

Knowledge Domain: Plumbing
Unit: Seal
Skill: O-Rings

Tools and Parts Required:

1. O-rings of various sizes
2. Ruler or tape measure
3. Flat-edge screwdriver
4. Oxygen regulator or other medical device with an O-ring
5. O-ring lubricant

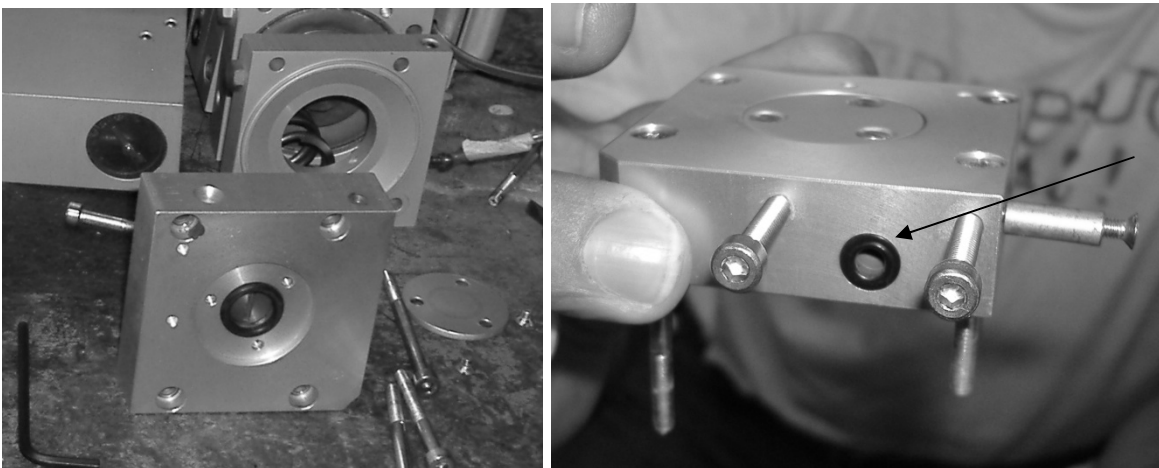
Introduction

An O-ring is a rubber loop. An O-ring sits in a groove between two parts of a machine. Sometimes an O-ring is not visible until a machine is disassembled. When compressed, an O-ring forms a seal. The seal prevents liquid or gas from leaking. A damaged O-ring cannot form a seal. Liquid or gas leaks out of the machine around a damaged O-ring. A small leak wastes energy. A big leak can prevent a machine from working. Damaged O-rings should be replaced.

O-rings are manufactured in many different sizes. The size of an O-ring includes its diameter and its cross-section (thickness). It is important to buy an O-ring that is the correct size. An O-ring that is the wrong size will not form a tight seal. It is also important to buy an O-ring that has the correct elasticity.

Example

Here are pictures of O-rings inside an infant ventilator



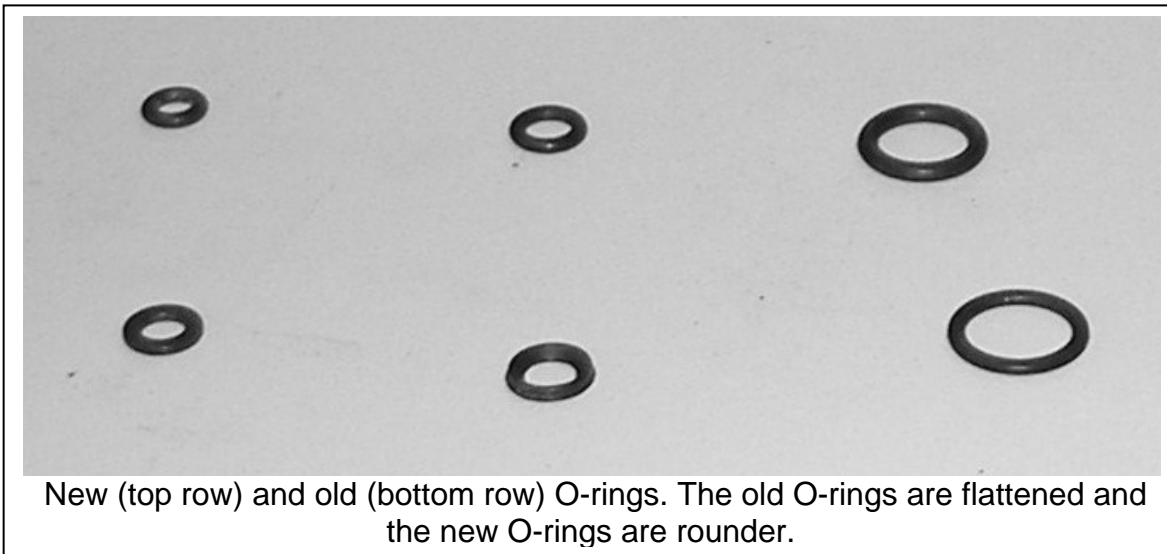
Identification and Diagnosis

O-rings are used in anesthesia machines, oxygen concentrators, ventilators, and other machines that regulate gases. O-rings are often used in pipe connections. Look for O-rings anywhere there needs to be a tight seal.

O-rings need to be replaced when they are damaged. Damaged O-rings:

- Do not form a strong seal. You may notice air leaking.
- Appear ripped or cracked
- Have lost their elasticity. Pull gently on the O-ring to test the elasticity.

You may not always be able to see the damage on an O-ring. If an O-ring does not seal properly, the O-ring should be replaced. Incorrectly sized O-rings should be replaced.



Procedure

Always wear safety goggles and gloves when replacing O-rings.

1. Turn off the machine. Verify that there is no flow through the machine.
2. Disconnect the machine around the O-ring.
3. Remove the O-ring using your fingers or a flat-head screwdriver.
4. Inspect the O-ring for damage. (See the "Identification & Diagnosis" section)
5. Lay the O-ring flat. Measure the inside diameter using a ruler or tape measure.

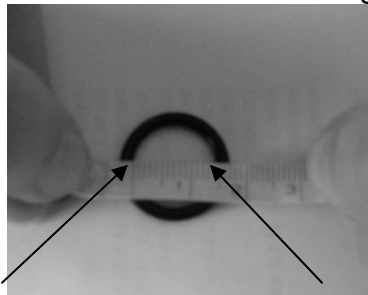


Figure 3: Measurement of the inside diameter of an O-ring. The arrows show where to take the measurements.

6. Approximate the thickness of the O-ring. Turn the O-ring on its side and use a ruler or tape measure to measure the thickness.

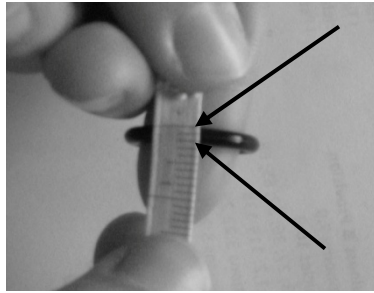
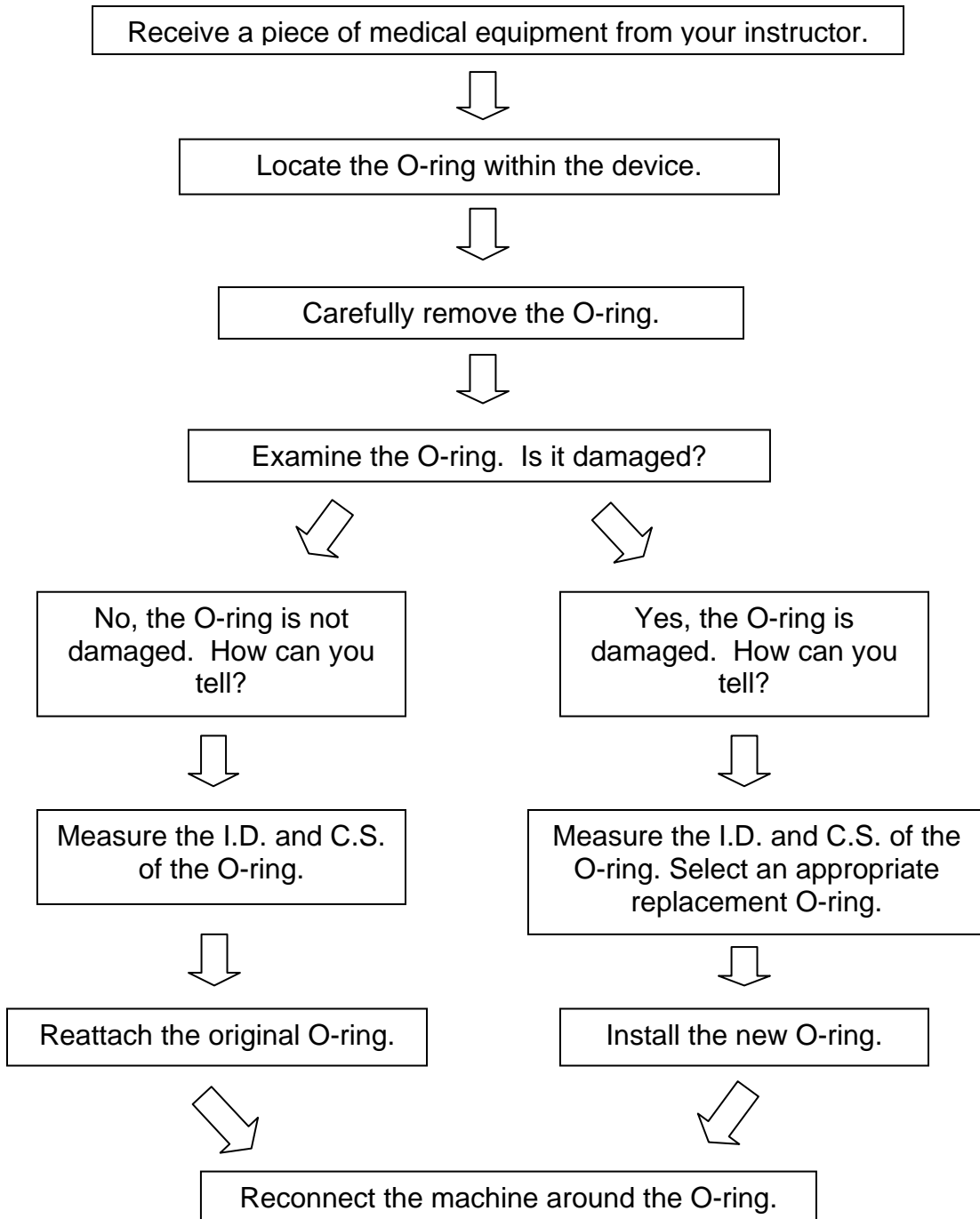


Figure 4: Measurement of the cross-section (thickness) of an O-ring. The arrows show where to take the measurements.

7. Buy an O-ring of the correct size and approximate elasticity. On a specifications sheet, the inside diameter may be abbreviated I.D. The cross-section may be abbreviated C.S.
8. Install the new O-ring in place of the old one.
 - Hold the O-ring down in the groove with one finger.
 - Push down around the loop until the entire O-ring is attached.
 - Be very careful not to cut or scratch the O-ring.
9. Verify that the O-ring fits tightly.
10. Lubricate the O-ring if it is located between two moving parts. Use a lubricant that is compatible with the O-ring material.
 - Many lubricants dissolve O-rings and shorten their life. Do not use a lubricant that is composed of the same material as the O-ring. For example, a silicone lubricant should not be used with a silicone O-ring. It is best to select a lubricant that is made for O-rings.
 - If you cannot find an O-ring lubricant, you will need to test the lubricant with a “wipe test.” Cover your finger with lubricant. Wipe the O-ring with the same finger. If your finger shows the color of the O-ring, the lubricant is dissolving the O-ring. Do not use the lubricant.
 - If you are still unsure after the wipe test, submerge your O-ring in the lubricant you think might work for one month. If the O-ring is not damaged after one month, the lubricant is probably safe to use.
11. Reconnect the machine around the new O-ring.

Exercise

Your instructor will give you several O-rings in various sizes. Practice measuring the inside diameter and cross-section of each O-ring. Your instructor must verify your measurements before you continue. Follow the instructions in the flow chart on the next page.



Your instructor must verify your work before you continue.

Preventative Maintenance and Calibration

Check pipe connections regularly for leaks. Replace damaged O-rings with new O-rings of the correct size and elasticity. Always calibrate every medical device before returning it to use.