



PLUMBING TECHNOLOGY/ PLUMBER CIP Code 46.0503

Introduction

Most people are familiar with plumbers who come to their home to unclog a drain or fix a leaking toilet. Plumbers, pipelayers, pipefitters, and steamfitters install, maintain, and repair many different types of pipe systems. Some of these dispose of waste, supply gas to stoves and furnaces, or provide for heating and cooling needs. Pipes 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 plumbing, pipelaying, pipefitting, and steamfitting are sometimes considered a single trade, this Program of Study will focus on specific segments of the trade. 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, waste disposers, and water heaters. They may lay clay, concrete, plastic, or cast-iron pipe for drains, sewers, water mains, and oil or gas lines. Before laying the pipe, plumbers may 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 can 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.

Plumbers 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, by contrast, are made of large cast-iron pipes; installation normally requires crews of pipefitters. Despite these differences, all plumbers 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. When plumbers working construction install piping in a new house, 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. First they 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. With 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 the 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.

Assumptions of This Program of Study

Students will demonstrate the ability to:

- Measure, cut, thread, and bend pipe to required angle, using hand and power tools or machines such as pipe cutters, pipe-threading machines, and pipe-bending machines.
- Study building plans and inspect structures to assess material and equipment needs, to establish the sequence of pipe installations, and to plan installation around obstructions such as electrical wiring.
- Locate and mark the position of pipe installations, connections, passage holes, and fixtures in structures, using measuring instruments such as rulers and levels.
- Fill pipes or plumbing fixtures with water or air and observe pressure gauges to detect and locate leaks.
- Assemble pipe sections, tubing and fittings, using couplings, clamps, screws, bolts, cement, plastic solvent, caulking, or soldering, brazing and welding equipment.
- Install pipe assemblies, fittings, valves, appliances such as dishwashers and water heaters, and fixtures such as sinks and toilets, using hand and power tools.
- Direct workers engaged in pipe cutting and preassembly and installation of plumbing systems and components.
- Cut openings in structures to accommodate pipes and pipe fittings, using hand and power tools.
- Review blueprints and building codes and specifications to determine work details and procedures.
- Install underground storm, sanitary and water piping systems and extend piping to connect fixtures and plumbing to these systems.

High-quality programs should meet the following standards:

- Promote **positive working relationships**
- Implement a **curriculum** that fosters all areas of skill development
- Use **appropriate and effective teaching approaches**
- Provide **ongoing assessments** of student progress
- Employ and support qualified **teaching staff**
- Establish and maintain relationships and use resources of the **community**
- Provide a safe and healthy learning **environments**
- Implement strong program organization and supervision policies that result in **high-quality teaching and learning**
- Integrate academic skills and aptitudes necessary for postsecondary education, gainful employment and a foundation of **lifelong learning**

CIP Code

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A program that prepares individuals to practice as licensed plumbers by applying technical knowledge, safety and skills to lay out, assemble, install and maintain plumbing fixtures and systems for steam, natural gas, oil, hot water, heating, cooling, drainage, lubricating, sprinkling and industrial processing systems in home and business environments. Includes instruction in source determination, water distribution, waste removal, pressure adjustment, basic physics, technical mathematics, blueprint reading, pipe installation, pumps, brazing and soldering, plumbing inspection and applicable codes and standards.

For more information, contact:

Dr. Jay Brown
Bureau of Career and Technical Education
PA Department of Education
333 Market Street, 11th Floor
Harrisburg, PA 17126-0333
Phone: 717-783-6991
Fax: 717-783-6672
TTY: 717-783-7445
jobrown@state.pa.us