
Sheet Metal Workers

(O*NET 47-2211.00)

Significant Points

- About 66 percent of sheet metal workers are found in the construction industry; around 21 percent are in manufacturing.
- Workers learn through informal on-the-job training or formal apprenticeship programs.
- Job opportunities in construction should be good, particularly for individuals who have apprenticeship training or who are certified welders; applicants for jobs in manufacturing may experience competition.

Nature of the Work

Sheet metal workers make, install, and maintain heating, ventilation, and air-conditioning duct systems; roofs; siding; rain gutters; downspouts; skylights; restaurant equipment; outdoor signs; railroad cars; tailgates; customized precision equipment; and many other products made from metal sheets. They also may work with fiberglass and plastic materials. Although some workers specialize in fabrication, installation, or maintenance, most do all three jobs. Sheet metal workers do both construction-related work and mass production of sheet metal products in manufacturing.

Sheet metal workers first study plans and specifications to determine the kind and quantity of materials they will need. They then measure, cut, bend, shape, and fasten pieces of sheet metal to make ductwork, countertops, and other custom products. In an increasing number of shops, sheet metal workers use computerized metalworking equipment. This enables them to perform their tasks more quickly and to experiment with different layouts to find the one that wastes the least material. They cut, drill, and form parts with computer-controlled saws, lasers, shears, and presses.

In shops without computerized equipment, and for products that cannot be made on such equipment, sheet metal workers make the required calculations and use tapes, rulers, and other measuring devices for layout work. They then cut or stamp the parts on machine tools.

Before assembling pieces, sheet metal workers check each part for accuracy using measuring instruments such as calipers and micrometers and, if necessary, finish pieces using hand, rotary, or squaring shears and hacksaws. After inspecting the pieces, workers fasten seams and joints together with welds, bolts, cement, rivets, solder, specially formed sheet metal drive clips, or other connecting devices. They then take the parts to the construction site, where they further assemble the pieces as they install them. These workers install ducts, pipes, and tubes by joining them end to end and hanging them with metal hangers secured to a ceiling or a wall. They also use shears, hammers, punches, and drills to make parts at the worksite or to alter parts made in the shop.

Some jobs are done completely at the jobsite. When installing a metal roof, for example, sheet metal workers usually measure and cut the roofing panels on site. They secure the first panel in place and interlock and fasten the grooved edge

of the next panel into the grooved edge of the first. Then, they nail or weld the free edge of the panel to the structure. This two-step process is repeated for each additional panel. Finally, the workers fasten machine-made molding at joints, along corners, and around windows and doors for a neat, finished effect.

In addition to installation, some sheet metal workers specialize in testing, balancing, adjusting, and servicing existing air-conditioning and ventilation systems to make sure they are functioning properly and to improve their energy efficiency. Properly installed duct systems are a key component to heating, ventilation, and air-conditioning (HVAC) systems; sometimes duct installers are called *HVAC technicians*. A growing activity for sheet metal workers is building commissioning, which is a complete mechanical inspection of a building's HVAC, water, and lighting systems.

Sheet metal workers in manufacturing plants make sheet metal parts for products such as aircraft or industrial equipment. Although some of the fabrication techniques used in large-scale manufacturing are similar to those used in smaller shops, the work may be highly automated and repetitive. Sheet metal workers doing such work may be responsible for reprogramming the computer control systems of the equipment they operate.

Work environment. Sheet metal workers usually work a 40-hour week. Those who fabricate sheet metal products work in shops that are well-lighted and well-ventilated. However, they stand for long periods and lift heavy materials and finished pieces. Sheet metal workers must follow safety practices because working around high-speed machines can be dangerous. They also are subject to cuts from sharp metal, burns from soldering and welding, and falls from ladders and scaffolds. They are often required to wear safety glasses and must not wear jewelry or loose-fitting clothing that could easily be caught in a machine. They may work at a variety of different production stations to reduce the repetitiveness of the work.

Those performing installation work do considerable bending, lifting, standing, climbing, and squatting, sometimes in close quarters or awkward positions. Although duct systems and kitchen equipment are installed indoors, the installation of siding, roofs, and gutters involves much outdoor work, exposing sheet metal workers to various kinds of weather.



Sheet metal workers often take additional training, provided by the union or by their employer, to improve their skills.

Projections data from the National Employment Matrix

Occupational Title	SOC Code	Employment, 2006	Projected employment, 2016	Change, 2006-16	
				Number	Percent
Sheet metal workers	47-2211	189,000	201,000	13,000	7

NOTE: Data in this table are rounded. See the discussion of the employment projections table in the *Handbook* introductory chapter on *Occupational Information Included in the Handbook*.

Training, Other Qualifications, and Advancement

Sheet metal workers learn their trade through both formal apprenticeships and informal on-the-job training programs. Formal apprenticeships are more likely to be found in construction.

Education and training. To become a skilled sheet metal construction worker usually takes between 4 and 5 years of both classroom and on-the-job training. While there are a number of different ways to obtain this training, generally the more formalized the training received by an individual, the more thoroughly skilled they become, and the more likely they are to be in demand by employers. For some, this training begins in a high school, where classes in English, algebra, geometry, physics, mechanical drawing and blueprint reading, and general shop are recommended.

After high school, there are a number of different ways to train. One way is to get a job with a contractor who will provide training on the job. Entry-level workers generally start as helpers, assisting more experienced workers. Most begin by carrying metal and cleaning up debris in a metal shop while they learn about materials and tools and their uses. Later, they learn to operate machines that bend or cut metal. In time, helpers go out on the jobsite to learn installation. Employers may send the employee to courses at a trade or vocational school or community college to receive further formal training. Helpers may be promoted to the journey level if they show the requisite knowledge and skills. Most sheet metal workers in large-scale manufacturing receive on-the-job training, with additional class work or in-house training as necessary. The training needed to become proficient in manufacturing takes less time than the training in construction.

Some employers, particularly large nonresidential construction contractors with union membership, offer formal apprenticeships. These programs combine paid on-the-job training with related classroom instruction. Usually, apprenticeship applicants must be at least 18 years old and meet local requirements. The length of the program, usually 4 to 5 years, varies with the apprentice's skill. Apprenticeship programs provide comprehensive instruction in both sheet metal fabrication and installation. They may be administered by local joint committees composed of the Sheet Metal Workers' International Association and local chapters of the Sheet Metal and Air-Conditioning Contractors National Association.

Sheet metal workers can choose one of many specialties. Workers can specialize in commercial and residential HVAC installation and maintenance, industrial welding and fabrication, exterior or architectural sheet metal installation, sign fabrication, and testing and balancing of building systems.

On the job, apprentices first receive safety training and then training in tasks that allow them to immediately begin work. They learn the basics of pattern layout and how to cut, bend,

fabricate, and install sheet metal. They begin by learning to install and maintain basic ductwork and gradually advance to more difficult jobs, such as making more complex ducts, commercial kitchens, and decorative pieces. They also use materials such as fiberglass, plastics, and other nonmetallic materials. Workers often focus on a sheet metal specialty. In the classroom, apprentices learn drafting, plan and specification reading, trigonometry and geometry applicable to layout work, welding, the use of computerized equipment, and the principles of heating, air-conditioning, and ventilation systems. In addition, apprentices learn the relationship between sheet metal work and other construction work.

Other qualifications. Sheet metal workers need to be in good physical condition and have mechanical and mathematical aptitude and good reading skills. Good eye-hand coordination, spatial and form perception, and manual dexterity also are important. Courses in algebra, trigonometry, geometry, mechanical drawing, and shop provide a helpful background for learning the trade, as does related work experience obtained in the U.S. Armed Services.

It is important for experienced sheet metal workers to keep abreast of new technological developments, such as the use of computerized layout and laser-cutting machines. Workers often take additional training, provided by the union or by their employer, to improve existing skills or to acquire new ones.

Certification and advancement. Certifications in one of the specialties can be beneficial to workers. Certifications related to sheet metal specialties are offered by a wide variety of associations, some of which are listed in the sources of more information at the end of this statement. Those that complete registered apprenticeships are certified as journey workers, which can help to prove their skills to employers.

Sheet metal workers in construction may advance to supervisory jobs. Some of these workers take additional training in welding and do more specialized work. Workers who perform building and system testing are able to move into construction and building inspection. Others go into the contracting business for themselves. Because a sheet metal contractor must have a shop with equipment to fabricate products, this type of contracting business is more expensive to start than other types of construction contracting.

Sheet metal workers in manufacturing may advance to positions as supervisors or quality inspectors. Some of these workers may move into other management positions.

Employment

Sheet metal workers held about 189,000 jobs in 2006. About 66 percent of all sheet metal workers were in the construction industry, including 45 percent who worked for plumbing, heating, and air-conditioning contractors; most of the rest in construction worked for roofing and sheet metal contractors. Some

worked for other special trade contractors and for general contractors engaged in residential and commercial building.

About 21 percent of all sheet metal workers were in manufacturing industries, such as the fabricated metal products, machinery, and aerospace products and parts industries. Some sheet metal workers work for the Federal Government.

Compared with workers in most construction craft occupations, relatively few sheet metal workers are self-employed.

Job Outlook

Average employment growth is projected. Job opportunities in construction should be good, particularly for individuals who have apprenticeship training or who are certified welders; applicants for jobs in manufacturing may experience competition.

Employment change. Employment of sheet metal workers is expected to increase 7 percent between 2006 and 2016, about as fast as the average for all occupations. This reflects growth in the number of industrial, commercial, and residential structures being built. The need to install energy-efficient air-conditioning, heating, and ventilation systems in older buildings and to perform other types of renovation and maintenance work also should boost employment. In addition, the popularity of decorative sheet metal products and increased architectural restoration are expected to add to the demand for sheet metal workers.

Job prospects. Job opportunities are expected to be good for sheet metal workers in the construction industry, reflecting both employment growth and openings arising each year as experienced sheet metal workers leave the occupation. Opportunities should be particularly good for individuals who have apprenticeship training or who are certified welders. Applicants for jobs in manufacturing may experience competition because a number of manufacturing plants that employ sheet metal workers are moving to other countries and the plants that remain are becoming more productive.

Sheet metal workers in construction may experience periods of unemployment, particularly when construction projects end and economic conditions dampen construction activity. Nevertheless, employment of sheet metal workers is less sensitive to declines in new construction than is the employment of some other construction workers, such as carpenters. Maintenance of existing equipment—which is less affected by economic fluctuations than is new construction—makes up a large part of the work done by sheet metal workers. Installation of new air-conditioning and heating systems in existing buildings continues during construction slumps, as individuals and businesses adopt more energy-efficient equipment to cut utility bills. In addition, a large proportion of sheet metal installation and maintenance is done indoors, so sheet metal workers usually lose less worktime due to bad weather than other construction workers.

Earnings

In May 2006, median hourly earnings of wage and salary sheet metal workers were \$17.96. The middle 50 percent earned between \$13.30 and \$24.89. The lowest 10 percent of all sheet metal workers earned less than \$10.36, and the highest 10 percent earned more than \$32.30. The median hourly earnings of the largest industries employing sheet metal workers were:

Building finishing contractors.....	\$18.84
Plumbing, heating, and air-conditioning contractors.....	18.60
Roofing contractors.....	17.27
Architectural and structural metals manufacturing.....	16.60

Apprentices normally start at about 40 to 50 percent of the rate paid to experienced workers. As apprentices acquire more skills, they receive periodic pay increases until their pay approaches that of experienced workers. In addition, union workers in some areas receive supplemental wages from the union when they are on layoff or shortened workweeks.

Related Occupations

To fabricate and install sheet metal products, sheet metal workers combine metalworking skills and knowledge of construction materials and techniques. Other occupations in which workers lay out and fabricate metal products include assemblers and fabricators; machinists; machine setters, operators, and tenders—metal and plastic; and tool and die makers. Construction occupations requiring similar skills and knowledge include glaziers and heating, air-conditioning, and refrigeration mechanics and installers.

Sources of Additional Information

For more information about apprenticeships or other work opportunities, contact local sheet metal contractors or heating, refrigeration, and air-conditioning contractors; a local of the Sheet Metal Workers International Association; a local of the Sheet Metal and Air-Conditioning Contractors National Association; a local joint union-management apprenticeship committee; or the nearest office of your State employment service or apprenticeship agency. You can also find information on the registered apprenticeship system with links to State apprenticeship programs on the U.S. Department of Labor's Web site: http://www.doleta.gov/atels_bat Apprenticeship information is also available from the U.S. Department of Labor's toll free helpline: 1 (877) 872-5627.

For general and training information about sheet metal workers, contact:

► International Training Institute for the Sheet Metal and Air-Conditioning Industry, 601 N. Fairfax St., Suite 240, Alexandria, VA 22314. Internet: <http://www.sheetmetal-iti.org>

► National Center for Construction Education and Research, P.O. Box 141104, Gainesville, FL 32614.

Internet: <http://www.nccer.org>

► Sheet Metal and Air-Conditioning Contractors' National Association, 4201 Lafayette Center Dr., Chantilly, VA 20151. Internet: <http://www.smacna.org>

► Sheet Metal Workers International Association, 1750 New York Ave. NW., Washington, DC 20006.

Internet: <http://www.smwia.org>

For general information on apprenticeships and how to get them, see the *Occupational Outlook Quarterly* article "Apprenticeships: Career training, credentials—and a paycheck in your pocket," online at <http://www.bls.gov/opub/ooq/2002/summer/art01.pdf> and in print at many libraries and career centers.