Process Heat Solutions

THERMAX

Combipac®

The Next-gen Hybrid Boiler

Capacity - 4 TPH to 25 TPH
Standard Design Pressure - 10.54/17.5 kg/cm^2(g)
Fuel - Rice Husk

Conserving Resources, Preserving the Future.

Thermax is a leading conglomerate in the energy and environment space and a trusted partner in energy transition. Thermax's extensive portfolio includes clean air, clean energy, clean water and chemical solutions. Backed by its longstanding industry partnerships across multiple sectors, Thermax has cultivated strong expertise in audit, consulting, execution, and maintenance coupled with digital solutions, ensuring a unified energy-management experience. Leveraging its distinctive engineering capabilities, Thermax converts costs to profits while protecting the environment – a win-win for the industry and society at large.

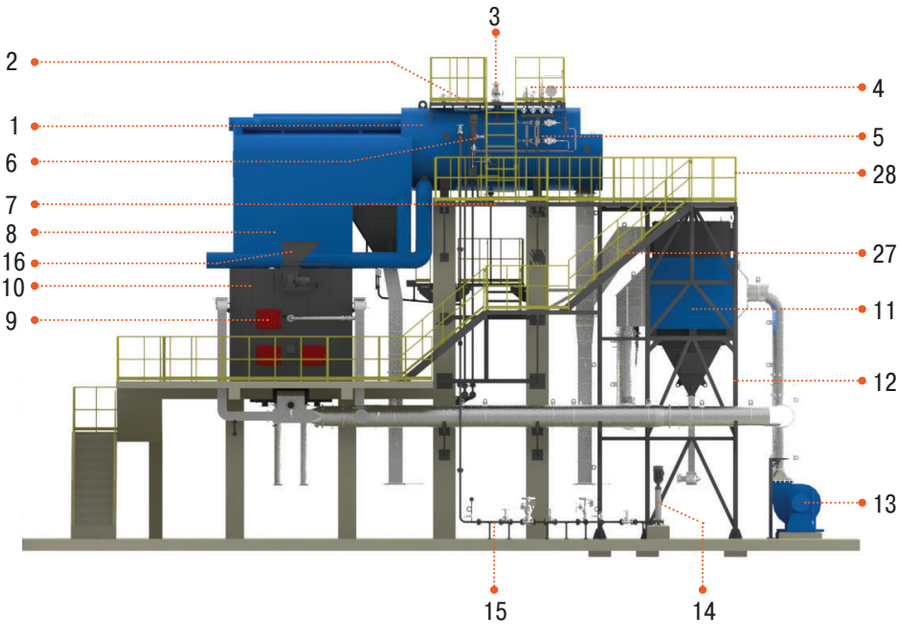
COMBIPAC® (CPFH)

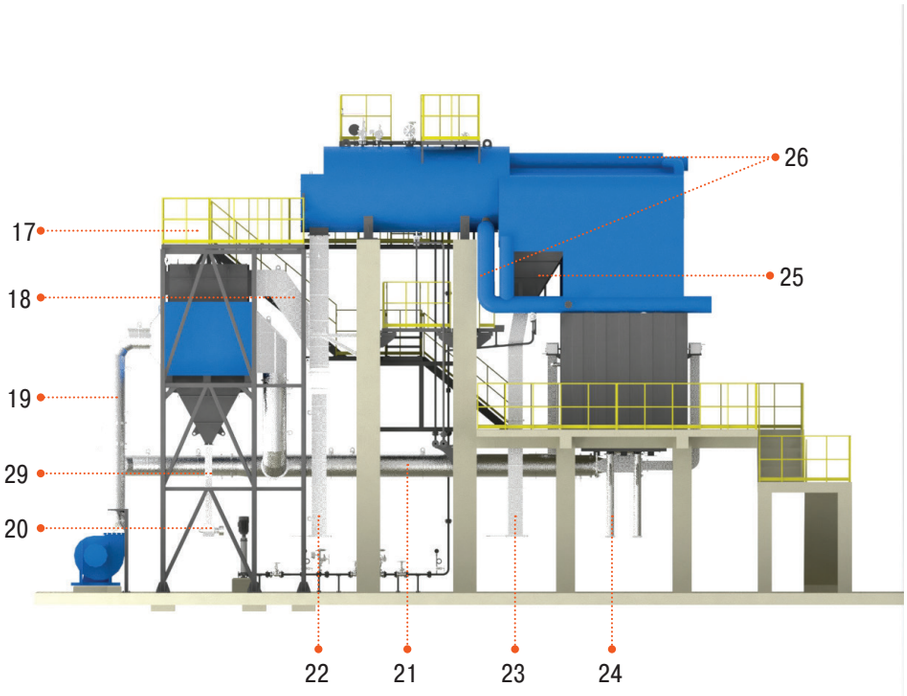
Combipac® (CPFH) is a hybrid - smoke and water tube boiler, with fluidised bed combustor (FBC), specially designed for firing rice husk; offering best in class efficiency and superior response to steam load.

Rice Husk

Key Components

Standardised balance of plant (BOP) and pre-engineered layout provides a one-stop solution ensuring high quality, safe, ergonomic operation and hassle free installation. (Installation-offered optionally)





1. Boiler Shell
2. Boiler Trim Access Platform*
3. Main Steam Stop Valve
4. Safety Valves
5. Level Gauge Glass Assembly
6. Level Controller
7. Blow Down Valve
8. Membrane Panel Assembly
9. Access Door
10. Furnace
11. Air Pre-Heater Assembly (APH)
12. APH Support Structure*
13. FD Fan Assembly
14. FW Pumping System
15. Feed Pipe Assembly
16. Over Bed Fuel Feeding
17. Smoke Tube Access Platform*
18. Flue Gas Ducting*
19. Primary Air Ducting*
20. APH Rotary Air Lock Valve
21. Combustion Air Ducting*
22. Ash Drain Port (Shell)*
23. Ash Drain Port (MPA)*
24. Ash Draub Port (Bed)
25. Ash Settling Chamber
26. Riser and Downcomer Assembly
27. Staircase for Platforms (Steel)*
28. Railings for Platforms (Steel)*
29. Ash Drain Port (APH)*

Note:

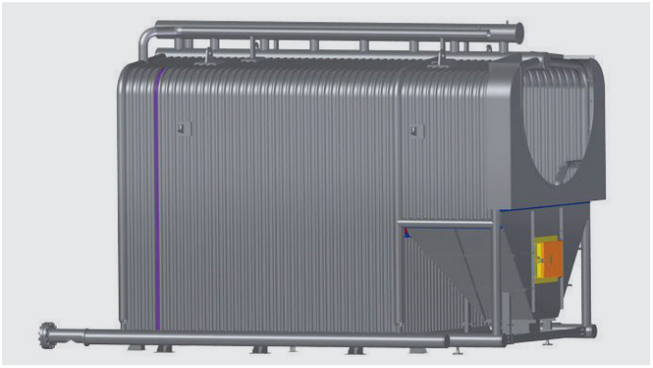
* Items are part of optional scope of supply
* Kindly refer scope of supply document for details of balance of plant equipment
* ID fan is part of standard scope of supply

Key Components of COMBIPAC®

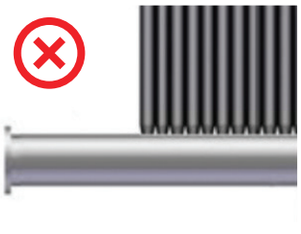
Membrane Panel Assembly (MPA)

Water wall panels provide a water-cooled, leak-tight enclosure for combustion gases, ensuring proper residence time, effective radiative heat transfer and lower furnace exit temperature.

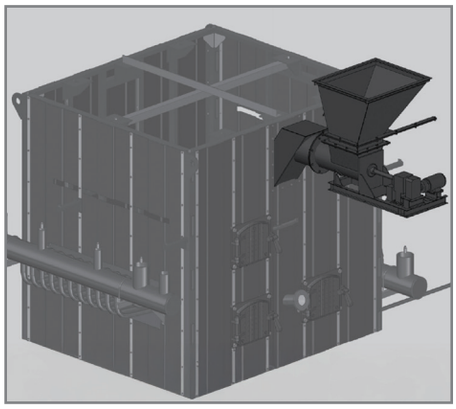
- Higher residence time ensures complete combustion, hence better efficiency
- Lower FOT ensures lower fouling and slagging, providing better uptime
- Tube-strip-tube design achieves higher heat transfer area, along with higher circulating velocity thereby, avoiding phase stratification
- Tubes without flow constrictions ensure lower pressure drop & improved circulation ratio



Tube-Strip-Tube Weld
(by Thermax)



Tube-Tube Weld
(by others)



Fuel Feeding System

Ensures that variety of fuel is fed with uniform distribution over the combustor area at a controlled rate commensurate with steam load requirement.

- OBF system is the best method for feeding Rice Husk which has high volatile matter and low fixed carbon
- Right combination of feeding type & fuel nature ensures the most efficient & trouble-free operation. E.g. OBF for husk, UBF for high moisture coal

Shell Assembly

Provides an enclosure to the convective smoke tubes and required water hold-up along with large steam water interface and high freeboard.

- Generates high quality steam with better response to fluctuating steam loads
- Single pass design, eliminates flue gas reversal resulting in lower erosion
- Tube coil inserts enhances heat transfer

Smart Control Options

Auto Combustion Control System

Amount of fuel to be fired and required combustion air changes with variation of process load on the boiler. Higher than necessary air results in excess air loss, whereas lower air results in unburnt losses. Hence, it is important to accurately maintain the air to fuel ratio in order to respond to fluctuating load as well as to maintain better efficiency at part load.

Scope includes:

- Pressure sensor to map the variation in process load
- VFD operated feeders to accurately maintain fuel firing rate
- Pneumatically actuated combustion air damper for modulating airflow
- PID controller to interpret the load on boiler and to actuate the control elements

Auto Draft Control System

For safe operation of a solid fuel-fired boiler, it is important to ensure the passage of flue gases through the boiler while maintaining a negative draft. The draft requirement varies with change in process load on the boiler. More than necessary draft allows higher excess air to pass through the system, thus increasing loss in efficiency and higher power consumption.

Scope includes:

- Pressure sensor to map the variation in draft
- VFD operated ID fan to accurately maintain draft
- PID controller to interpret draft in the system and actuate control element

Drum Level Control System

Water level control is the most important concern area for boiler management.
If the water level of boiler drops below a specified limit, it can lead to serious mechanical failure. ON/OFF systems are employed in small capacity manually operated boilers, but they have serious limitations like slow response, more wear and tear, variance in steam pressure and water carryover.

- **Single element control:**
  Employs level transmitter and control valve mechanism along with PIC controller to accurately maintain the water level.
- **Two element control:**
  This operates on two loops. The primary loop works on the error in water level and is comparatively slow. The secondary loop works directly on steam demand and has a faster response.
- **Three element control:**
  A third loop is superimposed on the previous calculations by measuring the actual flow rate of feedwater into the boiler. This system is often deployed where water level fluctuations cannot be tolerated.

Note:
*Above controls are part of optional scope of supply

What Makes the New COMBIPAC® Better than the Best?

All-side Enclosed Membrane Panel Assembly

- Up to 40% reduction in refractory by replacement of front and rear furnace refractory wall with water wall
- Reduces refractory installation and maintenance cost
- Reduces loss of efficiency due to air ingress caused by refractory wall wear and tear
- Up to 100% additional radiative heat transfer area
- Reduces potential fouling in smoke tubes due to lower furnace exit temperature
- Higher HTA clubbed with lower heat flux ensure better life even with low grade coal

Integral Ash Settling Chamber in MPA

- Novel design with reversal ensures better ash settlement reducing ash carryover to smoke tubes
- Additional HTA lowers shell inlet temperature
- Reduction in fouling in smoke tubes leading to higher uptime
- Improves tolerance for fouling fuel by lowering FOT thus improves fuel flexibility

Standardised Balance of Plant Options

- Pre-engineered to the engineering standards
- Safe access and ergonomic operation
- Single point responsibility ensures hassle free installation
- High quality of material
- Smart layouts lead to compact footprints

Major Applications


Rice Mill


Edible Oil


Textile Processing

Technical Specifications

Description	Unit	CPFH-40	CPFH-60	CPFH-80	CPFH-100	CPFH-120	CPFH-140	CPFH-160
Steam Output F&A 100^0 C	kg/hr	4000	6000	8000	10000	12000	14000	16000
Design Pressure (SVLOP)	kg/cm^{2}g	10.54/17.5						
Fuel		Rice Husk						
Fue Feeding System		Over Bed Feeding						
Fuel Combustion System		Fluidised Bed Combustion						
Furnace Compartments		1			2			
Efficiency (OBF) as per BS 845 Part 1 - NCV basis								
Rice Husk	%	84						
Fuel Consumption		Over Bed						
Rice Husk	kg/hr	887	1330	1773	2217	2660	3103	3547
Connected Load (10.54/17.5)		With APH and Cyclomax or Bag Filter and RAV for APH and Cyclomax						
Rice Husk (OBF)	KW	39/41	58/62	75/77	91/100	113/117	149/157	150/157
Dimensions								
Width	m	5.2	5.3	5.5	6.5	7.00	7.4	7.9
Length	m	15.7	16.6	17.8	19.9	20.7	21.1	21.4
Height	m	10.7	10.7	11	11.1	11.4	11.7	11.8
Chimney Top Diameter	mm	600	700	800	900	1000	1100	1150
Dry Weight of Single Largest Module	kg	4106	5565	7553	8579	9842	11738	13797

Notes:

- Efficiency and fuel consumption are calculated as per the analysis of fuel mentioned in the offer. It may vary as per variation in fuel specifications. Kindly refer offer document for more details.
- Weights and dimensions mentioned in the table may vary.

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Preserving the Future.

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- Air Pollution Control
- Boiler and Heater
- Build-Own -Operate
- Chemical
- Cooling
- Projects and Energy Solutions
- Process Heating
- Renewable Energy
- Water and Waste Solutions

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