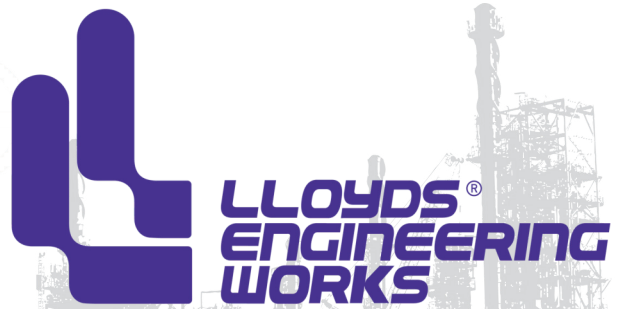


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# AFBC BOILER



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# SALIENT FEATURES OF LLOYDS ATMOSPHERIC FLUIDIZED BED COMBUSTION BOILER

## BEST COMBUSTION EFFICIENCY

Technical aspects required to accomplish the Features

- Selection of Fuel Nozzles & Sizing of Air Nozzles
- Proper excess air with a split of secondary (overbed) air and Primary air (under bed)
- Free board Combustion due to over bed firing
- Perfect Fluidization velocity
- Better Residence time
- Bed material selection
- Preheated air supply
- Uniform temperature all over the bed
- Fuel sizing less than 6 mm

## Lloyds Design Considerations

- For proper spread to have excellent contact of air and fuel
- Secondary over air fire with separate dampers on both sides to ensure complete combustion to minimize the unburnt carbon loss
- Optimum velocity considered while sizing Furnace
- Tall height Furnace considered for better residence & secondary Combustion
- Guidance for Proper bed material
- Air temperature maintained at 140-160 Deg C
- Selection of Air Nozzle, Coal Nozzles and fluidization velocity & DB plate pressure drop.
- Fuel distribution as advised by Lloyds

## BEST BOILER EFFICIENCY

Technical aspects required to accomplish the Features

- Less un burnt carbon
- Less Dry Flue gas exit loss
- Less Radiation loss Less Leakage

## Lloyds Design Considerations

- Due to best combustion, higher-residence time, best combustion
- Boiler outlet gas temperature maintained less than 140 Deg C., Proper sealing to restrict air leakage
- Due to proper refractory arrangement
- Gas tight enclosure machine welded membrane wall on both end

## HIGHER AVAILABILITY, EASE OF OPERATION & LESS MAINTENANCE

Technical aspects required to accomplish the Features

- Bed coils with higher pitch
- Studded Bed coil
- Air Nozzles
- Smooth flow of Fuel
- Mixing nozzle design

## Lloyds Design Considerations

- The Bed coils are located with higher pitch to avoid erosion
- SS studded bed coil considered to eliminate tube erosion
- SS tip Air nozzles considered for long life
- Holes on nozzles are located to have better fluidization
- Hot air considered to reduce the friction due to moisture on fuel to ensure the smooth flow through PA line
- Design to create more vacuum and less drop



# SALIENT FEATURES OF LLOYDS ATMOSPHERIC FLUIDIZED BED COMBUSTION BOILER

## LONG LIFE & ROBUST DESIGN

Technical aspects required to accomplish the Features

- Optimum Velocity profiles
- Higher thickness & Superior material
- Less Erosion
- Flow pattern

## Lloyds Design Considerations

- Wider pitch on SH coil to avoid fouling
- SH tube thickness and material selection are based on Metal temperature calculation considering the steam temperature fluctuation.
- Waterwall fin thickness arrived based on the fin tip temperature
- Better degree of inclination with 'SS' lining for Hoppers
- Sizing of Hanger rod/Lifting lug
- Higher refractory thickness around the bed
- Study and design proper flow path on Water / Steam side
- Study and design proper flow path on Air/Gas side

## BETTER TURN DOWN

Technical aspects required to accomplish the Features

- Thermal design
- Auxiliaries Sizing

## Lloyds Design Considerations

- Selection of No. of compartments
- Arriving higher DB plate pressure drop
- Arriving SH heating surface area
- Selection of mass velocity and pressure drops across Steam side
- Fans, Feed pump selection
- Fuel feeders sizing
- Control valve sizing suitable for 30 % MCR onwards

## SALIENT FEATURES

Technical aspects required to accomplish the Features

- Steam quality up to 99.99% to improve the life of Turbine
- Ease on Boiler Startup
- Better Steam water flow Circulation
- Less Erosion
- combustion without a risk of slagging and fouling
- Limit the NOX up to maximum extend
- More suitable for fuel having higher ashes & lower GCV
- Optimum mass velocity & Steam side pressure drop

## Lloyds Design Considerations

- Primary and secondary screen system
- Appropriate Drum water holding capacity and Steam space loading
- Providing proper No. of Cyclones
- Selection of Air Nozzles & Pressure drop
- Proper inclination of bed coil for better mass velocity to avoid DNB (Departure from Nucleate Boiling)
- Arriving Circulation calculation to size Downcomers & Risers
- Identify the bottle neck on the circulation circuit and improve the circulation
- Selection of PA line
- Routing of PA line with bare minimum bends
- Bed temperature - Below fuel ash softening temp.
- Higher pitches on Bed coil & SHs
- By maintaining the Bed temperature
- With Optimum Bed temperature and Furnace Bottom design
- Velocity criteria based on Mass velocity



# SALIENT FEATURES OF LLOYDS ATMOSPHERIC FLUIDIZED BED COMBUSTION BOILER

## OPEN BOTTOM HOPPER DESIGN (FUEL BED)

Technical aspects required to accomplish the Features

- Suitable for multi fuel like Char, Dolo char, Washery rejects, Rice husk & Coffee waste husk
- Low Sox
- Minimise the fuel ash agglomeration for biomass fuel

## Lloyds Design Considerations

- Proven design with continuous bed ash draining even for large sized particles
- By addition of proper quantity of lime stones at appropriate level
- Minimise the alkali content
- Uniform density across bed



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### Corporate Office



A-2, 2nd floor, Madhu Estate, Pandurang Budhkar Marg, Lower Parel, Mumbai - 400013, Maharashtra, INDIA



amit.mishra@lloyds.in,  
senthilkumar.sambandam@lloyds.in,  
infoengg@lloyds.in



91-22-6291 8111

### Factory & Registered Office



Plot no. A5/4, A5/5 & 6/3 MIDC Industrial Area, Murbad, Dist. Thane - 421401, Maharashtra, INDIA



Plot no. K-3, Additional MIDC, Murbad Area, Kudavali, Dist. Thane - 421401, Maharashtra, INDIA



infoengg@lloyds.in



91-2524222271 / 9545654196