

## Risk Assessment Form

<b>Procedure</b>	Use of Autoclave Benchtop (Priorclave compact 40)
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<b>Name(s) of person performing the work</b>	Users (Lab manager & Lab Technician & Tenants & Licensee's)		
<b>Name &amp; position of assessor</b>	Khwaja Islam & Laboratory Manager	<b>Signature</b>	
<b>Date of assessment</b>	01/10/2018	<b>RA Number</b>	BioE 0005

### **Outline of procedure / activity:**

The laboratory bench top autoclave (Priorclave compact 40) is used to steam sterilization of liquid (media or other fluids in unsealed containers), dry (instruments, plastic, dry glassware) and biological waste discard (including GMO waste (class 1 & 2) to make safe) for the tenants on ground and first floor of the BioEscalator of the Innovation Building. The laboratory bench top autoclave is used every day for the sterilization of laboratory equipment, glassware, liquid, GMO discard and is situated in the innovation laboratory (696.10.14) on the ground floor. The equipment weighs in excess of 120kg and requires at least 2 persons to lift. The autoclave uses immersion heaters in a reservoir of water below the lower shelf to raise steam. The heaters are protected from boiling dry by a low water cut-out.

#### Thermal lock:

Safety thermal lock (50°C door retention device) is set for load. Under normal circumstances the autoclave cannot be opened until the temperature of the load has fallen below 50°C. The thermal lock can be overridden using the key-switch on the control panel. This will cause the main vent to open. Great care should be exercised when using the key-switch since the loads could boil over if vented at elevated pressures and glassware could be damaged.

#### Drain condensers:

The drain condenser is fitted to the side of autoclave with pipe work to enter the condenser. Provision should be made to guard or insulate exiting the autoclave where these may present a heat hazard.

#### Stainless steel pressure vessel:

For cleaning do not use chlorine or hydroxide base cleaning agents as such chemicals could damage the surface finish and the integrity of the pressure vessel and door instead use soft water for regular cleaning of the interior.

#### Water supply:

De-ionised (Di-Water) or RO water supplies should not be used as the controls fitted rely on electrical conductivity to detect water supply. Softened water should be used (tap water).

#### Bench load:

The autoclave when loaded and with a full water charge will weigh around 100-150kg. For safety it's good to remember at all times that autoclave store considerable potential energy, and should be treated with respect and care. Never force the locking mechanism, or operate the autoclave with any leaks, incorrectly operating parts, report any faults to the laboratory manager.

Operator must be trained in operating and loading the autoclave to guarantee safe daily use. Untrained Personnel are not be allowed to operate the autoclave.

#### There are 3 pre-programmed cycles installed in the benchtop autoclave:

- Cycle 1: Dry/plastic – 121°C for 15 min.
- Cycle 2 Liquid – 121°C for 20 min.
- Cycle 3 Waste Discard – 134°C for 15 min.

#### Access codes:

- Key position (000) 1 it will only allow the user to start/stop the machine and open the door.
- **Key position (000) 2** which allows to start/stop the cycle and switch between programs. The user will not be allowed to change the settings within the programs.
- Key position (000) 3 allows full access. The user will be able to start/stop the cycle, switch between programs and to change the settings within the programs if required please contact lab manager.

#### Switch between the programs:

- Step 1 – press the OK button on the control panel for 4 seconds.
- Step 2 - The screen will then ask for the user to enter the access code which is **0002** by using the up and down arrows on the control panel and press OK.
- Step 3 – Once the access code is entered you will be asked if you want to clear faults. Select YES or NO then move to the right arrow to move to the next page symbol and press OK.
- Step 4 – next available screen will allow you to select a pre-programmed cycle's see above. Scroll up and down with the arrows keys and press OK when the desired program is selected. It will return to the main screen and press start.

#### Opening the Door:

1. Check the electricity supply is **ON**, and that the power is switched on at the wall socket.
2. To open the autoclave door press and release the **DOOR** button, which will bleep, and wait for a short time (about **20** seconds) until the **door** indicator illuminates and the sounder **bleeps** again.
3. During the wait time the temperature display will show **Hold** (confirming that the autoclave is waiting during its safety delay).
4. On pressing the **door** button a second time, you may hear the locking solenoid operate. You may now lift up the locking handle to the safety catch position. The safety catch is released by pushing it forward with your thumb and then lifting the locking handle to its fully open position. The door now can be pulled **open gently**.

**Do not attempt to open the door before the lock has released or damage to the locking mechanism may result which will not be covered by the warranty.**

**Care should be taken when opening the door as it will be hot and steam may be released.**

**Heatproof gloves and face shield should always be worn when unloading autoclaves.**

#### Checking water level:

5. Always check the condensate collection bottle on the right hand side of the machine, to make sure it is empty and not over flowing. Empty when  $\frac{3}{4}$  full as shown in the training.
6. The reservoir should be filled with **tap** water to a level just below the weir plate at the front of the autoclave. Always check the water level before starting a cycle.

#### Loading:

7. Load the autoclave with either the glassware, liquid or waste to be sterilised directly onto the shelves or in baskets, or in the case of waste loads which may leak liquids when autoclaved, water tight discard containers:
  - a. In the case of liquid, check that the bottle lids are not tightly shut to prevent pressure build up with the bottle.
  - b. In the case of dry/plastic, ensure the probe is left loose and that any bottle lids are not tightly sealed.
  - c. In the case of waste discard, place the bag of waste into the watertight discard container to prevent leakages in the autoclave. Care should be taken when loading the baskets or containers not to pack them too tightly with material. Ample room must be allowed for steam to penetrate the load properly or full sterilisation will not be achieved. When using autoclave bags these should be left open with the top of the bag rolled outwards, exposing the load to the steam inside the pressure vessel.

**Care should also be taken that the contents of bags and containers are not able to spill over into the body of the autoclave vessel. Any spillage could block pipes and valves and will not be covered by the warranty.**

#### Settings:

8. Once the autoclave has been satisfactorily loaded the controls should be set for the process cycle you require. See section pre-programmed cycles.

#### Closing the pressure door:

9. When you have selected your pre-program cycle close the door with the locking handle in the fully raised position.
10. Then, in a single action push the handle down into the locked position. The door will now be properly secured.

#### Starting a cycle:

11. Ensure the door is properly secured and the autoclave screen will display **VENT CLOSED DOOR CLOSED Ready to Start**. Then press the **START** button on the autoclave to begin the cycle.
12. The complete cycle will be displayed on screen, and the autoclave will emit a bleep for a short time (about 10 seconds). The autoclave is now ready to open and unload.
13. Use the heat resistance gloves to unload the autoclave.
  - a. In the case of liquid, reseal the bottle lids while wearing heat resistant gloves.
  - b. In the case of waste, once the container have cooled while wearing laboratory gloves remove the autoclavable bag and place in the hazard waste bin. Agar plates may have leaked in the container.
14. Aborting a cycle, simply press the **start** button.

#### Trouble shooting:

- If an over-temperature is detected from the sensor then power to the heating circuit will be switched

off and fault code **F018** will be shown in the temperature display. Should this occur, then the autoclave should be switched off and allowed to cool to a safe temperature and pressure before Opening for examination of the water level.

- It uses a water conductivity probe which detects water level using the conductivity of the water. If the water falls below the sensor the autoclave shuts down, the lower water warning is lit and fault code **F004** is shown in the temperature display.
- In hard water areas softened water must be used to prevent scale from forming in the autoclave.
- The **F018** or **F004** indication must be manually re-set when the door is opened by turning the program setting lock key-switch from position 1 to 3 and back again.
- Refer to manual page 34.

#### Aborting a cycle:

To abort the cycle at any stage press the **START** button.

#### Thermal lock Override:

1. First abort the cycle as above.
2. After checking that there is no pressure within the autoclave turn the thermal lock key to the right hold it there.
3. Press the DOOR button once, keeping the thermal lock key held over.
4. Wait during the HOLD display until there is a bleep and the DOOR indicator illuminates.
5. Keep the key held and press the DOOR button once to unlock the door.
6. The key-switch can now be released and the door opened as above.
7. If the key is released at any stage the procedure must be repeated to open the door and reset the display.

**Note:** Initial set up of the autoclave is 3 litres of RO water and 1 litre of tap water in the reservoir bottom of the autoclave below the lower shelf.

**Note:** Care should be taken when loading the baskets or containers are not to pack them too tightly with material.

**Note:** Care should be taken the contents of autoclave bags and containers are not able to spill into the body of the autoclave vessels as spillage could block pipes and valves.

**Note:** Depth of un-perforated discard containers should be no greater than 180mm for effective air displacement from the load.

#### Parts:

- Thermal printer roll (pack of 5) £23.63 part number ZZZ/ROL/007.
- Replacing paper roll refer to page 30 on the manual.

#### Routine operator maintenance:

#### Daily maintenance:

- To ensure protection from boiling dry, the insulated section of the low water probe between the stainless tip and the pressure vessel wall should be scrubbed clean. The sensor tip should also be kept clean to ensure good contact.
- Standing water within the vessel should be regularly removed, ideally with wet/dry type vacuum cleaner to prevent the build-up of *spilled media and potentially corrosive chemicals*. With the vessel emptied of water, the heating element(s) should be wiped with a damp cloth to remove any build-up of lime scale.

Weekly/Monthly Maintenance:

1. Autoclave cleanliness
  - Check exterior of machine and the inside walls of the pressure vessel for general cleanliness (particularly around operating parts and external switches and pin). Use anti-bacterial wipes to clean exterior panelling. Do not use chlorine or abrasive cleaners.
2. Door Gasket (s)
  - It is advisable to lubricate the sealing faces to prolong the life of the sealing gaskets with silicone grease such as a high vacuum grease. Ensure that the grease is lightly spread evenly around the surface of the gasket. This is carried out with the pressure door in the open position.
3. Door closure arms
  - To ensure a free action of the closure arms, should be kept lubricated and free from dirt. Use copper grease.
4. Hinges
  - With the pressure lid in the open position the hinge should be cleaned and lubricated with high melting point grease.

Safety Precautions:

Whilst the autoclave has built-in safety devices, their operation may be impaired if the autoclave is not used correctly and in accordance with the instructions. In addition, it is important to observe the following safety rules at all time:

- All cleaning and servicing the autoclave to be isolated from the power source and disconnected.
- This equipment weighs in excess of 100kg and requires at least 2 persons lift.
- Ensure the equipment is installed, operated and maintained by trained and authorised personnel.
- Always ensure the machine is level when in use.
- During operation some autoclave surfaces may become uncomfortably hot.
- Care should be taken when opening the autoclave after a sterilisation cycle as it will be hot and steam may be released. Heat proof gloves and a face shield when unloading autoclaves.
- The autoclave should only be used for its intended purpose.

### Potential hazards

Substance or item handled	Associated Hazard (s)	Existing Control Measures	Risk (L/M/H)	Further Action required	Risk (L/M/H)
Autoclave door	Hand or arm trapped in the door.	Ensure hands are out the way of the door. Use the handle to close the door carefully.	L	No further action required if the existing control measures are adhere to.	L
Contact with hot surfaces Drain condenser container	Burn / Scalds from contact with hot surfaces/glass ware	Wear appropriate PPE. Lab coat and safety glasses and gloves must be worn when operating the autoclave. Allow autoclave to cool down before attempting to open door or unload contents. Heat resistance gloves worn when unloading. Take care when unloading the unit. Lab gloves should also be worn when loading the autoclave. Caution hot surface signs are present – where the stickers are attached may become uncomfortably hot during the operation of the equipment.	M	No further action required if the existing control measures are adhere to.	M
Biological/GMO waste discard	Bio-Hazard	Wear appropriate PPE. Lab coat, safety glasses, gloves.	M	No further action required if the existing control measures are adhere to.	M

<p>Loading and unloading waste discard containers</p>	<p>Personal injury from lifting autoclave waste discard containers</p>	<p>Wear appropriate PPE (Lab coat, safety glasses, face shield and Lab gloves). Users are trained in manual handling operation.</p>	<p>L</p>	<p>No further action required if the existing control measures are adhere to.</p>	<p>L</p>
<p>Broken glass</p>	<p>Cuts</p>	<p>Wear appropriate PPE The contents of the autoclave should be stacked carefully and boxes should not be over loaded. Put in and remove content carefully from the autoclave.</p>	<p>L</p>	<p>No further action required if the existing control measures are adhere to.</p>	<p>L</p>
<p>Autoclave</p>	<p>Electrical hazard - Electrical shock – danger of death.</p>	<p>Only switch on the device if the device and power cable are undamaged. The lethal voltages inside of the device is not accessible which is contained in housing that is closed and undamaged. Do not remove the housing of the device. Only trained personal are allowed to use the machine. Autoclave is earthed, protective earth connection for the machine is provided using 13A plug fitted to the machine. Annual pat testing. Regular visual checks of power cords for fault, fraying or wear and regular electrical safety check. Any faults reported and repaired before use.</p>	<p>M</p>	<p>No further action required if the existing control measures are adhere to.</p>	<p>M</p>



Lifting and removing autoclave waste discard containers	Personal injury from lifting autoclave waste discard containers	Staff and tenants trained in manual handling operations.	L	No further action required if the existing control measures are adhere to.	L
Lifting and moving and transportation the benchtop autoclave	Personal injury from lifting and moving	The equipment weighs in excess of 120kg and requires at least 2 persons to lift. Operators trained in manual handling operations and will always be sure to follow manual handling guidelines when lifting equipment, ensuring the correct number of people are lifting the autoclave and the correct PPE is worn (Protective gloves).	M	No further action required if the existing control measures are adhere to.	M

**Persons potentially at risk:**

Only the user or others near by

**Action in event of an accident or emergency:**

1. **First Aid Measure:**  
**Burns** – immersing the burn in cool water immediately, removing clothing from the burn area, and keeping the injured area cool for at least five minutes (preferably longer). Any burns to the face or eye or any burns that blister should be seen by a physician.
2. **Fire:** raise the fire alarm and evacuate the area. Use correct fire extinguisher if you have been trained and it is safe to do so.

**Arrangements for monitoring effectiveness of control:**

Daily inspection of equipment by lab technician.

Annual preventative maintenance carried by external contractor (Priorclave Ltd).

Instruction and training given to all operators which is reviewed annually.

Existing operators receive annual refresher training.

Annual pat testing by external contractor.

Annual insurance inspection by Zurich engineer to comply with pressure systems safety regulations.





