



8878

INSTALLATION OF
PLUMBING AND PIPING
SYSTEMS I (11B)

30S/30E/30M

A Plumbing and Pipe Trades Course

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Course Description

A student wanting to develop skills in plumbing and the pipe trades must have knowledge of the basic principles of supporting and installing a piping system. The student will be able to describe, draw out, and demonstrate the ability to install plumbing and piping systems. The student will develop an understanding of the principles of grade and drainage and be able to apply those principles to diagnose plumbing and piping defects.

Goal 1: Describe and apply **health and safety** practices.

GLO 1.1: Describe and apply health and safety practices.

SLO 11B.1.1.1 Demonstrate an understanding of, and adherence to, health and safety practices.

GLO 1.2: Demonstrate an understanding of the ***Trade Safety Awareness Curriculum for Level 1 Apprentices***.

No applicable SLOs.

Goal 2: Demonstrate the **use and management of equipment, tools, and materials**, including those used in **fuel brazing and cutting**.

GLO 2.1: Demonstrate the **use and management of equipment and tools**.

SLO 11B.2.1.1 Describe the selection, use, and maintenance of steel welding tools and equipment. (A2a.11)

SLO 11B.2.1.2 Demonstrate basic techniques for the selection, use, and maintenance of steel welding tools and equipment. (A2a.12)

GLO 2.2: Demonstrate the use and management of **fuel brazing and cutting equipment and tools.**

- SLO 11B.2.2.1 Define terminology associated with fuel brazing and cutting. (A2d.1)
 - SLO 11B.2.2.2 Identify hazards and describe safe work practices pertaining to fuel brazing and cutting. (A2d.2)
 - personal
 - workplace
 - SLO 11B.2.2.3 Interpret codes and regulations pertaining to fuel brazing and cutting. (A2d.3)
 - SLO 11B.2.2.4 Identify types of fuel brazing and cutting equipment, and describe their components and applications. (A2d.4)
 - air-propane
 - air-acetylene
 - oxy-propane
 - oxy-acetylene
 - SLO 11B.2.2.5 Identify fuel brazing and cutting equipment accessories, and describe their applications and procedures for use. (A2d.5)
 - SLO 11B.2.2.6 Describe the procedures used to set up, adjust, and shut down fuel cutting and brazing equipment. (A2d.6)
 - SLO 11B.2.2.7 Describe the procedures used to cut materials using fuel cutting equipment. (A2d.7)
 - SLO 11B.2.2.8 Identify cutting faults and describe the procedures to prevent and correct them. (A2d.8)
 - SLO 11B.2.2.9 Describe the procedures used to braze materials using fuel brazing equipment. (A2d.9)
 - SLO 11B.2.2.10 Describe the procedures used to inspect and maintain fuel cutting and brazing equipment. (A2d.10)
 - SLO 11B.2.2.11 Describe the procedures used to transport and store fuel cutting and brazing equipment. (A2d.11)
 - SLO 11B.2.2.12 Demonstrate the procedures used to cut and braze materials using fuel brazing and cutting equipment. (A2d.12)
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Goal 3: Demonstrate an understanding of the **properties and applications** of various types of **piping and tubing**.

GLO 3.1: Demonstrate an understanding of the **properties and applications** of **piping and tubing**.

SLO 11B.3.1.1 Demonstrate pipe, tube, and tubing applications.
(Fundamentals Practical A6a.1)

GLO 3.2: Demonstrate an understanding of the **properties and applications** of **plastic piping**.

SLO 11B.3.2.1 Demonstrate the procedures used to measure, cut, and join plastic piping. (Plastic Practical A6a.1)

GLO 3.3: Demonstrate an understanding of the **properties and applications** of **copper tubes and tubing**.

SLO 11B.3.3.1 Demonstrate the procedures used to measure, cut, and join copper tubes and tubing. (Copper Practical A6a.1)

GLO 3.4: Demonstrate an understanding of the **properties and applications** of **steel piping**.

SLO 11B.3.4.1 Demonstrate the procedures used to measure, cut, and join steel piping. (Steel Practical A6a.1)

GLO 3.5: Demonstrate an understanding of the **properties and applications** of **cast iron piping**.

SLO 11B.3.5.1 Demonstrate the procedures used to measure, cut, and join cast iron. (Cast Practical A6a.1)

GLO 3.6: Demonstrate an understanding of the **properties and applications** of **glass piping**.

No applicable SLOs.

GLO 3.7: Demonstrate an understanding of the **properties and applications** of **asbestos-cement piping**.

SLO 11B.3.7.1 Define terminology associated with asbestos-cement.
(A5aAsbestos.1)

SLO 11B.3.7.2 Identify hazards and describe safe work practices pertaining to asbestos-cement piping. (A5aAsbestos.2)

SLO 11B.3.7.3 Interpret codes and regulations pertaining to asbestos-cement piping. (A5aAsbestos.3)

- SLO 11B.3.74 Interpret information pertaining to asbestos-cement piping found on drawings and specifications. (A5aAsbestos.4)
- SLO 11B.3.75 Describe the identification systems and methods for asbestos-cement piping. (A5aAsbestos.5)
- SLO 11B.3.76 Identify tools and equipment related to asbestos-cement piping, and describe their applications and procedures for use. (A5aAsbestos.6)
- SLO 11B.3.77 Identify asbestos-cement piping systems and describe their characteristics and applications. (A5aAsbestos.7)
- SLO 11B.3.78 Identify types of asbestos-cement piping and describe their properties and characteristics. (A5aAsbestos.8)
- SLO 11B.3.79 Identify fittings used with asbestos-cement piping and describe their purpose and applications. (A5aAsbestos.9)
- SLO 11B.3.710 Identify asbestos-cement piping accessories and describe their purpose and applications. (A5aAsbestos.10)
- supports
 - hangers
 - sleeves
- SLO 11B.3.711 Explain the systems of measurement for asbestos-cement piping. (A5aAsbestos.11)
- dimension
 - length
 - wall thickness/schedule
- SLO 11B.3.712 Describe the procedures used to measure asbestos-cement piping. (A5aAsbestos.12)
- SLO 11B.3.713 Perform calculations to determine asbestos-cement piping measurements. (A5aAsbestos.13)
- run and branch
 - fitting allowances
 - offsets
- SLO 11B.3.714 Describe the procedures used to inspect asbestos-cement piping. (A5aAsbestos.14)
- SLO 11B.3.715 Identify the methods used to cut asbestos-cement piping and describe their associated procedures. (A5aAsbestos.15)

- SLO 11B.3.7.16 Identify the methods used to join asbestos-cement piping and describe their associated procedures. (A5aAsbestos.16)
- mechanical joints
 - hub and spigot
- SLO 11B.3.7.17 Describe the procedures used to install fittings and accessories for asbestos-cement piping. (A5aAsbestos.17)
- SLO 11B.3.7.18 Describe the procedures used to measure asbestos-cement piping. (A5aAsbestos.18)
- SLO 11B.3.7.19 Describe the procedures used to cut asbestos-cement piping. (A5aAsbestos.19)
- SLO 11B.3.7.20 Describe the procedures used to join asbestos-cement piping. (A5aAsbestos.20)
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Goal 4: Demonstrate an understanding of the **properties and applications of various materials (other than piping and tubing)** used in plumbing and the pipe trades.

GLO 4.1: Demonstrate an understanding the **properties and applications of various materials (other than piping and tubing)** used in plumbing and the pipe trades.

No applicable SLOs.

Goal 5: Demonstrate an understanding of the **design and layout of piping systems.**

GLO 5.1: Demonstrate an understanding of the **design and layout of piping systems.**

- SLO 11B.5.1.1 Identify types of symbols and describe their characteristics and applications. (A3c.4)
- SLO 11B.5.1.2 Identify construction/project related documents and describe their applications. (A3c.5)
- change orders
 - addendums
 - as-builts
 - specifications
- SLO 11B.5.1.3 Identify drawing projections and views, and describe their applications. (A3c.6)
- projections (orthographic, oblique, isometric)
 - views (plan, section, detail, elevation, cross section)
- SLO 11B.5.1.4 Describe the use of scales. (A3c.7)
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- SLO 11B.5.1.5 Describe the procedures used for the care, handling, and storage of drawings. (A3c.8)
- SLO 11B.5.1.6 Describe plumber and gas layout drawings. (A3c.9)
- SLO 11B.5.1.7 Interpret information on drawings. (A3c.10)
- lines
 - legend
 - symbols and abbreviations
 - noted and specifications
 - schedules
 - scales
- SLO 11B.5.1.8 Demonstrate the procedures used for the care, handling, and storage of drawings. (A3c.11)
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Goal 6: Demonstrate an understanding of the **joining, fabrication, and installation** of piping systems, including **hoisting, lifting, and rigging, and access equipment.**

GLO 6.1: Demonstrate an understanding of the **joining and fabrication** of piping systems.

No applicable SLOs.

GLO 6.2: Demonstrate an understanding of the **installation** of piping systems.

No applicable SLOs.

GLO 6.3: Demonstrate an understanding of **hoisting, lifting, and rigging.**

- SLO 11B.6.3.1 Define terminology associated with hoisting, lifting, and rigging. (A2b.1)
- SLO 11B.6.3.2 Identify hazards and describe safe work practices pertaining to hoisting, lifting, and rigging. (A2b.2)
- SLO 11B.6.3.3 Identify codes and regulations pertaining to hoisting, lifting, and rigging. (A2b.3)
- SLO 11B.6.3.4 Identify types of rigging equipment and accessories, and describe their limitations, applications, and procedures for use. (A2b.4)
- SLO 11B.6.3.5 Identify types of hoisting and lifting equipment and accessories, and describe their applications and procedures for use. (A2b.5)
- SLO 11B.6.3.6 Describe the procedures used to inspect, maintain, and store hoisting, lifting, and rigging equipment. (A2b.6)

- SLO 11B.6.3.7 Identify types of knots, hitches, and bends, and describe their applications and the procedures used to tie them. (A2b.7)
- SLO 11B.6.3.8 Describe the procedures used to rig material/equipment for lifting. (A2b.8)
- SLO 11B.6.3.9 Describe the procedures used to ensure the work area is safe for lifting. (A2b.9)
- supervision of lift
 - securing work area
 - communication
- SLO 11B.6.3.10 Identify and describe procedures used to communicate during hoisting, lifting, and rigging operations. (A2b.10)
- hand signals
 - electronic communications
 - audible/visual
- SLO 11B.6.3.11 Explain sling angle when preparing for hoisting and lifting operations. (A2b.11)
- SLO 11B.6.3.12 Identify the factors to consider when selecting rigging equipment. (A2b.12)
- load characteristics
 - environment
 - safety factor
- SLO 11B.6.3.13 Describe the procedures used for attaching rigging equipment to the load. (A2b.13)
- SLO 11B.6.3.14 Describe the procedures used to perform a lift. (A2b.14)
- load determination
 - communication methods
 - pre-lift checks
 - placement of load
 - post-lift inspection
- SLO 11B.6.3.15 Demonstrate the procedures used to perform hoisting and lifting operations. (A2b.15)
- SLO 11B.6.3.16 Demonstrate calculations required when performing hoisting and lifting operations. (A2b.16)
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GLO 6.4: Demonstrate an understanding of **access equipment**.

- SLO 11B.6.4.1 Define terminology associated with ladders, scaffolding, and hydraulic lifts. (A2c.1)
- SLO 11B.6.4.2 Identify hazards and describe safe work practices pertaining to ladders, scaffolding, and hydraulic lifts. (A2c.2)
- SLO 11B.6.4.3 Identify codes and regulations pertaining to ladders, scaffolding, and hydraulic lifts. (A2c.3)
- SLO 11B.6.4.4 Identify types of ladders, scaffolding, and hydraulic lifts, and describe their characteristics and applications. (A2c.4)
- SLO 11B.6.4.5 Describe the procedures used to erect and dismantle ladders and scaffolding. (A2c.5)
- SLO 11B.6.4.6 Describe the procedures used to inspect, maintain, and store ladders, scaffolding, and hydraulic lifts. (A2c.6)
- SLO 11B.6.4.7 Demonstrate procedures on the use of ladders, scaffolding, and hydraulic lifts, their applications, and their limitations. (A2c.7)

Goal 7: Demonstrate an understanding of the **documentation and testing** of piping systems.

No applicable SLOs.

Goal 8: Describe and demonstrate the transferable **cross-curricular** knowledge and skills as they pertain to plumbing and the pipe trades.

GLO 8.1: Read, interpret, and communicate **information**.

No applicable SLOs.

GLO 8.2: Apply knowledge and skills from **mathematics**.

No applicable SLOs.

GLO 8.3: Apply knowledge and skills from the **sciences**.

No applicable SLOs.

GLO 8.4: Apply knowledge and skills from **information and communication technology**.

No applicable SLOs.

Goal 9: Demonstrate an understanding of the **structure and scope** of plumbing and the pipe trades.

GLO 9.1: Demonstrate an understanding of the **structure and scope of plumbing and the pipe trades, as well as associated occupations.**

No applicable SLOs.

GLO 9.2: Demonstrate an understanding of **training and employment opportunities** in plumbing and the pipe trades, as well as in associated occupations.

SLO 11B.9.2.1 Demonstrate an awareness of training opportunities available to tradespeople.

Goal 10: Demonstrate an awareness of **sustainability** as it pertains to plumbing and the pipe trades.

GLO 10.1: Describe the impact of **human sustainability** on the health and well-being of plumbers, tradespersons working in the pipe trades, and those who use the systems they construct.

SLO 11B.10.1.1 Demonstrate an awareness of the sustainable factors that influence human health and well-being for plumbers and pipe trade workers.

SLO 11B.10.1.2 Demonstrate an awareness of the long-term health concerns related to plumbing and the pipe trades.

SLO 11B.10.1.3 Demonstrate an awareness of the sustainability of plumbers' working conditions; explain working hours, out-of-town travel, and shift work.

SLO 11B.10.1.4 Demonstrate an awareness of the sustainability of plumbers' working conditions; explain working hours, out-of-town travel, and shift work.

GLO 10.2: Describe plumbing and the pipe trades' **sustainability practices and impact on the environment.**

SLO 11B.10.2.1 Demonstrate an awareness of the importance of designing piping systems in order to minimize the amount of material used.

GLO 10.3: Describe **sustainable business practices** within plumbing and the pipe trades.

SLO 11B.10.3.1 Demonstrate an awareness of the types of employers who hire plumbers and pipe trade workers.

Goal 11: Demonstrate an awareness of the **ethical and legal standards, including codes**, as they pertain to plumbing and the pipe trades.

GLO 11.1: Demonstrate an understanding of **ethical and legal standards**.

- SLO 11B.11.1.1 Exhibit positive ethics by demonstrating quality workmanship.
- SLO 11B.11.1.2 Demonstrate an awareness of ethical concerns as they relate to job-site safety.
- SLO 11B.11.1.3 Demonstrate an understanding of all applicable codes and regulations.

Goal 12: Demonstrate **employability skills**.

GLO 12.1: Demonstrate fundamental **employability skills**.

- SLO 11B.12.1.1 Demonstrate regular and punctual attendance.
- SLO 11B.12.1.2 Communicate respectfully and effectively with teachers, supervisors, co-workers, and students.
- SLO 11B.12.1.3 Demonstrate problem-solving skills.
- SLO 11B.12.1.4 Demonstrate critical-thinking skills.
- SLO 11B.12.1.5 Demonstrate the ability to accept and follow direction and feedback.
- SLO 11B.12.1.6 Demonstrate teamwork skills.

GLO 12.2: Demonstrate an understanding of the **business operations** of a plumbing and pipe trades organization.

- SLO 11B.12.2.1 Demonstrate an awareness of the effects of inefficient work habits.

Goal 13: Demonstrate an awareness of the **history, technological progression, and emerging trends** in plumbing and the pipe trades.

GLO 13.1: Demonstrate an awareness of the **history, technological progression, and emerging trends** in plumbing and the pipe trades.

- SLO 11B.13.1.1 Demonstrate an awareness of the history, technological progression, and emerging trends in plumbing and piping systems and their installation.
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