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திகதி ) 02/08/2023  
Date )

Deputy Director Generals/ National Hospital of Sri Lanka/ Kandy  
All Provincial Directors of Health Services  
All Regional Directors of Health Services  
All Directors of Teaching Hospitals  
All Directors of District General Hospitals  
All Medical Superintendents of Base Hospitals

### Technical Specifications for an Ash Pit

Incineration is being carried out as a recommended method of managing infectious and sharps wastes generated in healthcare settings. The residues generated after incineration is considered as hazardous. As such, it has to be disposed of in a proper manner as per the environmental regulations in Sri Lanka. Currently there are no hazardous landfills in Sri Lanka. Therefore, healthcare facilities with on-site incinerators are required to dispose of the ash in an "Ash Pit" as a temporary solution.

The Directorate of Environmental and Occupational Health has finalized the specifications for ash pits with the technical inputs from the Waste Management Authority – Western Province.

The specification detail for an ash pit is attached for your information.

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Deputy Director General (Covering up)

Environmental and Occupational Health and Food Safety

Deputy Director General  
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# **Technical Specifications for Ash Pits (to dispose of residues generated after incineration of infectious and sharps wastes)**

*Technical specifications for the development of this document - by Waste Management Authority – Western Province*

*Reviewed and approved - by Engineering Branch - Ministry of Health*

## **1. Purpose**

Incineration is being carried out as a recommended method of managing infectious and sharps wastes generated in healthcare settings. Since the residues which are generated after incineration are hazardous, it has to be disposed of in a proper manner. In Sri Lanka, there are no hazardous landfills. Therefore as a temporary measure, healthcare facilities having incinerators are advised to construct ash pits and dispose of the residue into those. The ash pits have to be built in a proper manner to prevent environmental pollution.

## **2. Scope**

This document is a technical specification and covers a variety of designs for ash pits. It provides guidance on the siting, construction, use, and aftercare of ash pits. There are many similarities between the designs of sharps pits, ash pits, and placenta pits. However, there are some important differences. For example, where placenta pits are designed to leach liquid, ash pits must be fully sealed to prevent the pollutants in the ash from leaching out. Large plastic containers are an option for sharps but cannot be used for ash because any hot material remaining in the ash could melt the plastic.

## **3. Materials and Equipment**

- For the construction of the ash pit:
  - Pit - shovels, picks, etc.
  - Slab - concrete; though wood can be used only in emergency situations
  - Cover - concrete, though wood or plastic can be used in emergency situations
  - Lining or impermeable slab seating – concrete, bricks, clay, or preformed concrete rings approx. 1 m diameter
  - Ground level - mason's tools
  - Drainage ditch - plastic pipe (diameter: 40 to 50 mm)
  - Hinges, padlock and fittings for the lid
  - Fencing materials (if the pit is not to be built in an already secure area)

➤ For use of the ash pit:

- Personal protective equipment including overall or apron, closed shoes or boots, facemask, goggles and heat resistant (leather) gloves
- Heatproof (metal) bucket with lid
- Small shovel that can fit into the grate if necessary
- Brush

#### 4. Hazards and Safety Concerns

**Heat**—hot ash can cause burns and can also be blown by the wind, making it hazardous to handle when hot. Only handle ash when it has cooled.

**Toxicity**—ash contains dioxins and heavy metals. Concentrations will vary with the waste incinerated and the conditions of incineration.

**Environment and food contamination**—ash is easily spread by the wind and many of the contaminants that it contains can be transported globally. These pollutants can also be taken up by domestic animals such as chickens and cows and passed on via eggs, meat and milk. If water gets into the ash pit, it can leach pollutants into the soil.

**Sharps**—incineration will not destroy broken glass, needles, lancets, scalpels that can cause injury.

#### 5. Procedures

- Planning before construction of the pit
- Decide on the capacity required. Infectious waste is not very dense, so a volume reduction of around 95% can be anticipated. There should be enough capacity to take 5 years' production of ash. If this is too much for one pit, two should be made. The amount and density of waste produced will vary from facility to facility, so it is best to estimate the ash volume based on your facility's waste. Data needed are:
  - Amount of waste (kg) produced per day in the facility. This should be known from the baseline assessment.
  - The density of waste to be incinerated. A simple way to estimate this is to fill a 50-liter bin with waste, weigh it, and subtract the weight of the bin to give the weight of 50 liters of waste in kilograms. Multiply this by 20 and you will have the weight of 1,000 liters or 1 cubic meter.
  - Percentage of ash remaining after incineration. If you do not know this, assume 5%.
- Calculate the volume of ash to be produced over 5 years as follows:

$$\text{Volume} = \frac{\text{Weight of waste produced in a}}{\text{}} \times \text{Number of days} \times \% \text{volume}$$

$$\text{of Ash (m}^3\text{)} = \frac{\text{day (kg)}}{\text{Density of waste (kg/m}^3\text{)}} \times \text{in 5 years (1825 days)} \times \text{remaining (number/100)}$$

As an example, a 100 bed produce 60 kg of waste each day with a density of 225kg/m<sup>3</sup>. Assuming 95% volume reduction (i.e., only 5% of the volume remains after incineration, the calculation would be:

$$\text{Volume of Ash (m}^3\text{)} = \frac{60 \text{ kg/day}}{225 \text{ (kg/m}^3\text{)}} \times 1825 \text{ days} \times 5\% = 24.3\text{m}^3$$

As per the site availability designing of the ash pit can be done as follows.  
For cylindrical shaped ash pit,

$$\text{Volume of Ash (m}^3\text{)} = \frac{(\text{Diameter (m)})^2}{4} \times \frac{22}{7} \times \text{Depth of pit (m)}$$

For Cuboid shaped ash pit,

$$\text{Volume of Ash (m}^3\text{)} = \text{Length (m)} \times \text{Width (m)} \times \text{Depth of pit (m)}$$

You can reverse the equation according to the limiting dimensions. (In most cases depth become as limiting factor due to level of water table or obstacles while at digging the earth. As well as it is better to keep the depth to be easy for construction and the maintenance (cleaning and refreshing at delivering ashes to central ash pit in future)). If the Volume is much high, then multiple ash pit can be recommended.

Select appropriate site for the pit. It should be:

- As close to the incinerator as possible; indeed, sometimes they are constructed underneath the incinerator so that ash can be scraped directly from the grate into the pit.
- In a secure, non-public area that cannot be accessed by feral or domestic animals.
- Consider the local soil type.
- If the soil is particularly sandy it may require extra reinforcement to prevent the pit collapsing.
- If the subsoil is very rocky and/or has a lot of cracks, the pit may be partially made of bricks above ground.
- Check that the pit will not affect the groundwater, or be affected by it.
- Ash pits are not recommended in sites where the water table is near the surface or in

areas prone to flooding.

- At least 1.5 m from the bottom of the pit to the groundwater level is recommended.
- Dig a test pit and insert a narrow metal pipe or bar into the soil to a depth of 1.5 m. If the end of the bar is wet or soil removed from the pipe is wet, the pit may be too close to the ground water. Note that recent heavy rain may affect the results.
- If the groundwater is too close to the bottom of the test pit, consider other options:
- Changing the design of the pit to make it wider but shallower.
- Creating more, shallower pits.
- Creating a pit that is partially made of bricks above ground.
- Pit construction
- Gather the necessary materials and tools, as described above.
- Dig the pit.
- Reinforce the bottom of the pit. Concrete is the preferred material. Bricks can be used as long as the pit is fully watertight.
- Reinforce the sides of the pit.
- The entire area of the pit must be lined for stability and to prevent leaching.
- Options for reinforcement include:
- Concrete
- Preformed concrete ring (approx. 1 m diameter)
- Bricks—can be used so long as the pit is fully watertight
- Make a slab with the following specifications:
- Large enough to cover the pit and extend at least 15 cm beyond its edges.
- About 7 cm thick.
- With a disposal hole of about 30 x 40 cm.
- A lip around the edge of the disposal hole is recommended to prevent rainwater getting in.
- Make a lid for the hole.
- Connect it to the slab with some kind of hinges.
- Add a padlock for security and/or to close the pit permanently once it is full.
- Place the slab over the pit.
- The slab should be slightly raised above soil level to prevent runoff water from entering the pit.
- Make a drainage channel around the pit to prevent runoff water from entering and to protect the walls of the pit.
- Use of the ash pit

- Check equipment.
- Check and don PPE.
- Check the ash is cold enough to handle safely. It is common to leave the incinerator to cool overnight after use and remove the ash the following morning.
- Remove the ash from the grate.
- Unlock the top of the ash pit, and put the new ash in.
- Note the amount of space remaining in the pit.
- Lock the pit.
- If the pit is becoming full, or has reached particular fill levels (half full, three quarters full), notify the waste manager so that there is time to construct another pit or investigate other disposal options before the situation becomes critical.
- Clean and put away equipment at the end of the day.
- Record any incidents and accidents using standard procedures.
- Closure of the ash pit
- Once the ash pit has full, it should be sealed. It may be locked or sealed with concrete.
- Management should retain records of the location of the pit for future reference.

## **6. Reporting and Recordkeeping**

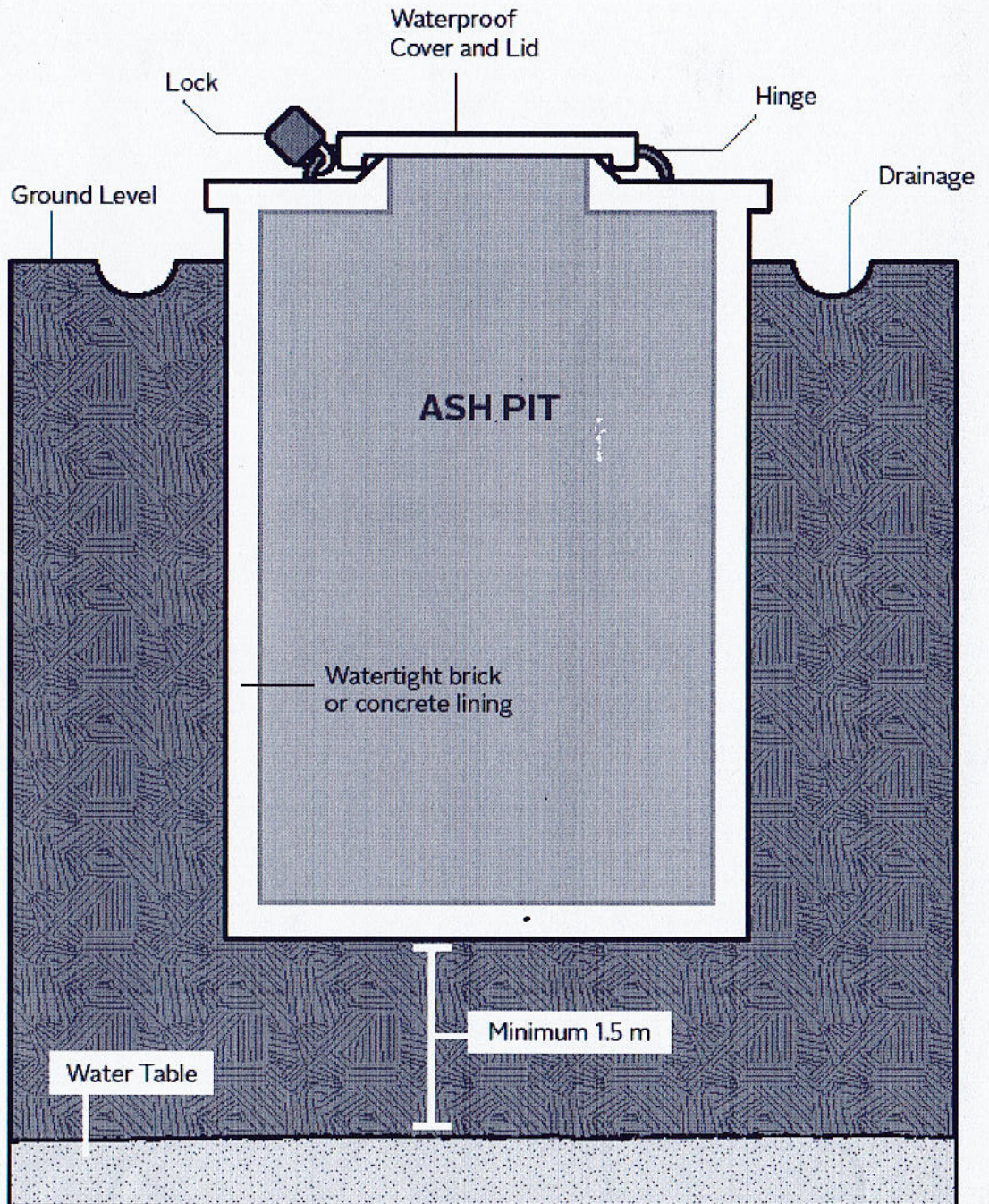
No regular reporting is needed for the use of the ash pit.

Accidents and incidents should be reported through the normal channels and procedures.

The user(s) of the ash pit should report to the waste manager when the ash pit is half full and three-quarters full so that the necessary arrangements can be made to construct any new one that is needed.

## 7. Attachments

Ash Pit diagram



Refer to the text for more information about sizing.