

b. ELECTRICAL SUCTION APPARATUS

1. Purpose of Equipment

To provide an efficient means of removing a body fluid (e.g. blood, mucus, vomitus) from wounds, the respiratory tract or a body cavity.

2. How the Equipment Works

There are several types of suction machine. According to the design, different flow rates and different pressures – high, low or dual – can be attained.

It is important to read and understand the relevant documentation for the machine you are using. For example some machines are designed to function for only 1 to 2 hours at a time and will be seriously damaged if they are run continuously over a longer period. These are labelled 'Int', which means they are for intermittent use only.

Each model will have a pump which may be driven either electrically or by hand. This, under carefully controlled conditions, draws fluid from the patient, through a flexible tube, into a glass reservoir jar (Figure 36). To prevent fluids passing back to the pump, a float valve (F) rises until a predetermined fluid level is reached. It then closes off the suction.

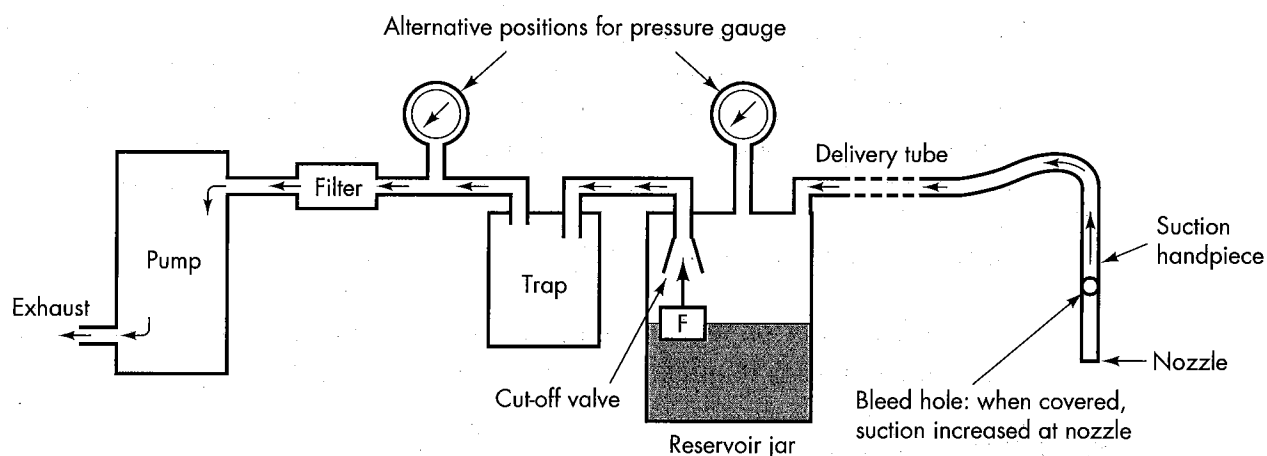
When the float valve operates, the apparatus must be switched off while the jar is changed. If the machine has a dual reservoir (two jars) a quick changeover can take place without switching off the apparatus.

There should be a bacterial filter between the reservoir jar and the pump. This reduces the risk of cross infection and possible damage to the pump. It also provides some safeguard for the maintenance engineer.

3. Routines and Safety

To reduce the risk of cross infection, many hospitals have a suction pump in each of the departments likely to need one. These will be the operating theatre, casualty or accident and emergency department, intensive care and recovery units, post operative wards, dental surgeries, the Ear, Nose and Throat (ENT) ward and the maternity department.

Each ward or department is responsible for its own machine, which should be labelled with the name of the ward or department.



The components of a portable suction apparatus. The pump may be protected from infected material, which could be drawn from the reservoir jar, by a trap and/or filter. There is a cut-off valve within the reservoir jar, which operates when the level of fluid in the jar is sufficiently high to raise the float F, so as to prevent any foreign material being aspirated into the pump. There are alternative positions for the pressure gauge.

Figure 36: Typical suction circuit

i. Routines

Before using the suction pump:

- check that it is the correct machine for the task (e.g. that the pressure is sufficient)
- check details on the information plate or in the manual
- do not pull the machine by the electric power lead

During use:

- keep ventilation grills free from obstruction
- do not continue to use machine if the vacuum gauge has a low reading

After use:

- unplug the machine from electricity supply
- wipe clean the outside of the machine
- clean and sterilise all jars, float units, tubing and catheters
- change bacterial filters, especially if discoloured

Daily:

- keep air vents free from obstruction
- check that there is no visible damage to the machine, electrical lead and plug
- check that machine is thoroughly clean from previous day's use
- check that all equipment (jars, tubing, etc) has been sterilised
- check that bacterial filter has been changed (this should be replaced if it becomes wet or discoloured)

- check there is a good supply of bacterial filters available
- check reservoir jars for cracks or chipped rims
- check there are spare jars available
- before filling reservoir jar, check that float unit moves freely (Figure 36)
- check that tubing is anti-static (it will have a yellow line or flash along its length, or, if transparent tubing, a black line along its length)
- use a defoaming agent in the reservoir jar to prevent frothing, e.g. diesel oil
- make sure the jar is fitted tightly

DO NOT use cotton wool or lint as a bacterial filter. In an emergency, lint-free material (e.g. bandage) may be used.

One to three monthly:

- send machine to workshop for testing and general overhaul. The air-intake filter should be cleaned or replaced

Do thoroughly clean the machine and sterilise reservoir jars, tubing, float unit, etc before use. This is to help safeguard the maintenance personnel from infection.

ii. Safety

Do use the machine on a firm and level surface

Do disconnect the machine from the mains power supply before cleaning, changing jars, replacing filters or when the machine is not being used

Do ensure that anti-static tubing is used

Do change bacterial filters every day and when they become wet or discoloured

DO NOT use the mains power lead to pull the machine from one place to another

DO NOT continue to run the machine if the pressure gauge reading is low

4. How to Use the Equipment

Because there are many designs of suction pump, the manufacturer's instructions should be followed.

The following instructions are a general guide only:

- i. make sure that the equipment is in an upright position and standing on a level surface
- ii. confirm that a suitable electric mains power socket is available and that it has an earth pin. (If unsure, check the manufacturer's manual *or* contact the manufacturer if possible *or* call in a qualified technician for advice)
- iii. check that all external connections are tight and there is no obvious leakage point
- iv. before filling the reservoir jar, check the float valve moves freely (Figure 36)
- v. check that the reservoir jar has no cracks and that the rim is not chipped
- vi. check that the jar fits tightly (Figure 37)
- vii. check that anti-static tubing is being used
- viii. plug the machine into mains and switch on
- ix. check the vacuum gauge for correct reading (on some machines the rate can be adjusted)

If using a dual pressure machine:

- x. ensure that the correct setting is being used

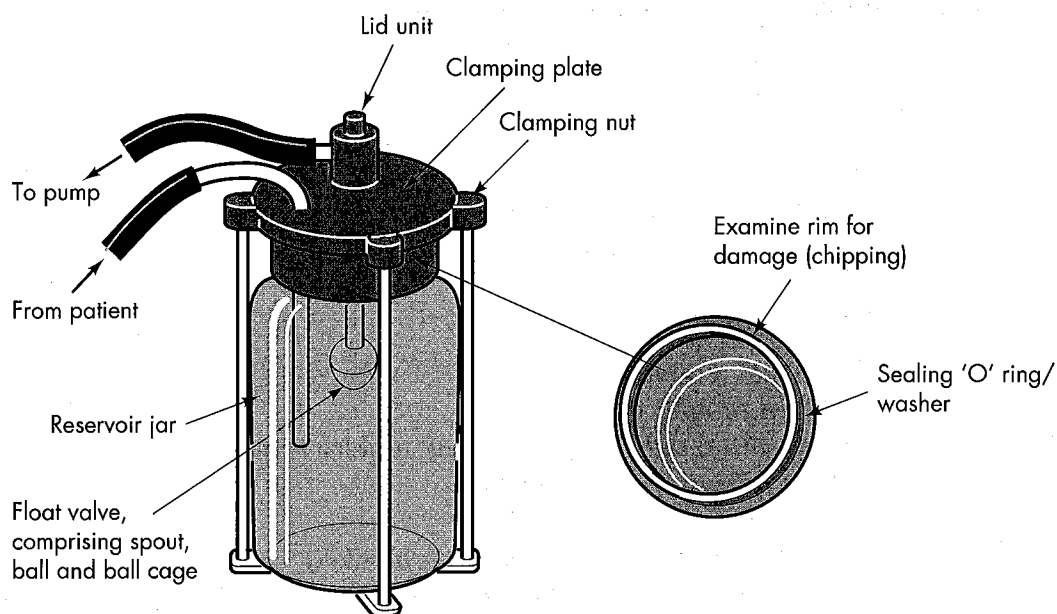


Figure 37: Typical reservoir jar (plastic or glass)

5. Simple Fault-Finding and Maintenance

A second machine should be available for emergency use

Example a:

The suction pump does not work

- check the socket outlet

If satisfactory:

- check the mains lead

If satisfactory:

- return the machine to the workshop because there is a major fault which needs to be repaired by a qualified technician

Example b:

The machine works but the suction power is poor

- check setting of suction control knob

If setting is correct:

- switch off the machine
- remove tubing running from the suction pump to the reservoir jar
- place a finger over the outlet port of the pump from where the tubing has been removed
- switch on the machine

If the pressure gauge needle does not rise rapidly:

- return the machine to the workshop for repair

If the pressure gauge needle does rise rapidly:

- switch off the machine
- reconnect tubing
- remove jar and fill with water to 'full' level
- refit the reservoir jar
- switch on the machine to confirm low pressure
- switch off the machine

Visible problems may be:

- leaking at a joint
- cracked or split tubing
- jar not fitted tightly (jar seal may require replacing)
- wrong type of jar being used
- jar is cracked or chipped
- bacterial or air inlet filter may be blocked
- float valve is not working and the washer, the 'O' ring or the whole unit needs to be replaced

Replacement of the washer or 'O' ring is a simple task. If any one of the other components is thought to be causing the problem, replace it and re-test the machine.

6. Spares

If possible, the full range of the manufacturer's spares should be held in store and replenished when used.

Local needs:

- Spare machine
- Reservoir jar
- Reservoir jar seals
- Float valve unit
- Float valve washers or 'O' rings
- Anti-static tubing
- Anti-static tubing clamps if fitted (some machines have push-on connections only)
- Electrical mains power lead
- Mains power plug and fuse (if required)

7. User Checklist (to be displayed near the equipment)

Always refer to the manufacturer's instructions

Try to keep this machine in this department/ward to help prevent cross-infection.

To keep the equipment in good working order for as long as possible:

- i. keep it in a clean, well ventilated store
- ii. read and understand the relevant documentation before using the suction pump
- iii. keep the machine clean
- iv. make sure that all external components (e.g. jars and tubing) are sterilised after use
- v. keep air inlet vents free from obstructions
- vi. change bacterial filters after every use and when they become wet or discoloured
- vii. make sure that there is a good supply of bacterial filters available
- viii. check reservoir jars for cracks and chipped rims
- ix. make sure that there are spare jars available
- x. check float unit moves freely before fitting jar
- xi. make sure jar is fitted tightly
- xii. use a defoaming agent in the jar to prevent frothing
- xiii. in machines with two jars, ensure that the tubing connections are correctly made. Wrong connections could lead to the float valve becoming ineffective and damaging the suction unit.

Report to the Maintenance Officer:

- any visible damage to the mains power lead, plug, body of the machine or any of its component parts (e.g. jars, tubing, etc)
- any fault or poor function

Follow these SAFETY points:

Do use the machine on a firm and level surface

Do disconnect the machine from the mains power supply before cleaning, changing jars, replacing filters or when the machine is not being used

Do ensure that anti-static tubing is used

Do change bacterial filters after every use and when they become wet or discoloured

Do NOT use the main power lead to pull the machine from one place to another

Do NOT continue to run the machine if the pressure gauge reading is low

c. **MANUAL SUCTION APPARATUS**

Modern manual suction apparatus is manufactured using design methods and materials which overcome the need for general maintenance. However, good practices are important.

- i. All manual suction pumps and their components should be cleaned after each use in a solution of water, detergent and disinfectant. The cleaning solution should be pumped through the pump.

Take particular care with the reservoir jars and tubing. Some reservoirs can be autoclaved, but if in doubt, use the above method.

- ii. Dry all components thoroughly. Store in a clean area out of direct sunlight.

If the pump does not work, check for

- badly fitting connections
- kinked or damaged tubing

Weekly:

- closely inspect for general wear or damage. In this way, a possible mechanical breakdown can be anticipated and appropriate action taken

Minor repairs may be carried out at the local workshop or by the hospital's handyman.

Do make sure the pump has been thoroughly cleaned and dried before sending it to the workshop or handyman.

Report to the Maintenance Officer:

- any visible damage
- any fault or poor function

Spares:

If the pump is in regular use:

- have a spare suction pump in store for emergency
- anti-static tubing