



# FANKUN® Incinerators



## **Multi-Functional System**

The Revolutionary Incineration Technology

For Permanent, Container and Mobile Incinerators

## Definitions of Waste



*Municipal Solid Waste*



*Medical Waste*



*Animal Carcass Waste*

### Municipal Solid Waste

Municipal Solid Waste (MSW), more commonly known as household waste, consists of everyday items we use and then throw away, such as product packaging, grass clippings, furniture, clothing, bottles, food scraps, newspapers, appliances, paint, and batteries. This comes from our homes, schools, hospitals and businesses.

### Medical Waste

Medical waste is all waste materials generated at health care facilities such as hospitals, clinics, physician's offices, dental practices, blood banks, and veterinary hospitals/clinics, as well as medical research facilities and laboratories.

### Animal Carcass Waste

Animal Carcass Waste is animal tissue, blood and body fluid as well as carcasses from primarily in clinical, hospital, research facilities, slaughter house and farms.

## Typical Impacts of Waste on the Environment and Public

### Municipal Solid Waste (MSW):

- Open burning of MSW produces nitrogen oxides and sulfur dioxide as well as trace amounts of toxic pollutants, such as mercury compounds and dioxins;
- Non-biodegradable and non-compostable biodegradable wastes that are capable of emitting greenhouse gases, toxic fumes, and particulate matters as they accumulate in open landfills;

- Underground water leaching in landfill area which increase the concentrations of  $\text{Cl}^-$ ,  $\text{NO}_3^-$ ,  $\text{SO}_4^{2-}$ ,  $\text{NH}_4^+$ , Phenol, Fe, Zn and COD in groundwater source;
- Breeding ground for pests such as rats, rodents, mosquitoes, flies and cockroach which can spread infectious diseases;
- Growth of microbial pathogens from organic waste fermentation can result in various types of infectious and chronic diseases to the waste workers and the rag pickers;
- Underground fire due to the heat from biological decomposition of uncover landfills; and
- Biodegradable waste that is buried in municipal solid waste landfills will decompose over many decades forming methane, carbon dioxide, and trace constituents that include hazardous air pollutants (such as mercury), volatile organic compounds, and hydrogen sulfide.
- Exposure to diseases when waste such as plastics and other recyclables are collected and sold for recycling;



*Underground fire*



*Rag pickers at landfill*



*Animals and birds at landfill*



*Dumping of waste in river*



*Open burning*



*Hazardous gas emission*

### **Medical Waste:**

- Water pollution from illegal dumping in landfill;
- Exposure to diseases when waste such as syringes and other recyclables are collected and sold for recycling; and
- Air pollution from open burning that releases dioxin and furan.



*Open burning of medical waste*



*Dumping medical waste in river*



*Collecting medical waste to sell for recycling*

### **Animal Carcass Waste:**

- Potential diseases that can spread from animal carcasses to human if not managed properly:
  - HIV - spread by chimpanzees
  - Hantavirus - spread by mice and rats
  - Avian flu – spread by chickens, ducks, birds and pigs
  - Rabies – spread by dogs
  - Ebola – spread by chimpanzees, gorillas, fruit bats, monkeys, forest antelope and porcupines
  - Swine flu – spread by pigs
  - Bubonic Plague – spread by rats and cats
  - Foot and mouth disease – spread by birds, arthropods and parasites
  - Toxoplasmosis – spread by cats
  - Anthrax – spread by gorillas and chimpanzees
  - Mad cow disease – spread by cattle
  - Middle Eastern Respiratory Syndrome (MERS) – spread by camels
  - SARS – spread by bats and civet cats
- Animal carcasses will be eaten by dogs, birds and other animals;
- Direct losses of methane from animals are due to fermentation caused by bacteria;
- Animal carcasses may contain bacteria and other diseased/ harmful organisms that can infect humans directly or through contamination of a residential water supply;
- Animal carcasses may contain bacteria and other diseased/harmful organisms that can contaminate soil; and
- Odor from rotten animal carcasses



*Birds eating animal carcass*



*Dogs eating animal carcass*



*Rotten animal carcass*



*Dumping of animal carcass in river*



*Dead pigs due to Swine flu*



*Mad cow disease*

## Typical Waste Management of Municipal Solid Waste



*Sanitary landfill*



*Incinerator*



*Open dumping*



*Recycling*

## SANITARY LANDFILL OF MUNICIPAL SOLID WASTE

### Advantages:

- volume of wastes can be increase with little addition of people/equipment
- no open burning, ultimate disposal
- low water/groundwater pollution
- can handle large amounts of wastes with less cost
- filled land can be reused for other community purposes

### Disadvantages:

- completed landfill areas can settle and requires maintenance
- requires proper planning, design, and operation
- noise and traffic
- dust and odor
- air pollution from toxic gases and volatile organic compounds
- releases greenhouse gases (methane and CO<sub>2</sub>)
- can leak and cause groundwater contamination
- slow decomposition of waste
- encourages waste production
- difficulty to find land in urban area
- operation is affected by weather condition

## INCINERATION OF MUNICIPAL SOLID WASTE

### Advantages:

- requires minimum land
- less pressure to find land for landfill
- can be operated in any weather
- produces stable odor-free residue
- refuse volume is reduced by half
- reduces volume of solid waste
- solid waste is safer after burning
- destroys biological threats such as bio-hazard waste
- burning some materials can create ash that is useful for fertilizer
- can trap all emissions in filters
- can be used to boil water and turn a turbine generator to make energy
- no ground water contamination

### Disadvantages:

- expensive to build and operate
- high energy requirement
- requires skilled personnel and continuous maintenance
- air pollution if flue gas treatment is not properly treated

## OPEN DUMPING OF MUNICIPAL SOLID WASTE

### Advantages:

- inexpensive

### Disadvantages:

- health-hazard - insects, rodents etc.
- damage due to air pollution
- run-off pollution
- dust and odor
- operation is affected by weather condition
- air pollution from toxic gases and volatile organic compounds
- releases greenhouse gases (methane and CO<sub>2</sub>)
- can leak and cause groundwater contamination
- slow decomposition of waste
- biological threat
- encourages waste production
- open to rag pickers
- difficulty to find land in urban area

## RECYCLING OF MUNICIPAL SOLID WASTE

### Advantages:

- discourage dumping of wastes
- key to providing a livable environment for the future
- reuse of raw materials such as plastic, metals, glass, paper and etc

### Disadvantages:

- expensive
- some wastes cannot be recycled
- technological push needed
- separation of useful material from waste difficult
- expose to biological and chemical contamination
- some waste recycling are not commercial viable

## Typical Waste Management of Medical Waste



*Autoclave*



*Microwave*



*Alkaline Hydrolysis Digester*



*Incinerator*

### AUTOCLAVE TREATMENT OF MEDICAL WASTE

#### **Advantages:**

- use steam and pressure
- destroy pathogens
- can be operated in any weather

#### **Disadvantages:**

- expensive
- high energy requirement
- some wastes cannot be treated
- need a shredder to make the waste into ash form
- separation of useful material from waste difficult
- need waste separation
- slow operation
- does not reduce waste as much as incinerator



## MICROWAVE TREATMENT OF MEDICAL WASTE

### Advantages:

- use microwave assisted with steam
- destroy pathogens
- can be operated in any weather

### Disadvantages:

- expensive
- high energy requirement
- some wastes cannot be treated
- need a shredder to make the waste into ash form
- separation of useful material from waste difficult
- need waste separation
- slow operation
- does not reduce waste as much as incinerator

## ALKALINE HYDROLYSIS DIGESTER TREATMENT OF MEDICAL WASTE

### Advantages:

- sodium hydroxide or potassium hydroxide to catalyze the hydrolysis of biological material
- destroy pathogens
- can be operated in any weather
- no emission
- only minor odor

### Disadvantages:

- large carbohydrate molecules such as cellulose are resistant to alkaline hydrolysis digestion
- cannot treat non-biological wastes
- small volume
- expensive
- biological and non-biological waste separation
- slow operation
- does not reduce waste as much as incinerator

## INCINERATION OF MEDICAL WASTE

### Advantages:

- use high thermal treatment
- reduce and eliminate waste's hazard
- can be operated in any weather
- produces stable odor-free residue
- make the waste into ash form
- destroy pathogens and sharp objects
- does not need waste separation

### Disadvantages:

- expensive to build and operate
- high energy requirement
- requires skilled personnel and continuous maintenance

## Typical Waste Management of Animal Carcass Waste



*Composting*



*Incineration*



*Alkaline Hydrolysis Digester*



*Landfill*



*Bones can't be destroyed through composting and landfill.*



*Animal carcasses fat, oil and grease byproducts from Alkaline Hydrolysis Digester.*



*Used and contaminated personal protection equipments can only be destroyed through incineration.*

## COMPOSTING OF ANIMAL CARCASS

### Advantages:

- inexpensive

### Disadvantages:

- health-hazard - insects, rodents etc.
- not suitable for animal carcasses contaminated with diseases
- run-off pollution
- odor
- operation is affected by weather condition
- releases greenhouse gases (methane and CO<sub>2</sub>)
- can leak and cause groundwater contamination
- slow decomposition of waste
- biological threat
- easily accessible by scavenging animals
- bones and teeth can't be destroyed
- difficulty to find land in urban area
- affected by weather

## INCINERATION OF ANIMAL CARCASS

### Advantages:

- use high thermal treatment
- bones and teeth can be destroyed
- can be operated in any weather
- produces stable odor-free residue
- make the waste into ash form
- destroy pathogens of animal carcasses contaminated with diseases
- does not need waste separation
- no ground water contamination
- no byproducts of animal carcasses fat, oil and grease
- used and contaminated personal protection equipments can be destroyed easily

### Disadvantages:

- expensive to build and operate
- high energy requirement
- requires skilled personnel and continuous maintenance

## ALKALINE HYDROLYSIS DIGESTER TREATMENT OF ANIMAL CARCASS

### Advantages:

- sodium hydroxide or potassium hydroxide to catalyze the hydrolysis of biological material
- destroy pathogens
- can be operated in any weather
- no emission
- only minor odor

### Disadvantages:

- large carbohydrate molecules such as cellulose are resistant to alkaline hydrolysis digestion
- bones and teeth can't be destroyed easily
- byproducts of animal carcasses fat, oil and grease
- small volume
- can't destroy used and contaminated personal protection equipments
- waste water

## LANDFILL OF ANIMAL CARCASS

### Advantages:

- inexpensive

### Disadvantages:

- health-hazard - insects, rodents etc.
- not suitable for animal carcasses contaminated with diseases
- run-off pollution
- odor
- operation is affected by weather condition
- releases greenhouse gases (methane and CO<sub>2</sub>)
- can leak and cause groundwater contamination
- slow decomposition of waste
- biological threat
- easily accessible by scavenging animals
- bones and teeth can't be destroyed
- difficulty to find land in urban area
- affected by weather

# FANKUN XBF-B

## Multi-Functional Modular Container Incineration System

FANKUN XBF – B Multi-Functional Modular Container Incineration System is exceptionally strong and highly mobile. It is designed with high incineration efficacy to incinerate large volume of wastes quickly at waste sites.

FANKUN XBF-B is specifically developed as a multi-functional incineration system to incinerate various range of materials such as animal carcasses resulting from catastrophic events (such as oil spillages, earth-quakes and typhoons) or outbreaks of disease (such as Avian Flu, Foot & Mouth disease, BSE and Swine Fever), medical waste, contraband (such as illegal drugs) and household wastes.

FANKUN XBF-B modular containerization is the most feasible and viable option in contrast to the construction of on-site facilities and housing structures, eliminating the man power and costs involved. It is also the quickest way to effectively contain the outbreak of disease and epidemics. Bio-security is assured by moving the incinerator rather than the diseased carcasses.



# FANKUN®

Modular Container Incinerator

# FANKUN XBF-B-1

## Multi-Functional Mobile Container Incineration System

**Advantages of FANKUN XBF-B-1 multi-functional modular container incinerator:**

### Large volume capacity

Its multi-functional modular container incineration is an unrivalled force in the incineration of large volumes of waste. It will incinerate continuously, making use of our unique air purification system.

### High burning capacity

It has an approximately incineration capacity of 8-12 T/day for household wastes or animal carcass with a residue rate of less than 3-5%. Its per hour burn rate ensures that a single unit can incinerate around 8,000 chickens a day (with an average weight of 1 kg).

### Unique mobility

Modular containerization enables immediate waste management as the units are fully assembled and pre-installed. It can be hoisted onto a trailer by crane and maneuvered into waste sites in farms, remote areas, towns, villages, tourist spots and disaster areas.

### Fast deployment

Modular containerization is the most feasible and viable option in contrast to the construction of on-site facilities and housing structures, eliminating the man power and costs involved.

### Easy to use

With automatic burn cycles and a waste transfer unit, its simplicity offers effortless operation, despite its size.

### Robust construction

Built with high quality materials, the FANKUN XBF-B-1 offers reliable service when it is needed the most, designed to cope with the intensive wear and tear of incineration.

### Legislation compliance

FANKUN XBF-B-1 is fully compliant for efficiency and cleaner emissions.



## FANKUN XBF-B-1

### Key Specifications:

Stationery in one container c/w one independent incineration system and one separated flue gas treatment system.

Incineration capacity\*: 8 -12T/24 hours

Overall Length: 12 m

Overall Width: 2.4 m

Overall Height in transit: 2.7 m

Overall Height in operation (with standard stack): 4 m

Total Weight: 28 tons

Vehicle Transition Speed: ≤ 60 km/hr

*\*based upon the calorific value of waste stream.*

*Specifications subject to change for continuous improvement.*

# FANKUN®

Modular Container Incinerator

# FANKUN XBF-B-1

## Technical Specifications



### Waste Type:

Whole animal carcass remains or animal carcass waste, medical and household waste.

### Construction:

Mild steel welded fabrication consisting of sheet steel and structural section supports and bracings.

### Lining:

**Chamber** - Consists of high grade zirconium ceramic fiber blanket which are lightweight, thermally efficient, low heat storage and complete resistance to thermal shock to replace traditional refractory bricks.

### Dimensions of Chambers:

Primary Chamber: Length = 1850 mm, Width = 1350 mm, Height = 1340 mm

Secondary Chamber: Length = 890 mm, Width = 1350 mm, Height = 1350 mm

### Temperature of Chambers:

Primary Chamber: 850°C ~ 950°C

Secondary Chamber: 900°C ~ 950°C

### Chamber Pressure:

Primary Chamber: -5 Pa ~ -30 Pa

Secondary Chamber: -5 Pa ~ -30 Pa

### Burners:

Fully automatic, high efficiency burners with electronic ignition, flame recognition and combustion control devices fitted.

### Energy Consumption:

It is determined by the heating value of burning objects as below:

Heating value >1300 kcal/kg, close to zero fuel consumption;

Heating value between 1000 kcal ~ 1300 kcal/kg, consumption  $\geq 15$ L/hr;

Heating value < 1000 kcal/kg, consumption  $\geq 20$ L/hr.

# FANKUN XBF-B-1

## Technical Specifications



### Fuel Supply:

Light diesel grades from -10# to 30#. (Please refer to “[www.sinopecsenmeifj.com](http://www.sinopecsenmeifj.com)” for China diesel grading)

### Furnace Surface Temperature:

Temperature of Furnace Surface:  $\geq 65^{\circ}\text{C}$ ; some other parts are  $80^{\circ}\text{C}$ .

### Controlling Method:

Automatic closed loop control system and high voltage power button.

### Capacity

Incineration capacity: 8 -12T/24 hr

Total Installed Capacity: 35 kW/hr

### Flue Gas Purification System:

Smoke elimination tube, heat exchanger, neutralizing solution injector, neutralization, cooler, de-dusting filter bag and high pressure liquid circuit.

### Compliance:

The content and total emission of various pollutants in flue gas meet the China Standard of “Life Garbage Incineration Pollution Control Standards - GB18485-2001”.

Flue gas smoke stays at zero level based on Ringelmann Scale at all time. No waste water produced.

Dioxin - passed the China standard of “National Environment Analysis Testing Center - Environment Inspection Report”

Residual rate: < 3-5% with no waste water produced.

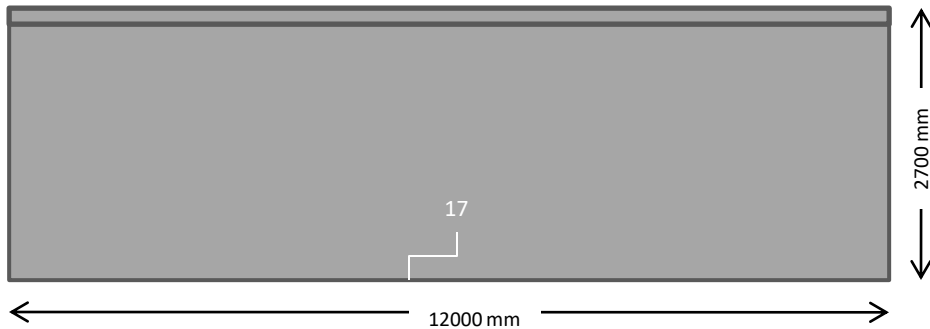


# FANKUN XBF-B-1

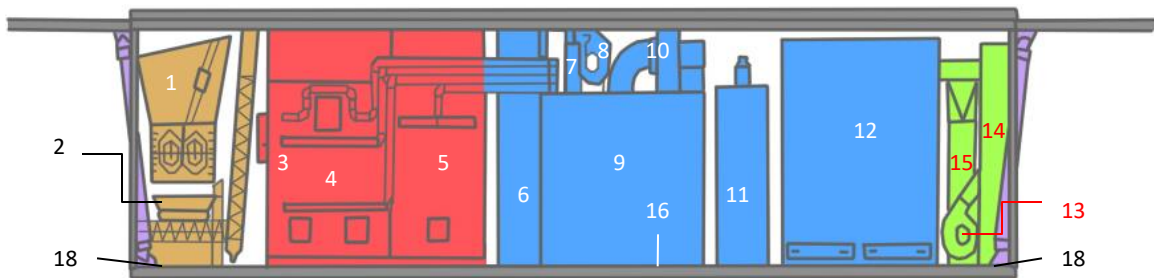
## Technical Specifications



### Schematic Diagram:



FANKUN XBF-B-1 outer dimension



FANKUN XBF-B-1 internal and operation schematic diagram

Diagram Number	System Name	Function
1 - 2	Transfer Unit	Lifting, crushing and transporting of waste for incineration.
3 - 5	Incineration	Waste feeding, combustion chamber and combustion support.
6 - 12	Cooling	Flue gas cooling.
13 – 15	Exhaust	Flue gas treatment and emission.
16	Base	Fixed base.
17 - 18	Power Supply	Automatic control, manual control and emergency control system.

# FANKUN XBF-A

## Multi-Functional Mobile Incineration System

**Advantages of FANKUN XBF-A multi-functional mobile incinerator:**

### Large volume capacity

Its multi-functional mobile incineration is an unrivalled force in the incineration of large volumes of waste. It will incinerate continuously, making use of our unique air purification system.

### High burning capacity

It has an approximately incineration capacity of 8-12 T/day for household wastes or animal carcass with a residue rate of less than 3-5%. Its per hour burn rate ensures that a single unit can incinerate around 8,000 chickens a day (with an average weight of 1 kg).

### Unique mobility

Mobile incinerator enables immediate waste management as the units are fully assembled and installed on a trailer platform. It can be quickly towed and maneuvered into waste sites in farms, remote areas, towns, villages, tourist spots and disaster areas.

### Fast deployment

Mobile incinerator is the most feasible and viable option in contrast to the construction of on-site facilities and housing structures, eliminating the man power and costs involved.

### Easy to use

With automatic burn cycles and a waste transfer unit, its simplicity offers effortless operation, despite its size.

### Robust construction

Built with high quality materials, the FANKUN XBF-A offers reliable service when it is needed the most, designed to cope with the intensive wear and tear of incineration.

### Legislation compliance

FANKUN XBF-B-1 is fully compliant for efficiency and cleaner emissions.



## FANKUN XBF-A

### Key Specifications:

The whole incineration and flue gas treatment system is installed on the platform of a trailer.

Incineration capacity\*: 8 -12T/24 hours

Overall Length: 13 m

Overall Width: 2.5 m

Overall Height in transit: 2.7 m

Overall Height in operation (with standard stack): 4 m

Total Weight: 24 tons

Vehicle Transition Speed: ≤ 60 km/hr

*\*based upon the calorific value of waste stream.*

*Specifications subject to change for continuous improvement.*

# FANKUN®

## Mobile Incinerator

# FANKUN XBF-A

## Technical Specifications



### Waste Type:

Whole animal carcass remains or animal carcass waste, medical and household waste.

### Construction:

Mild steel welded fabrication consisting of sheet steel and structural section supports and bracings.

### Lining:

**Chamber** - Consists of high grade zirconium ceramic fiber blanket which are lightweight, thermally efficient, low heat storage and complete resistance to thermal shock to replace traditional refractory bricks.

### Dimensions of Chambers:

Primary Chamber: Length = 1850 mm, Width = 1350 mm, Height = 1340 mm

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# FANKUN XBF-A

## Technical Specifications



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Temperature of Furnace Surface:  $\geq 65^{\circ}\text{C}$ ; some other parts are  $80^{\circ}\text{C}$ .

### Controlling Method:

Automatic closed loop control system and high voltage power button.

### Capacity

Incineration capacity: 8 -12T/24 hr

Total Installed Capacity: 35 kW/hr

### Flue Gas Purification System:

Smoke elimination tube, heat exchanger, neutralizing solution injector, neutralization, cooler, de-dusting filter bag and high pressure liquid circuit.

### Compliance:

The content and total emission of various pollutants in flue gas meet the China Standard of “Life Garbage Incineration Pollution Control Standards - GB18485-2001”.

Flue gas smoke stays at zero level based on Ringelmann Scale at all time. No waste water produced.

Dioxin - passed the China standard of “National Environment Analysis Testing Center - Environment Inspection Report”

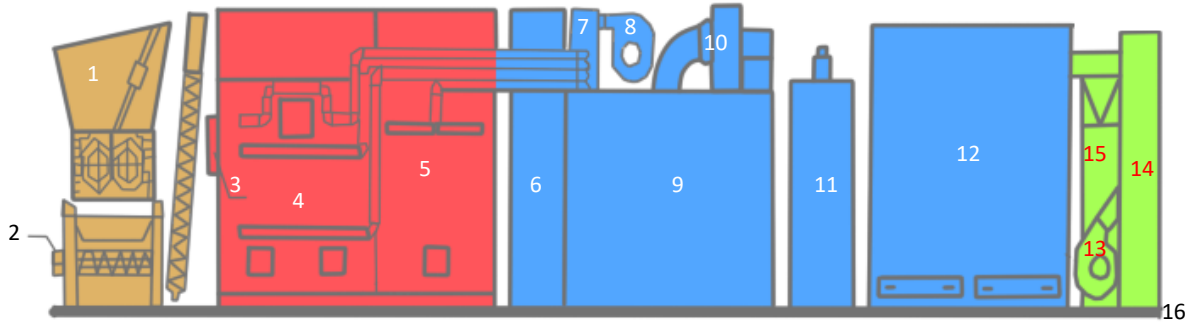
Residual rate: < 3-5% with no waste water produced.

# FANKUN XBF-A

## Technical Specifications



### Schematic Diagram:



FANKUN XBF-A schematic diagram



FANKUN XBF-A ready for delivery

Diagram Number	System Name	Function
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16	Base	Fixed base.
18	Power Supply	Automatic control, manual control and emergency control system.

## Incineration Process

The Incineration Process comprises of incineration→cooling→neutralization→filtration→discharging processes which are fully controlled under a “closed-loop auto control system.

### 1. Feeding waste into the incineration chamber:

Waste is fed to an automatic elevating bucket conveyor to a crusher. The crusher will reduce large waste to a smaller size which can be fed continuously to the incinerator through a feeding device.

### 2. Combustion in primary and secondary combustion chambers:

The broken waste will be incinerated in the primary combustion chamber under the temperature of 850°C~950°C for complete combustion. Flue gas arisen from the primary chamber will be transferred into the secondary combustion chamber to assure complete combustion of organic residuals. The flue gases which have highly toxic harmful organic pollutants such dioxin and furan will be oxidized in the secondary combustion chamber at the temperature of 900°C~950°C.

### 3. Flue Gas Treatment:

The final unit of the incineration plant is one of the most important parts as it has the objective of cleaning the air pollutants produced. Incinerated waste produces pollutants such as dust, heavy metals and flue gases. Combinations of several individual cleaning components are utilized to provide an effective overall flue gas treatment system.

- Flue gas cooling

From the incinerator, exhaust flue gases are passed to a heat exchanger and a neutralizing cooler where the combustion gases are cooled to a temperature where they are suitable to pass through the flue gas treatment system. The neutralizing cooler will remove various acidic pollutants through neutralization reaction process.

- Filtration

The filtration system in the flue gas treatment will remove flue gas pollutants as followings:

- particular matter which size ranges from 1μm to 1mm up to 99.9%;
- the remaining of organic pollutants particularly dioxin and furan from secondary combustion chamber to almost complete elimination;
- heavy metals up to 95%; and
- the remaining acid pollutants from neutralizing cooler up to further 80%.

Purified flue gas will be discharged from the lower chimney through an induced draft fan.

### 4. Disposal of remaining waste residue:

Remaining waste residue of less than 3-5% will be handled manually. Technologies to recycle it into fertilizers, soil conditioner and building materials are available upon request.