

The Rotary Combustion PYROT® - 100kW- 540kW



Overview

- Component Description
- Fuel and Combustion Flow
- Controls
- Procedures
- Safety Devices
- Cleaning and Maintenance

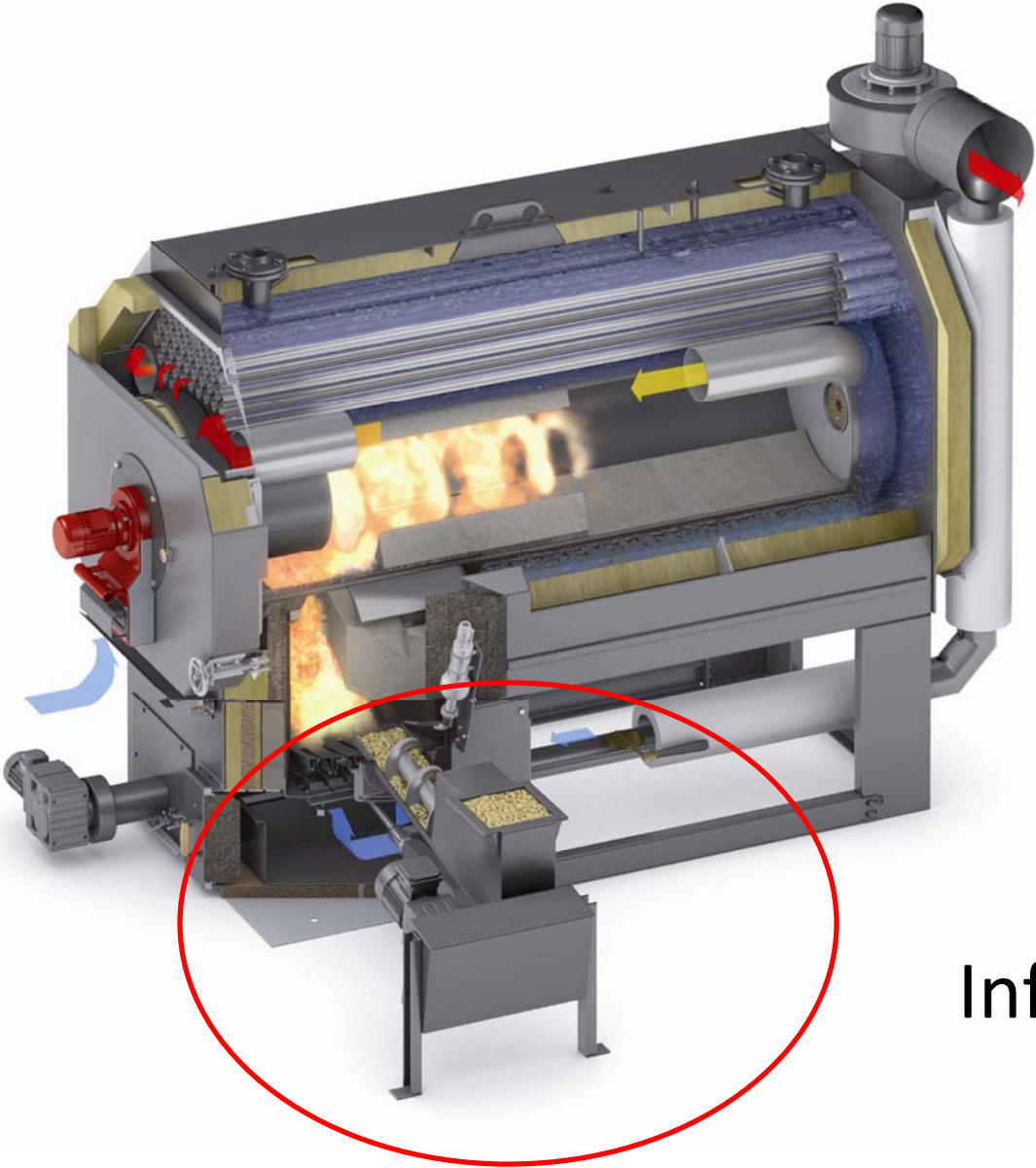
Important:

The Pyrot is designed for conditioned wood fuels with maximum moisture Content of 35%.

PYROT[®] - Components



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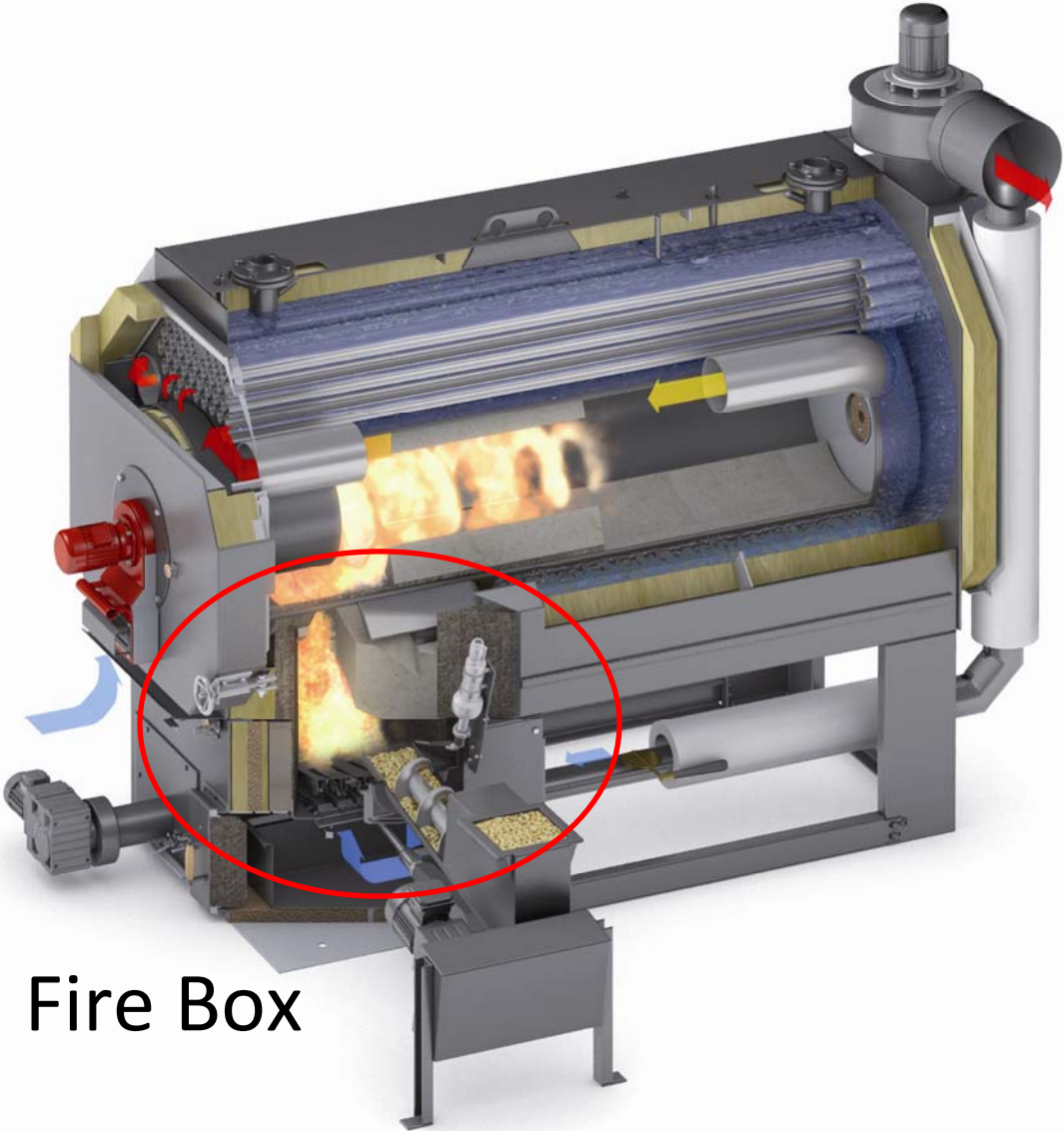


Infeed Module

PYROT[®] - Components



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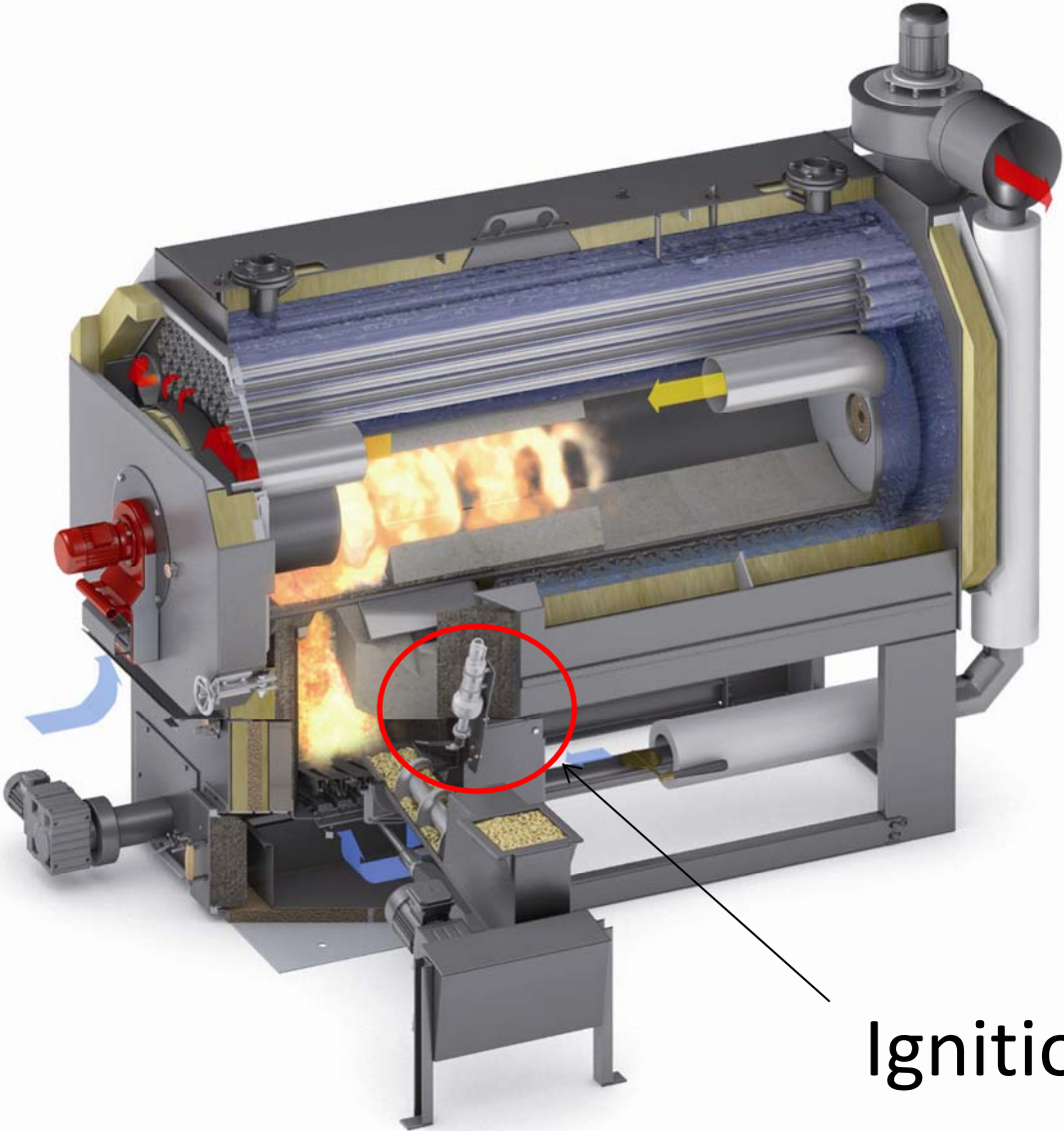


Fire Box

PYROT[®] - Components



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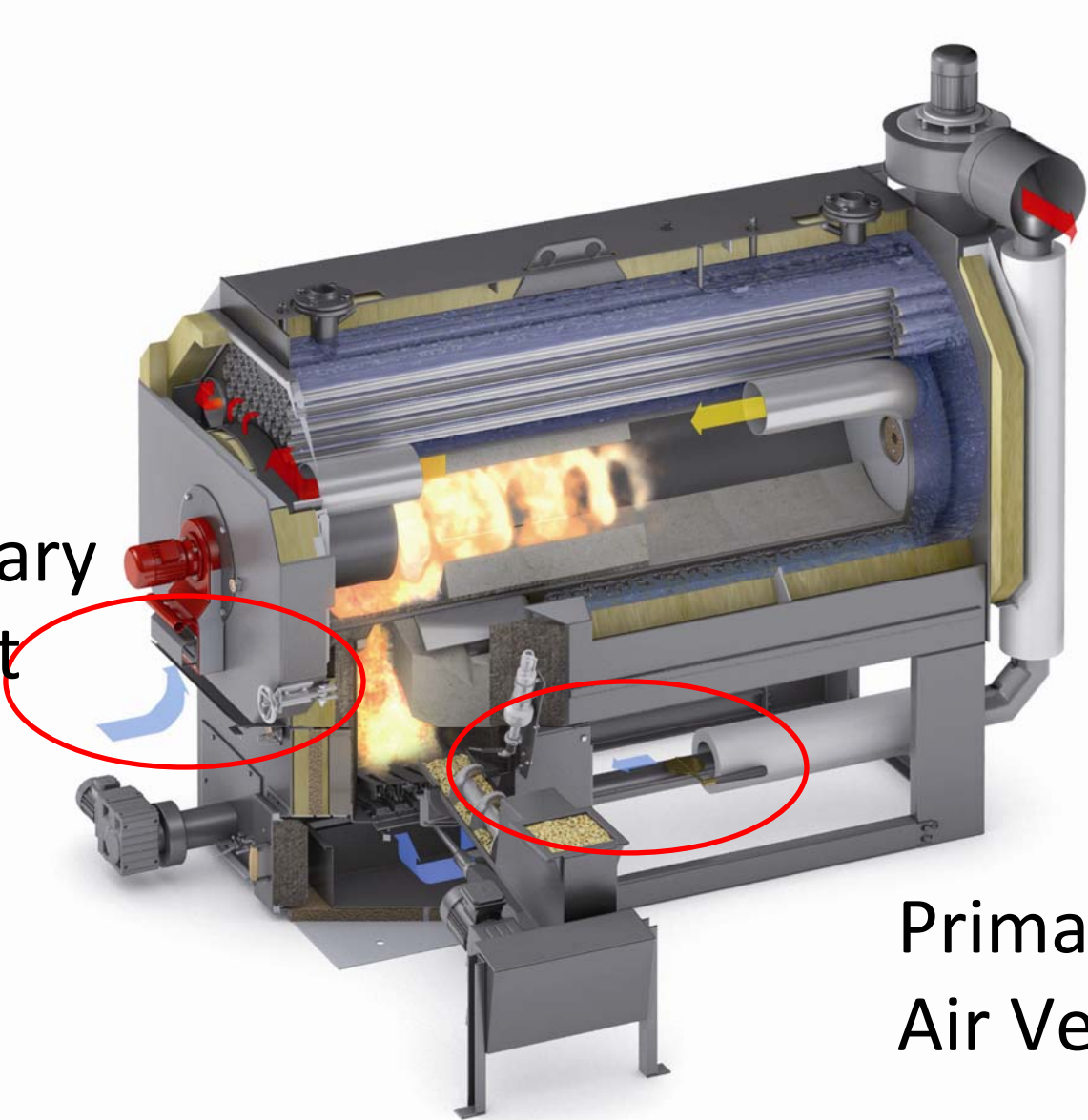
Ignition Gun

PYROT[®] - Components



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Secondary
Air Vent

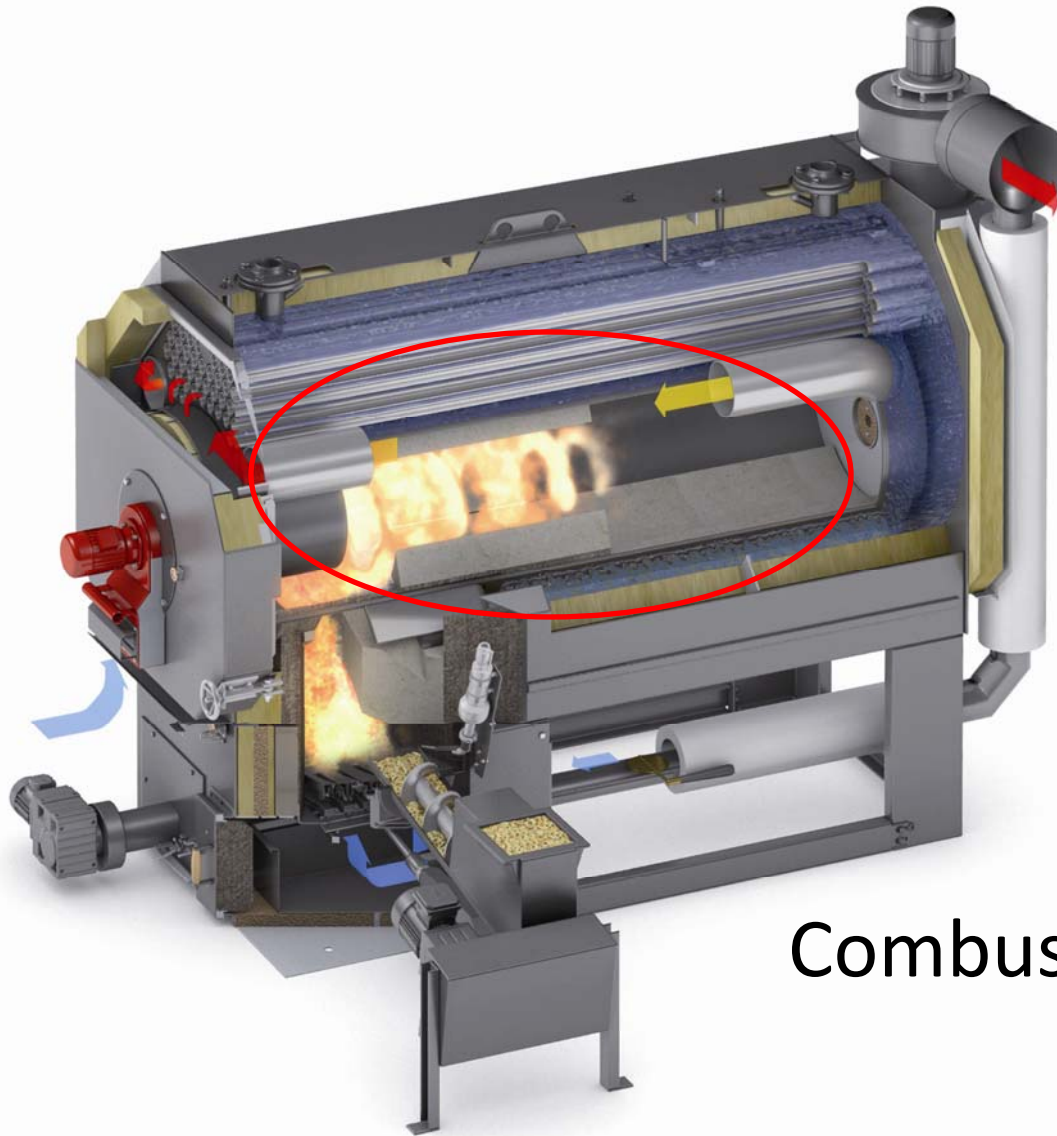


Primary
Air Vent

PYROT[®] - Components

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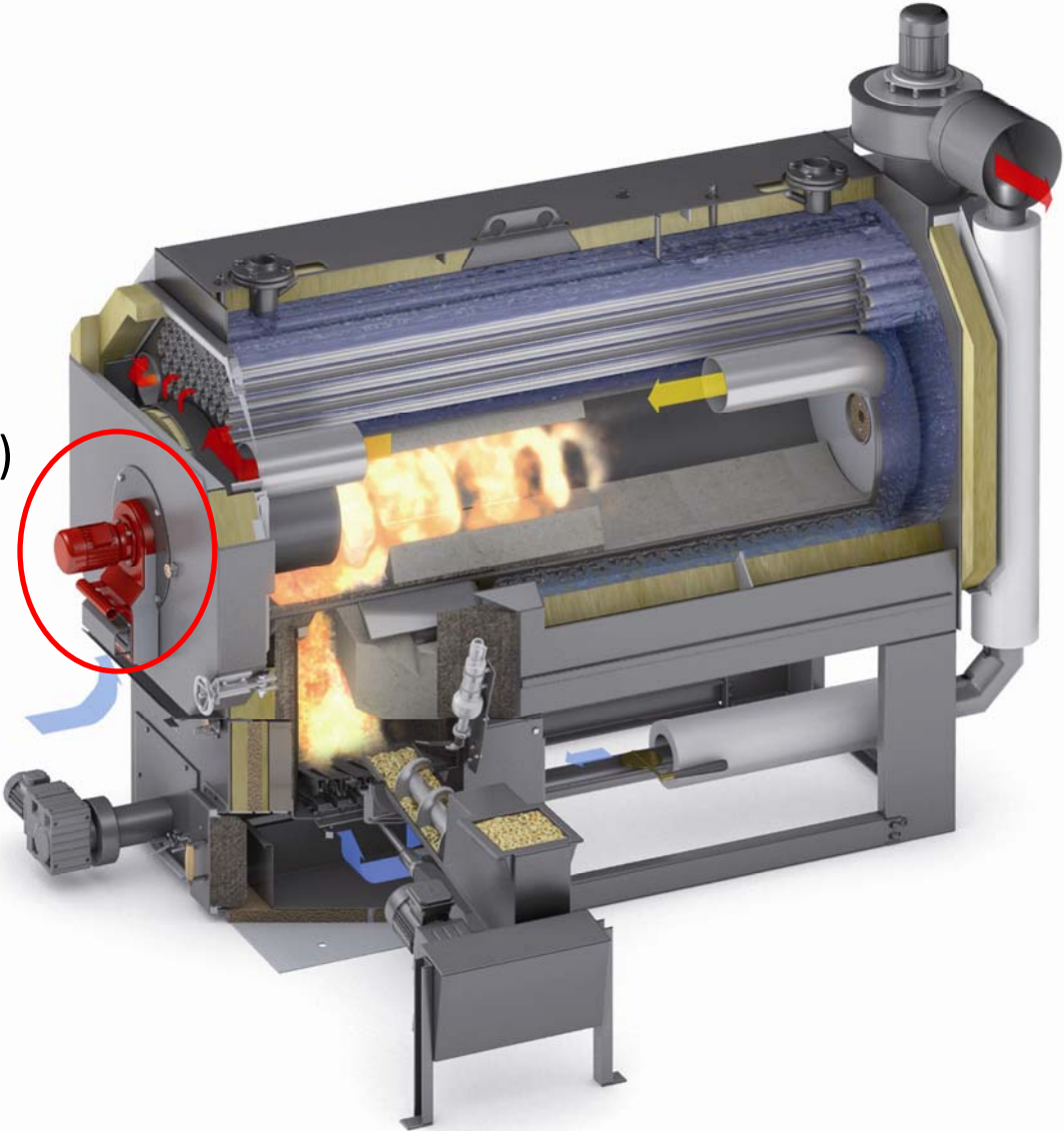
Combustion Chamber

PYROT[®] - Components



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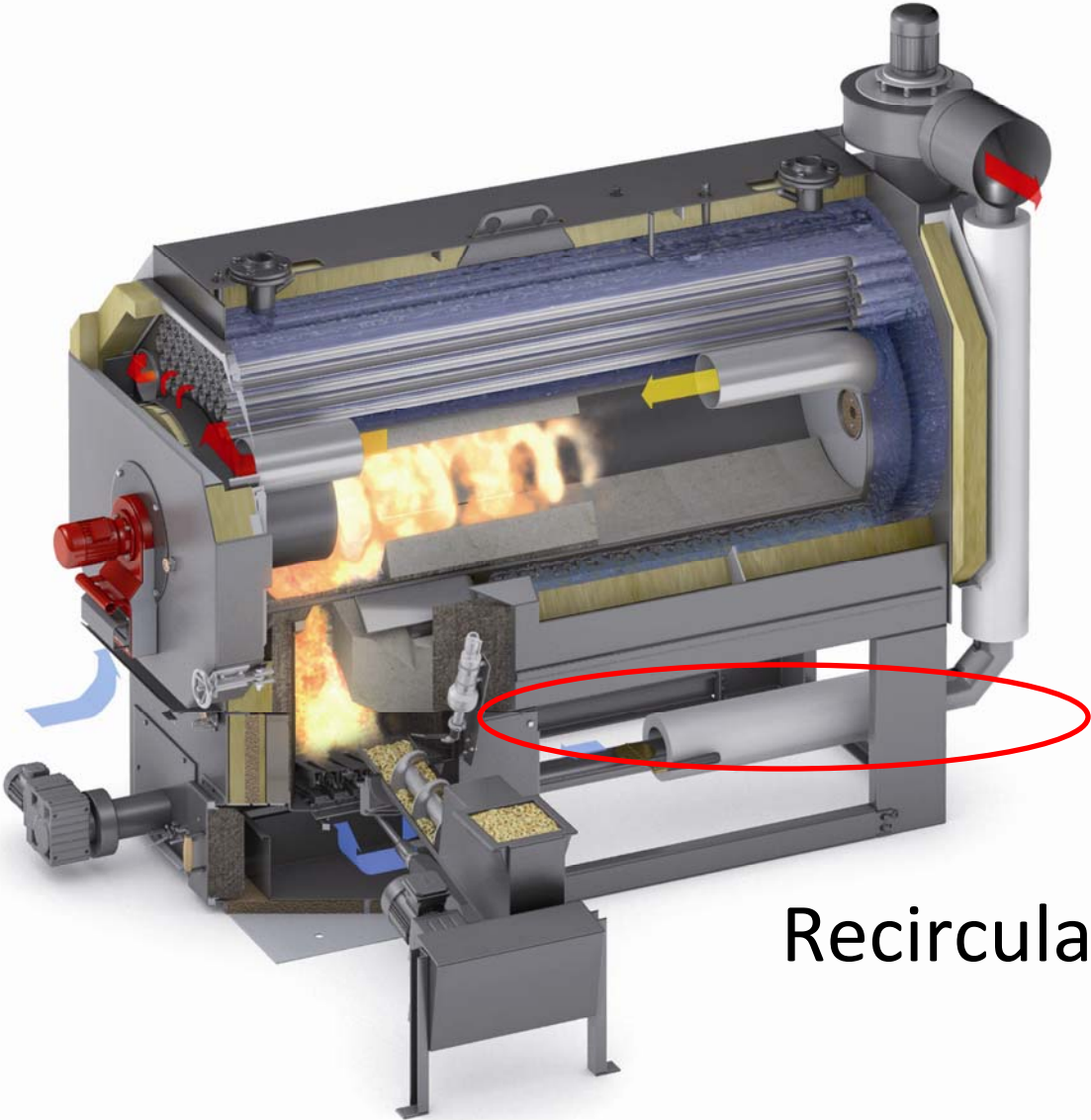
Rotation
Blower
(Secondary Fan)



PYROT[®] - Components



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Recirculation Gas

PYROT® - Components

Exhaust Blower

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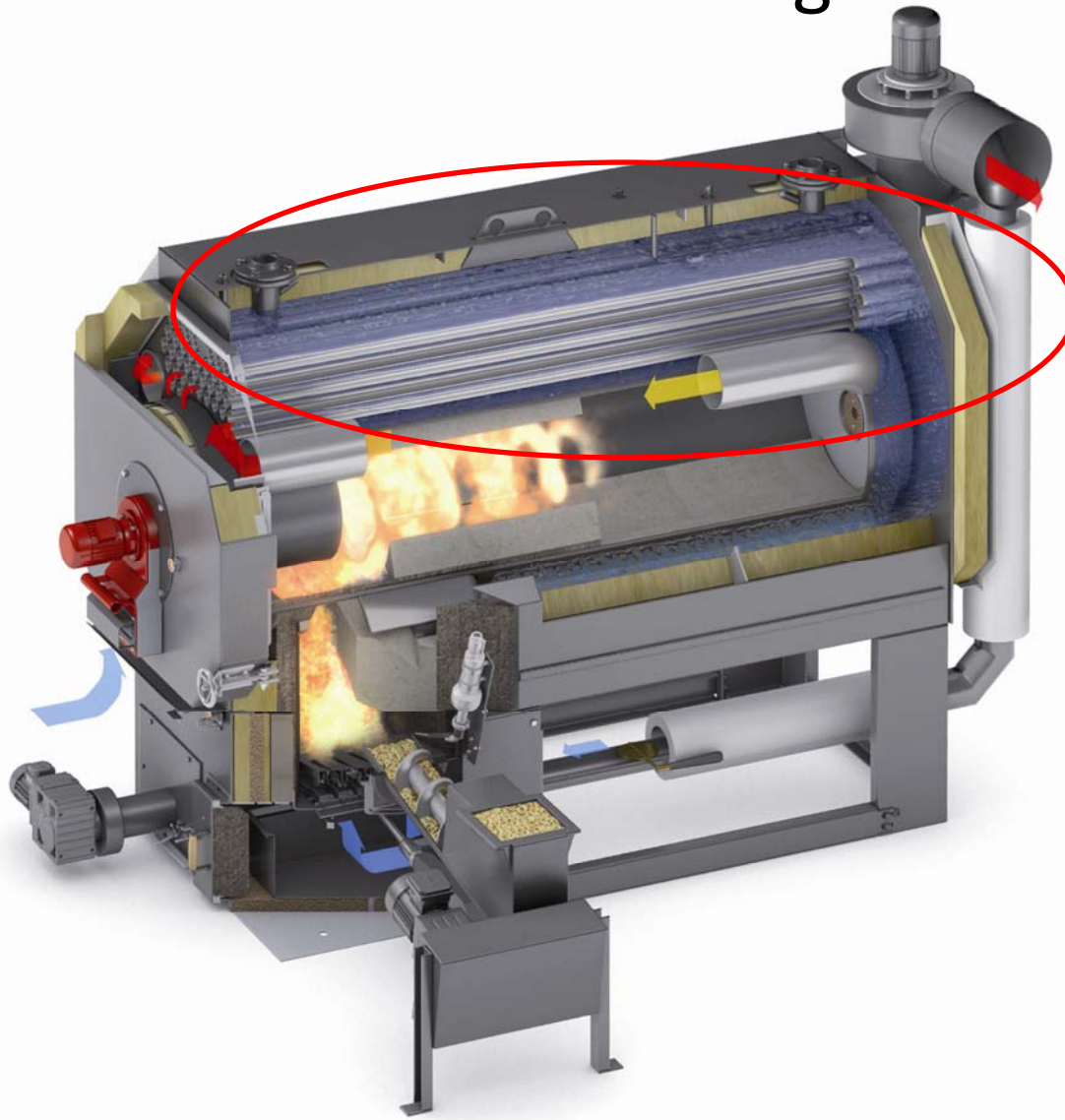


PYROT[®] - Components

Heat Exchanger

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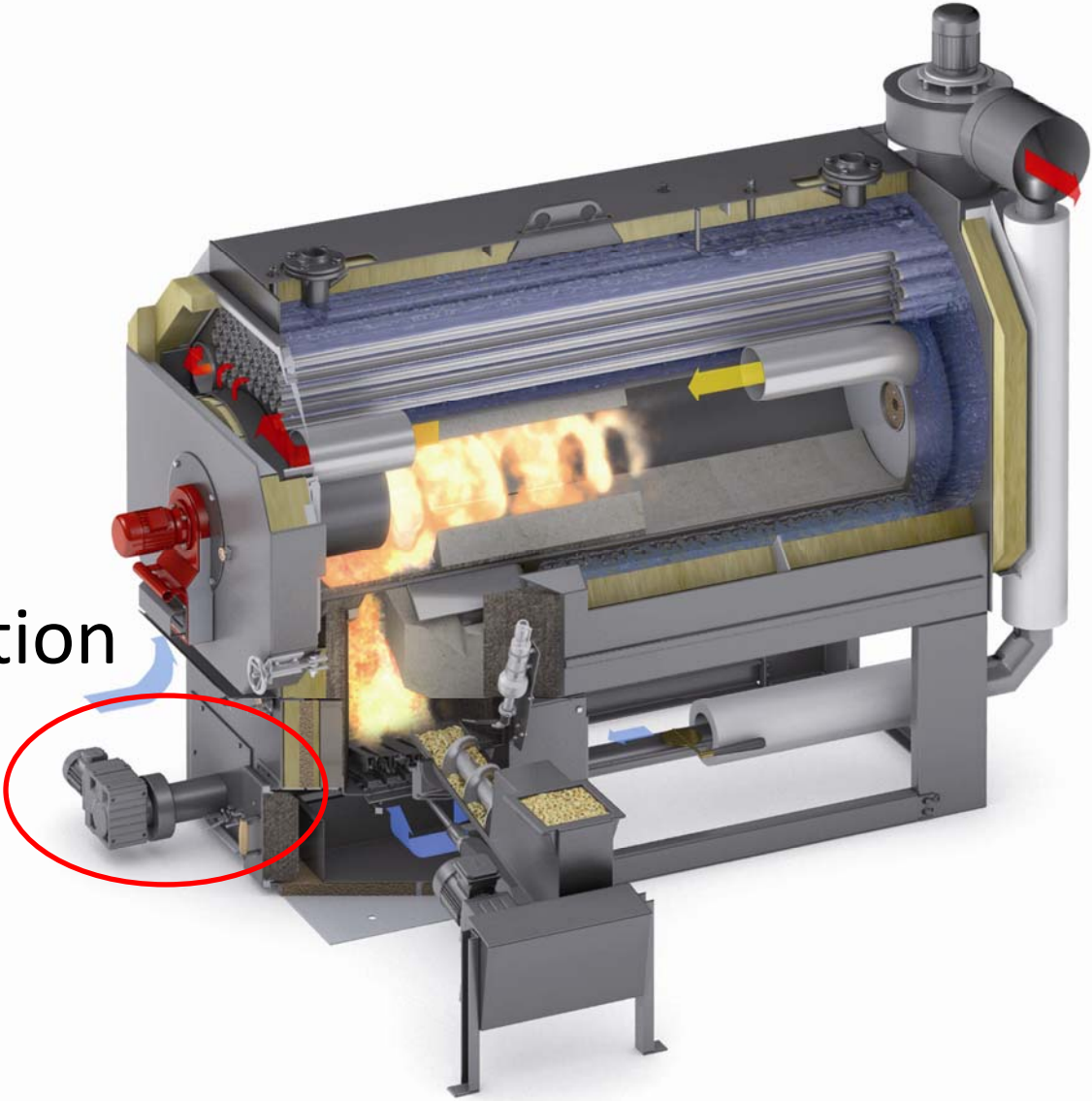


PYROT[®] - Components



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Ash
Extraction

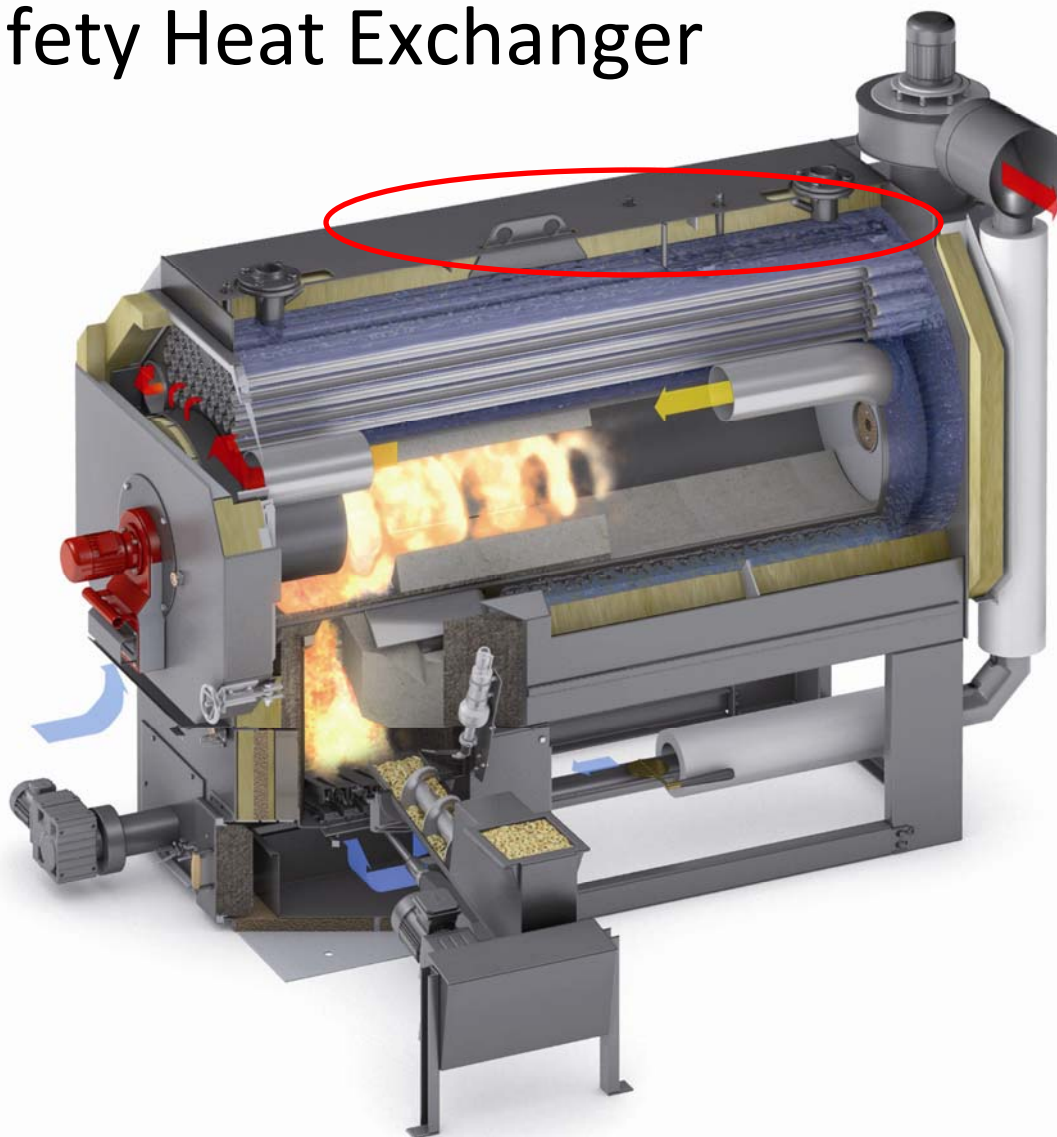


PYROT[®] - Components

Safety Heat Exchanger

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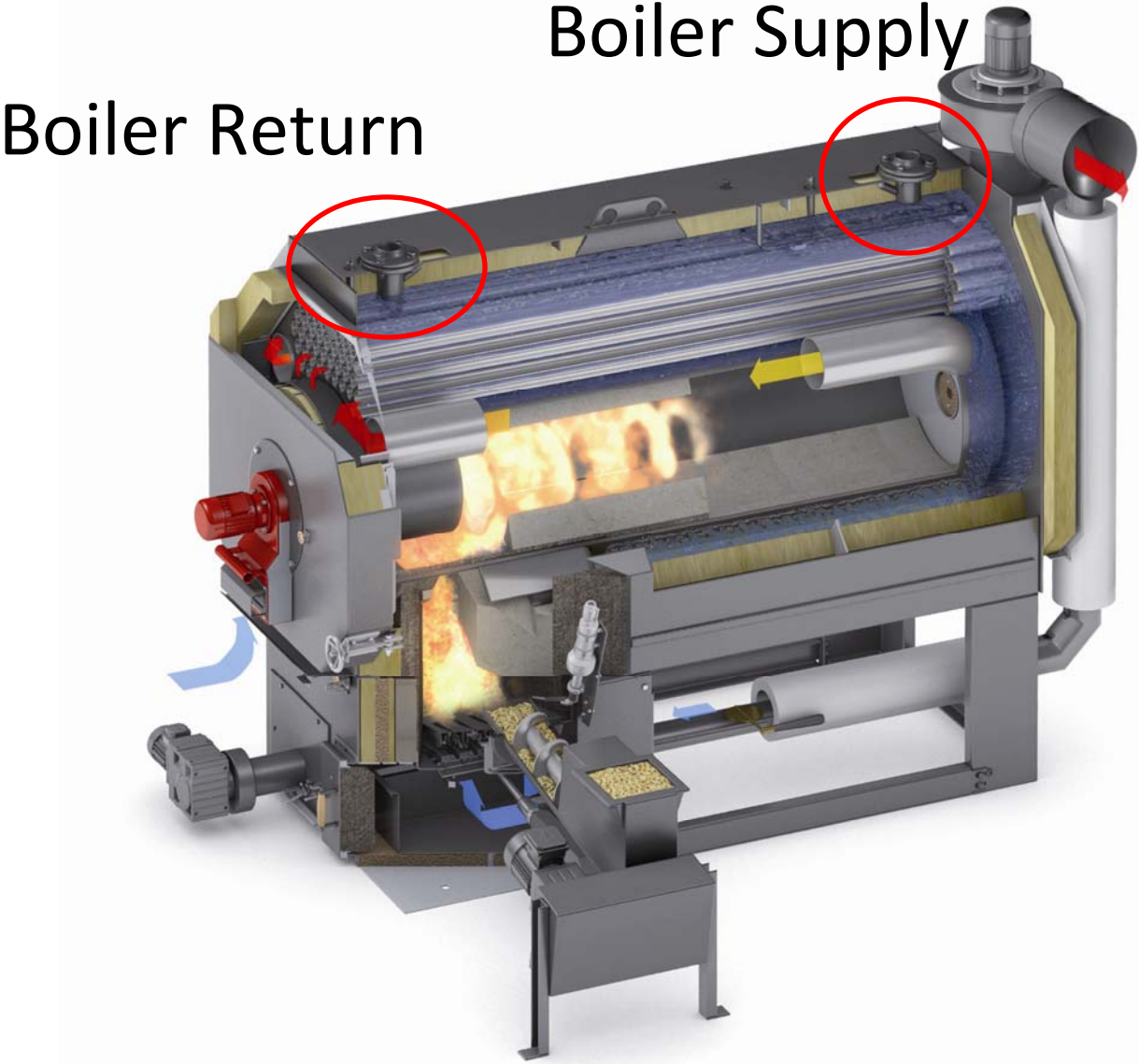
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PYROT® - Components



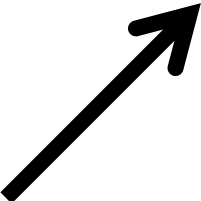
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PYROT® - Fuel Flow

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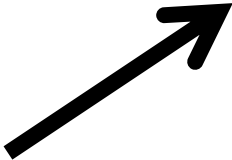
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Silo

PYROT[®] - Fuel Flow

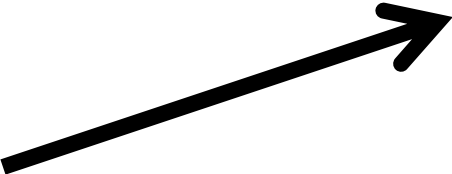
Pipe Auger



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PYROT[®] - Fuel Flow



Sliding Gate



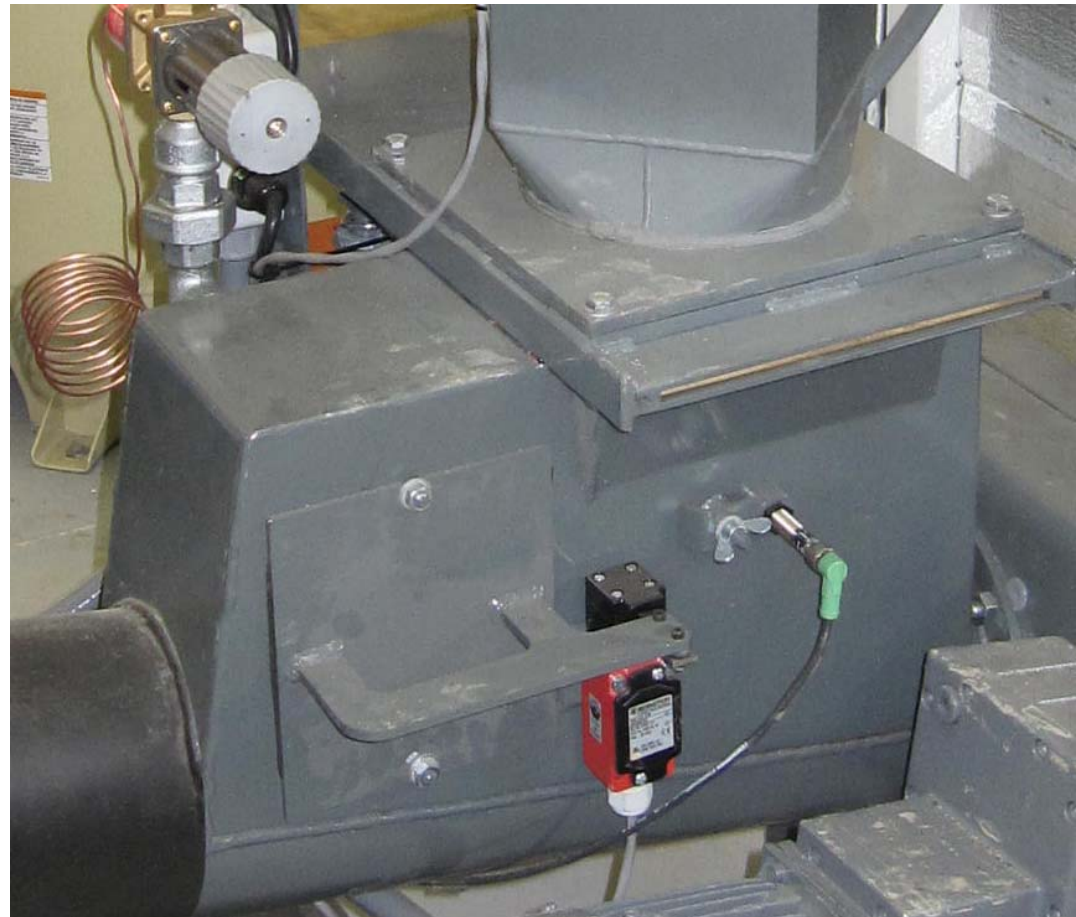
PYROT® - Fuel Flow

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Metering Bin

Stage one of fuel supply
Is controlled by light barrier in the
metering container and the limit
switch on the sliding gate



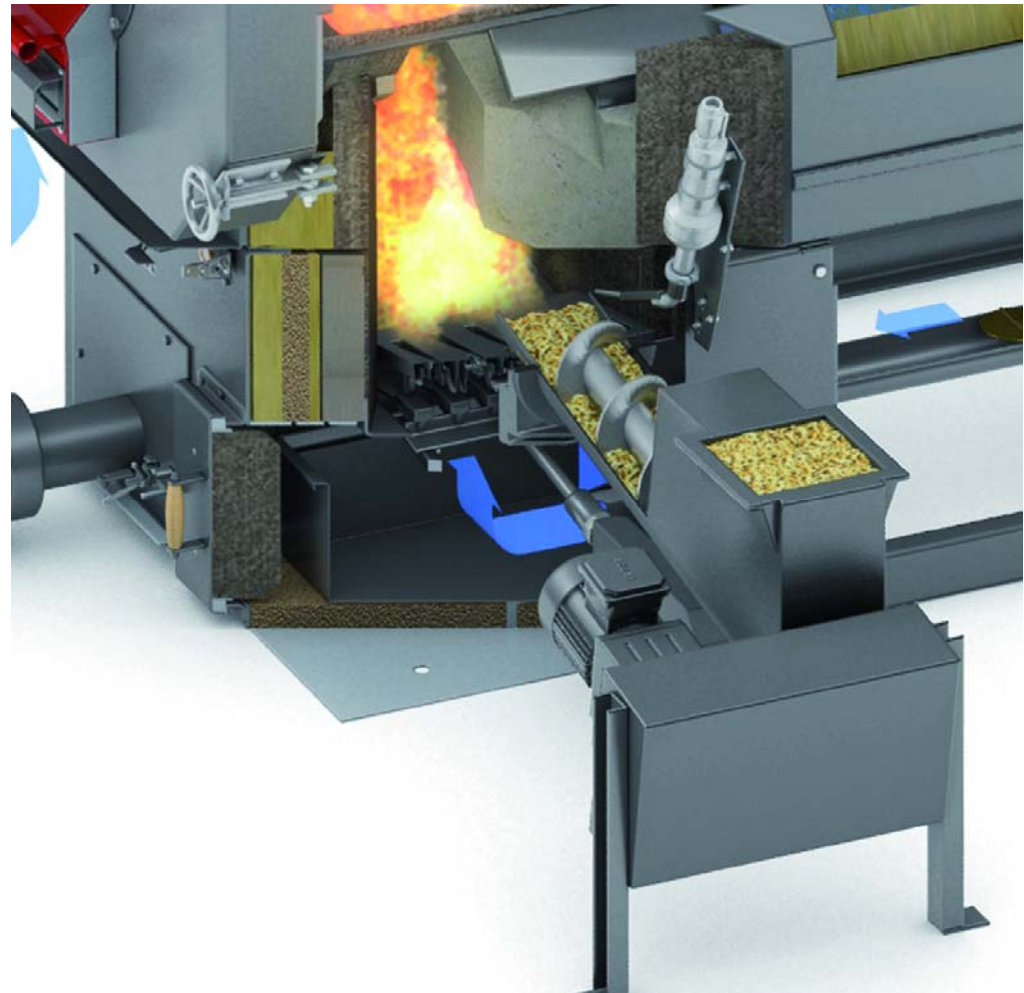
PYROT[®] - Fuel Flow

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Infeed Module

Controls the amount of fuel loaded into the fire box



PYROT[®] - Fuel Flow

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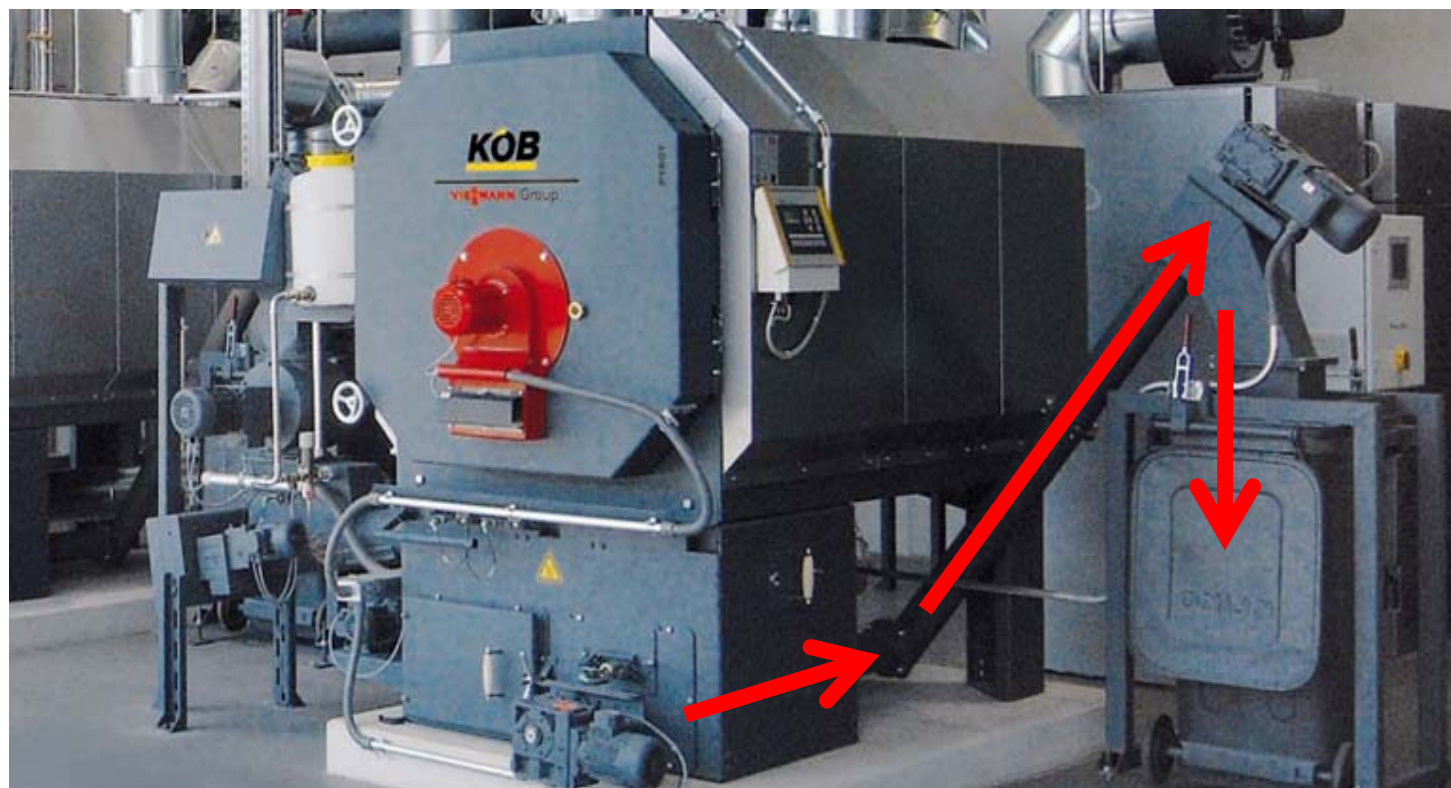
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Fire Box

Inside the fire box, the burning fuel will be worked down the moving grate towards the ash auger.

The moving grate is controlled by the grate drive motor.





Automatic Ash Extraction System

Ash is augured from the trough in the fire box and then up and into the ash can with the ash transport auger

PYROT® - Combustion Flow



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Primary Burn Chamber

- **Exhaust Blower**

Induces a negative pressure in the fire box and therefore controls boiler output.

- **Primary Air Vent**

Allows fresh air into the primary burn chamber.

- **Recirculation Gas**

Pushed back into the primary burn chamber and is used to maintain cooler temperatures and lower oxygen levels.

- **Gasification**

Gasses are produced during the primary burn that are reburned in the second burn chamber



PYROT® - Combustion Flow

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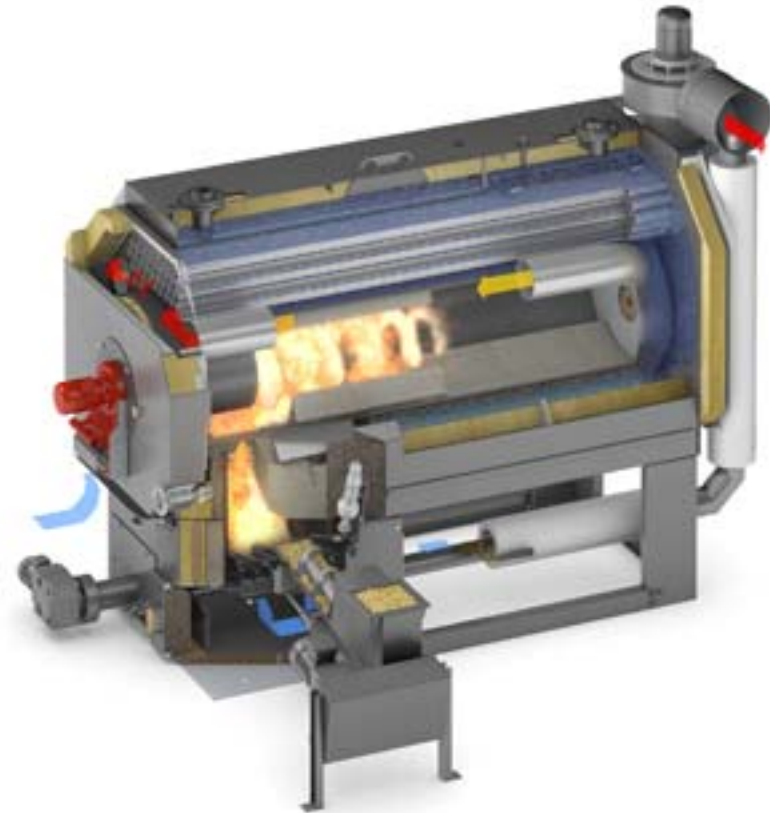
Secondary Burn Chamber

- **Rotation Blower**

The rotation blower injects secondary fresh air and mixes it with combustion gases produced in the primary burn.

- **Heat Exchanger**

The heat produced in the secondary burn chamber is pulled up through the heat exchanger by the exhaust blower and the exhaust is expelled out the chimney.



PYROT® - Controls



VIEHMANN Group

Ecotronic

- Controller for the Pyrot
- Parameter Menues
- Errors and Warnings
- Status Display



PYROT® - Controls



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Ecotronic Menus

- Boiler On/Off (F1)
- Parameter Menu (F3)
- Parameter Service Menu (OK+F3)
- Loading Menu (F4)
- Loading Service Menu (OK+F4)
- See handouts for details



PYROT[®] - Procedures



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Startup

- **Rinse Combustion Chamber**
 - Exhaust fan on
 - Open secondary air vent
 - Close primary air vent
 - Start opening sliding gate
 - Run approx 30 seconds
 - Close secondary air vent
 - Open primary air vent
 - Wait for sliding gate to finish opening

- **Fill metering bin**
 - Once sliding gate is open
 - Start pipe auger
 - Run until light barrier is blocked

PYROT[®] - Procedures



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Startup

- **Fill firebox**
 - **Once infeed light barrier is blocked**
 - **Start infeed auger**
 - **Run infeed auger for set time**
 - **OK-F4 (1)**

- **Ignition**
 - **Start ignition gun**
 - **Runs until O2 drops below 16%**
 - **System goes onto load**

- **Note: If ignition takes too long, the infeed auger will pulse in more fuel to continue ignition.**

Load

- Exhaust fan controls boiler output
 - If supply temp is below target – ramp up exhaust fan
 - If supply temp is below target – ramp down exhaust fan
 - Rate of change is controlled by the Throttle Factor

- Oxygen (λ) sensor controls the feed rate
 - If O₂ is above target, increase infeed rate
 - If O₂ is below target, decrease infeed rate
 - Rate of change is controlled by the Material Factor

PYROT[®] - Procedures



VIEHMANN Group

Shutdown - Burnout

- Sliding gate closes

- Infeed auger continues to be regulated by O2 levels

- Burnout complete when O2 reaches setpoint
 - OK-F3 (37)
 - Range: 16%-18%

- Exhaust fan continues to run for 30 minutes
 - Ensures that flammable gases don't build up in combustion chamber

Standby

- If the load on the system is less than the minimum output for the boiler, the system will go on standby
- Minimum output is determined by the exhaust fan minimum
 - OK-F3 (51)
- If the supply temperature goes over the supply temp max the system will go on standby
 - Supply temp max, OK-F3 (33)
- If the system goes on standby, the sliding gate will close and the burnout procedure will take place.

Restart from Standby

- **The system will automatically restart (following the startup procedure) when the system temperature drops below the system design temperature.**
 - **System design temperature – F3 (12)**
 - **Ensure that restart on system design temperature is enabled in OK-F3 (11)**

PYROT® - Safety Devices



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- **Emergency Stop Button**
- **Low Water Cut Off**
- **High Temperature Limit**
- **Safety Heat Exchanger**
- **Infeed Tube Temperature Probe**
- **Quencher Tank**

PYROT® - Safety Devices

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Emergency Stop Button

- Will shut down all components of the boiler.
- 15 second delay from when the button is pressed to when the alarm is generated and sliding gate closes
- Error on the ecotronic will show up as a Pressure Switch Error
- This will stop the exhaust fan but the fire will still continue to burn. This produces a positive pressure in the boiler which can cause smoking. This should only be used in emergency situations. Normal shutdown should be done by pressing F1 and letting the boiler go through the burnout procedure.



PYROT® - Safety Devices

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Low Water Cut Off

- Will cause a fault if low water level in system
- Causes a full system shutdown.
- There is a reset switch on the device.



PYROT[®] - Safety Devices

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High Temperature Limit

- Will cause a fault if high temperature limit is reached (100 deg C or 110 deg C)
- Causes a full system shutdown.
- There is a small button under a black cap that must be pressed to reset this device.
- Ensure that the temperature probe is fully inserted in the well in the center of the top plate of the boiler.



PYROT[®] - Safety Devices

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Safety Heat Exchanger

- This device is a mechanical solenoid that is opened if temperature in heat exchanger exceeds the solenoid setpoint
 - 95 deg C or 100 deg C
- When solenoid opens, fresh water runs through a secondary heat exchanger in the boiler, causing it to cool the boiler down
- This device will continue to keep the boiler cool even during a power outage.



PYROT[®] - Safety Devices

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Infeed Tube Temperature Probe

- This probe is to identify if there is burn-back occurring in the infeed tube.
- If temp exceeds setpoint, the infeed auger will run and empty all of the fuel in the tube into the firebox
 - OK-F3 (38)
- System goes into burnout



PYROT[®] - Safety Devices

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Quencher Tank

- This device is connected to a mechanical switch that will open when setpoint is reached, discharging liquid from the tank into the metering bin.
- This is to prevent burn-back in the infeed tube and is functional even if there is a power outage.
- Note: if the quencher tank is discharged into an auger of pellets, it is a good idea to try to manually empty the pellets into the firebox before the pellets swell and jam the infeed



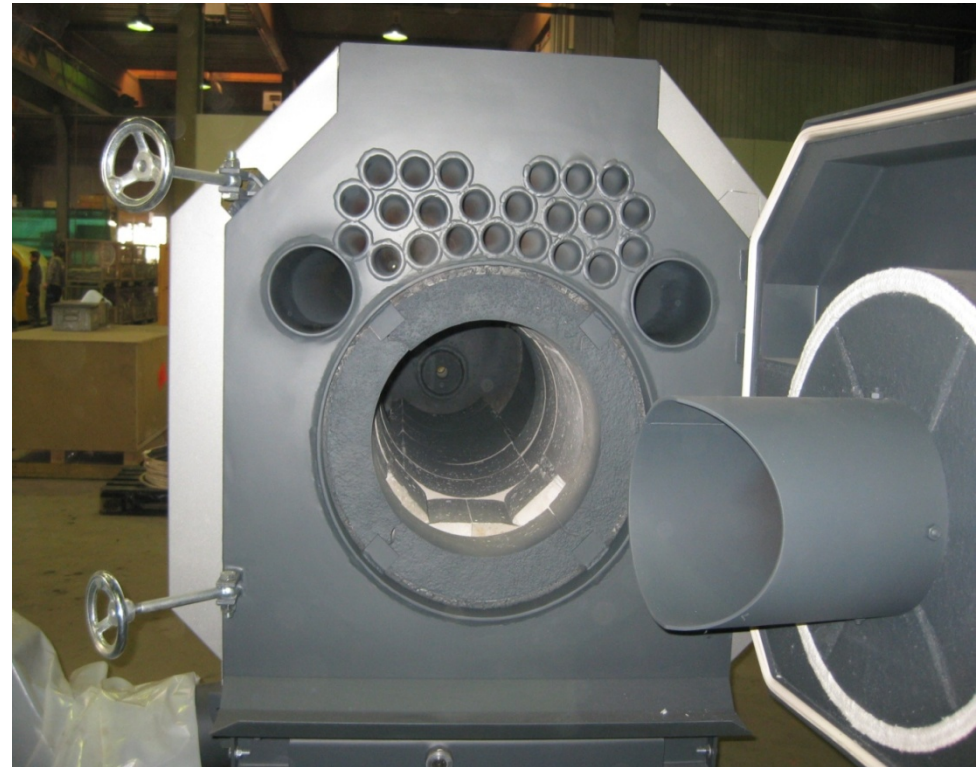
PYROT® - Cleaning and Maintenance

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Areas to be cleaned

- Heat exchanger tubes
- Combustion Chamber
- Exhaust Fan
- Firebox
- Light Barriers and Inspection Windows
- Ash Pan
- Recirculation Gas Line
- Exhaust gas collector
- Ash Bin



PYROT[®] - Cleaning and Maintenance



VIEHMANN Group

Automatic Tube Cleaning System

- Solenoids are fired sequentially with 100 psi air to clean ash out of the heat exchanger tubes
- With automatic tube cleaning, the tubes will need to be cleaning manually every 600 hours
- Without automatic tube cleaning this should be done every 300 hours.
- See Operation and Maintenance Instructions for all cleaning intervals and descriptions.

