



Reducing UPOPs and Mercury Releases from
The Health Sector in Africa



**Infrastructure Requirements for the setup of
healthcare waste treatment systems**

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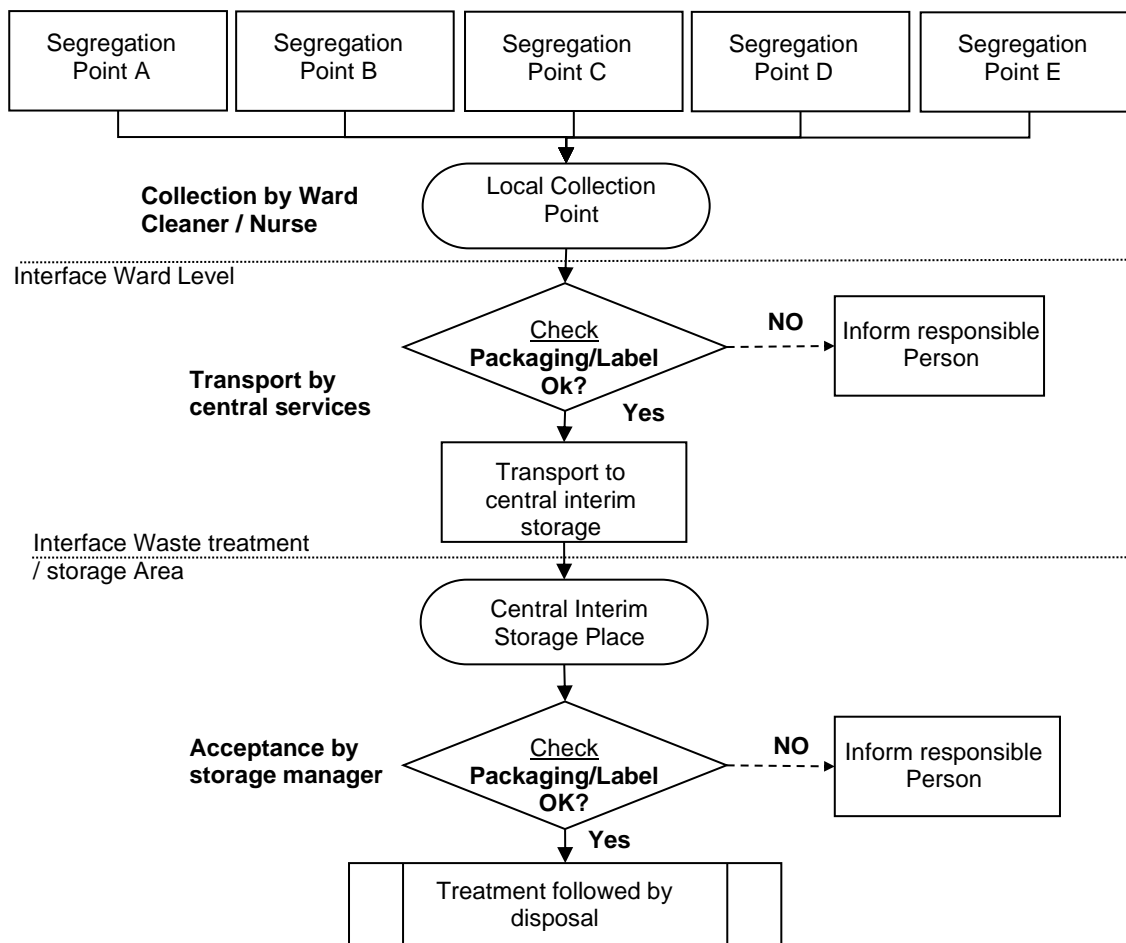
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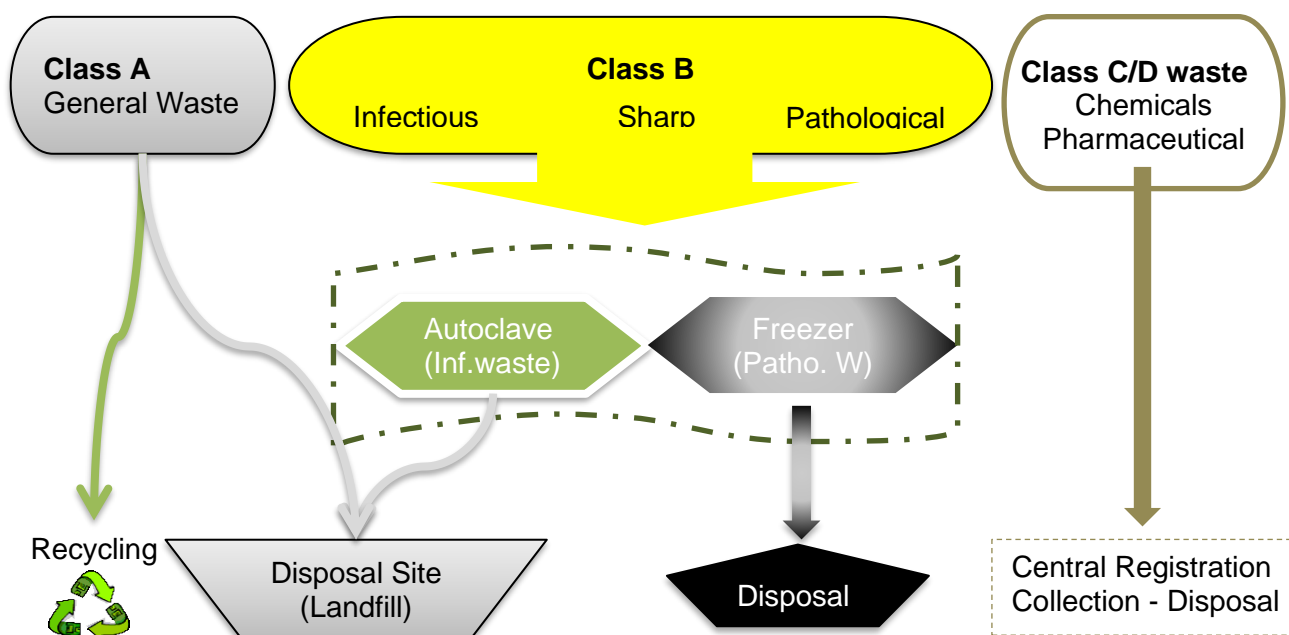
1 General Information & Requirements

Within the project: “Reducing UPOPs and Mercury Releases from The Health Sector in Africa”, it is planned to provide in the first round non-incineration treatment technologies for 3 health centres and 2 hospitals to enable these to set up an efficient waste management system. The general waste collection process within a healthcare unit will be as followed:



To enable the healthcare facilities to carry out this working process, the setup of adequate infrastructure is required.

The healthcare facilities are expected to treat the waste classes B1 and B2 at their facility. Also it is expected that the hospitals might will receive Class B waste from other nearby healthcare facilities for treatment. Health centres will only treat their own waste. Class C & D waste will be safely stored and form time to time collected and disposed of. For the treatment of Class B waste, steam based treatment technologies (e.g. autoclaving) shall be the preferred solution. In the following, an overview of the healthcare waste treatment and disposal strategy for the healthcare facilities is displayed:



For the management and treatment of the waste, a functional site, designed under consideration of logistic aspects, will be needed. Based on general waste management aspects and the existing regulations, following main areas are required:

- A) Non-infectious, hazardous waste storage
- B) Treatment & storage area for infectious waste
- C) Multipurpose storage area
- D) Multipurpose waste storage for recycling

In the following, sample designs for waste treatment areas are provided.

Note: Depending of the calculated yearly amount of waste, the healthcare facilities are divided in

Small hospital (Type A): Hospitals with <150 beds

Large Hospital (Type A-2): Hospitals with 150-300 beds

Health Centres (Type B): Average Health Centre

Depending on the type, healthcare facilities will receive different types of treatment technologies, the requirements for the types are:

Requirements for Electricity:

- Type A: 380 V / 3~ / 50 Hz; Required Power 25 kW
- Type A-2: 380 V / 3~ / 50 Hz; Required Power 2 x 25 kW
- Type B: 380 V / 3~ / 50 Hz; Required Power 6 kW

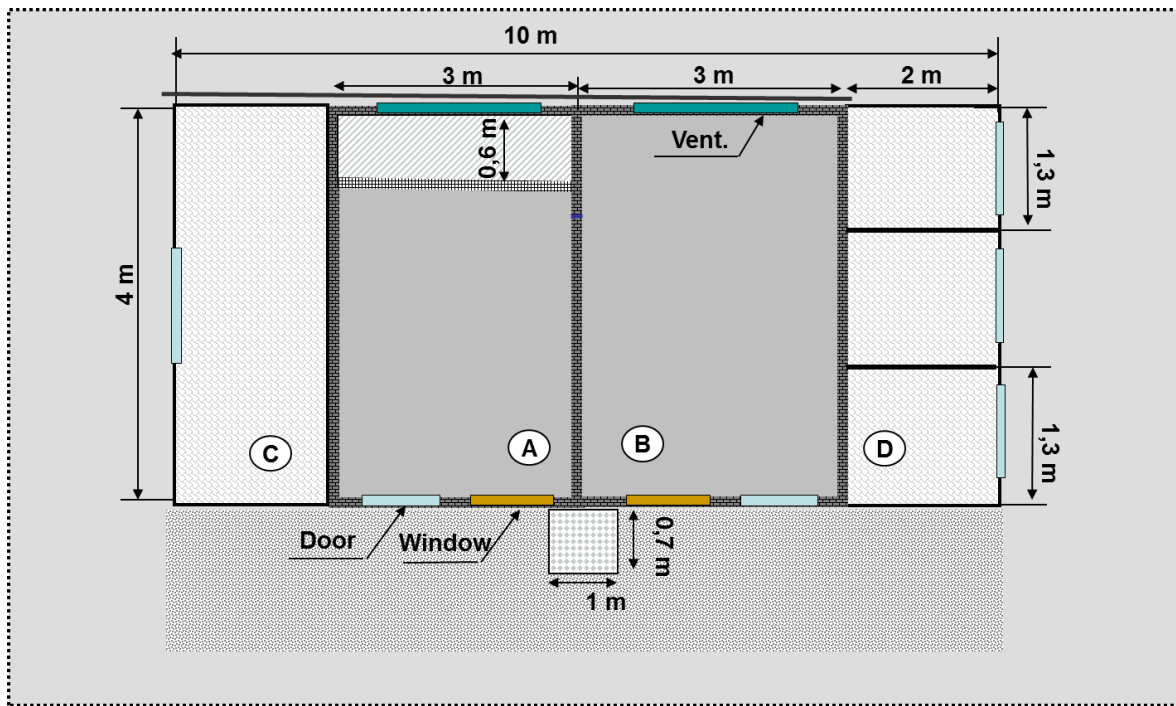
Requirements for Water:

- Type A: Stable, clean water supply, pressure minimum 4 bar
- Type B: Stable, clean water supply, free flow

2 Sample design for a hospital (Type A, A-2)

2.1 General building design:

In the following sketch, the general layout of the recommended building can be found:



Building requirements for different areas:

A) Hazardous waste storage

Task:

The incoming hazardous waste (Class D) will be registered, weight and placed ready for pick-up. Non-infectious, hazardous waste has to be interim stored until pick-up for final treatment and disposal. To be expected storage time for waste which cannot be on-site treated will be up to one year.

Sample structural requirement:

- Size: 4 x 3 m = 12m², minimum height 2,5 m;
- Floor: with flood concrete and epoxy coating;
- Equipped with a tiled water proof sump (0.6x3x0.5m) for the storage of liquid and chemical waste.
- 1 x Window (1600x1000 mm)
- 1 x Ventilation
- 1 x Lockable outside door with ventilation

B) Infectious waste treatment & Storage area

Task:

Class B waste from the hospital is collected and will be registered, weight and placed ready for treatment. The waste will be autoclaved after a sufficient amount of waste is collected.

This will be done in the area B). In front of this area (outside), a washing and disinfection place for bins, containers, etc. should be located.

Structural requirement:

- Size: 4 x 3 m = 12m², height 2.5 m.
- Floor: with flood concrete and tiles;
- Equipped with a washbasin for hand-washing
- 1 x Window (1600x1000 mm)
- 1 x Lockable outside door with ventilation
- 1 x outside washing place (1000x750x150), tiled, waterproof

C) Multipurpose storage area

Task: Waste management and housekeeping equipment & supplies should be stored here

Structural requirement:

- Attached to the main building
- Size: 2 x 4 m = 8m², minimum height 2 m.
- Floor: with flood concrete
- 1 x lockable door (padlock)

D) Multipurpose waste storage for recycling

Task:

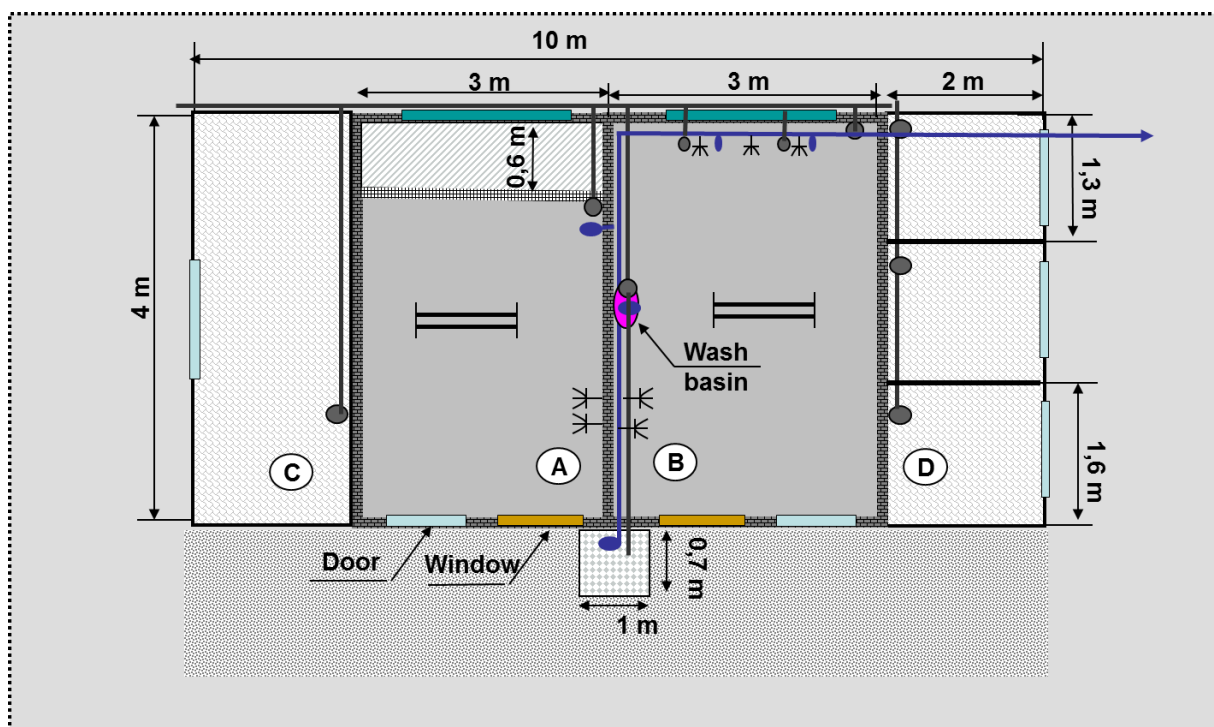
Simple storage, for the storage of different kind of non-hazardous waste (plastic waste, paper/cardboard, glass) for recycling.

Structural requirement:

- Attached to the main building
- Size: 2 x 4m = 8m², divided into three compartments, minimum height 2 m.
- Floor: with flood concrete
- 3 x lockable door (padlock)

2.2 Plumbing & electricity:

In the following sketch, the location of the needed connections for water, waste water and electricity can be found:



Electricity & plumbing requirements for different areas:

A) Hazardous waste storage

Plumbing & Electricity requirement:

- Floor Drain (DN 50)
- Water connection, 1 x ½", flow 25 l/min
- 2 x Power Point 220V, 16A
- 2 x Fluorescent lamp

B) Infectious waste treatment & Storage area

Plumbing & Electricity requirement:

- Water connection
 - i. 2 x ½", flow 10 l/min
 - ii. 2 x ¾" with flow of 25l/min, pressure 4 bar
- 2 x Floor Drain (DN 50)
- 1 x Sink Drain (DN 50)
- 2 x Syphonic drain (DN 50), anticorrosive
- 3 x Power Point 220V, 16A
- 2 x Power Point, electric intake tri-phase (III) + PE for 25 kW. With wire 3m (Note: this is the supply for the autoclaves and example only, please check the final requirements based on the number and type of autoclave which will be supplied)

C) Multipurpose storage area

Plumbing & Electricity requirement:

- 1 x Floor Drain (DN 50)

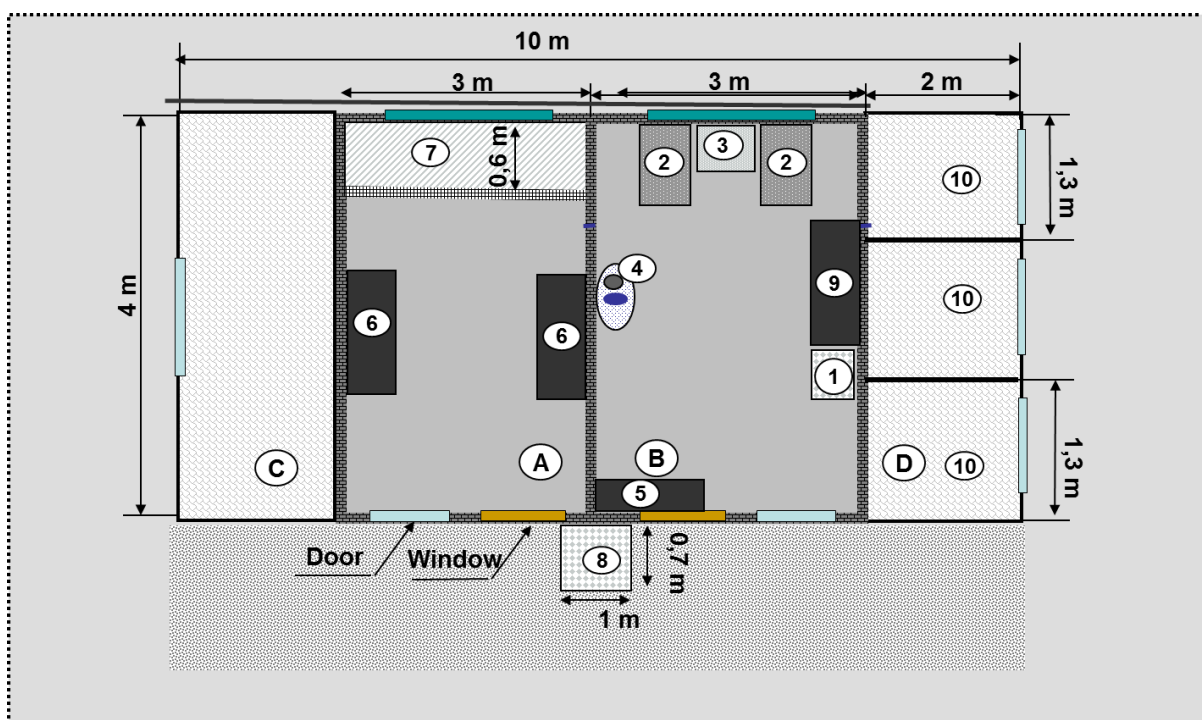
D) Multipurpose waste storage for recycling

Plumbing & Electricity requirement:

- 3 x Floor Drain (DN 50)

2.3 Equipment and area planning:

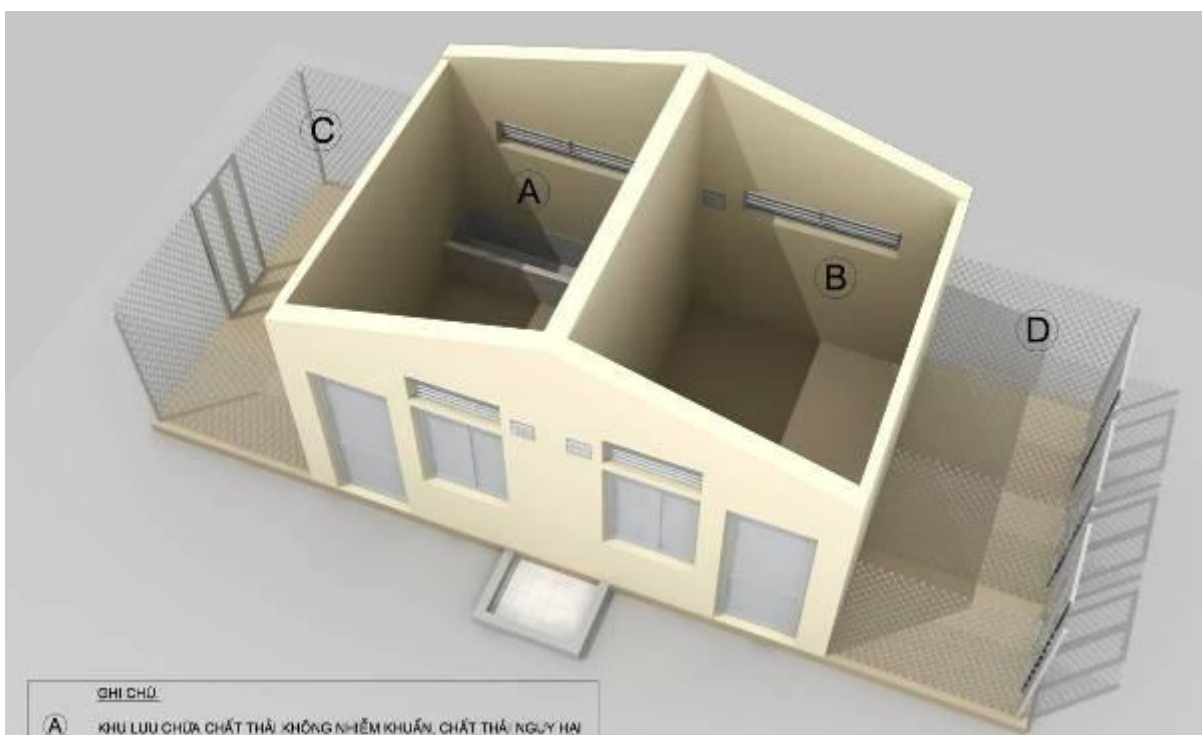
In the following sketch, the proposed location for equipment and the area planning for different activities is displayed:



Legend:

1	Ground scale	7	Storage area for liquid haz. waste
2	Small Autoclave	8	Container washing & disinfection
3	Water treatment	9	Storage area – waste equipment
4	Hand washing	10	Storage area – recyclables
5	Office Desk		
6	Storage area for solid haz. waste		

2.4 Design Recommendations:

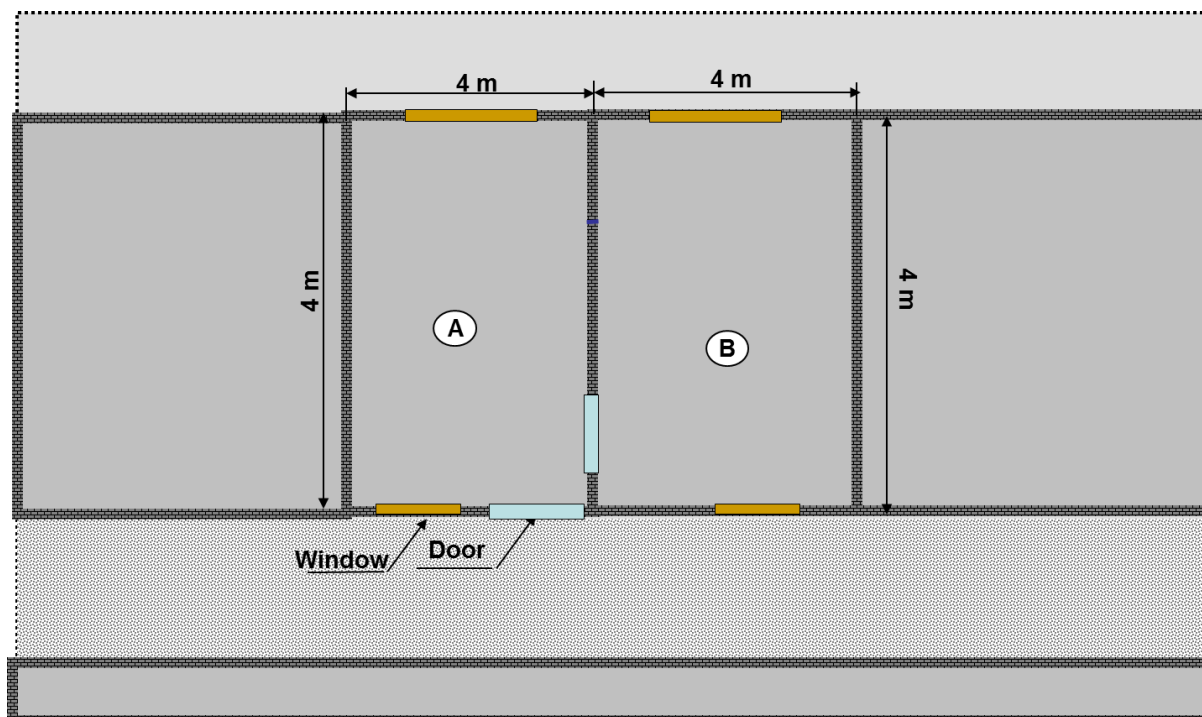


3 Sample design for Health Centres

For health centres it is expected that at least two rooms will be available for waste management. The refurbishment of existing buildings or the usage of existing rooms can be considered. In the following, a sample design for the usage of two existing rooms for waste management within a building is exemplary described.

3.1 General area planning:

In the following sketch, the general layout of the recommended set up can be found:



Case: In the Health Centre, the setup of a special building for healthcare waste was not possible. Instead two rooms with a size of each 16m² could be identified as future place for the management of healthcare waste.

A) Treatment & Management area for infectious waste

Task:

Class B waste from the health centre will arrive here. The incoming waste will be registered, weight and placed ready for treatment. The waste will be disinfected by steam (autoclaving) and will be placed ready for disposal

Structural requirement:

- Size: 4 x 4 m = 16m²
- Floor: with flood concrete and epoxy coating;
- Equipped with a washbasin for hand-washing
- 1 x Window
- 1 x Lockable outside door with ventilation

B) Infectious, hazardous waste storage & cleaning area

Task:

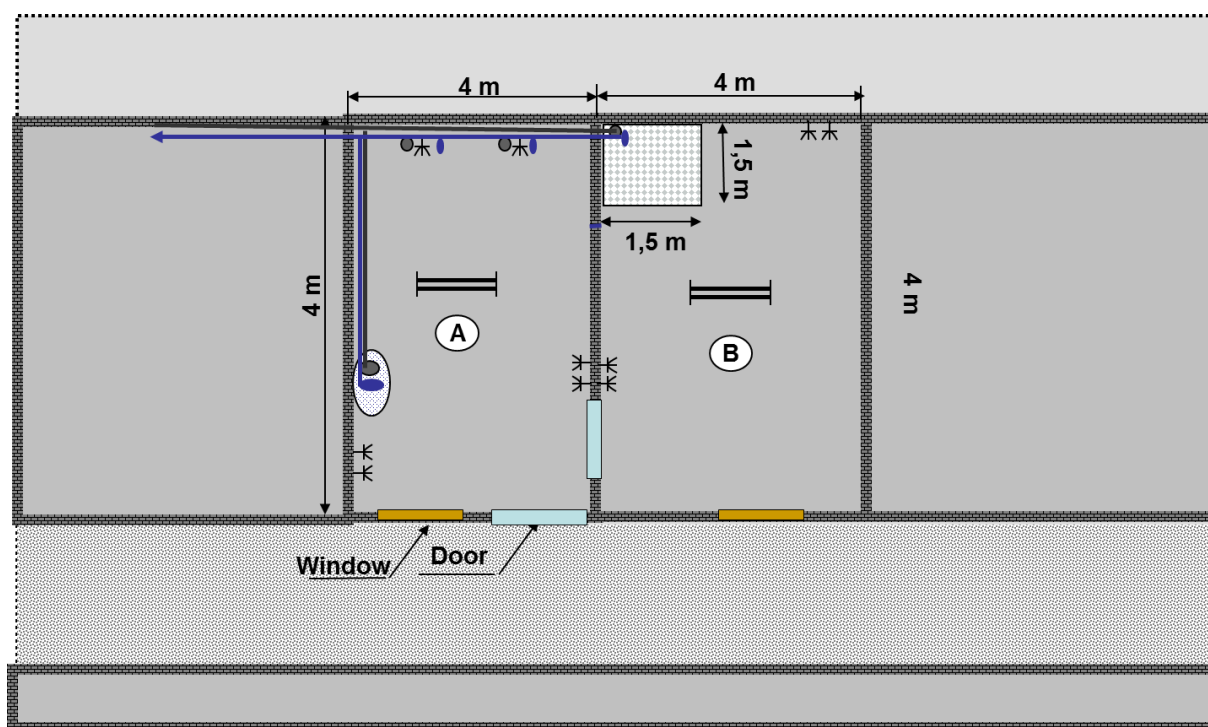
Infectious, hazardous waste has to be interim stored until treatment. Bins and buckets used for the collection, transport and treatment of waste have to be cleaned. In the area, a washing and disinfection place for containers is located.

Structural requirement:

- Size: 4 x 4,5 m = 18m², minimum height 2,5 m;
- Floor: with flood concrete and epoxy coating;
- 1 x washing place (1,5x1,5x0,1), tiled, waterproof
- 1 x Window
- 1 x Inside door

3.2 Plumbing & electricity:

In the following sketch, the location of the needed connections for water, waste water and electricity can be found:



Electricity & plumbing requirements for different areas:

- A) Treatment & Management Area for bio-hazardous waste

Plumbing & Electricity requirement:

- Water connection
 - i. 2 x 1/2", good flow
 - ii. 2 x 3/4", good flow
- 1 x Sink Drain (DN 50)
- 2 x Syphonic drain (DN 50), anticorrosive, must be able to resist a temperature of 100°C
- 2 x 2 Power Point 220V, 16A
- 1 x Fluorescent lamp

- 2 x Power Point, electric intake tri-phase (III) + PE for each 6 kW. With wire 3m (Note: this is the supply for the autoclaves and example only, please check the final requirements based on the number and type of autoclave which will be supplied)

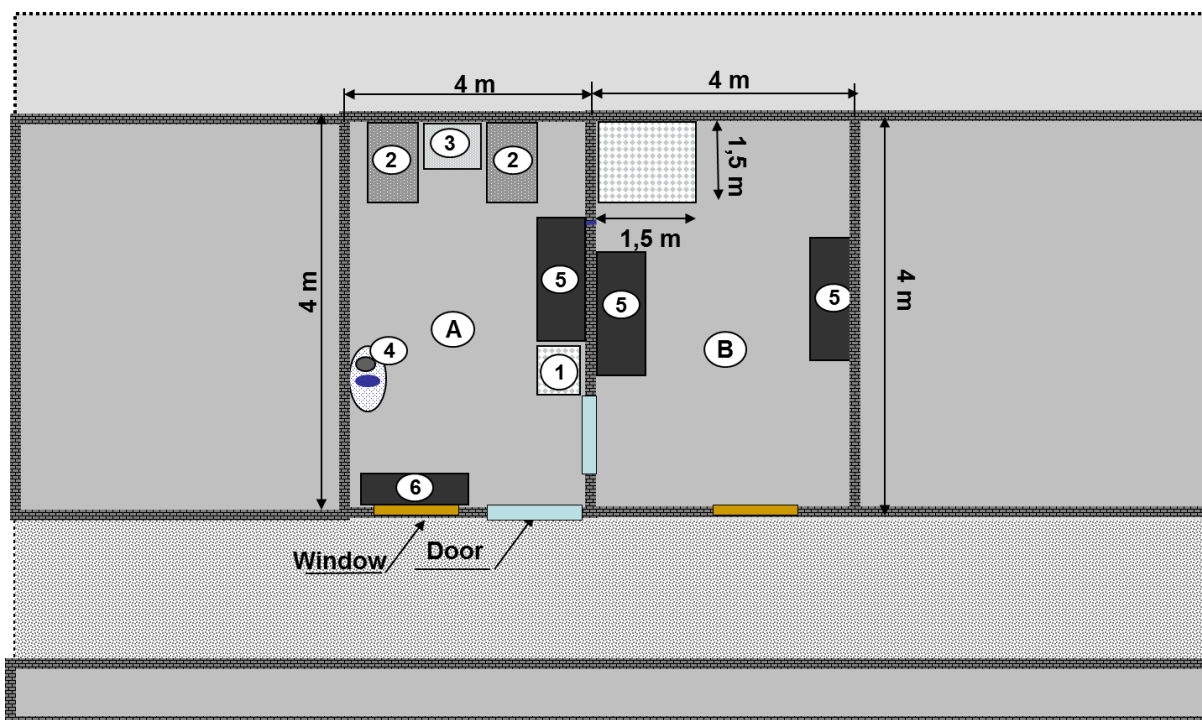
B) Infectious, hazardous waste storage & cleaning area

Plumbing & Electricity requirement:

- Floor Drain (DN 50)
- Water connection, 1 x ½", good flow
- 2 x Power Point 220V, 16A
- 2 x Fluorescent lamp

3.3 Equipment and area planning:

In the following sketch, the proposed location for equipment and the area planning for different activities is displayed:



Legend:

1	Ground scale
2	Waste treatment (autoclave)
3	Water distiller
4	Hand wash basin
5	Storage shelves
6	Office Desk