

Knowledge Domain: Plumbing

Unit: Seal

Skill: Jars and lids for suction machines

Tools and Parts Required:

- 1) Suction Machine
- 2) Replacement Jars
- 3) Replacement Lids (if required)
- 4) Silicone
- 5) Epoxy Resin
- 6) Soldering iron
- 7) Heat shrink tubing (if required)
- 8) Hand drill
- 9) Silicone release spray/Vaseline/Vegetable oil
- 10) Liquid soap
- 11) Sandpaper/Emery paper
- 12) Gloves

Introduction

A medical suction machine is used to aspirate blood or mucus from a body cavity or operation site. A suction machine is used to create a partial vacuum. A suction canister or jar has to be completely air-tight. The air-tight jar enables the user to provide a high suction and create pressure. A damaged jar prevents the creation of the required suction. A broken jar may cause the contents to leak out. Leakage may form a biohazard.

Example

Below are pictures of the suction machine jars and lids and machines.



Replacement Jars

Lid



Suction Machine

Identification and Diagnosis

Lack of proper function in a suction machine indicates a problem in the machine or jar. Check the machine for the creation of vacuum. A damaged jar may not fill. Check the suction jar. The jar may be cracked or the lid may be broken or loose.

Procedure

Identify the damage to the jar or lid. A cracked or leaking jar can be sealed with epoxy. Refer to the BTA skill *Plumbing-Leaking-Epoxy* for more details on diagnosis and repair.

Major damage to the jar or lid requires fabrication of a replacement.

Replacement jar: Similar to original in dimensions

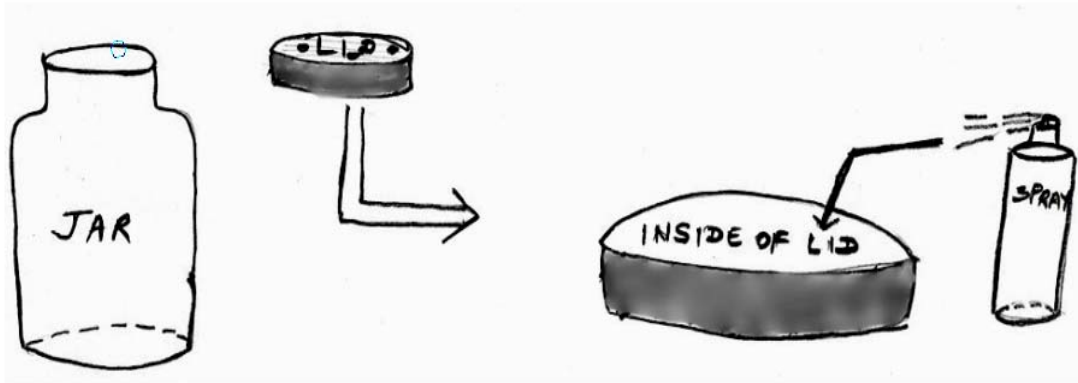
1. Identify a jar with an opening of equal or slightly smaller size than the lid.
2. The jar should have similar dimensions and form an air-tight fit with the lid.
3. To prepare the jar for use, clean the jar.

Replacement jar: Smaller than original in dimensions

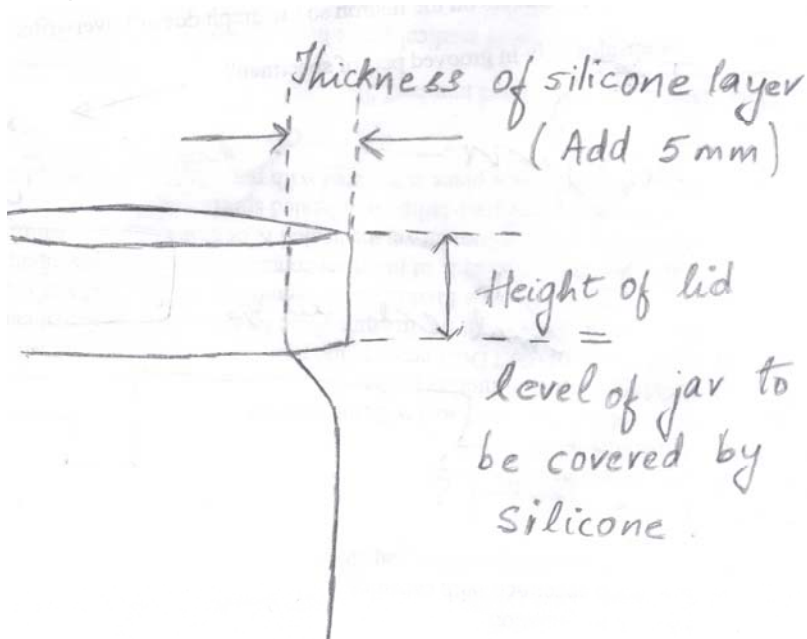
1. If the jar is smaller than the original, the fit between the jar and the lid will not be air-tight.
2. A gasket must be made for such a smaller jar. The gasket will ensure the required air-tight fit between the lid and the jar.
A lid that snaps on is better than a screw-on lid.

To prepare the gasket:

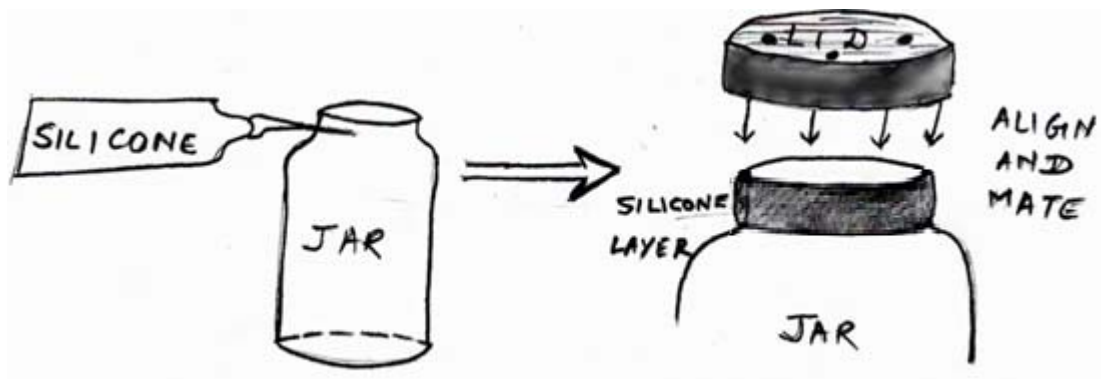
1. Wash the jar and lid with hot water and liquid soap.
2. Dry the jar and lid for 30 minutes. The jar and lid must be completely dry before starting.
3. Spray only the inside rim of the lid with silicone release spray. Spraying needs to be done before the first time of fabrication. Spraying is done to prevent the gasket from sticking to the inside edge of the lid while it is curing.
4. Do not spray the jar. The gasket will adhere to the jar.
See the picture below for representation of spraying the lid.



5. Overlap the lid with the jar. Note the difference in dimensions.
6. Cut the end nozzle of the silicone sealant tube to the required thickness. The required thickness is determined by the thickness of the required gasket.
7. Squeeze a sufficiently thick and wide strip of silicone all around the edge of the jar. The silicone must be applied in a layer with the thickness 5mm more than the difference in diameter.
8. The edges where the lid will mate or overlap with it should be covered with silicone. The coverage can be estimated by looking at the height of the lid. See picture below for estimation of silicone thickness.



9. Wait for about five minutes or until the silicone develops a light "skin." The 'skin' will appear when the silicone starts to cure. The silicone must not be fully cured. The top surface of the silicone must be dry to touch. Check label instructions for time of curing.
10. Align and mate the jar and lid. Align when the silicone is not 'wet'. The silicone should not be fully cured while aligning. The silicone should still be malleable. Do not over-tighten. Do not screw the lid shut. See picture below of mating the lid with the jar.



11. Scrape off the excess silicone from the edges of the jar and lid. Excess silicone is squeezed out from the bottom edge of the lid.
12. Wait for the silicone to cure for about 24 hours or as indicated on packaging.
13. Separate the lid from the jar carefully after curing is complete.
14. Avoid damage to the gasket.
15. Clean and dry the jar and lid before use.

Maintenance of gasket

Do not over-tighten lid. Do not put too much pressure on the gasket. Do not expose the gasket to excessive heat or sharp surfaces. Inspect the gasket regularly.

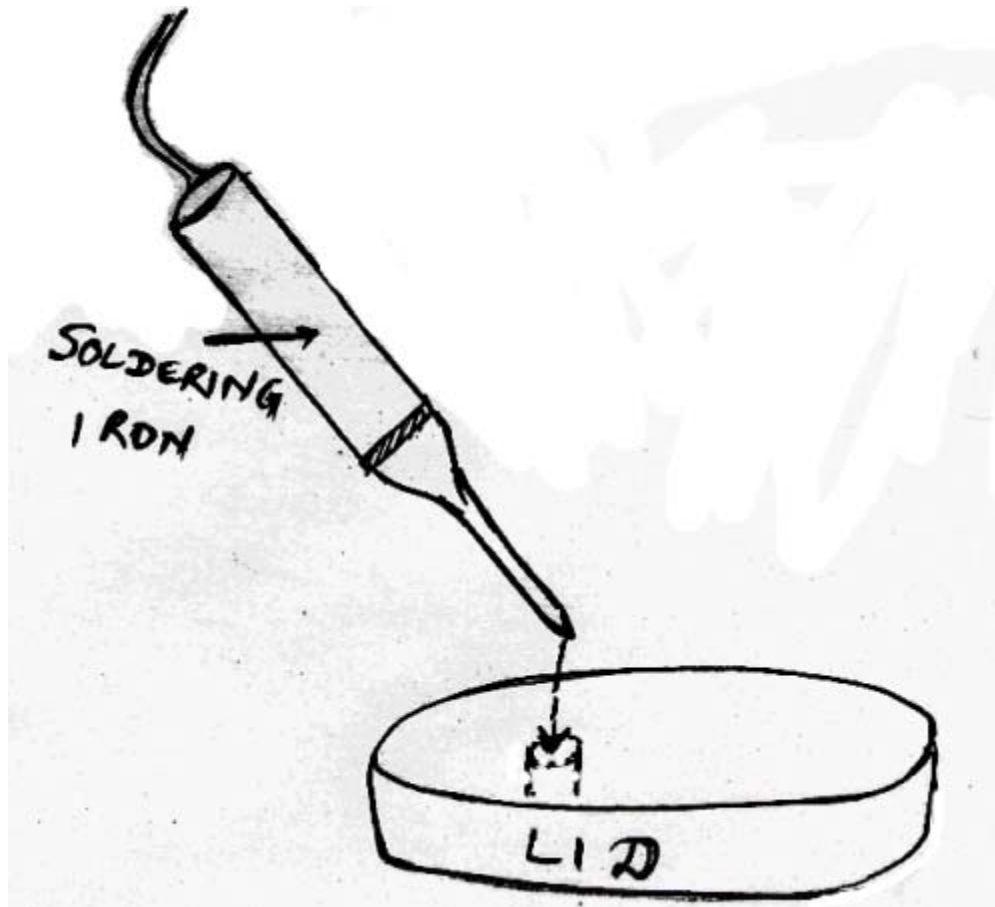
Replacement lid

Suction jar lids have tubes attached to the jar via the lid. The tubes are generally of three types:

1. Tube for vacuum. The partial vacuum is created by means of this tube.
2. Tube for 'Tandem' connection. The tandem connection is used to inter-connect two jars. The tandem connection is an optional connection and is not always used.
3. Tube for patient input. Biological material enters at this tube.

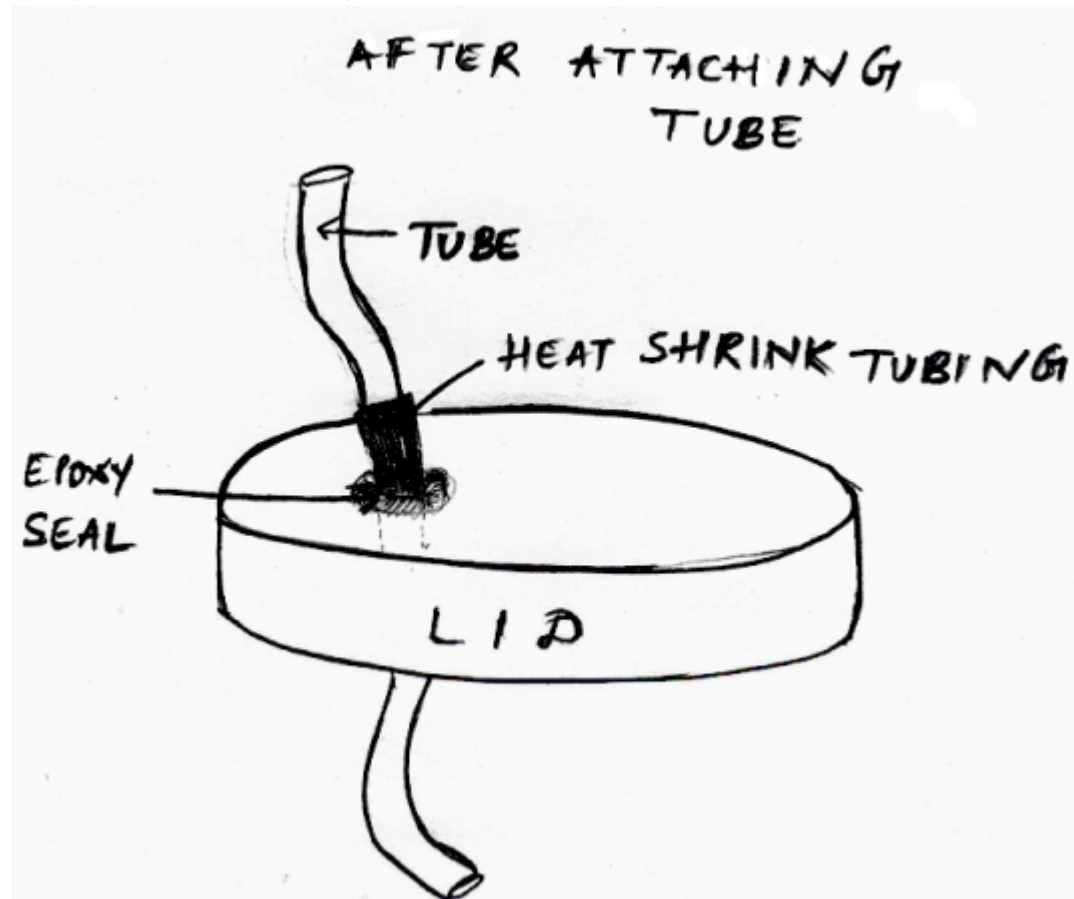
To make a lid:

1. Identify a lid of similar dimensions to the original lid to fit on the jar.
 2. Identified lid may be of larger size than jar. Follow instructions to make a gasket as given above.
 3. Use a soldering iron to make the desired number of holes in the plastic lid. A minimum of two holes will be required. A plastic lid is more desirable.
 4. Use a hand drill to make holes for a metallic lid. Use emery or sandpaper to smooth rough edges after drilling.
- See picture below for representation of making a hole in a lid for tubes to pass through.



5. Take care to make the holes of a similar size to the suction tubes.
6. Use heat shrink tubing as padding around the tubes to ensure a tight fit. Refer to skill *Electrical – Connections - Heat Shrink Tubing* for details.
7. Use epoxy resin to form a seal between the tube and the hole in the lid. Use of epoxy resin will make the connection air-tight. Refer to the skill *Plumbing-Leaking-Epoxy* for directions on the use of epoxy resin.

See picture below for a representation of the final assembled lid.



Jar and Lid Damaged

Both the jar and the lid may be broken or damaged. Replace both the jar and the lid.

Exercise

Examine a suction machine. Check the suction jars for leakage or damage. Locate a jar of similar dimensions. Locate a lid of similar dimensions. Design the replacement using the steps given above.

Preventative Maintenance and Calibration

Replace or repair the damaged suction jar and tubing. Empty the jar regularly. Reusable equipment must be disinfected. Wear gloves while cleaning suction apparatus. Clean the suction jar and tubes for 30-45 minutes. Cleaning solution may be composed of a solution of three parts water and one part vinegar. Rinse and dry the suction jars and tubes well before use.