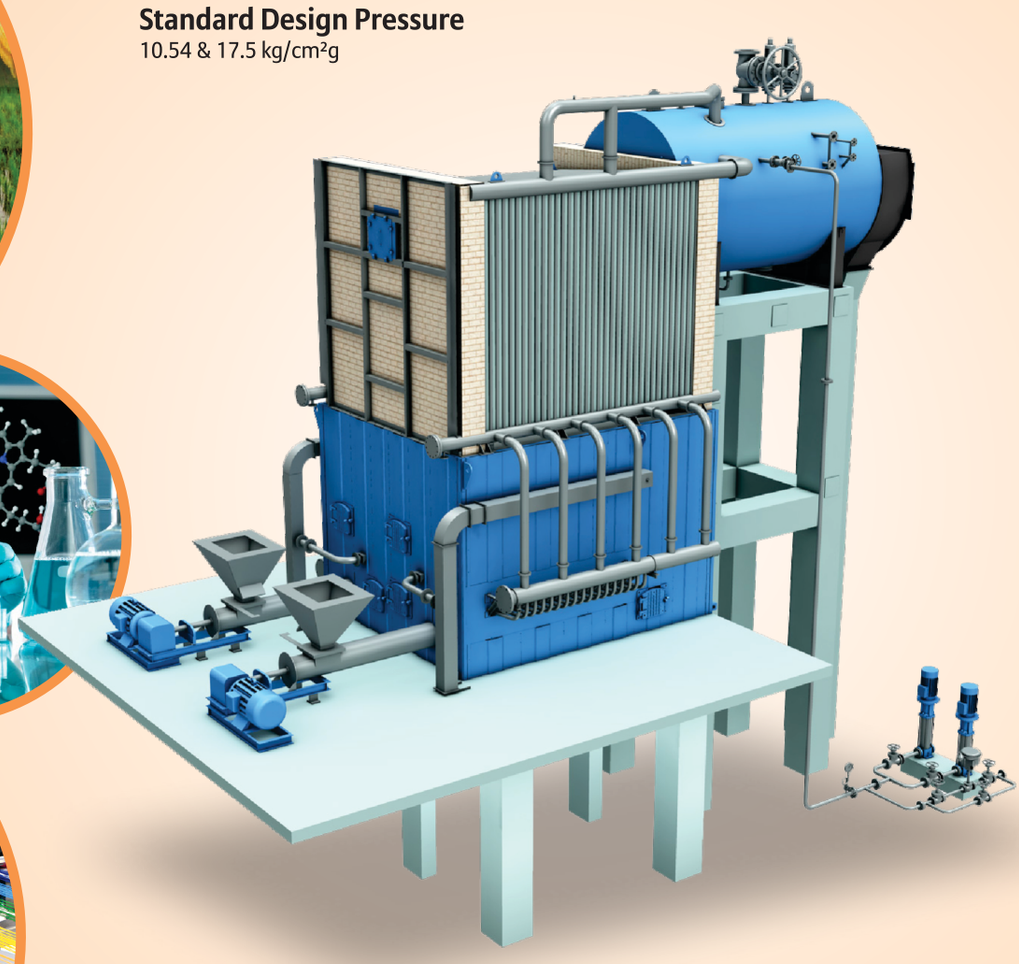
THERMAX 50 Vibrant Years

COMBIPAC®

The Multi Solid Fuel Fired Hybrid Steam Boiler
With Fluidised Bed Combustor

Capacity Range
4 TPH to 16 TPH

Standard Design Pressure
10.54 & 17.5 kg/cm²g



Heating Division

Improving your business is our business

Thermax offers products, systems and solutions in energy and environment engineering to industrial and commercial establishments around the world. Its business expertise cover heating, cooling, waste water recovery, captive power, water treatment & recycling, air pollution control & waste management and chemicals.

Thermax brings extensive experience to the customers industrial applications through technology partnerships and strategic alliances.

Operating from its Head office in Pune Thermax has 11 state of art manufacturing facilities (7 in India 4 in overseas). It has sales & service network spread over India, SE Asia, Middle East, Africa, Russia, UK and the US.

C & H Heating Division

We offer widest range of options covering combustion of various solid, liquid and gaseous fuels, heat recovery from gas turbine/ engine exhaust, waste heat recovery and fired heaters for various industrial processes and applications.

The Multi Solid Fuel Fired Hybrid Steam Boiler

The Combipac (CPFD) is a hybrid smoke and water tube design boiler, with the combustor based on the principle of Fluidised Bed Combustion (FBC). The fuel bed is fluidised by the injection of air from the bottom of the bed, through a set of air nozzles, using a FD fan. This produces a fuel bed resembling a boiling fluid, which helps to achieve uniform mixing and efficient combustion.

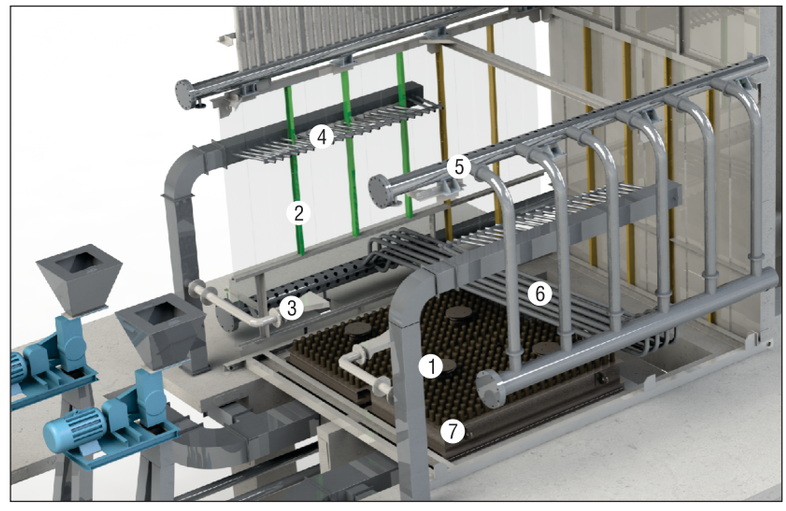
In this Combipac - FBC range of boilers, the higher turbulence levels, better residence time, low excess air and uniform distribution of air and fuel improve overall combustion efficiency, better response to steam load.

These Combipac boilers also offer the flexibility of firing a wide variety of low cost solid fuels like coal, biomass/ agro-waste efficiently.

Salient features

- Best suited to burn fine particles
- Controlled bed temperature
- Flexibility in operation
- Rapid responses to load
- Minimum unburnt losses
- Ability to handle high ash coal
- Low excess air required hence higher efficiency
- Fully automatic operation
- Uniform heat flux ensuring longer refractory life
- Specially designed air nozzles for optimum performance
- Ability to handle high mositure (upto 35%) on coal

Internals

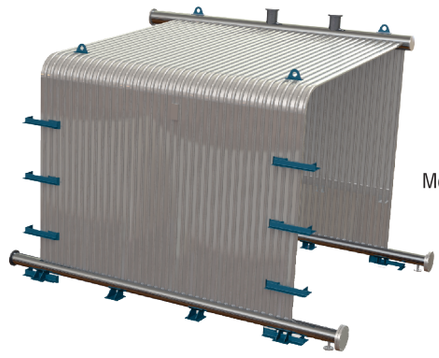


1. Fuel Feeding nozzle
2. Furnace structure
3. Fuel spreader
4. Cycloidal air injection system
5. Downcomer
6. In bed tubes
7. Air nozzle

Membrane Panel Assembly

D-type Membrane panel:

- Controlled bed temperature
- To achieve water circulation
- Reduces stress concentration on the shell tube plate
- Effective radiative heat transfer due to optimum distance between membrane panel assembly and bed



Membrane panel assembly

Shell Assembly

Efficient and dependable convective pass design:

- Single pass design
- Optimally sized diameter tubes
- Elimination of turning of flue gas in convective bank
- Reduction in tube and tube plate erosion

High steam quality and better load response:

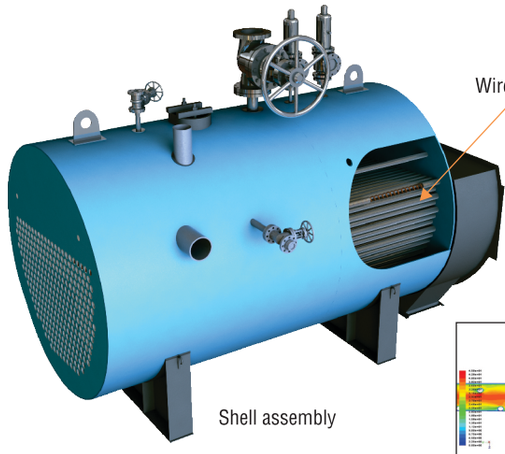
- Higher steam/ water interface area and higher freeboard
- Ensure better steam quality
- Large water holding capacity
- Better response to the fluctuating loads

Wire coil inserts:

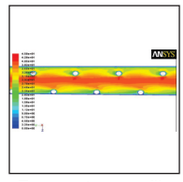
- Improved flue gas turbulence and velocity
- Improved heat transfer performance

Simple layout:

- Smoke chambers with hinged doors
- Easy cleaning



Shell assembly



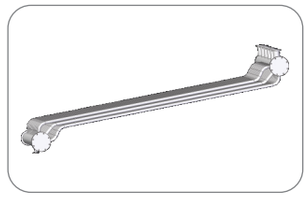
Temperature profile of shell tube

In-bed tubes

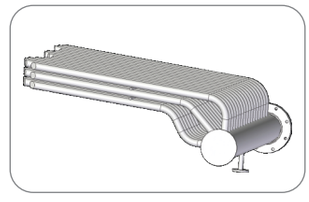
The membrane panel in the Combipac CPFD is provided with integrated in-bed tubes to recover heat from the radiation zone and maintain uniform bed temperature.

Salient features

- All bends are placed outside fuel bed zone eliminating erosion levels.
- Thanks to higher pitch, lower air & particle velocity between tubes is achieved ensuring reduction in erosion levels.
- Designed with very high circulation ratio and water velocity to eliminate tube overheating.



Bed header assembly



Bed header assembly

Fuel feeding system

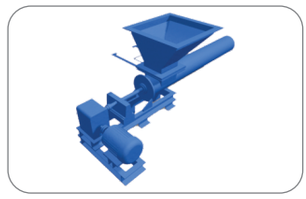
Combipac CPFD fuel feeding offers the flexibility to fire a wide variety of solid fuels in this boiler.

- **Under Bed Feeding (UBF)**

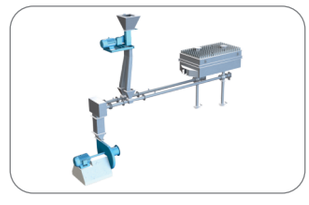
  The under bed feeding system is suitable for fuels like rice husk, Indian coal, Indonesian coal, lignite etc. The under bed feeding system consists of a rotary feeder and a booster fan.

- **Over Bed Feeding (OBF)**

  The over bed feeding system in the boiler is by a screw feeder, suitable for fuels like coal, paddy husk, biomass pellets and PKS.



Screw feeder



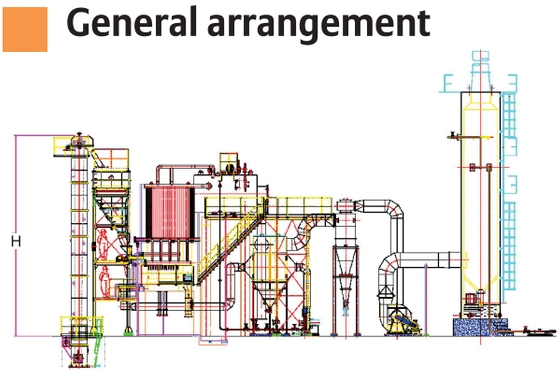
Under bed feeding system

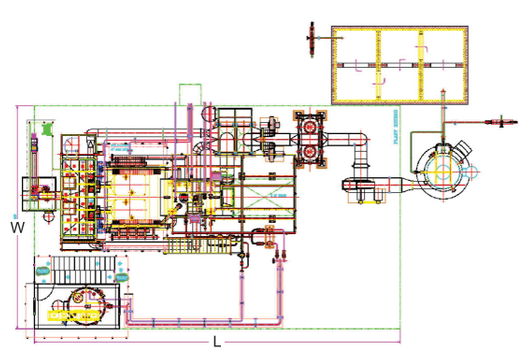
Technical specifications

Description	Unit	CPFD-40	CPFD-60	CPFD-80	CPFD-100	CPFD-120	CPFD-140	CPFD-160
Capacity (kg/hr F&A 100 deg C)	kg/hr	4000	6000	8000	10000	12000	14000	16000
Design pressure (SVLOP)	kg/cm^{2}g				10.54 / 17.5			
Fuel					Husk/ Indian Coal/ Indonesian Coal/Lignite			
Fuel feeding system					**Auto - Underbed / Overbed**			
Combustion system					Fluidised Bed Combustion			
Furnace compartments			1				2	
Efficiency (Underbed / Overbed)	%				**As Per BS 845 Part -1 NCV Basis**			
Husk	%				85 / 84			
Indian coal	%				86 / 85.5			
Indonesian coal	%				86.5 / NA			
Lignite	%				84.5 / NA			
Fuel Consumption					Underbed / Overbed			
Husk	kg/hr	876/887	1314/1330	1753/1773	2191/2217	2629/2660	3067/3103	3505/3547
Indian coal	kg/hr	584/588	876/881	1168/1175	1460/1469	1752/1763	2044/2056	2336/2350
Indonesian coal	kg/hr	446/NA	669/NA	892/NA	1115/NA	1338/NA	1561/NA	1784/NA
Lignite	kg/hr	741/NA	1111/NA	1482/NA	1852/NA	2223/NA	2593/NA	2964/NA
Connected load (10.54 / 17.5)					**With APH & MDC**			
Under Bed firing		40/43	58/61	75/77	94/103	117/121	141/148	160/168
Over Bed firing		32/34	47/50	60/62	76/85	96/100	120/127	130/137
Connected Load (10.54 / 17.5)					**With APH & Cyclomax or Bagfilter**			
Under Bed firing		48/50	69/73	90/92	109/119	135/139	171/178	180/188
Over Bed firing		39/49	58/62	75/77	90/100	114/ 118	149/157	150/157
Dimensions								
A	mm	9841	10430	10651	11130	10786	13318	10754
B	mm	4600	4829	5449	5300	5500	7249	7369
C	mm	3000	3000	3000	3000	3000	3000	3000
D	mm	6515	6370	7040	6905	7295	7495	7505
E	mm	23000	24000	24400	25000	25000	27000	25063
F	mm	8220	8704	9654	9955	10675	12544	12804
G	mm	9040	9045	10084	10100	10870	10990	11000
Chimney top diameter	mm	600	700	800	900	1000	1100	1150
Dry weight (10.54 / 17.5)								
Boiler shell	tonne	4.5 / 5.0	6.0 / 6.5	7.5 / 8.5	9.0 / 10.0	12.5 / 14.0	14.0 / 16.5	17.0 / 19.0
Furnace*	tonne	32.0	37.0	46.0	54.0	70.0	75.0	75.0
Flooded weight (10.54 / 17.5)								
Boiler shell	tonne	10.0 / 10.5	12.0 / 12.5	16.0 / 17.0	19.0 / 20.0	26.0 / 27.5	29.5 / 32.0	34.5 / 36.5
Furnace*	tonne	33.0	38.0	47.5	55.5	72.0	77.0	77.0

Note: Design standard-IBR. Efficiency is calculated based on NCV of Husk as 2900 kcal/kg, Indian coal as 4300 kcal/kg, Indonesian coal as 5600 kcal/kg and Lignite as 3450 kcal/kg. *Furnace weight includes furnace structure, membrane panel and refractory. Above mentioned weights and dimensions may vary with actuals. Please refer to offer document for more details.

General arrangement





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Thermax Business Portfolio

- Heating
- Cooling
- Power Generation
- Air Pollution Control
- Chemicals
- Water & Wastewater Solutions
- Solar
- Specialised Services

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