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# Pipelayers, Plumbers, Pipefitters, and Steamfitters

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## Significant Points

- Job opportunities should be very good, especially for workers with welding experience.
- Pipelayers, plumbers, pipefitters, and steamfitters comprise one of the largest and highest paid construction occupations.
- Most States and localities require plumbers to be licensed.
- Apprenticeship programs generally provide the most comprehensive training, but many workers train in career or technical schools or community colleges.

## Nature of the Work

Most people are familiar with plumbers who come to their home to unclog a drain or install an appliance. In addition to these activities, however, pipelayers, plumbers, pipefitters, and steamfitters install, maintain, and repair many different types of pipe systems. For example, some systems move water to a municipal water treatment plant and then to residential, commercial, and public buildings. Other systems dispose of waste, provide gas to stoves and furnaces, or provide for heating and cooling needs. Pipe systems in powerplants carry the steam that powers huge turbines. Pipes also are used in manufacturing plants to move material through the production process. Specialized piping systems are very important in both pharmaceutical and computer-chip manufacturing.

Although pipelaying, plumbing, pipefitting, and steamfitting sometimes are considered a single trade, workers generally specialize in one of five areas. *Pipelayers* lay clay, concrete, plastic, or cast-iron pipe for drains, sewers, water mains, and oil or gas lines. Before laying the pipe, pipelayers prepare and grade the trenches either manually or with machines. After laying the pipe, they weld, glue, cement, or otherwise join the pieces together. *Plumbers* install and repair the water, waste disposal, drainage, and gas systems in homes and commercial and industrial buildings. Plumbers also install plumbing fixtures—bathtubs, showers, sinks, and toilets—and appliances such as dishwashers and water heaters. *Pipefitters* install and repair both high-pressure and low-pressure pipe systems used in manufacturing, in the generation of electricity, and in the heating and cooling of buildings. They also install automatic controls that are increasingly being used to regulate these systems. Some pipefitters specialize in only one type of system. *Steamfitters* install pipe systems that move liquids or gases under high pressure. *Sprinklerfitters* install automatic fire sprinkler systems in buildings.

Pipelayers, plumbers, pipefitters, and steamfitters use many different materials and construction techniques, depending on the type of project. Residential water systems, for example, incorporate copper, steel, and plastic pipe that can be handled and installed by one or two plumbers. Municipal sewerage systems, on the other hand, are made of large cast-iron pipes; installation

normally requires crews of pipefitters. Despite these differences, all pipelayers, plumbers, pipefitters, and steamfitters must be able to follow building plans or blueprints and instructions from supervisors, lay out the job, and work efficiently with the materials and tools of their trade. Computers and specialized software are used to create blueprints and plan layouts.

When construction plumbers install piping in a new house, for example, they work from blueprints or drawings that show the planned location of pipes, plumbing fixtures, and appliances. Recently, plumbers have become more involved in the design process. Their knowledge of codes and the operation of plumbing systems can cut costs. They first lay out the job to fit the piping into the structure of the house with the least waste of material. Then they measure and mark areas in which pipes will be installed and connected. Construction plumbers also check for obstructions such as electrical wiring and, if necessary, plan the pipe installation around the problem.

Sometimes, plumbers have to cut holes in walls, ceilings, and floors of a house. For some systems, they may hang steel supports from ceiling joists to hold the pipe in place. To assemble a system, plumbers—using saws, pipe cutters, and pipe-bending machines—cut and bend lengths of pipe. They connect lengths of pipe with fittings, using methods that depend on the type of pipe used. For plastic pipe, plumbers connect the sections and fittings with adhesives. For copper pipe, they slide a fitting over the end of the pipe and solder it in place with a torch.

After the piping is in place in the house, plumbers install the fixtures and appliances and connect the system to the outside water or sewer lines. Finally, using pressure gauges, they check the system to ensure that the plumbing works properly.

**Work environment.** Pipefitters and steamfitters most often work in industrial and power plants. Plumbers work in commercial and residential settings where water and septic systems need to be installed and maintained. Pipelayers work outdoors, sometime in remote areas, as they build the pipelines that connect sources of oil, gas, and chemicals with the users of these materials. Sprinklerfitters work in all buildings that require the use of fire sprinkler systems.

Because pipelayers, plumbers, pipefitters, and steamfitters frequently must lift heavy pipes, stand for long periods, and sometimes work in uncomfortable or cramped positions, they need physical strength and stamina. They also may have to



*Pipelayers lay clay, concrete, plastic, or cast-iron pipe for drains, sewers, water mains, and oil or gas lines.*

**Projections data from the National Employment Matrix**

Occupational Title	SOC Code	Employment, 2006	Projected employment, 2016	Change, 2006-16	
				Number	Percent
Pipelayers, plumbers, pipefitters, and steamfitters.....	47-2150	569,000	628,000	59,000	10
Pipelayers.....	47-2151	67,000	72,000	5,800	9
Plumbers, pipefitters, and steamfitters.....	47-2152	502,000	555,000	53,000	11

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*.

work outdoors in inclement weather. In addition, they are subject to possible falls from ladders, cuts from sharp tools, and burns from hot pipes or soldering equipment.

Pipelayers, plumbers, pipefitters, and steamfitters engaged in construction generally work a standard 40-hour week; those involved in maintaining pipe systems, including those who provide maintenance services under contract, may have to work evening or weekend shifts and work on call. These maintenance workers may spend a lot of time traveling to and from worksites.

**Training, Other Qualifications, and Advancement**

Most pipelayers, plumbers, pipefitters, and steamfitters train in career or technical schools or community colleges, and on the job through apprenticeships.

**Education and training.** Pipelayers, plumbers, pipefitters, and steamfitters enter into the occupation in a variety of ways. Most residential and industrial plumbers get their training in career and technical schools and community colleges and from on-the-job training. Pipelayers, plumbers, pipefitters, and steamfitters who work for nonresidential enterprises are usually trained through formal apprenticeship programs.

Apprenticeship programs generally provide the most comprehensive training available for these jobs. They are administered either by union locals and their affiliated companies or by nonunion contractor organizations. Organizations that sponsor apprenticeships include: the United Association of Journeymen and Apprentices of the Plumbing and Pipefitting Industry of the United States and Canada; local employers of either the Mechanical Contractors Association of America or the National Association of Plumbing-Heating-Cooling Contractors; a union associated with a member of the National Fire Sprinkler Association; the Associated Builders and Contractors; the National Association of Plumbing-Heating-Cooling Contractors; the American Fire Sprinkler Association, or the Home Builders Institute of the National Association of Home Builders.

Apprenticeships—both union and nonunion—consist of 4 or 5 years of paid on-the-job training and at least 144 hours of related classroom instruction per year. Classroom subjects include drafting and blueprint reading, mathematics, applied physics and chemistry, safety, and local plumbing codes and regulations. On the job, apprentices first learn basic skills, such as identifying grades and types of pipe, using the tools of the trade, and safely unloading materials. As apprentices gain experience, they learn how to work with various types of pipe and how to install different piping systems and plumbing fixtures. Apprenticeship gives trainees a thorough knowledge of all aspects of the trade. Although most pipelayers, plumbers, pipefit-

ters, and steamfitters are trained through apprenticeship, some still learn their skills informally on the job.

**Licensure.** Although there are no uniform national licensing requirements, most States and communities require plumbers to be licensed. Licensing requirements vary, but most localities require workers to have 2 to 5 years of experience and to pass an examination that tests their knowledge of the trade and of local plumbing codes before working independently. Several States require a special license to work on gas lines. A few States require pipe fitters to be licensed. These licenses usually require a test, experience, or both.

**Other qualifications.** Applicants for union or nonunion apprentice jobs must be at least 18 years old and in good physical condition. A drug test may be required. Apprenticeship committees may require applicants to have a high school diploma or its equivalent. Armed Forces training in pipelaying, plumbing, and pipefitting is considered very good preparation. In fact, people with this background may be given credit for previous experience when entering a civilian apprenticeship program. High school or postsecondary courses in shop, plumbing, general mathematics, drafting, blueprint reading, computers, and physics also are good preparation.

**Advancement.** With additional training, some pipelayers, plumbers, pipefitters, and steamfitters become supervisors for mechanical and plumbing contractors. Others, especially plumbers, go into business for themselves, often starting as a self-employed plumber working from home. Some eventually become owners of businesses employing many workers and may spend most of their time as managers rather than as plumbers. Others move into closely related areas such as construction management or building inspection.

For those who would like to advance, it is increasingly important to be able to communicate in both English and Spanish in order to relay instructions and safety precautions to workers with limited understanding of English; Spanish-speaking workers make up a large part of the construction workforce in many areas. Supervisors and contractors need good communication skills to deal with clients and subcontractors.

**Employment**

Pipelayers, plumbers, pipefitters, and steamfitters constitute one of the largest construction occupations, holding about 569,000 jobs in 2006. About 55 percent worked for plumbing, heating, and air-conditioning contractors engaged in new construction, repair, modernization, or maintenance work. Others did maintenance work for a variety of industrial, commercial, and government employers. For example, pipefitters were employed as maintenance personnel in the petroleum and chemical industries, both of which move liquids and gases through

pipes. About 12 percent of pipelayers, plumbers, pipefitters, and steamfitters were self-employed.

**Job Outlook**

Average employment growth is projected. Job opportunities are expected to be very good, especially for workers with welding experience.

**Employment change.** Employment of pipelayers, plumbers, pipefitters, and steamfitters is expected to grow 10 percent between 2006 and 2016, about as fast as the average for all occupations. Demand for plumbers will stem from new construction and building renovation. Bath remodeling, in particular, is expected to continue to grow and create more jobs for plumbers. In addition, repair and maintenance of existing residential systems will keep plumbers employed. Demand for pipefitters and steamfitters will be driven by maintenance and construction of places such as powerplants, water and wastewater treatment plants, office buildings, and factories, with extensive pipe systems. Growth of pipelayer jobs will stem from the building of new water and sewer lines and pipelines to new oil and gas fields. Demand for sprinklerfitters will increase because of changes to State and local rules for fire protection in homes and businesses.

**Job prospects.** Job opportunities are expected to be very good, as demand for skilled pipelayers, plumbers, pipefitters, and steamfitters is expected to outpace the supply of workers well trained in this craft in some areas. Some employers report difficulty finding workers with the right qualifications. In addition, many people currently working in these trades are expected to retire over the next 10 years, which will create additional job openings. Workers with welding experience should have especially good opportunities.

Traditionally, many organizations with extensive pipe systems have employed their own plumbers or pipefitters to maintain equipment and keep systems running smoothly. But, to reduce labor costs, many of these firms no longer employ full-time, in-house plumbers or pipefitters. Instead, when they need a plumber, they rely on workers provided under service contracts by plumbing and pipefitting contractors.

Construction projects generally provide only temporary employment. When a project ends, some pipelayers, plumbers, pipefitters, and steamfitters may be unemployed until they can begin work on a new project, although most companies are trying to limit these periods of unemployment to retain workers. In addition, the jobs of pipelayers, plumbers, pipefitters, and steamfitters are generally less sensitive to changes in economic conditions than jobs in other construction trades. Even when construction activity declines, maintenance, rehabilitation, and replacement of existing piping systems, as well as the increasing installation of fire sprinkler systems, provide many jobs for pipelayers, plumbers, pipefitters, and steamfitters.

**Earnings**

Pipelayers, plumbers, pipefitters, and steamfitters are among the highest paid construction occupations. Median hourly earnings of wage and salary plumbers, pipefitters, and steamfitters were \$20.56. The middle 50 percent earned between \$15.62 and \$27.54. The lowest 10 percent earned less than \$12.30, and the highest 10 percent earned more than \$34.79. Median

hourly earnings in the industries employing the largest numbers of plumbers, pipefitters, and steamfitters were:

Natural gas distribution.....	\$24.91
Nonresidential building construction.....	21.30
Plumbing, heating, and air-conditioning contractors.....	20.44
Utility system construction.....	19.18
Local government.....	17.86

In May 2006, median hourly earnings of wage and salary pipelayers were \$14.58. The middle 50 percent earned between \$11.75 and \$19.76. The lowest 10 percent earned less than \$9.73, and the highest 10 percent earned more than \$25.73.

Apprentices usually begin at about 50 percent of the wage rate paid to experienced workers. Wages increase periodically as skills improve. After an initial waiting period, apprentices receive the same benefits as experienced pipelayers, plumbers, pipefitters, and steamfitters.

About 30 percent of pipelayers, plumbers, pipefitters, and steamfitters belonged to a union. Many of these workers are members of the United Association of Journeymen and Apprentices of the Plumbing and Pipefitting Industry of the United States and Canada.

**Related Occupations**

Other workers who install and repair mechanical systems in buildings include boilermakers; electricians; elevator installers and repairers; heating, air-conditioning, and refrigeration mechanics and installers; industrial machinery mechanics and maintenance workers; millwrights; sheet metal workers; and stationary engineers and boiler operators. Other related occupations include construction managers and construction and building inspectors.

**Sources of Additional Information**

For information about apprenticeships or work opportunities in pipelaying, plumbing, pipefitting, and steamfitting, contact local plumbing, heating, and air-conditioning contractors; a local or State chapter of the National Association of Plumbing, Heating, and Cooling Contractors; a local chapter of the Mechanical Contractors Association; a local chapter of the United Association of Journeymen and Apprentices of the Plumbing and Pipefitting Industry of the United States and Canada; or the nearest office of your State employment service or apprenticeship agency. Apprenticeship information is also available from the U.S. Department of Labor’s toll free helpline: (877) 872-5627.

For information about apprenticeship opportunities for pipelayers, plumbers, pipefitters, and steamfitters, contact:

- United Association of Journeymen and Apprentices of the Plumbing and Pipefitting Industry, 901 Massachusetts Ave. NW., Washington, DC 20001. Internet: <http://www.ua.org>

For more information about training programs for pipelayers, plumbers, pipefitters, and steamfitters, contact:

- Associated Builders and Contractors, Workforce Development Department, 4250 North Fairfax Dr., 9th Floor, Arlington, VA 22203. Internet: <http://www.trytools.org>
- Home Builders Institute, National Association of Home Builders, 1201 15th St.NW., Washington, DC 20005.

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

For general information about the work of pipelayers, plumbers, and pipefitters, contact:

➤ Mechanical Contractors Association of America, 1385 Piccard Dr., Rockville, MD 20850. Internet: <http://www.mcaa.org>

➤ National Center for Construction Education and Research, 3600 NW 43rd St., Bldg. G, Gainesville, FL 32606.

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

➤ Plumbing-Heating-Cooling Contractors—National Association, 180 S. Washington St, Falls Church, VA 22040.

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

For general information about the work of sprinklerfitters, contact:

➤ American Fire Sprinkler Association, Inc., 12750 Merit Dr., Suite 350 Dallas, TX 75251.

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

➤ National Fire Sprinkler Association, 40 Jon Barrett Rd., Patterson, NY 12563. Internet: <http://www.nfsa.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,” in print at many libraries and career centers and online at: <http://www.bls.gov/opub/ooq/2002/summer/art01.pdf>