

industries that have extensive installations for power, heating, and cooling. Most worked in urban areas. In less populated areas, carpenters, heating and air-conditioning installers, or drywall installers may do insulation work.

Training, Other Qualifications, and Advancement

Most insulation workers learn their trade informally on the job, although some workers complete formal apprenticeship programs. For entry jobs, insulation contractors prefer high school graduates who are in good physical condition and licensed to drive. High school courses in blueprint reading, shop math, science, sheet-metal layout, woodworking, and general construction provide a helpful background. Applicants seeking apprenticeship positions must have a high school diploma or its equivalent, and be at least 18 years old.

Trainees who learn on the job receive instruction and supervision from experienced insulation workers. Trainees begin with simple tasks, such as carrying insulation or holding material while it is fastened in place. On-the-job training can take up to 2 years, depending on the nature of the work. Learning to install insulation in homes generally requires less training than does insulation application in commercial and industrial settings. As they gain experience, trainees receive less supervision, more responsibility, and higher pay.

In contrast, trainees in formal apprenticeship programs receive in-depth instruction in all phases of insulation. Apprenticeship programs may be provided by a joint committee of local insulation contractors and the local union of the International Association of Heat and Frost Insulators and Asbestos Workers, to which many insulation workers belong. Programs normally consist of 4 years of on-the-job training coupled with classroom instruction, and trainees must pass practical and written tests to demonstrate knowledge of the trade.

Skilled insulation workers may advance to supervisor, shop superintendent, or insulation contract estimator, or they may set up their own insulation business.

Job Outlook

Job opportunities are expected to be excellent for insulation workers, largely due to the numerous openings arising each year as experienced insulation workers move to other occupations. Because there are no strict training requirements for entry, many people with limited skills work as insulation workers for a short time and then move on to other types of work, creating many job openings. Other opportunities will arise from the need to replace workers who leave the labor force. In addition, many potential workers may prefer work that is less strenuous and has more comfortable working conditions. Well-trained workers will have especially favorable opportunities.

In addition to replacement needs, new jobs will arise as employment of insulation workers increases about as fast as the average for all occupations through the year 2010 as a result of growth in residential and nonresidential construction. Demand for insulation workers will be spurred by the continuing concerns about the efficient use of energy to heat and cool buildings, resulting in increased demand for insulation workers in the construction of new residential, industrial, and commercial buildings. In addition, renovation and efforts to improve insulation in existing structures also will increase demand.

Insulation workers in the construction industry may experience periods of unemployment because of the short duration of many construction projects and the cyclical nature of construction activity. Workers employed in industrial plants generally have more stable employment because maintenance and repair must be done on a continuing basis. Most insulation is applied after buildings

are enclosed, so weather conditions have less effect on the employment of insulation workers than on that of some other construction occupations.

Earnings

In 2000, median hourly earnings of insulation workers were \$13.05. The middle 50 percent earned between \$9.99 and \$17.00. The lowest 10 percent earned less than \$7.96, and the highest 10 percent earned more than \$24.75. Median hourly earnings in the industries employing the largest numbers of insulation workers in 2000 are shown below:

Miscellaneous special trade contractors	\$13.91
Masonry, stonework, and plastering	12.24

Union workers tend to earn more than nonunion workers. Apprentices start at about one-half of the journeyworker's wage. Insulation workers doing commercial and industrial work earn substantially more than those working in residential construction, which does not require as much skill.

Related Occupations

Insulation workers combine their knowledge of insulation materials with the skills of cutting, fitting, and installing materials. Workers in occupations involving similar skills include carpenters; carpet, floor, and tile installers and finishers; drywall installers, ceiling tile installers, and tapers; roofers; and sheet metal workers.

Sources of Additional Information

For information about training programs or other work opportunities in this trade, contact a local insulation contractor, a local chapter of the International Association of Heat and Frost Insulators and Asbestos Workers, the nearest office of the State employment service or apprenticeship agency, or:

- ▶ International Association of Heat and Frost Insulators and Asbestos Workers, 1776 Massachusetts Ave. NW., Suite 301, Washington, DC 20036. Internet: <http://www.insulators.org>
- ▶ National Insulation and Abatement Contractors Association, 99 Canal Center Plaza, Suite 222, Alexandria, VA 22314.
- ▶ Insulation Contractors Association of America, 1321 Duke St., Suite 303, Alexandria, VA 22314.

Painters and Paperhangers

(O*NET 47-2141.00, 47-2142.00)

Significant Points

- Working conditions can be hazardous.
- Most workers learn informally on the job as helpers; however, training authorities recommend completion of an apprenticeship program.
- Due to worker turnover, employment prospects should be good.

Nature of the Work

Paint and wall coverings make surfaces clean, attractive, and bright. In addition, paints and other sealers protect outside walls from wear caused by exposure to the weather. Although some people do both painting and paperhanging, each requires different skills.

Painters apply paint, stain, varnish, and other finishes to buildings and other structures. They choose the right paint or finish for the surface to be covered, taking into account durability, ease of

handling, method of application, and customers' wishes. Painters first prepare the surfaces to be covered, so that the paint will adhere properly. This may require removing the old coat of paint by stripping, sanding, wire brushing, burning, or water and abrasive blasting. Painters also wash walls and trim to remove dirt and grease, fill nail holes and cracks, sandpaper rough spots, and brush off dust. On new surfaces, they apply a primer or sealer to prepare the surface for the finish coat. Painters also mix paints and match colors, relying on knowledge of paint composition and color harmony. In large paint shops or hardware stores, these functions are automated.

There are several ways to apply paint and similar coverings. Painters must be able to choose the right paint applicator for each job, depending on the surface to be covered, the characteristics of the finish, and other factors. Some jobs need only a good bristle brush with a soft, tapered edge; others require a dip or fountain pressure roller; still others can best be done using a paint sprayer. Many jobs need several types of applicators. The right tools for each job not only expedite the painter's work but also produce the most attractive surface.

When working on tall buildings, painters erect scaffolding, including "swing stages," scaffolds suspended by ropes, or cables attached to roof hooks. When painting steeples and other conical structures, they use a bosun's chair, a swing-like device.

Paperhangers cover walls and ceilings with decorative wall coverings made of paper, vinyl, or fabric. They first prepare the surface to be covered by applying "sizing," which seals the surface



Painting and paperhangers require considerable stamina while bending, stooping, and climbing.

and makes the covering stick better. When redecorating, they may first remove the old covering by soaking, steaming, or applying solvents. When necessary, they patch holes and take care of other imperfections before hanging the new wall covering.

After the surface has been prepared, paperhangers must prepare the paste or other adhesive. Then, they measure the area to be covered, check the covering for flaws, cut the covering into strips of the proper size, and closely examine the pattern to match it when the strips are hung.

The next step is to brush or roll the adhesive onto the back of the covering and to then place the strips on the wall or ceiling, making sure the pattern is matched, the strips are hung straight, and the edges are butted together to make tight, closed seams. Finally, paperhangers smooth the strips to remove bubbles and wrinkles, trim the top and bottom with a razor knife, and wipe off any excess adhesive.

Working Conditions

Most painters and paperhangers work 40 hours a week or less; about 1 out of 10 works part time. Painters and paperhangers must stand for long periods. Their jobs also require a considerable amount of climbing and bending. These workers must have stamina, because much of the work is done with their arms raised overhead. Painters often work outdoors but seldom in wet, cold, or inclement weather.

Painters and paperhangers risk injury from slips or falls off ladders and scaffolds. They sometimes may work with materials that can be hazardous if masks are not worn or if ventilation is poor. Some painting jobs can leave a worker covered with paint.

Employment

Painters and paperhangers held about 518,000 jobs in 2000; most were painters. More than 1 out of every 3 painters and paperhangers work for contractors engaged in new construction, repair, restoration, or remodeling work. In addition, organizations that own or manage large buildings—such as apartment complexes—employ maintenance painters, as do some schools, hospitals, factories, and government agencies.

Self-employed painting contractors accounted for 47 percent of all painters and paperhangers. This is significantly greater than the corresponding proportion of building trades workers in general.

Training, Other Qualifications, and Advancement

Painting and paperhanging are learned through apprenticeship or informal, on-the-job instruction. Although training authorities recommend completion of an apprenticeship program as the best way to become a painter or paperhanger, most painters learn the trade informally on the job as a helper to an experienced painter. Few opportunities for informal training exist for paperhangers because few paperhangers have a need for helpers.

The apprenticeship for painters and paperhangers consists of 3 to 4 years of on-the-job training, in addition to 144 hours of related classroom instruction each year. Apprentices receive instruction in color harmony, use and care of tools and equipment, surface preparation, application techniques, paint mixing and matching, characteristics of different finishes, blueprint reading, wood finishing, and safety.

Whether a painter learns the trade through a formal apprenticeship or informally as a helper, on-the-job instruction covers similar skill areas. Under the direction of experienced workers, trainees carry supplies, erect scaffolds, and do simple painting and surface preparation tasks while they learn about paint and painting equipment. As they gain experience, trainees learn to prepare surfaces for painting and paperhanging, to mix paints, and to apply paint

and wall coverings efficiently and neatly. Near the end of their training, they may learn decorating concepts, color coordination, and cost-estimating techniques. In addition to learning craft skills, painters must become familiar with safety and health regulations so that their work is in compliance with the law.

Apprentices or helpers generally must be at least 16 years old and in good physical condition. A high school education or its equivalent, with courses in mathematics, usually is required to enter an apprenticeship program. Applicants should have good manual dexterity and color sense.

Painters and paperhangers may advance to supervisory or estimating jobs with painting and decorating contractors. Many establish their own painting and decorating businesses.

Job Outlook

Job prospects should be good, as thousands of painters and paperhangers transfer to other occupations or leave the labor force each year. Because there are no strict training requirements for entry, many people with limited skills work as painters or paperhangers for a short time and then move on to other types of work. Many fewer openings will occur for paperhangers because the number of these jobs is comparatively small.

In addition to the need to replace experienced workers, new jobs will be created. Employment of painters and paperhangers is expected to grow about as fast as the average for all occupations through the year 2010, reflecting increases in the level of new construction and in the stock of buildings and other structures that require maintenance and renovation. Painting is very labor-intensive and not suitable to the kinds of technological changes that might make workers more productive and thus restrict employment growth.

Jobseekers considering these occupations should expect some periods of unemployment, especially until they become fully skilled. Many construction projects are of short duration, and construction activity is cyclical and seasonal in nature. Remodeling, restoration, and maintenance projects, however, often provide many jobs for painters and paperhangers even when new construction activity declines. The most versatile painters and skilled paperhangers generally are best able to keep working steadily during downturns in the economy.

Earnings

In 2000, median hourly earnings of painters, construction and maintenance, were \$13.10. The middle 50 percent earned between \$10.36 and \$16.81. The lowest 10 percent earned less than \$8.56, and the highest 10 percent earned more than \$22.39. Median hourly earnings in the industries employing the largest numbers of painters in 2000 are shown below:

Painting and paper hanging	\$13.03
Residential building construction	12.79
Real estate operators and lessors	10.95
Real estate agents and managers	10.77
Personnel supply services	10.63

In 2000, median earnings for paperhangers were 15.33. The middle 50 percent earned between \$10.89 and \$19.91. The lowest 10 percent earned less than \$8.04, and the highest 10 percent earned more than \$24.16. Earnings for painters may be reduced on occasion because of bad weather and the short-term nature of many construction jobs. Hourly wage rates for apprentices usually start at 40 to 50 percent of the rate for experienced workers and increase periodically.

Some painters and paperhangers are members of the International Brotherhood of Painters and Allied Trades. Some maintenance painters are members of other unions.

Related Occupations

Painters and paperhangers apply various coverings to decorate and protect wood, drywall, metal, and other surfaces. Other construction occupations in which workers do finishing work include carpenters; carpet, floor, and tile installers and finishers; drywall installers, ceiling tile installers, and tapers; and plasterers and stucco masons.

Sources of Additional Information

For details about painting and paperhanging apprenticeships or work opportunities, contact local painting and decorating contractors, a local of the International Brotherhood of Painters and Allied Trades, a local joint union-management apprenticeship committee, or an office of the State apprenticeship agency or employment service.

For general information about the work of painters and paperhangers, contact:

► International Brotherhood of Painters and Allied Trades, 1750 New York Ave. NW., Washington, DC 20006.

For information on training programs, contact:

► Associated Builders and Contractors, 1300 N. 17th St., Arlington, VA 22209. Internet: <http://www.abc.org>

► Painting and Decorating Contractors of America, 3913 Old Lee Highway, Suite 33B, Fairfax, VA, 22030.

Pipelayers, Plumbers, Pipefitters, and Steamfitters

(O*NET 47-2151.00, 47-2152.01, 47-2152.02, 47-2152.03)

Significant Points

- Job opportunities should be excellent because not enough people are seeking training.
- Most workers learn the trade through 4 or 5 years of formal apprenticeship training.
- Pipelayers, plumbers, pipefitters, and steamfitters make up one of the largest and highest paid construction occupations.

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 supply air-conditioning. 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.

Although pipelaying, plumbing, pipefitting, and steamfitting sometimes are considered a single trade, workers generally specialize in one of the four 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. *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- and low-pressure pipe systems used in