

NCCER SHEET METAL CURRICULUM

The following is a brief description of subjects contained in all four levels of the sheet metal program as well as the core curricula that all level one students are expected to pass.

CORE CURRICULUM

The core curricula provides a basic introduction to construction work for all crafts. The core curriculum consists of 9 modules taught through in-person instruction and supplemented by online programming.

Basic Safety

Presents basic jobsite safety information to prepare workers for the construction environment. Describes the common causes of workplace incidents and accidents and how to avoid them. Introduces common personal protective equipment (PPE), including equipment required for work at height, and its proper use. Information related to safety in several specific environments, including welding areas and confined spaces, is also provided.

Introduction to Construction Math

Reviews basic math skills related to the construction trades and demonstrates how they apply to the trades. Covers multiple systems of measurement, decimals, fractions, and basic geometry.

Introduction to Hand Tool

Introduces common hand tools used in a variety of construction crafts. Identifies tools and how to safely use them. Proper hand tool maintenance is also presented.

Introduction to Power Tools

Identifies and describes the operation of many power tools common in the construction environment. Provides instruction on proper use, as well as on safe-handling guidelines and basic maintenance.

Introduction to Construction Drawings

Introduces the basic elements of construction drawings. The common components of drawings are presented, as well as the most common drawing types. The use of drawing scales and how to measure drawings is also covered.

Basic Rigging

Provides basic information related to rigging and rigging hardware, such as slings, rigging hitches, and hoists. Emphasizes safe working habits in the vicinity of rigging operations.

Basic Communication Skills

Provides good techniques for effective communication on the job. Includes examples that emphasize the importance of both written and verbal communication skills. Describes the importance of reading skills in the construction industry and covers proper techniques to use in a variety of different written communication formats.

Basic Employability Skills

Describes the opportunities offered by the construction trades. Discusses critical thinking and essential problem-solving skills for the construction industry. Also identifies and discusses positive social skills and their value in the workplace.

Introduction to Material Handling

Describes the hazards associated with handling materials and provides techniques to avoid both injury and property damage. Common material-handling equipment is also introduced.

SHEET METAL – LEVEL ONE

Introduction to the Sheet Metal Trade

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

Tools of the Trade

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.

Introduction to Sheet Metal Layout and Processes

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.

Trade Math One

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 stretch outs.

Fabrication One – Parallel Line Development

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

Installation of Ductwork

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.

Installation of Air Distribution Accessories

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

Insulation

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

Architectural Sheet Metal

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

SHEET METAL – LEVEL TWO

Trade Math Two

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

Plans and Specifications

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.

Fabrication Two – Radial Line Development

Introduces trainees to radial line development principles 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.

Sheet Metal Duct Fabrication Standards

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.

Air Properties and Distribution

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

Bend Allowances

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.

Soldering

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

Basic Piping Practices

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

Fiberglass Duct

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

Trade Math Three – Field Measuring and Fitting

Describes the techniques used for field measuring and layout of duct runs and fittings. Also provides practice in solving field-measuring problems.

Air Systems

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

Principles of Airflow

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

Louvers, Dampers, and Access Doors

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

Comprehensive Plan and Specification Reading

Provides a case-study approach to learning how to use building plans and specifications 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.

Fabrication Three – Triangulation

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

Advanced Architectural Sheet Metal

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

Shop Production and Organization

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, the critical path method, and the roles and relationships of shop personnel.

Air Testing and Balancing

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.

Introduction to Welding, Brazing and Cutting

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.

Fume and Exhaust System Design

Reviews the codes and specifications pertaining to fume and exhaust system design for safe workspaces. 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.

Fabrication Four – Comprehensive Review

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.

Introductory Supervisory Skills

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.



THE NCCER PROGRAM

NCCER (National Center for Construction Education & Research) maintains a portable and widely recognized credentialing and certification system through its Registry. This Registry assures portability of skills by providing transcripts, certificates and wallet cards to students who successfully complete the NCCER Curriculum through an accredited sponsor. These valuable industry credentials benefit students as they seek employment and build their careers. To be entered in NCCER's Automated National Registry, you must complete and sign a Registration and Release Form. This form will be completed on the first night of class in each semester and requires your Social Security Number and your signature.

NCCER has developed a consistent program of accreditation, instructor certification, standardized curriculum, registry, assessment and certification, which are key elements in developing a skilled workforce of craft professionals.

NCCER is the accrediting body for the industry and establishes the benchmark for quality training and assessments. By partnering with industry and academia, NCCER has developed a system for program accreditation that is similar to those found in institutions of higher learning. This process ensures that students receive quality training based on uniform standards and criteria.

The NCCER Curriculum, in cooperation with publishing partner Pearson, has developed and publishes a world-class curriculum created by "Subject Matter Experts" representing contractors and schools from around the country. "Subject Matter Experts" ensure exceptional training programs that meet or exceed national industry standards. The NCCER Curriculum, which includes more than 60 craft areas, is taught worldwide by contractors, associations, construction users, and secondary and post-secondary schools. In addition, multiple State Departments of Education recognize the curriculum along with the U.S. Department of Labor - Office of Apprenticeship.