.

04307-09 Advanced Architectural Sheet Metal (12.5 Hours)

Provides the opportunity to practice layout, fabrication, and installation of various architectural pieces. Makes use of items built in Fabrication Three – Radial Line Development.

SHEET METAL: Level Four

04401-09 Shop Production and Organization (15 Hours)

Introduces trainees to the important production, organization, planning, and control functions that occur in a sheet metal shop. Emphasizes optimization of processes and accurate estimating for competitive bidding. Discusses project planning techniques, principles of efficient shop layout and materials flow, and the roles and relationships of shop personnel.

04402-09 Air Testing and Balancing (25 Hours)

Trainees learn how to balance an air distribution system so that the right amount of air is correctly distributed at the proper velocities and returned to the heating and cooling units. Reviews the tools and techniques used for adjusting fans, volume dampers, registers, and grilles. Provides proper techniques for duct leakage testing.

04403-09 Introduction to Welding, Brazing and Cutting (25 Hours)

Introduces trainees to the important techniques and proper operation of equipment used for welding, brazing, and cutting. Emphasizes safety and awareness of hazards involved. Students practice welds in a variety of positions and perform a basic braze.

04404-09 Fume and Exhaust System Design (25 Hours)

Reviews the codes and specifications pertaining to fume and exhaust system design for safe workplaces. Instructs trainees in selecting the appropriate materials for fume or exhaust system components and to identify the different types of hoods and applications for each.

04405-09 Fabrication Four: Comprehensive Review (40 Hours)

Provides a comprehensive review of parallel line, radial line, and triangulation development methods for laying out sheet metal patterns. Trainees practice laying out and fabricating selected sheet metal fittings using these methods.

04406-09 Introductory Supervisory Skills (20 Hours)

Teaches the basic skills required to supervise personnel, including leadership, team building, communication and motivation. Discusses gender and cultural issues. Emphasizes principles of project planning and management, including problem solving and decision making. Presents case studies for student participation.