



Western Technical College

10462105 Pipefitting for Maintenance

Course Outcome Summary

Course Information

Description	This course will introduce students to basic pipe fitting skills and knowledge. Topics include standard tools, materials, and fitting techniques used in manufacturing pipefitting applications. Upon completion, students should be able to demonstrate basic pipefitting aptitude.
Career Cluster	Manufacturing
Instructional Level	Associate Degree Courses
Total Credits	3
Total Hours	72

Textbooks

Modern Plumbing – with Lab Workbook. 9th Edition. Copyright 2022. Blankenbaker, E. Keith. Publisher: Goodheart-Wilcox Co. **ISBN-13:** 978-1-64564-671-6. Required.

Success Abilities

1. Cultivate Passion: Enhance Personal Connections
2. Cultivate Passion: Expand a Growth-Mindset
3. Live Responsibly: Embrace Sustainability
4. Refine Professionalism: Participate Collaboratively
5. Refine Professionalism: Practice Effective Communication

Program Outcomes

1. Interpret industrial/engineering drawings.
2. Apply precision measuring for production and inspection.
3. Apply industrial safety standards.
4. Maintain industrial systems.

5. Demonstrate pipe-fitting and plumbing methods.

Course Competencies

1. Interpret a piping schematic.

Assessment Strategies

- 1.1. Project
- 1.2. Skill Demonstration

Criteria

You will know you are successful when

- 1.1. you build project based on the schematic.
- 1.2. you select the piping based on the schematic.
- 1.3. you select the accessories (valves & fittings) based on the schematic.
- 1.4. you verify project adheres to the schematic.
- 1.5. you identify schematic symbols.

Learning Objectives

- 1.a. Identify piping symbols on a schematic.
- 1.b. Identify pipe sizes from the schematic.
- 1.c. Identify proper valves from a schematic.
- 1.d. Identify proper pipes and tubing from a schematic.
- 1.e. Associate a physical layout with its schematic.

2. Examine pipe sizes, materials and schedules.

Assessment Strategies

- 2.1. Written Objective Test
- 2.2. Skill Demonstration

Criteria

You will know you are successful when

- 2.1. you identify pipe type and size.
- 2.2. you identify pipe material.
- 2.3. you identify type of thread.

Learning Objectives

- 2.a. Define pipe.
- 2.b. Identify pipe by size both standard and metric.
- 2.c. Identify different thread types.
- 2.d. Identify pipe materials and their uses.

3. Examine types of pipe fittings.

Assessment Strategies

- 3.1. Written Objective Test
- 3.2. Skill Demonstration

Criteria

You will know you are successful when

- 3.1. you identify a specific fitting.
- 3.2. you identify a specific thread.
- 3.3. you explain the use for a given fitting.

Learning Objectives

- 3.a. Identify different types of fittings including: nipples, unions, elbows, etc.
- 3.b. Explain the difference between straight and tapered thread.
- 3.c. Explain applications for different fittings.
- 3.d. Describe where different types of fittings are used in a system.

4. Examine different types of valves and their related components.

Assessment Strategies

- 4.1. Written Objective Test
- 4.2. Skill Demonstration

Criteria

You will know you are successful when

- 4.1. you use valve nomenclature.
- 4.2. you explain how specific valves work.
- 4.3. you properly lock out / tag out a valve.
- 4.4. you identify a valve by its components.
- 4.5. you select a correct valve for a given application.
- 4.6. you install a valve.

Learning Objectives

- 4.a. Identify and explain the operation of various valves including: globe, gate, ball, plug, check, flow control, etc.
- 4.b. List safety precautions and procedures necessary when working with valves.
- 4.c. Identify valve materials and their applications.
- 4.d. Define and use valve terminology.
- 4.e. Inspect valves.
- 4.f. Select valves for a specific application.

5. Examine different types of tubing and their related components.

Assessment Strategies

- 5.1. Written Objective Test
- 5.2. Skill Demonstration

Criteria

You will know you are successful when

- 5.1. you identify tubing size and type.
- 5.2. you explain how tubing is sized.
- 5.3. you identify tubing material.
- 5.4. you identify tubing connectors.
- 5.5. you identify tubing valves.

Learning Objectives

- 5.a. Identify tubing by use.
- 5.b. Identify tubing by type.
- 5.c. List strength and weaknesses of various tubing types.
- 5.d. Select valves related to tubing for a specific application.

6. Install tubing with fittings.

Assessment Strategies

- 6.1. Skill Demonstration

Criteria

You will know you are successful when

- 6.1. you cut tubing to correct length.
- 6.2. you deburr cut as required.
- 6.3. you make flare to correct angle as required.
- 6.4. you select the correct tool for cutting/deburring/flaring/bending etc.
- 6.5. you verify flare is not cracked and does not stress metal.

Learning Objectives

- 6.a. Explore proper use of cutting/deburring/flaring/bending tools.
- 6.b. Cite the correct flaring angles for tubing type.
- 6.c. Select the proper fittings for a particular type of tube and application.
- 6.d. Cut and deburr tubing.

- 6.e. Flare tubing according to material type.
- 6.f. Assemble tubing and fittings.
- 6.g. Practice tube bending.

7. Layout a piping system.

Assessment Strategies

- 7.1. Written Objective Test
- 7.2. Skill Demonstration

Criteria

You will know you are successful when

- 7.1. you select the correct pipe for an application.
- 7.2. you select the proper joining procedure i.e. threading, weld, etc.
- 7.3. you explain safety procedures for the system.
- 7.4. you create a simple installation schematic.
- 7.5. you selects valves and valve material according to the application.
- 7.6. you include routing and pipe support locations in layout.

Learning Objectives

- 7.a. Match piping material to the fluids and pressure with which it is compatible.
- 7.b. Explain the proper joining process for a specific piping application.
- 7.c. Select the proper valve to use for given quantity and or material.
- 7.d. Identify schematic symbols and their meanings.

8. Install a piping system.

Assessment Strategies

- 8.1. Project
- 8.2. Skill Demonstration

Criteria

You will know you are successful when

- 8.1. you follow safety procedures for piping installation.
- 8.2. you install the correct fittings and elbows.
- 8.3. you verify piping system operates properly as per the layout.
- 8.4. you troubleshoot defects and leaks as necessary.

Learning Objectives

- 8.a. Install pipefitting accessories.
- 8.b. Assemble components as needed.
- 8.c. Assemble tools required for the job.
- 8.d. Explain each safety consideration for a piping system installation.
- 8.e. Explain lockout/tagout safety precautions and procedures necessary for piping system installation.
- 8.f. Prepare components for assembly.
- 8.g. Assemble components according to the layout.
- 8.h. Test the system for proper operation.
- 8.i. Adjust the system as needed to operate properly.
- 8.j. Install a valve.
- 8.k. Install plastic piping.
- 8.l. Cut pipe for threading.

9. Examine plumbing codes and standards.

Assessment Strategies

- 9.1. Written Objective Test

Criteria

You will know you are successful when

- 9.1. you identify local plumbing codes.
- 9.2. you apply codes to work sites.
- 9.3. you identify materials to use for a given job.

9.4. you explain licensure requirements.

Learning Objectives

- 9.a. Establish minimum requirements for designing and selecting materials.
- 9.b. Investigate local plumbing codes.
- 9.c. Investigate slope of pipe.
- 9.d. Investigate water flow and pressure.

10. Install plumbing fixtures.

Assessment Strategies

- 10.1. Demonstration

Criteria

You will know you are successful when

- 10.1. you select the correct plumbing fixtures based on print.
- 10.2. you install the fixtures.
- 10.3. you identify and repair leaks.
- 10.4. you demonstrate proper tool usage.

Learning Objectives

- 10.a. Identify various plumbing fixtures.
- 10.b. Select appropriate fixtures based on the system design.
- 10.c. Examine ways to repair leaks and stoppages.
- 10.d. Interpret prints.
- 10.e. Select appropriate tools for installation and plumbing maintenance.
- 10.f. Practice installation.

11. Practice maintaining a plumbing system.

Assessment Strategies

- 11.1. Skill Demonstration

Criteria

You will know you are successful when

- 11.1. you file a daily report based on building walkthroughs.
- 11.2. you demonstrate maintenance and care of equipment.
- 11.3. you determine best procedures for addressing problems discovered during the walkthrough.
- 11.4. you identify proper techniques for opening clogged sanitary systems.
- 11.5. you maintain valves.
- 11.6. you explain the importance of plumbing insulation.

Learning Objectives

- 11.a. Identify purpose of a daily walk-through.
- 11.b. Care for tools.
- 11.c. Practice opening clogs.
- 11.d. Identify and repair leaks.
- 11.e. Identify different types of drain snakes.
- 11.f. Perform preventive maintenance of valves.
- 11.g. Explore the value of maintaining plumbing insulation.

12. Examine different types of electrical tubing, piping (conduit), and their related components.

Assessment Strategies

- 12.1. Written Objective Test
- 12.2. Skill Demonstration

Criteria

You will know you are successful when

- 12.1. you identify electrical tubing size and type.
- 12.2. you explain how electrical tubing is sized.
- 12.3. you identify electrical tubing material.
- 12.4. you identify electrical tubing connectors.

Learning Objectives

- 12.a. Identify electrical tubing by use.
- 12.b. Identify electrical tubing by type.
- 12.c. List strengths and weaknesses of various electrical tubing types.

13. Install electrical tubing and conduit with fittings.

Assessment Strategies

- 13.1. Skill Demonstration

Criteria

You will know you are successful when

- 13.1. you cut electrical tubing to the correct length.
- 13.2. you deburr cut as required.
- 13.3. you make bends to the correct angle as required.
- 13.4. you select the correct tool for cutting/deburring/bending etc.
- 13.5. you verify bend did not crimp crack or stress the material.

Learning Objectives

- 13.a. Explore proper use of cutting/deburring/bending tools.
- 13.b. Cite the correct take-up dimensions for conduit size and bender.
- 13.c. Select the proper fittings for a particular type of electrical piping application.
- 13.d. Cut and deburr electrical tubing.
- 13.e. Assemble electrical tubing and fittings.
- 13.f. Practice conduit bending.