**Purpose**

The purpose of this SOP is to ensure the user has a basic understanding on how best to safely operate the Astell autoclave. This equipment should only be operated by trained personnel.

**Scope of policy**

This SOP will include how to operate the autoclave in the safest way possible, how to maintain and clean the autoclave on a regular basis, and important safety information to consider when using the autoclave.

**Introduction**

An autoclave is essentially just a large steel vessel through which steam or another gas is circulated to sterilize things, perform scientific experiments, or carry out industrial processes. Typically the chambers in autoclaves are cylindrical, because cylinders are better able to withstand extreme pressures than boxes, whose edges become points of weakness that can break.

The high-pressure makes them self-sealing (the words "auto" and "clave" mean automatic locking), though for safety reasons most are also sealed manually from outside. Just like on a pressure cooker, a safety valve ensures that the steam pressure cannot build up to a dangerous level. Once the chamber is sealed, all the air is removed from it either by a simple vacuum pump or by pumping in steam to force the air out of the way. Steam is then pumped through the chamber at a higher pressure than normal atmospheric pressure so it reaches a temperature of about 121-140˚C.

Once the temperature is reached, a thermostat kicks in and starts a timer. The steam pumping continues for a minimum of about 3 minutes and a maximum of about 15-20 mins- generally long enough to kill most microorganisms. The exact sterilisation time depends on a variety of factors, including the contamination level of the items being autoclaved (the more contaminated they are, the longer it will take as there are more microbes) and how the autoclave is loaded (the more freely steam can circulate, the quicker the sterilisation will be).

**Safety Information**

Electrical fire risk

This equipment contains electrical circuitry which carries sufficient energy to cause and sustain a fire. Active system thermal energy-input protection & overcurrent protection is provided on all appropriate circuits. Safety valve prevents excessive pressure build up in the chamber. The equipment is protected from overheating by an electrical thermal cut-out sensing excessive boiler temperature. Temperatures due to the designed heat source(s) in extreme fault conditions could attain 150˚C internal to the chamber/boiler.

Handing steriliser loads

Due care should be exercised when handling loads and moving them in and out of the steriliser. There are no instructions how to handle these loads in the manual or this SOP due to the fact that there are a wide variety of different loads that can be used.

Operating conditions: the permitted temperature range when using this product is between 0-40C and humidity should not exceed 75%. Do not site the equipment in an area where there are significant quantities of dust, which can gather on the equipment and cause malfunction. Do not sit the equipment where spray or fumes from other equipment may enter the cabinet tor cooling vent.

Steamy environment: if a large volume of steam is discharged into a confined operating area the resulting condensation may cause a hazard or operating faults or permanent damage to the controller. This would not be caused by the small amount of steam generated in normal use when the machine is operated. It could be caused by a continuous leak of steam from the supply pipe, a badly maintained and failed safety valve, the user must ensure that all appropriate maintenance be performed to avoid such large stem leaks which are outside the warranty.

**Operation**

Swiftlock classic steriliser quick reference operation guide:

1. Check that display power is on
2. Press [door] button. The bolt will unlock
3. Turn handle and open door
4. Check gasket is correctly seated and inspect for damage
5. Load steriliser- if the machine is fitted with load sense timing place load sensing probe in position in centre of load if the cycle requires use of load sensing. If the cycle does not require use of the load sensing probe, place the probe safely on one side of the load.
6. Close and rotate the handle lock
7. Select cycle
8. Press [start] button, cycle will begin
9. When display shows ‘complete’ at end of cycle, press [door]
10. Door unlocks, rotate handle & open door
11. Open door fully and unload chamber
12. If [door] button is pressed and door is not opened, it will cancel after 10 seconds, and will relock. After this, to open, just press [door] button again.

Notes: if the door is closed by accident, press [door] to open. If the handle is rotated to a locked position when the door is opened, press [door] button and return handle to unlocked position.

After Use: after unloading the steriliser, always leave the cover slightly open when not in use to avoid compressing the gasket.

**Maintenance**

Storage: This product must be stored in temperatures between -10˚C and +70˚C. Storage of this product in cold and damp conditions may lead to a hazard or operating faults if the equipment is put into service before it has dried out and achieved equilibrium with its surroundings of the operating site.

Cleaning: clean the chamber regularly, as water contaminated with split load contents will cause failure and may burn out heaters or block pipework, valves or drains.

Steriliser cleaning:

The chamber and all wetted part should be cleaned regularly in order to maintain adequate operating conditions. Load containers should be chosen to minimise loss of the contents into the steriliser, e.g.: ideally do not use plastic bags inside the steriliser baskets but use a purpose-made steriliser container designed to catch leaking waste.

Chamber cleaning:

The chamber should be cleaned internally to prevent build-up of contaminants, and we would suggest that for a machine in daily use, if used for fluid loads or waste destruct the chamber should be checked once a week and cleaned if necessary. For other applications cleaning should be at monthly intervals or more frequently if needed…

* Open the door as normally
* Remove all trays or shelves
* Clean the base of the chamber with hot water. Do not use an abrasive cleaner or one which may leave soluble residues that would remain in the pipework and contaminate the water
* Take care not to damage the sensors, or to displace them in any way
* Wash the sensors with hot sensors and a soft cloth. Rinse if required with clean warm water
* Dry the chamber with paper or cotton towels. Do not leave fragments of paper or lint behind
* Wipe the gasket with a wet cloth moistened with a little detergent
* Do not use chlorine bleach cleaners inside the stainless steel chamber. Water and detergent should be used to wash the chamber out when required, and a ‘scotchbrite’ scouring pad may be used carefully. Do not damage the gasket or the gasket mating surfaces.

Maintain the following every 3 months

Safety valve testing: Astell Scientific advise that the safety valve be tested at 3 month intervals. The controller will warn you on screen when this is needed. This can be changed if required to suit local pressure vessel regulations.

Gasket: keep the mating surface of the chamber flange clean. This bears on the gasket to seal the chamber if necessary apply silicone grease. Check that the gasket is not bulging out of the groove and, that the edge is smooth without any cuts or abrasions. Check that the gasket is fitted correctly- the small holes (4) should be on the outside lip. Replace the gasket regularly. Astell advise that the gasket is a wearing part and will require replacing at 12 month periods or 6 months if the machine is used intensively or for many high temp samples.

Clean out chamber and inspect for damage to sensors etc.

**General operation and log book**

Although the safety record of the laboratory sterilisers is good, remember at all times they store considerable potential energy, and should be treated with respect and care. If correctly used and cared for, our steriliser will give you a long and safe service.

Pay proper attention to regular maintenance. Never force the locking mechanism, or operate the machine with any leaks, or incorrectly operating parts.

Report any defects to the responsible person. If deterioration or defects are noticed, record them in a log book and contact the Astell service department. Record the results of annual and periodic inspections. Every 4 to 6 weeks is recommended. Check the logbook before you start using the machine, as someone else may have recorded a fault that you were not aware of.