

Sample Lesson Plan from

Plumbing

Instructor Guide

Module 3 - Copper Pipe

Task 1 - Bend copper tube

Performance Objective: Given copper tubing and benders, the student will bend the tubing to an angle specified by the instructor. The bent tube will be free of kinks and crimps and must meet acceptable plumbing standards.

Resources

Copper tubing
Level-type bender
Spring bender
Tubing cutter

Teacher Preparation:

1. Review lesson plan.
 - a. Lesson introduction and overview.
 - b. Safety rules and regulations.
 - c. Motivational techniques to be used.
 2. Construct or review test to be given.
 3. Secure necessary tools, equipment and materials.
 4. Establish safety rules and regulations.
 5. Secure audio-visual materials and equipment.
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APPLICATION: Given instructions, information, and all necessary tools, supplies, and equipment, the student will practice the task as taught.

EVALUATION: Evaluate to ensure the student can bend the tubing to an angle specified by the instructor. The bent tube will be free of kinks and crimps and must meet acceptable plumbing standards.

SUMMARY/CLOSURE:

1. Summarize lesson and make other demonstrations as necessary.
2. Reemphasize safety precautions.
3. Introduce next task and make necessary assignments.

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Theory

1. Explain relevant safety precautions for using tube benders.
2. Identify the types of copper tubing and point out their uses.
3. Identify the types of copper tubing benders.
 - a. Spring type
 - b. Lever type
4. Discuss reasons for bending copper tubing.
5. Explain the markings on the handle of the lever-type bender and their importance in the bending operation.
6. Discuss the bend radius.
7. Describe “spring back” in tube bending and how to compensate for it.
8. Explain the method of removing the external spring in the spring-type bender after bending.
9. Explain the procedure for bending pipe with either type of bender.

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Demonstration

1. Select tubing to be used.
2. Cut tubing to length.
3. Square end of tubing with a file.
4. Ream both ends of workpiece.
5. For first bend, measure from end of tubing and mark for desired dimensions.
6. Bend workpiece slowly and carefully to avoid flattening or kinking.

Lever-type Bender

7. Push link against stop pin.
8. Position tube bender with "0" on link and "0" on form handle.
9. Place measured mark directly over the 90 degree mark on the link.
10. Close latch over tube.
11. Close shoe handle and align "0" mark with "0" form handle.
12. With smooth motion, pull shoe handle around until "0" mark is opposite 90 degree mark and form handle.
13. Compensate for spring back.

Spring-type Bender

14. Place bending spring over tubing.
15. Place spring bender inside tubing.
16. Bend workpiece to desired angle.
17. Remove external spring after bending by twisting spring to expand and pulling at the same time.
18. Pull inside spring by twisting to contract and pulling at the same time.