



8985

APPLIED PLUMBING AND  
PIPING SYSTEMS (12D)

40S/40E/40M

A Plumbing and Pipe Trades Course



# 8985 APPLIED PLUMBING AND PIPING SYSTEMS 40S/40E/40M

## Course Description

A student wanting to extend skills in plumbing and the pipe trades must be able to demonstrate the installation and selection of the appropriate fixtures. The student will be able to diagnose and correct plumbing and piping defects. The student will be able to use the newest techniques available and implement them wherever they are practical.

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

#### **GLO 1.1:** Describe and apply health and safety practices.

- SLO 12D.1.1.1 Demonstrate an understanding of, and adherence to, health and safety practices.
- SLO 12D.1.1.2 Discuss implications of asbestos cement pipe and fittings. (A1a.11)
- describe what asbestos is, and why it has been used so much
  - describe the potential health hazards associated with asbestos
  - identify typical products and materials that contain asbestos
  - describe proper precautions and work practices when working around asbestos
  - describe how to recognize asbestos hazards due to damage or deterioration
  - describe appropriate response to an asbestos fiber release
  - describe what Workplace Safety and Health regulations, guidelines, and bulletins apply to workers who work with or work around asbestos and what aspects of those regulations, guidelines, and bulletins affect you or your company

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

No applicable SLOs.

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**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 12D.2.1.1 Apply knowledge and skills related to the safe and appropriate cleaning, maintenance, and management of plumbing tools and equipment.

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

No applicable SLOs.

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**Goal 3:** Demonstrate an understanding of the **properties and applications** of various types of **pipng and tubing**.

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

No applicable SLOs.

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

No applicable SLOs.

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

No applicable SLOs.

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

No applicable SLOs.

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

No applicable SLOs.

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

No applicable SLOs.

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

No applicable SLOs.

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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.

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**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 12D.5.1.1 Demonstrate the knowledge, skills, and attitudes required to lay out piping systems.

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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.

SLO 12D.6.1.1 Demonstrate the knowledge, skills, and attitudes to fabricate piping systems.

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

No applicable SLOs.

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

No applicable SLOs.

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**GLO 6.4:** Demonstrate an understanding of **access equipment**.

No applicable SLOs.

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

**GLO 7.1:** Demonstrate an understanding of the **documentation and testing** of piping systems.

SLO 12D.7.1.1 Document and test piping systems.

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**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**.

SLO 12D.8.1.1 Demonstrate the knowledge, skills, and attitudes to read, interpret, and communicate information used in plumbing and the pipe trades (i.e., technical information, technical manuals, permits, codes and regulations, bills of lading, invoices, manufacturers' directions, and specifications).

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

SLO 12D.8.1.1 Demonstrate the ability to apply knowledge and skills from mathematics in the layout, joining, and fabrication of plumbing systems.

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

SLO 12D.8.3.1 Demonstrate the ability to apply knowledge and skills required in the layout, joining, and fabrication of piping systems.

SLO 12D.8.3.2 Define terminology associated with electricity as related to the trade. (A9a.1)

SLO 12D.8.3.3 Identify hazards and describe safe work practices pertaining to electricity. (A9a.2)

SLO 12D.8.3.4 Interpret electrical-related information found on drawings and specifications. (A9a.3)

SLO 12D.8.3.5 Identify tools and equipment used to test electrical circuits, and describe their applications and procedures for use. (A9a.4)

SLO 12D.8.3.6 Explain Ohm's law and describe its applications and associated calculations. (A9a.5)

SLO 12D.8.3.7 Identify types of current, and describe their characteristics and applications. (A9a.6)

- SLO 12D.8.3.8 Identify types of electrical circuits, and describe their characteristics, operation, and applications. (A9a.7)
- identify and explain electron theory
  - identify and explain basic series circuits
  - identify and explain parallel circuit
  - identify and explain mill voltage
  - identify and explain 24 volt circuit
  - identify and explain 110 volt circuit
  - identify and explain open and closed circuits (controls)
  - identify and explain relay circuit
  - identify and explain voltage drops in circuit
- SLO 12D.8.3.9 Identify and demonstrate types of electrical equipment and components, and describe their characteristics, operation, and applications. (A9a.8)
- identify and explain thermopile and thermocouple
  - identify and explain transformer
  - identify and explain thermostats
  - identify and explain safety controls
  - identify and explain connectors and connections
  - identify and explain wire sizes and types
  - identify and explain meters
  - identify and explain Code requirements
  - identify and explain motors

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

No applicable SLOs.

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**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.**

- SLO 12D.9.1.1 Demonstrate an understanding of the regulating bodies that oversee plumbing and the pipe trades.
- SLO 12D.9.1.2 Describe two levels of workplace competency. (A3b.2)
- job competencies related to workplace culture
    - knowledge of workplace equipment and materials
    - skills and techniques
  - social competencies related to workplace culture
    - frame of reference for evaluation workplace events
    - language of work
    - workplace belief systems
    - rules and meanings
    - multiculturalism and equity in the workplace
- SLO 12D.9.1.3 Describe accommodation for apprentices with disabilities. (A3b.3)
- technical training
    - requirements
    - roles and responsibilities
    - services and information required by persons with disabilities
  - on-the-job
    - requirements
    - roles and responsibilities
    - services and information required by persons with disabilities

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

- SLO 12D.9.2.1 Demonstrate an understanding of some of the various training certifications that can increase a plumber's employability (i.e., confined space, first aid, etc.).
- SLO 12D.9.2.2 Demonstrate an understanding of the training programs that are available in plumbing and the pipe trades.



SLO 12D.9.2.3 Demonstrate the knowledge, skills, and attitudes to participate in a job interview.

SLO 12D.9.2.4 Demonstrate the knowledge, skills, and attitudes to create a resumé and portfolio to be used in finding a position in plumbing and the pipe trades, or a related occupation.

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**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 12D.10.1.1 Demonstrate an understanding of the impact of human sustainability on the health and well-being of plumbers, tradespersons working in the pipe trades, and those who use their systems.

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

SLO 12D.10.2.1 Demonstrate an understanding of the sustainability practices and of the environmental impact of plumbing and the pipe trades.

SLO 12D.10.2.2 Demonstrate an awareness of piping systems that incorporate green technology.

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

SLO 12D.10.3.1 Describe sustainable business practices within plumbing and the pipe trades.

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**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 12D.11.1.1 Demonstrate an understanding of codes and regulations related to plumbing and the pipe trades.

SLO 12D.11.1.2 Demonstrate an awareness of the legal requirements related to specialized procedures and testing.

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**GLO 11.2:** Demonstrate an understanding of **gas codes**.

- SLO 12D.11.2.1 Define terminology associated with gas code. (A10a.1)
- SLO 12D.11.2.2 Identify hazards and describe safe work practices pertaining to gas code. (A10a.2)
- SLO 12D.11.2.3 Interpret codes and regulations pertaining to gas. (A10a.3)
- SLO 12D.11.2.4 Interpret information pertaining to gas found on drawings and specifications. (A10a.4)
- SLO 12D.11.2.5 Describe the identification systems and methods for gas. (A10a.5)
- SLO 12D.11.2.6 Identify tools and equipment related to gas, and describe their applications and procedures for use. (A10a.6)
- SLO 12D.11.2.7 Identify gas systems, and describe their characteristics and applications. (A10a.7)
- SLO 12D.11.2.8 Identify types of gas, and describe their properties and characteristics. (A10a.8)
- SLO 12D.11.2.9 Explain the systems of measurement for gas. (A10a.9)
- SLO 12D.11.2.10 Describe the procedures used to install fittings and accessories for steel piping. (A10a.10)

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**Goal 12:** Demonstrate **employability skills**.

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

- SLO 12D.12.1.1 Demonstrate regular and punctual attendance.
  - SLO 12D.12.1.2 Demonstrate critical-thinking and problem-solving skills.
  - SLO 12D.12.1.3 Demonstrate accountability by taking responsibility for their actions.
  - SLO 12D.12.1.4 Demonstrate adaptability, initiative, and effort.
  - SLO 12D.12.1.5 Demonstrate the ability to accept and follow direction and feedback.
  - SLO 12D.12.1.6 Demonstrate teamwork skills.
  - SLO 12D.12.1.7 Demonstrate the ability to stay on task and use time effectively.
  - SLO 12D.12.1.8 Demonstrate the ability to communicate respectfully and effectively with teachers, supervisors, coworkers, and students.
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**GLO 12.2:** Demonstrate an understanding of the **business operations** of a plumbing and pipe trades organization.

SLO 12D.12.2.1 Prepare a material take-off sheet as part of an estimate.

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**GLO 12.3:** Demonstrate critical thinking skills.

SLO 12D.12.3.1 Demonstrate the ability to solve complex, multi-stage problems related to the design, construction, and/or renovation of structures.

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**GLO 12.4:** Demonstrate an understanding of **culture** and its influence in the workplace.

SLO 12D.12.4.1 Demonstrate respectful interactions with individuals of different cultures.

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**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 12D.13.1.1 Demonstrate an awareness of the history, technological progression, and emerging trends in plumbing and the pipe trades.

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