

## INCINERATOR OPTIONS

Our Surefire range of incinerators are engineered to provide a safe efficient solution for the disposal of a wide range of wastes, such as hazardous, medical, animal, general and liquid waste streams.

The scope of supply includes, but is not limited to:

Rotary combustion chambers	Starved air gasification units
Fixed hearth units	Thermal oxidisers
Hot incandescent hearth units	Sludge/liquid waste incinerators
Stepped hearth combustion chambers	Waste oil combustion plant
Containerised incinerators	Waste to energy systems
Mobile incinerators	



### Surefire TS Fixed Hearth Incinerators

The Surefire TS range of fixed hearth incinerators has numerous examples throughout the world and offers an efficient and environmentally clean solution to the problems associated with the disposal of a variety of waste types.

#### Applications

For the simple and cost effective disposal of bulk and batch loads of medical, general and animal remains wastes.

#### Throughput Capacities

Up to 300kg/hour in the standard format

#### Basic Plant Description

The plant will comprise of:

- Manual Loading
- Automatic Loading (subject to capacity)
- Main combustion chamber
- Secondary after burning emission control chamber
- Discharge chimney

After removing ash from the cool chamber each morning, the plant will be cycled through a Pre-heat period. During this period the afterburner operates, to elevate the secondary chamber to temperature in excess of the temperature defined by the applicable environmental standard. Once this has been achieved, after about 15 minutes, and recognised by the control system the plant automatically cycles into a Burn Period.

A bulk load of bagged or loose waste is then introduced into the primary chamber either manually via the bulk and/or batch load doors or via the automatic loader.

With waste deposited on the hearth of the chamber, ignition will be provided by one or several



burners positioned to ensure efficient coverage of the hearth. Combustion air will also be provided by a fan in the form of high pressure, high velocity air, to strategic areas of the fire bed and secondary chamber.

The products of combustion from the primary chamber will exhaust into the secondary chamber located directly above the primary chamber for treatment. Within the secondary chamber additional heat and air are added to promote combustion in the gaseous phase. These gases will reside within the chamber at the minimum specified time and temperature, thus ensuring complete combustion of the volatile and solid particulate.

Treated gases will exit the secondary chamber, directly into the secondary chamber mounted refractory lined exhaust chimney.

Continuous loading is carried out throughout the day, until the last charge has been introduced. Thereafter the operator may select Cool Down cycle. This function automatically ensures completion of the incineration process and cycles the unit through a controlled cooling and shut down process to enable safe removal of the ash the following morning, prior to start up.

The whole system is controlled and policed by a central relay logic control system.

### Basic Features

- Heavy Steel Shell
- Cylindrical chambers for strength
- 1600°C grade Super duty refractory lining
- High efficiency calcium silicate insulation
- Temperature controlled burners
- Forced combustion air
- Full sized load/ash removal interlocked door
- Batch load door (manual load version)
- Hydraulic charge door (automatic load version)
- Refractory lined chimney for longevity
- Low fuel consumption
- Low maintenance
- Sterile Ash residue less than 5% w/w
- Fully assembled and tested prior to despatch
- Refractory cured prior to despatch
- User friendly automatic control

### Options

- Manual or automatic loading subject to waste capacity
- Skid mounting for mobility
- Available to fire natural gas / lpg / diesel / kerosene / waste oils / biofuels
- Trailer mounted
- Energy Heat Recovery

### Environmental Standards

**The plant can be engineered to meet any of the following standards:**

- EU Waste Incineration Directive
- US EPA
- EU Animal By Products Regulation 1774/2002
- World Bank Emission Standards
- NEMA Act (EMCA)
- World Health Organisation Emission Standards
- UK Clean Air Act
- British Standards BS3316

The Surefire SA range of cremators have numerous examples throughout the world and offer an efficient and environmentally clean solution to the problems associated with the disposal of animal carcasses.

### Applications

Bulk and individual animal carcass and remains.

### Throughput Capacities

Up to 500kg/hour in the standard format.

### Basic Plant Description

The plant will comprise of either manual or automatic loading (subject to capacity) main combustion chamber, a secondary afterburning emission control chamber and a discharge chimney.

After removing ash from the cool chamber each morning, the plant will be cycled through a pre-heat period. During this period the afterburner operates, to elevate the secondary chamber to temperature in excess of 850°C. Once this has been achieved and recognised by the control system the plant automatically cycles into a burn period.

At this stage all loading functions become available. In the case of the automatic load version animal carcasses may be delivered to a bin tipping machine adjacent to the ram loader, in wheeled 660 litre containers. Once engaged into the tipper the bin will be elevated automatically and tipped into the ram loader.

With the waste tipped in the loader, the selection of a spring return switch on the adjacent satellite control station closes the feed door. Providing various temperature and emission interlocks are proven, the hydraulic charge door which seals the primary chamber from the loading machine will power open and a hydraulic ram will drive the waste into the primary chamber. Once inside the ram will reverse and the charge door will close in preparation for the next charge.

With waste deposited on the hearth of the chamber, ignition will be provided by two or more ignition burners positioned to ensure efficient coverage of the hearth. Combustion air will also be provided in the form of high pressure, high velocity air, to strategic areas of the fire bed and secondary chamber.

To manage the rendered fats and liquids released from the waste, a burner will be fired under the hearth, to elevate the temperature of the hearth. This established design, ensures efficient destruction of even the wettest of wastes.

The products of combustion from the primary chamber will exhaust into the secondary chamber located directly above the primary chamber for treatment. Within the secondary chamber additional heat and air are added to promote combustion in the gaseous phase. These gases will reside within the chamber for at least 2 seconds at a minimum temperature of 850°C thus ensuring complete combustion of the volatile and solid particulate.

Flue gases leaving the Secondary Chamber will be monitored for oxygen content by a continuous oxygen analyser. The output from this analyser will be used to control the combustion airflow to the secondary chamber to maintain constant oxygen content in the flue gases leaving the chamber. The carbon monoxide content and particulate will also be monitored. Treated gases will exit the secondary chamber, directly into the secondary chamber mounted exhaust chimney.

This process is carried out throughout the day, until the last charge has been introduced. Once introduced, the operator may select cool down cycle. This function automatically ensures completion of the incineration process and cycles the unit through a controlled cooling and shut down process to enable safe removal of the ash the following morning, prior to start up.



## Basic Features

- Heavy Steel Casing
- 1600°C grade super duty refractory lining
- High efficiency calcium silicate insulation
- Temperature controlled air
- Elevated Hot Crematory Hearth
- Full sized load/ash removal interlocked door
- Hydraulic charge door (automatic load version)
- Refractory lined chimney for longevity
- Low fuel consumption
- Low maintenance
- Sterile ash residue less than 5% w/w
- Fully assembled and tested prior to despatch
- User friendly automatic controls

## Options

- Manual or automatic loading subject to waste capacity
- Available to fire natural gas / LPG / diesel / kerosene / waste oils / bio fuels
- Energy Heat Recovery
- Recuperation of the gases to adjacent chambers
- Ash processing

## Environmental Standards

**The plant can be engineered to meet any of the following standards:**

- EU Waste Incineration Directive
- US EPA
- EU Animal by Products Regulation
- UK Process Guidance Note PG5/3 (04)
- British Standards BS3316

The Surefire SH range of stepped hearth incinerators have been specifically developed for the efficient continuous destruction of waste, having a mid to high calorific value.

### Applications

For the continuous 24/7 disposal of medical and general municipal wastes.

### Waste Loading

Automatic via a ram loader or feed hopper

### Basic Plant Description

Solid waste for combustion enters the vertical lift door from the ram loader at intervals of every 15-20 minutes, subject to the waste profile.

The primary chamber has three hearths in cascade. When introduced the waste resides on the upper hearth on to which the first hearth ignition burner is focused, to initiate dehydration and initial combustion of the waste. As the waste is dehydrated each subsequent load ploughs through the previous charge causing the waste to tumble and fall into the second hearth. The tumbling action of the waste falling from one hearth to the next breaks up the waste and exposes fresh faces of the waste to the combustion air ensuring complete burn out of the waste. With waste residing on the second hearth, a second primary burner ensures ignition of the waste previously insulated and now exposed through the tumbling action of the hearths.

Close control of the primary chamber combustion process is provided in the form of combustion airflow and distribution, waste feed flow and supplementary burner operation where necessary.

Once the waste has been ignited, the elevated temperature will be recognized by the control system and the primary burners will stage low fire and then OFF. To support combustion, pressurised air will be injected into the waste at each hearth level thus ensuring intimate mixing of the air and waste for good combustion. The amount of air introduced will be accurately metered by servo motor controlled valves, which will respond to changes in the combustion conditions. Should the waste be of a sufficiently low calorific value where self combustion cannot be sustained, the ignition burners will respond by progressively refiring.

Periodically a refractory hearth ram will advance into the chamber under hydraulic pressure sweeping waste off second hearth onto the final third hearth. Waste on the third hearth will be processed to ash by the introduction of air before it is finally discharged by the action of a second hearth ram into the sealed ash sump, which incorporates a grate to grade the ash, thus ensuring it is thoroughly burnt out. Air will be blown into the ash sump to complete combustion and to cool the ash. As demanded by the control system a hydraulically operated ash door will periodically open for several seconds releasing ash into ash conveyor.

The products of combustion will be transferred under negative pressure from the primary chamber via a refractory lined transfer duct into the adjacent secondary chamber.

### Basic Features

- 24 hour operation
- Heavy steel construction
- 1600°C grade hot face refractory lining
- Calcium silicate insulation
- Temperature controlled burners
- Hydraulically operated hearths in cascade
- Forced combustion air
- Excellent fuel efficiency
- Low maintenance

### Throughput Capacities

From 100kg/hour to several tonnes per hour

- Excellent Ash quality
- User friendly controls
- Auto ash discharge

### Options

- Available to fire natural gas / lpg / diesel / kerosene / waste oil / bio fuels / tallow
- Energy recovery



The Surefire RI range of rotary incinerators have been developed for the efficient destruction of a wide range of wastes on a continual basis.

### Applications

For the continuous 24/7 disposal of medical / general / animal remains and high moisture wastes such as sludges, pastes and sewage.

### Throughput Capacities

From 100kg/hour to 4000kg/hour

### Waste Loading

Automatic via a ram loader, feed hopper, screw conveyor or shredding system.

### Basic Plant Description

The rotary incinerator will be of a co – current or counter current design, selected to suit the specific waste stream.

Waste for incineration will be introduced into the static feed end. The rotary combustion chamber is constructed as a cylindrical refractory lined drum, inclined towards the de-ashing end. The drum is supported by four heavy-duty rollers. The whole assembly is fitted to a skid constructed from steel beams, to enable the unit to be transported in one section.

Fitted externally to the drum is a heavy steel tyre, which engages with a geared motor drive. To provide optimum rate of movement of the waste through the primary chamber, the drive is speed controlled via the control system to provide the ideal rotational speed. Internally the drum is lined with an abrasion resistant refractory castable and a back up insulation board. Constructed into the refractory are several “lifters”, to ensure that waste having high moisture content is forced to tumble during rotation, rather than slip down the chamber walls. This tumbling action is the technique that promotes intimate mixing of the waste with the combustion conditions, hence promoting extended residence of waste within the drum, ensuring optimum combustion and high quality ash.

During operation, waste is processed through the primary chamber at a speed dictated by the speed of rotation. A primary ignition burner and a series of air jets will provide the necessary heat and combustion air to sustain combustion.

To prevent the ingress of “tramp” air into the chamber, the junction between the rotary chamber and the static load end and the static ash vestibule will be fitted with seals. These seals will be proprietary rotary incinerator leaf sprung seals to ensure a permanent seal irrespective of expansion rates. The combustion process renders the waste to ash and it is manoeuvred along the length of the primary chamber until it finally drops into the de-ash vestibule.

At the base of the ash vestibule is a hydraulically operated refractory lined door. Ash is retained within this zone, where additional air is added. This completes burn out of any residual carbon and cools the material in

preparation for discharge. After a predetermined period the hydraulic door opens, the discharge conveyor starts and ash is released into a conveyor hopper below the vestibule. After a period of several seconds the door is closed.

Ash is transferred from the discharge area into an external sealed container. Once full the container is removed to landfill. Combustion gases within the chamber are drawn up into the secondary chamber via the gas transfer duct.



## Basic Features

- 24 hour operation
- Heavy steel construction
- 1600°C grade hot face refractory lining
- Calcium silicate insulation
- Temperature controlled burners
- Hydraulically operated hearths in cascade
- Forced combustion air
- Excellent fuel efficiency
- Low maintenance
- Excellent Ash quality
- User friendly controls
- Auto ash discharge

## Options

- Available to fire natural gas / lpg / diesel / kerosene / waste oil / bio fuels / tallow
- Energy recovery