



**Sardhana Papers Pvt. Ltd.**

**Regd. Off. & Works :**

Meerut Road,  
SARDHANA-250 342 (Meerut)  
+91 9319801326  
+91 8191001926  
E-mail : sardhanapapers@gmail.com  
CIN No. : U21011UP1985PTC007097

Ref. No. ....

Date.....

Dt. : 19<sup>th</sup> Sep. 2023

## **PURCHASE ORDER FOR BOILER**

**M/s Industrial Boilers Ltd.**  
**225-1/B, 226, 227, 228, Vapi Industrial Township,**  
**G.I.D.C. , Vapi - 396 195**

Dear Sir,

As desired by you please find enclosed herewith our offer for a High Pressure, Fluidised Bed Combustion Boiler, Model **MAGNUM - 400**.

Underbed Feeding -Coal (100%)

Overbed Feeding -Rice Husk (100%), Mustard (100%), Patta Kutti (20%), Bagasse (20%)

While designing the system, we have assumed the following data:-

Boiler Capacity (From 120°C)	<b>40,000 Kg/hr</b>
Steam temperature at Boiler Outlet	<b>490 +/-10°C (On Overbed Feeding)</b>
Boiler Design Pressure	<b>75 Kg/cm<sup>2</sup></b>
Super Heater Outlet Pressure	<b>68 Kg/cm<sup>2</sup></b>

For the purpose of Clarity and simplification our quotation is grouped separately as follows.

**BOILER DATA**

Design Data

Annexure - I

Scope of Supply.

Annexure - II

Technical Specification

Annexure - III

**COMMERCIAL DATA**

Techno Commercial Offer

Annexure - IV

General Terms & Conditions.

Annexure - V

We hope you will find this offer in line with your requirement. In case you require any further information please feel free to contact us.

Thanking you,

**For Sardhana Papers Pvt. Ltd.**

**Director**





## BOILER DESIGN DATA

The following parameters have been taken as the basis for the design of the boiler.

### Boiler parameters at Maximum Continuous Rating :-

Steam flow at Superheater outlet	40,000 kg/hr
Steam pressure at Superheater outlet	68.00 kg/cm <sup>2</sup> (g)
Steam temp. at outlet	490°C on Over Bed Feeding
Feed water temp. at inlet to Economiser	105 - 120°C

### The Type of Boiler selected is :-

Location	Indoor
Type	Single Drum Water Tube
Combustion system	Fluidised Bed
Draft system	Balanced draft
Support	Bottom supported on RCC construction.
Pass	Four + Economiser

### Fuel Specifications

#### **Coal (100%)**

• GCV	5200 Kcal/Kg
• Moisture	< 5%
• Ash	< 22%
• Size	1.5 to 6 mm

#### **Rice Husk (100%)**

• GCV	3300 Kcal/Kg
• Moisture	< 15%
• Ash	< 18%

#### **Mustard Straw (100%)**

• GCV	3600 Kcal/kg
• Moisture	< 15%
• Ash	< 14%

#### **Bagasse (20%), Patta (20%), Kutti (20%) (Moisture - 25%)**

### Site Conditions :-

Ambient temp (for design)	40°C
Relative humidity (for design)	60%
Wind load	As per IS 875
Seismic coefficient	As per IS 1893

# TOP FEATURES

Super High Efficiency Boiler

Low Thermal Inertia  
Superfast Steamer

Fully welded design  
No Expanded Tubes  
No Leakage

Extra large Combustion zone  
For complete burning of fuel

Choice of Fuel Combustion Systems  
FBC, Brownian and Stoker

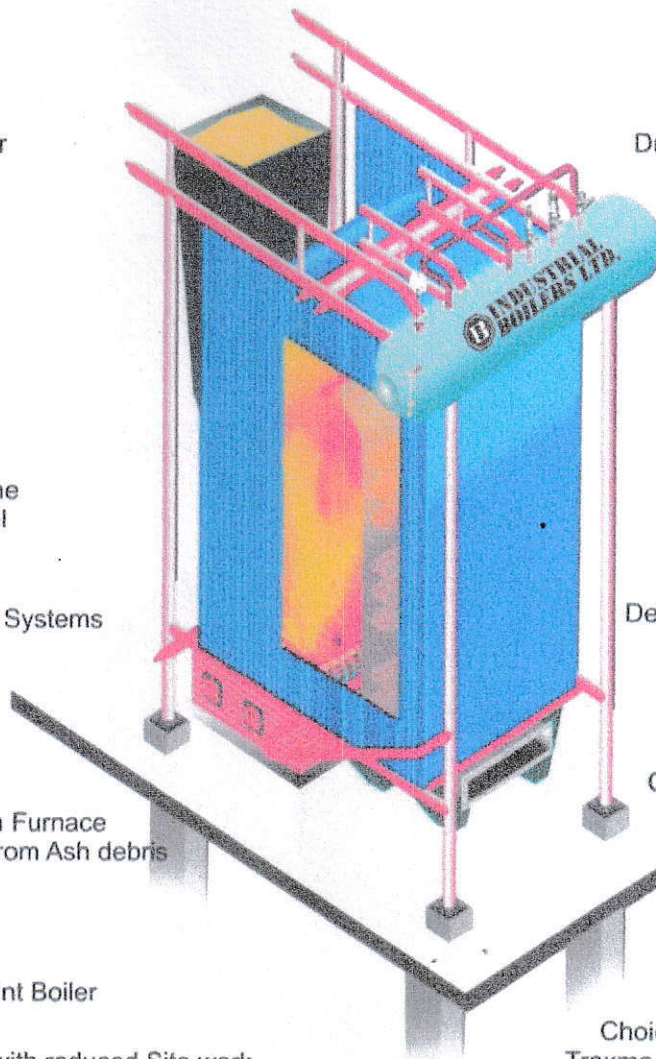
Bare Minimum Refractories

Ash settling Chamber within Furnace  
Protects combustion zone from Ash debris

Floor Mounted Boiler

Space Saving, Low Foot Print Boiler

Factory assembled design with reduced Site work



Drum Supported on Downcomers

Moisture Separation Internal  
within Drum

Defined Flue gas path  
No Short Circuiting

Built in Multistage Superheater  
with Attemperator

Freely expandable Boiler

Defined Natural Circulation Circuit

Choice of Feed Pumps  
Centrifugal or Plunger

Choice of Boiler instrumentation  
Standard, PLC, SCADA

Optional Air Preheater

Pressurised Economiser

Choice of Pollution Control Systems  
Trexma, Bag Filter, Wet Scrubber, ESP

**Codes & Standards :-**

Pressure parts	As per IBR with its latest amendments.
Non pressure parts	As per our Standard Engineering Practice.
Boiler Thermal Efficiency	As per BS 845 Part I, Indirect method.
Radiation loss	As per standard ABMA radiation loss chart

**Utility Requirements :-****Electrical Requirements for Motors**

Voltage	415 $\pm$ 6% V
Frequency	50 $\pm$ 3% Hz
Phase	3 phase, 4 wire

**Electrical Requirements for Instrumentation and Panel**

Voltage	230 V
Frequency	50 Hz
Phase	Single Phase

**Instrument Air**

Pressure	7.0 Kg/cm <sup>2</sup> g
Quality	Dry, free from oil & dirt
Dew point temp.	- 15° C
Quantity	10 m <sup>3</sup> /hr

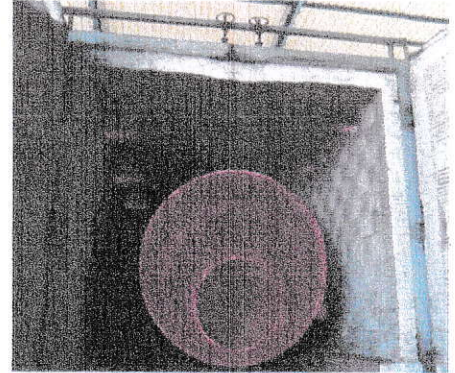


## **SINGLE DRUM, WATER TUBE SCOPE OF SUPPLY MAGNUM WITH FBC**

### **CONSTRUCTION :**

The Boilers offered by us are made as per the latest IBR Regulations and are of Class-I Fusion welded construction. Stringent quality control is observed at every stage of manufacture right from raw material stage to testing of Boiler prior to dispatch. The Drum is manufactured from Boiler Quality Steel, fully welded construction with 100% radiography, Stress Relieving and hydraulic testing.

This drum is Stress Relieved and Heated Treated to 600 Deg C in a special Gas Fired furnace during the manufacturing stage.



### **FLUE GAS PATHS :**

The Boiler consists of a configuration enabling high turn down ratios. The combustion once completed in the furnace is released into the free board zone at a temperature slightly higher than 1000°C.

Tall furnace enables the combustible products to completely burn off completely. Simultaneously, the water walls absorb a large proportion of the Radiation Energy.

The Hot gases then reverse into the Superheater zone where the Primary and Secondary Superheaters bring down the flue gas temperature further before the gases enter the Economiser.

Pollution Control equipment like ESP reduce the ash emission before the gases are ejected thru the ID fan and Chimney.

### **STEAM DRUM :**

The boiler consist of one Steam drum. This drum connects the various Heating Surface Sections within the Boiler. The drum incorporates a set of Drum Internals for separation of steam before their exit.

A Periodic Blow Down connection with an internal pipe is provided in the drum for removing the dissolved solids, mud and sludge during operation.

### **BOILER BANK TUBES :**

Tubes of BS 3059 grade, Seamless, are used for the Boiler Bank. These consist of water wall and Convection Bank.

### **ECONOMISER BANK TUBES :**

Tubes of BS 3059 grade, Seamless, are used for the Economizer Bank.

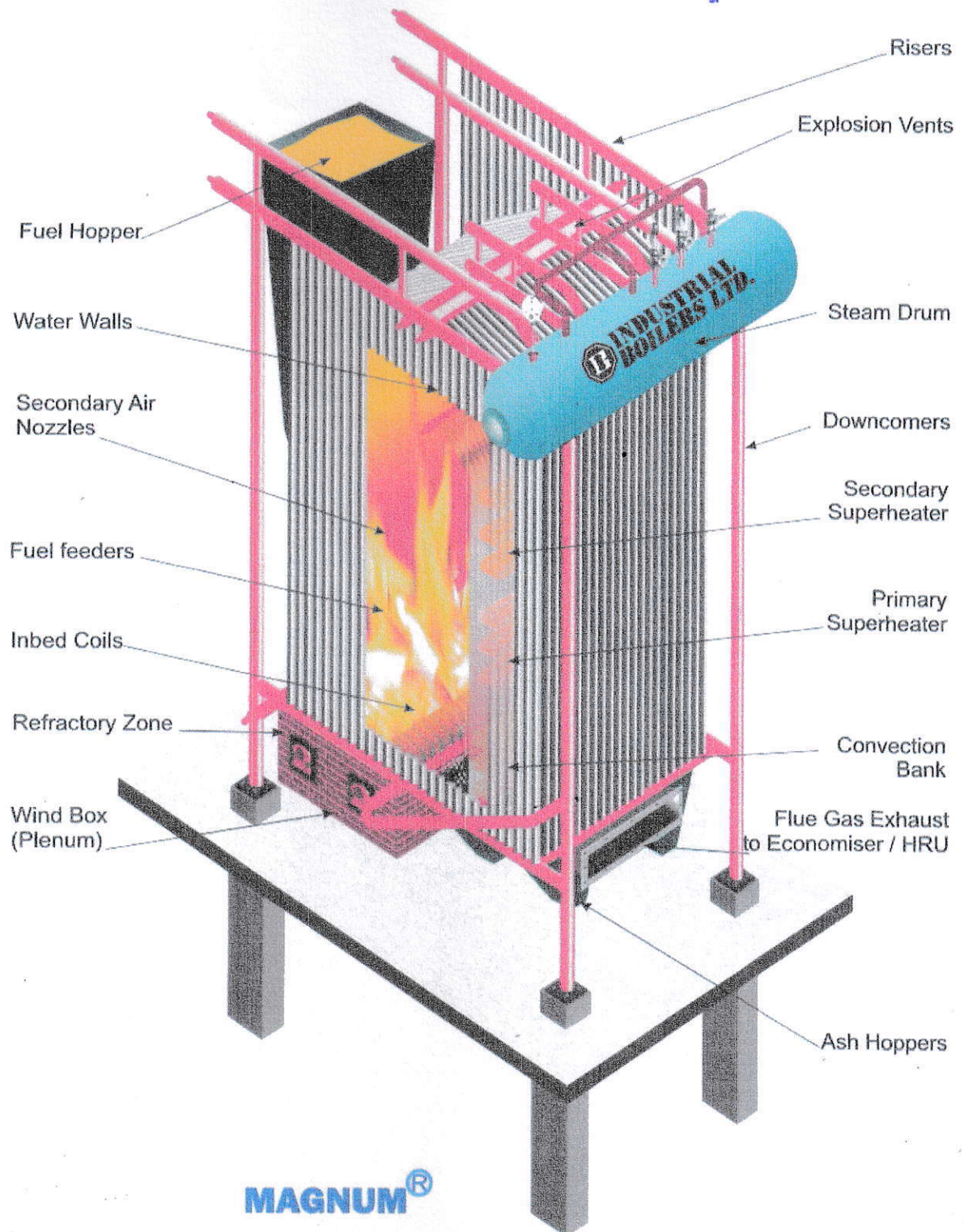


### HEADERS, RISERS AND DOWNCOMERS :

These are made from extra thick Seamless pipes as per ASTM 106.

### FEED PUMPS :

Two numbers (One duty and One stand by) electrically driven Multistage Feed Pumps with motors will be provided. Pumps are of KSB make.



**MOUNTINGS & FITTINGS ON THE STEAM DRUM :**

One Air Vent Valve.  
Two Single Post Spring Loaded Safety Valves.  
Two Sets of Reflex Water Level Gauges.  
One Pressure Gauge with Siphon and cock.  
One Drain + One Root Valve.  
One Check Valve.  
One CBD Valve.  
One Chemical Dosing Valve.

**MOUNTINGS & FITTINGS ON THE SUPERHEATER :**

One Main Steam Stop Valve.  
One Air Vent Valve.  
One Single Post Spring Loaded Safety Valves.  
One Pressure Gauge with Siphon and cock.  
One Drain + One Root Valve.

**MOUNTINGS & FITTINGS ON THE ECONOMISER :**

One Feed and Check Valve.  
One Air Vent Valve.  
One Pressure Gauge with Siphon and cock.  
One Drain + One Root Valve.

**MOUNTINGS & FITTINGS CONNECTED ON THE WATER WALL HEADER :**

Four Drains + Four Root Valves.

**MOUNTINGS & FITTINGS ON THE FEED WATER LINE :**

One Pressure Gauge with Siphon and cock.  
Two Stop Valve. (Pump Discharge)  
Two Check Valve. (Pump Discharge)  
One Feed Water Flow Control Valve  
One Feed Water Recirculation Valve.  
Three Isolation Valve for Feed water Control Valve.

**MOUNTINGS & FITTINGS ON THE DEAERATOR :**

One Pressure Gauge with Siphon and cock.  
One DM Water Inlet Valve.  
One Water Condensate Inlet Valve.  
One Steam inlet valve with Pneumatic Flow control valve.  
One Water inlet Valve with Pneumatic Flow Control valve.  
One Water Outlet Valve to Feed Pumps.  
One Drain Valve.  
One Set of Water Level gauge Glass.  
One Deaerator Level Transmitter  
One Deaerator pressure Transmitter



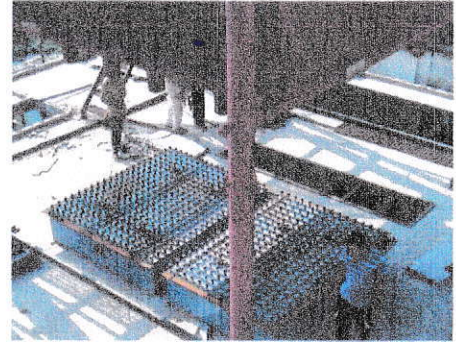
### **AUTOMATIC WATER LEVEL CONTROL :**

3 Element Feed water regulating system to ensure correct water level in the Boiler is provided.

The system correlates the Level in the Drum with the demand in Steam Flow to accurately give an output to the Feed Water Control valve to maintain the correct water level in the boiler drum.

### **FLUIDISED BED EQUIPMENT :**

The furnace materials such as Windbox with Stainless Steel Nozzles, Fire Doors and Ash Doors will be provided.



### **OVERBED FUEL FEEDING SYSTEM :**

Over bed fuel feeding system will be provided for easy operation consisting of VFD controlled Screw Feeders with Gear Box and Motor.

### **UNDERBED FUEL FEEDING SYSTEM :**

Underbed fuel feeding system will be provided for easy operation consisting of VFD controlled Feeders with Gear Box and Motor. PA Fans for Pneumatic conveying will be supplied.

### **SAMPLE COOLERS :**

Three Nos. sample coolers for Blow Down, Saturated Steam and Superheated steam.

### **BLOW DOWN TANK :**

One Blow Down tank to connect all the Drains of the Boiler will be provided.

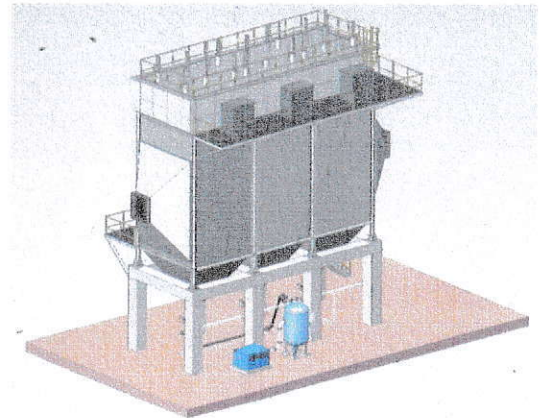
### **FLY ASH REMOVAL SYSTEM :**

Rotary Air lock valves below Superheater Chamber, Economiser and Dust Collector for removal of ash will be provided.

### **ELCTROSTATIC PRECIPITATOR :**

A highly efficient ESP is provided to check carry over the dust particles which otherwise would escape to the atmosphere. The precipitator traps the dust particles by the use of Electrostatic Charge. Rapping hammers are used to discharge the ash.

Ash is continuously discharged from the Bottom of the Electrostatic Precipitator.



### **SILENCERS :**

Three Silencers are provided for Safety Valves. Air Vent will also be connected to one of these.



### DEAERATOR :

Complete Deaerator consisting of Storage tank and Head alongwith instrumentation will be provided. Deaerated Feed Water Tank of 30 minutes storage. Deaerator instrumentation includes Steam Temperature, Pressure and Water Level control.

### CONTROL PANEL:

The panel consist of a sophisticated but user friendly circuit enabling the operator to run the boiler in automatic or manual mode as desired.

Various instruments and safety features are as detailed below:

In auto mode the boiler will operate all sequences automatically taking control from the PLC.

The MCC will be fixed (non-draw out) type modular with single front and is suitable for indoor application. Cable entry is from the bottom.

In the control panel Switches, Motors Starters, Indication Lamps, Control Fuses, Main Incoming Switch and Inter connecting wiring is provided.

- F.D. Fans (2 Nos)

- I.D. Fans

- P A Fans (2 Nos)

- Feed Pumps (2 Nos.)

- Coal Feeders (6 Nos.)

- Husk Feeders (4 Nos.)

- Temperature indicators with selector switch.

Annunciation windows to show unhealthy operation for the following are provided:

- F. D. Fan Trip

- I. D. Fan Trip

- P.A. Fan Trip

- Feed Pumps Trip

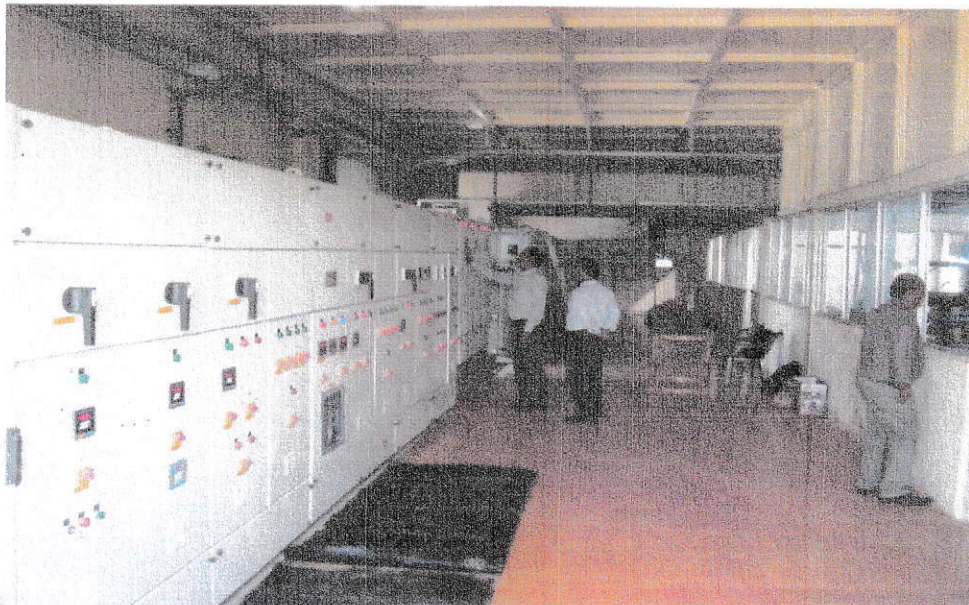
- Coal Feeders Trip

- Husk Feeders Trip

- Drum Level Low

- Drum Level High

- Bed Temp. High





### PLC CONTROL PANEL :

A **Master Control System** will be provided.

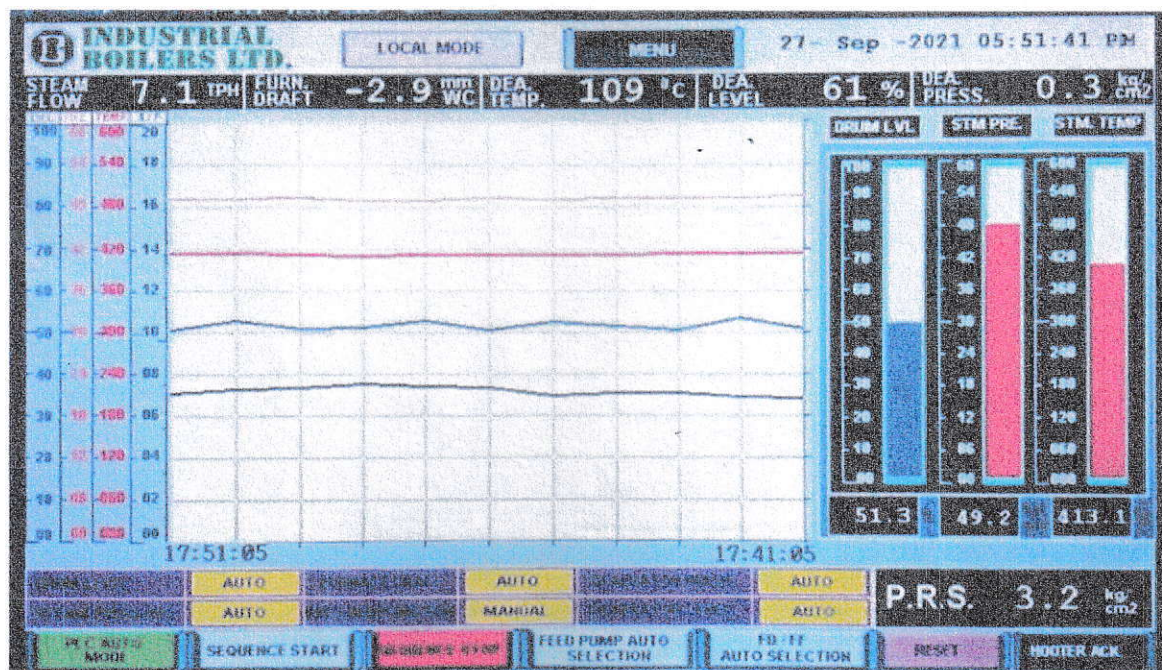
Data acquired by the PLC will be displayed on a Touch Colour HMI Screen – 10 inch size as well as on a SCADA based computer. (PC in Clients' scope)

The PLC interfaces with various Boiler parameters and Controls the boiler as well as indicates its Performance with Trends.

Amongst the important Displays are

1. Steam Flow.
2. Totalised Steam Flow.
3. Feed Water Flow.
4. Steam Drum Pressure.
5. Superheater Header Pressure.
6. Superheated Steam Temperature.
7. Flue Gas Temperature.
8. Feed Water Temperature.
9. Economiser Water Outlet Temperature.
10. Drum Level.
11. Deaerator Level.
12. Deaerator Pressure.
13. Furnace Pressure.

All field instruments required for Data acquisition for these displays will be provided.



EXCLUSIONS	
#	Water treatment plant, Feed water Tank.
#	All Feed Water Piping.
#	Main Chimney.
#	All Flue and Air Ducts.
#	Low Pressure Steam Pipe Line
#	High Pressure Steam Pipe Line
#	Steam Header for distribution of process steam
#	Blow down and Drain Piping from terminal Valves on the boiler.
#	Fuel Handling system – Conveyors, Elevator.
#	Ash Handling System with Silo
#	Refractory.
#	Insulation.
#	Structural Supports. Platform and Ladders.
#	Bunker( Fuel & Bed Material), Ash Hoppers etc....
#	All Electrical cables. Earthing
#	Compressed Dry and Oil Free air Supply.
#	All Civil work and structural design work/Shed.
#	First fill of Lubricants and chemicals for boil out.
#	First fill and Flushing Oil for Turbine.
#	Painting at Site.
#	Condensate return system.
#	Pressure Reducing & Desuperheating Station.
#	IBR inspection / or any other Govt. inspection and registration at Site.
#	Erection of the Boiler and other accessories.
#	Hotel Accommodation for our Site Engineers.
#	All Taxes & Duties as applicable at the time of dispatch.
#	Any other item which is not specifically mentioned in the Offer.



## TECHNICAL SPECIFICATIONS OF BOILER MAGNUM – FBC

Max. Continuous rating	:	40,000 Kg/hr (From 120°C)
Type of Boiler	:	Single Drum FBC
Model No.	:	<b>MAGNUM - FBC - 400</b>
Design Code	:	Indian Boiler Regulations
Design Pressure	:	75 Kg/cm <sup>2</sup>
Hydraulic Test Pressure	:	112.5 Kg/cm <sup>2</sup>
Feed water Temperature	:	105 - 120°C
Thermal Efficiency (+/-2%) (As per BS: 845 Pt.1 Indirect Method)	:	80% On Husk 82% On Coal

### Material Specifications :

Boiler Drum	:	ASTM 515/516 Gr 70
Headers	:	ASTM 106 Gr B <u>Seamless</u>
Boiler Tubes	:	BS 3059 <u>Seamless</u> - 6.35mm Thk
Superheater	:	BS 3059 and <u>T - 22</u>
Economiser	:	BS 3059 <u>Seamless</u>

### F.D. Fan details :

Type	:	Centrifugal Direct Drive
Motor	:	100 HP
Pressure	:	600 mm
CFM	:	18000
Quantity	:	2 Nos

### I.D. Fan details :

Type	:	Centrifugal V- Belt Drive
Motor	:	150 HP
Pressure	:	225 mm
CFM	:	31000
Quantity	:	1 No.

### P.A. Fan details :

Type	:	Centrifugal Direct Drive
Motor	:	20 HP
Pressure	:	1100 mm
CFM	:	1400
Quantity	:	2 Nos

**Feed Pump details**

Type	:	Multistage
Flow	:	44 m <sup>3</sup> /hr
Head	:	80 Kg/cm <sup>2</sup>
Motor	:	As per pump manufacturer
No. of pumps	:	2 Nos.

**Fuel Feeder details – Overbed Fuel Feeding**

Type	:	Screw Feeders
Motor	:	3 HP
Quantity	:	4 Nos.

**Fuel Feeder details – Underbed Fuel Feeding**

Motor	:	5 HP
Quantity	:	6 Nos.

**Velocity Profile :**

Fluidised Bed	:	3 – 2 m/sec
Freeboard Zone	:	6 – 8 m/sec
Super Heater Bank	:	8 – 10 m/sec
Economizer Bank	:	8 – 10 m/sec
Gas Ducting	:	8 – 10 m/sec
Chimney	:	6 – 8 m/sec

**Temperature Profile**

Fluidised Bed	:	900 – 975°C
Free Board Area	:	1200 – 1400°C
At Chimney	:	120 – 140°C

**BOILER VALVE SIZING****MOUNTINGS & FITTINGS**

Main Steam Stop Valve.	:	150 mm
Air Vent Valves.	:	25 mm
Single Post Safety Valves.	:	50 mm
Water level gauges.	:	20 mm
Pressure gauges with siphon and cock.	:	15 mm
Blow down valve.	:	50 mm
Feed line valves.	:	100 mm
Drain valves.	:	25 mm

**CHIMNEY**

Recommended Chimney diameter	:	2.5 meters on Top
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### FEED WATER SPECIFICATIONS

Deaerated and Demineralised water is recommended for the boiler.

Feed water should meet the following requirements.

Water Hardness	:	0.01 ppm max.
pH	:	8.5 - 9.5
Dissolved Oxygen	:	0.01 ppm max.
Oil Content	:	Nil
TDS	:	0.1 ppm max.
Silica	:	0.009 (Max.)

### BOILER WATER SPECIFICATIONS

Water Hardness	:	0.01 ppm max.
Total Alkalinity ( as $\text{CaCO}_3$ )	:	300 ppm max. but not exceeding 20% of TDS
Caustic Alkalinity ( as $\text{CaCO}_3$ )	:	150 ppm max.
pH	:	11 - 12
Unreacted Sodium Sulphate (as $\text{Na}_2\text{SO}_3$ )	:	30 -50 ppm.
Phosphates ( as $\text{PO}_4$ )	:	20 - 40 ppm.
TDS	:	1000 ppm max.,
Residual Hydrazine ( as $\text{N}_2\text{H}_4$ )	:	0.5 ppm max.


## COMMERCIAL OFFER

<p>Supply of One No. IBL, Water Tube, Single Drum, Model <b>MAGNUM-400</b> FBC Fired Steam Boiler capable of generating <b>40000 Kg/hr</b> of Steam (From 120°C) at the Superheater outlet pressure of <b>69 Kg/cm<sup>2</sup>(g)</b> and Steam temperature of <b>490°C</b> at Super heater outlet as per standard scope of supply along with</p> <p>Pressurised Economiser Superheater Air Pre Heater Under Bed &amp; Overbed Firing System ID &amp; FD Fan Deaerator 30 min storage Tank with Valves &amp; instruments Feed Pumps 2 Nos. LP and HP Doser Sample Coolers VFD For ID &amp; FD Fan Blow Down Tank PLC Based Control Panel.</p>	<p><b>Rs. 5,15,40,000/-</b> (Rupees Five Crores Fifteen Lacs Fourty Thousand Only)</p> <p>Ex-Works Vapi</p>
<p>Supply of 4 Field Electrostatic Precipitator Complete with Erection, Electricals, Insulation etc.</p>	<p><b>Rs. 2,01,03,000/-</b></p>
<p>Local Hotel, Conveyance and To and Fro for all supervisors.</p>	<p>At Actuals</p>

**Note :**

Freight	-	Client Scope
Price Basis	-	Ex-works Vapi
Taxes & Duties	-	As applicable at the time of dispatch

For Sardhana Papers Pvt. Ltd.

  
Director



## GENERAL TERMS & CONDITIONS

**PRICE :** The Prices quoted are Ex-works Vapi. Insurance, Freight, Taxes are extra. GST and Bank charges are also payable by you as applicable.

### **DELIVERY :**

The delivery will be 6 - 8 months from the date of receipt of your technically and commercially clear order accompanied by necessary advance.

We are not responsible for any delay caused by extraneous circumstances or Acts of God beyond our control and cannot pay any damages or penalties on this account. The equipment ordered will be dispatched in lots. If required we can undertake the dispatch of the equipment on behalf of the buyer by road transport only to any destination given by the buyer on freight TO - PAY basis, on the clear understanding that we will not be liable for any damages whatsoever. The freight charges contracted by us on behalf of the buyer will be deemed as negotiated under the buyer's authority and therefore it shall be binding on the Buyer to make full payment.

### **WARRANTY :**

Our products are warranted for a period of ONE YEAR from the date of dispatch, against any manufacturing defect or faulty workmanship reported in writing during the Warranty Period. The Warranty does not extend to consequential damages or losses. The Warranty is NULL & VOID if repairs and/or replacements are carried out without our consent in writing. It also does not cover bought-out items.

This warranty is not applicable if full payment has not been given to us.

### **CONFIDENTIALITY :**

The client shall treat all quotations, drawings, data, technical information etc. received from Industrial Boilers Ltd. as strictly confidential and shall take all precautions necessary to prevent the unauthorised disclosure in part or parcel of any of the above mentioned, to any third party.

### **TERMS OF PAYMENT :**

First 40% of the order value is payable as Advance with your firm order.

Second Advance 20% after 2 Months

The balance amount as per our Proforma Invoice, including all costs and levies, such as price increase if any, GST and Insurance charges etc. is payable before the materials are dispatched from our works.

Any delay in payment of advance will lead to delay in delivery of the equipment and we not be held liable to pay damages.

### **PLACE OF JURISDICTION**

In the event of any dispute arising as a result of contracting to supply against this offer and quotation, the place of Jurisdiction will be Greater Bombay and no other place.

### **ARBITRATION**

All disputes or differences whatsoever arising between the parties out of or relating to the construction, meaning and operation or effect of this contract or the breach thereof shall be settled by arbitration in accordance with the Rules of Arbitration of the Indian Council of Arbitration and the Award made in pursuance thereof shall be binding on both the parties.

All orders will only be accepted after the realisation after of the agreed advance which shall not be subject to any interest under any circumstances whatsoever. We however reserve the right to adjust such advance against any payments which might fall due because of delay in lifting of the ordered equipment or on account of incidental expenses incurred on buyer's behalf. An order placed with us cannot be canceled for any reason whatsoever without our consent in writing. Any cancellation of order without or consent will result in the forfeiture of Advance, without prejudice to our claim for compensation and other legal remedies.

**For Sardhana Papers Pvt. Ltd.**

  
Director



For the purpose of Clarity and simplification our quotation is grouped separately as follows.

**BOILER DATA**

Design Data

Annexure - I

Scope of Supply.

Annexure - II

Technical Specification

Annexure - III

**COMMERCIAL DATA**

Techno Commercial Offer

Annexure - IV

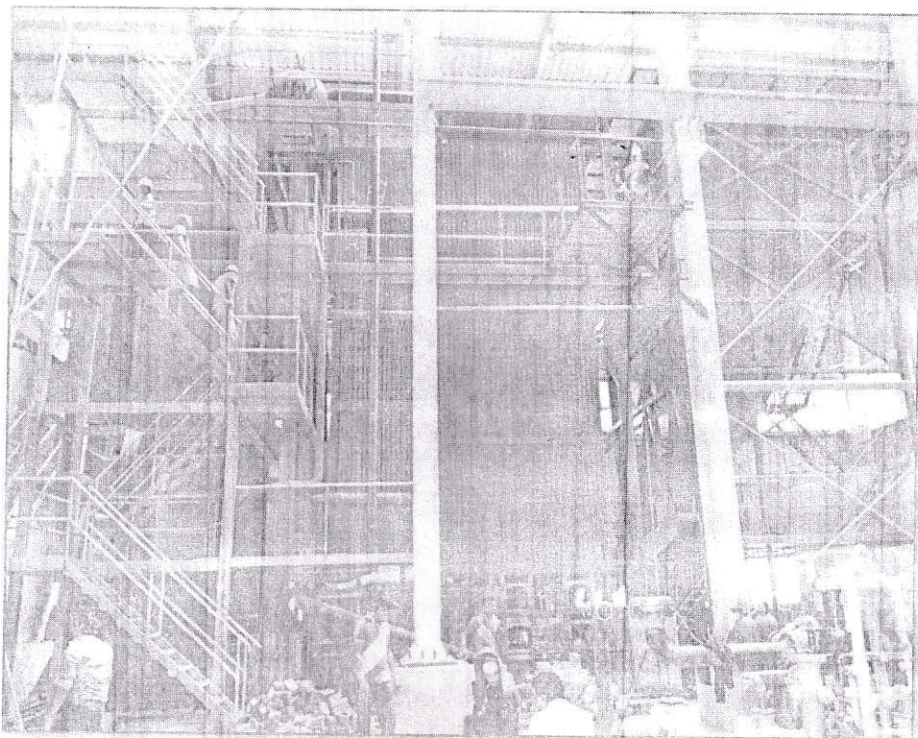
General Terms & Conditions.

Annexure - V

We hope you will find this offer in line with your requirement. In case you require any further information please feel free to contact us.

Thanking you,  
for INDUSTRIAL BOILERS LTD.

**R. K. JAUHARI**  
**Vice President - Marketing**  
9350169002



## ANNEXURE - I BOILER DESIGN DATA

The following parameters have been taken as the basis for the design of the boiler.

**Boiler parameters at Maximum Continuous Rating :-**

Steam flow at Superheater outlet	40,000 kg/hr
Steam pressure at Superheater outlet	72.00 kg/cm <sup>2</sup> (g)
Steam temp. at outlet	Mustard - 450°C Coal - 490°C Rice Husk - 490°C
Feed water temp. at inlet to Economiser	105 - 120°C

**The Type of Boiler selected is :-**

Location	Indoor
Type	Single Drum Water Tube
Combustion system	Fluidised Bed
Draft system	Balanced draft
Support	Bottom supported on RCC construction.
Pass	Four Pass Water wall + Economiser

**Fuel Specifications**

**Coal (100%)**

• GCV	4200 / 5200 Kcal/Kg
• Moisture	< 5%
• Ash	< 22%
• Size	1.5 to 6 mm

**Rice Husk (100%)**

• GCV	3300 Kcal/Kg
• Moisture	< 15%
• Ash	< 18%

**Mustard Straw (100%)**

• GCV	3600 Kcal/kg
• Moisture	< 15%
• Ash	< 14%

**Bagasse (20%) (Moisture < 50%)**

**Patta (20%), Kutti (20%) (Moisture < 25%)**

**Site Conditions :-**

Ambient temp (for design)	40°C
Relative humidity (for design)	60%
Wind load	As per IS 875
Seismic coefficient	As per IS 1893



#### Codes & Standards :-

Pressure parts  
Non pressure parts  
Boiler Thermal Efficiency  
Radiation loss

As per IBR with its latest amendments.  
As per our Standard Engineering Practice.  
As per BS 845 Part I, Indirect method.  
As per standard ABMA radiation loss chart

#### Utility Requirements :-

##### **Electrical Requirements for Motors**

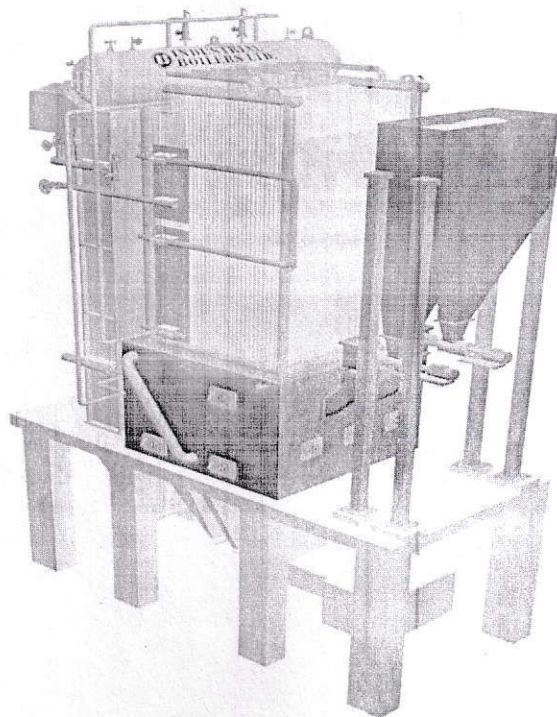
Voltage	415 $\pm$ 6% V
Frequency	50 $\pm$ 3% Hz
Phase	3 phase, 4 wire

##### **Electrical Requirements for Instrumentation and Panel**

Voltage	230 V
Frequency	50 Hz
Phase	Single Phase

##### **Instrument Air**

Pressure	7.0 Kg/cm <sup>2</sup> g
Quality	Dry, free from oil & dirt
Dew point temp.	- 15° C
Quantity	10 m <sup>3</sup> /hr



# TOP FEATURES

Super High Efficiency Boiler

Low Thermal Inertia  
Superfast Steamer

Fully welded design  
No Expanded Tubes  
No Leakage

Extra large Combustion zone  
For complete burning of fuel

Choice of Fuel Combustion Systems  
FBC, Brownian and Stoker

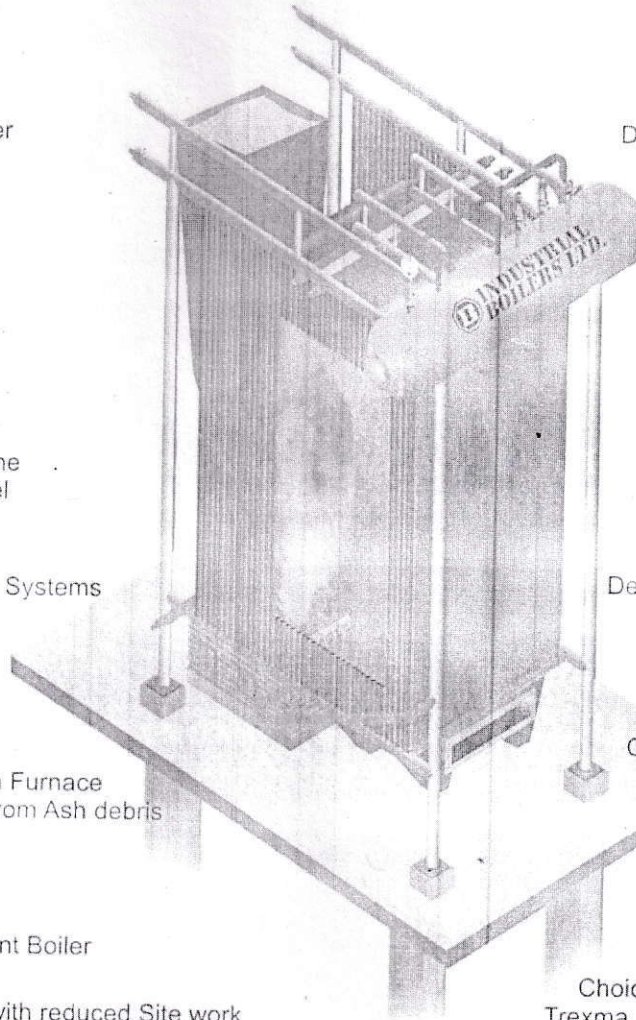
Bare Minimum Refractories

Ash settling Chamber within Furnace  
Protects combustion zone from Ash debris

Floor Mounted Boiler

Space Saving, Low Foot Print Boiler

Factory assembled design with reduced Site work



Drum Supported on Downcomers

Moisture Separation Internal  
within Drum

Defined Flue gas path  
No Short Circuiting

Built in Multistage Superheater  
with Attemperator

Freely expandable Boiler

Defined Natural Circulation Circuit

Choice of Feed Pumps  
Centrifugal or Plunger

Choice of Boiler instrumentation  
Standard, PLC, SCADA

Optional Air Preheater

Pressurised Economiser

Choice of Pollution Control Systems  
Trexma, Bag Filter, Wet Scrubber, ESP

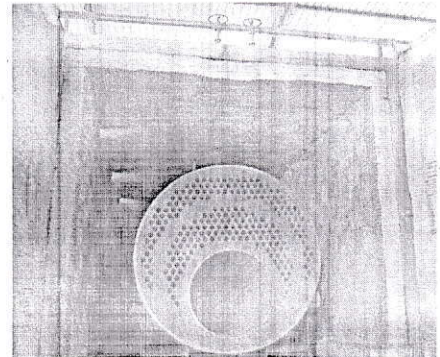


**ANNEXURE- II  
SINGLE DRUM, WATER TUBE  
SCOPE OF SUPPLY  
MAGNUM WITH FBC**

**CONSTRUCTION :**

The Boilers offered by us are made as per the latest IBR Regulations and are of Class-I Fusion welded construction. Stringent quality control is observed at every stage of manufacture right from raw material stage to testing of Boiler prior to dispatch. The Drum is manufactured from Boiler Quality Steel, fully welded construction with 100% radiography, Stress Relieving and hydraulic testing.

This drum is Stress Relieved and Heated Treated to 600 Deg C in a special Gas Fired furnace during the manufacturing stage.



**FLUE GAS PATHS :**

The Boiler consists of a configuration enabling high turn down ratios. The combustion once completed in the furnace is released into the free board zone at a temperature slightly higher than 1000°C.

Tall furnace enables the combustible products to completely burn off completely. Simultaneously, the water walls absorb a large proportion of the Radiation Energy.

The Hot gases then reverse into the Superheater zone where the Primary and Secondary Superheaters bring down the flue gas temperature further before the gases enter the Economiser.

Pollution Control equipment like ESP reduce the ash emission before the gases are ejected thru the ID fan and Chimney.

**STEAM DRUM :**

The boiler consist of one Steam drum. This drum connects the various Heating Surface Sections within the Boiler. The drum incorporates a set of Drum Internals for separation of steam before their exit.

A Periodic Blow Down connection with an internal pipe is provided in the drum for removing the dissolved solids, mud and sludge during operation.

**BOILER BANK TUBES :**

Tubes of BS 3059 grade, Seamless, are used for the Boiler Bank. These consist of water wall and Convection Bank.

**ECONOMISER BANK TUBES :**

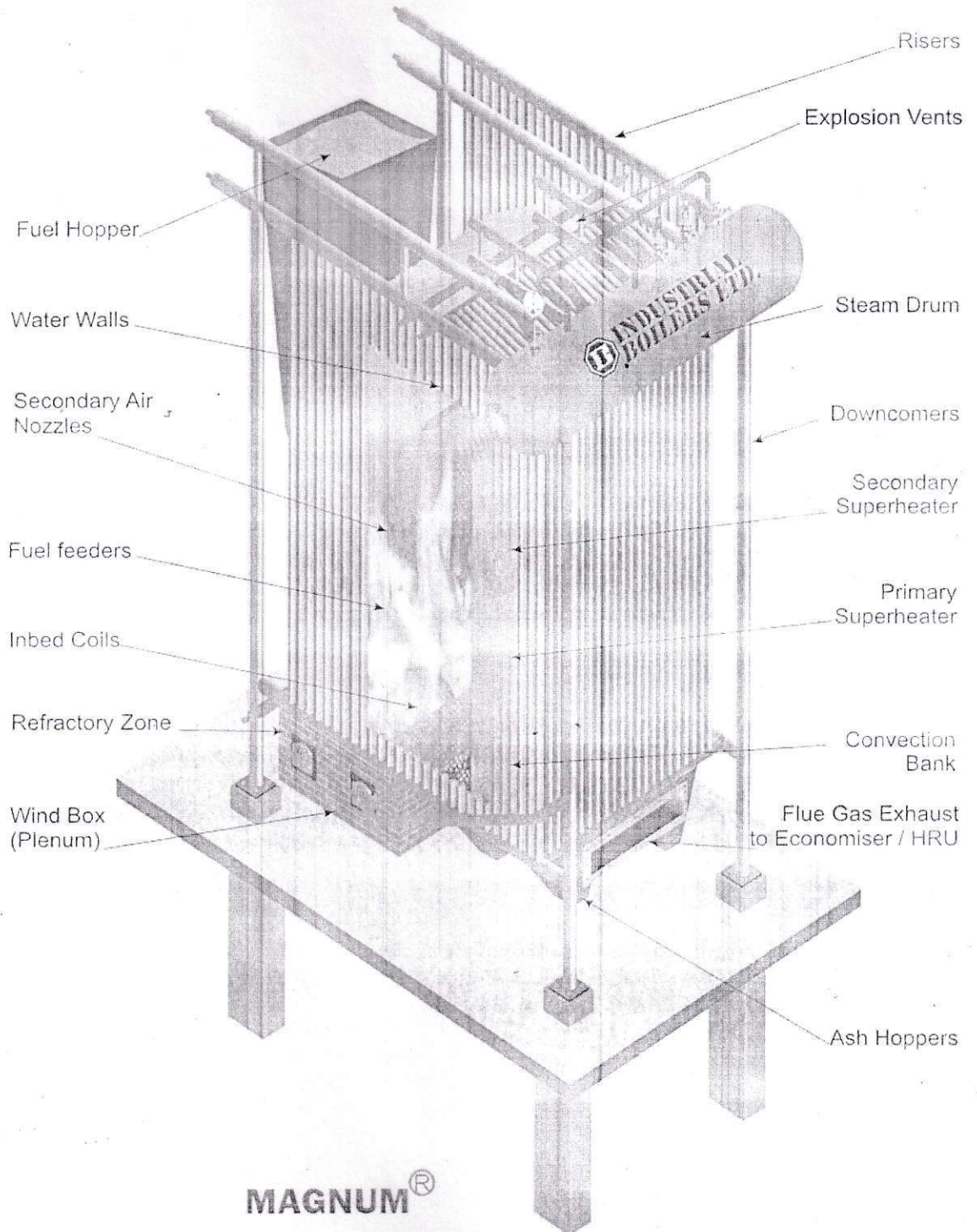
Tubes of BS 3059 grade, Seamless, are used for the Economizer Bank.

### HEADERS, RISERS AND DOWNCOMERS :

These are made from extra thick Seamless pipes as per ASTM 106.

### FEED PUMPS :

Two numbers (One duty and One stand by) electrically driven Multistage Feed Pumps with motors will be provided. Pumps are of KSB make.





**MOUNTINGS & FITTINGS ON THE STEAM DRUM :**

One Air Vent Valve.  
Two Single Post Spring Loaded Safety Valves.  
Two Sets of Reflex Water Level Gauges.  
One Pressure Gauge with Siphon and cock.  
One Drain + One Root Valve.  
One Check Valve.  
One CBD Valve.  
One Chemical Dosing Valve.

**MOUNTINGS & FITTINGS ON THE SUPERHEATER :**

One Main Steam Stop Valve.  
One Air Vent Valve.  
One Single Post Spring Loaded Safety Valves.  
One Pressure Gauge with Siphon and cock.  
One Drain + One Root Valve.

**MOUNTINGS & FITTINGS ON THE ECONOMISER :**

One Feed and Check Valve.  
One Air Vent Valve.  
One Pressure Gauge with Siphon and cock.  
One Drain + One Root Valve.

**MOUNTINGS & FITTINGS CONNECTED ON THE WATER WALL HEADER :**

Four Drains + Four Root Valves.

**MOUNTINGS & FITTINGS ON THE FEED WATER LINE :**

One Pressure Gauge with Siphon and cock.  
Two Stop Valve. (Pump Discharge)  
Two Check Valve. (Pump Discharge)  
One Feed Water Flow Control Valve  
One Feed Water Recirculation Valve.  
Three Isolation Valve for Feed water Control Valve.

**MOUNTINGS & FITTINGS ON THE DEAERATOR :**

One Pressure Gauge with Siphon and cock.  
One DM Water Inlet Valve.  
One Water Condensate Inlet Valve.  
One Steam inlet valve with Pneumatic Flow control valve.  
One Water inlet Valve with Pneumatic Flow Control valve.  
One Water Outlet Valve to Feed Pumps.  
One Drain Valve.  
One Set of Water Level gauge Glass.  
One Deaerator Level Transmitter  
One Deaerator pressure Transmitter

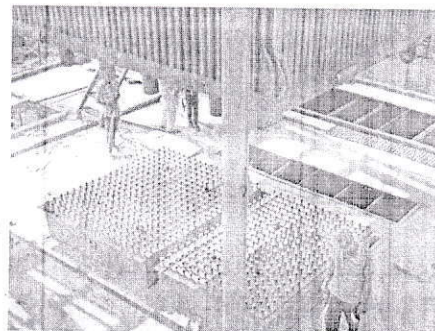
**AUTOMATIC WATER LEVEL CONTROL :**

3 Element Feed water regulating system to ensure correct water level in the Boiler is provided.

The system correlates the Level in the Drum with the demand in Steam Flow to accurately give an output to the Feed Water Control valve to maintain the correct water level in the boiler drum.

**FLUIDISED BED EQUIPMENT :**

The furnace materials such as Windbox with Stainless Steel Nozzles, Fire Doors and Ash Doors will be provided.

**OVERBED FUEL FEEDING SYSTEM :**

Over bed fuel feeding system will be provided for easy operation consisting of VFD controlled Screw Feeders with Gear Box and Motor.

**UNDERBED FUEL FEEDING SYSTEM :**

Underbed fuel feeding system will be provided for easy operation consisting of VFD controlled Feeders with Gear Box and Motor. PA Fans for Pneumatic conveying will be supplied.

**SAMPLE COOLERS :**

Three Nos. sample coolers for Blow Down, Saturated Steam and Superheated steam.

**BLOW DOWN TANK :**

One Blow Down tank to connect all the Drains of the Boiler will be provided.

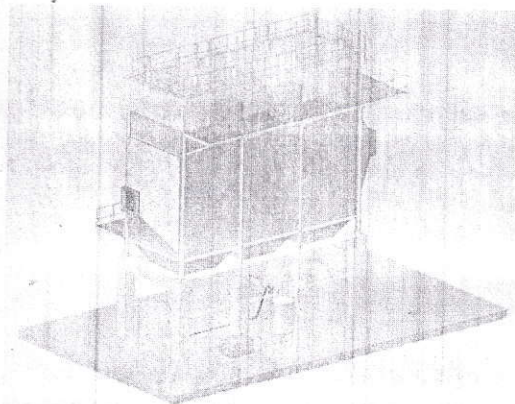
**FLY ASH REMOVAL SYSTEM :**

Rotary Air lock valves below Superheater Chamber, Economiser and Dust Collector for removal of ash will be provided.

**ELCTROSTATIC PRECIPITATOR :**

A highly efficient ESP is provided to check carry over the dust particles which otherwise would escape to the atmosphere. The precipitator traps the dust particles by the use of Electrostatic Charge. Rapping hammers are used to discharge the ash.

Ash is continuously discharged from the Bottom of the Electrostatic Precipitator.

**SILENCERS :**

Three Silencers are provided for Safety Valves. Air Vent will also be connected to one of these.



**DEAERATOR :**

Complete Deaerator consisting of Storage tank and Head alongwith instrumentation will be provided. Deaerated Feed Water Tank of 30 minutes storage. Deaerator instrumentation includes Steam Temperature, Pressure and Water Level control.

**CONTROL PANEL:**

The panel consist of a sophisticated but user friendly circuit enabling the operator to run the boiler in automatic or manual mode as desired.

Various instruments and safety features are as detailed below:

In auto mode the boiler will operate all sequences automatically taking control from the PLC.

The MCC will be fixed (non-draw out) type modular with single front and is suitable for indoor application. Cable entry is from the bottom.

In the control panel Switches, Motors Starters, Indication Lamps, Control Fuses, Main Incoming Switch and Inter connecting wiring is provided.

F.D. Fans (2 Nos)

I.D. Fans

P A Fans (2 Nos)

Feed Pumps (2 Nos.)

Coal Feeders (6 Nos.)

Husk Feeders (4 Nos.)

Temperature indicators with selector switch.

Annunciation windows to show unhealthy operation for the following are provided:

F. D. Fan Trip

I. D. Fan Trip

P.A. Fan Trip

Feed Pumps Trip

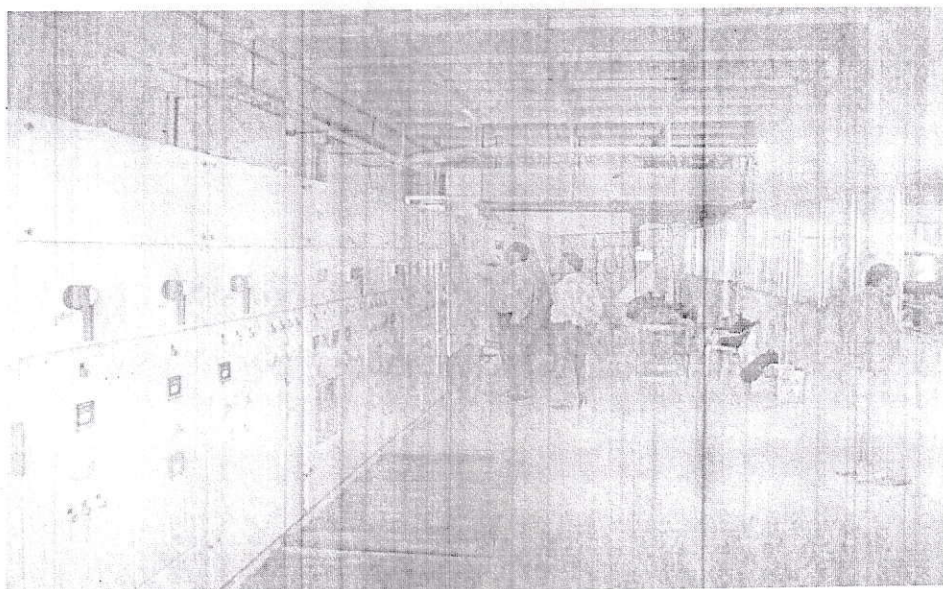
Coal Feeders Trip

Husk Feeders Trip

Drum Level Low

Drum Level High

Bed Temp. High



### PLC CONTROL PANEL :

A Master Control System will be provided.

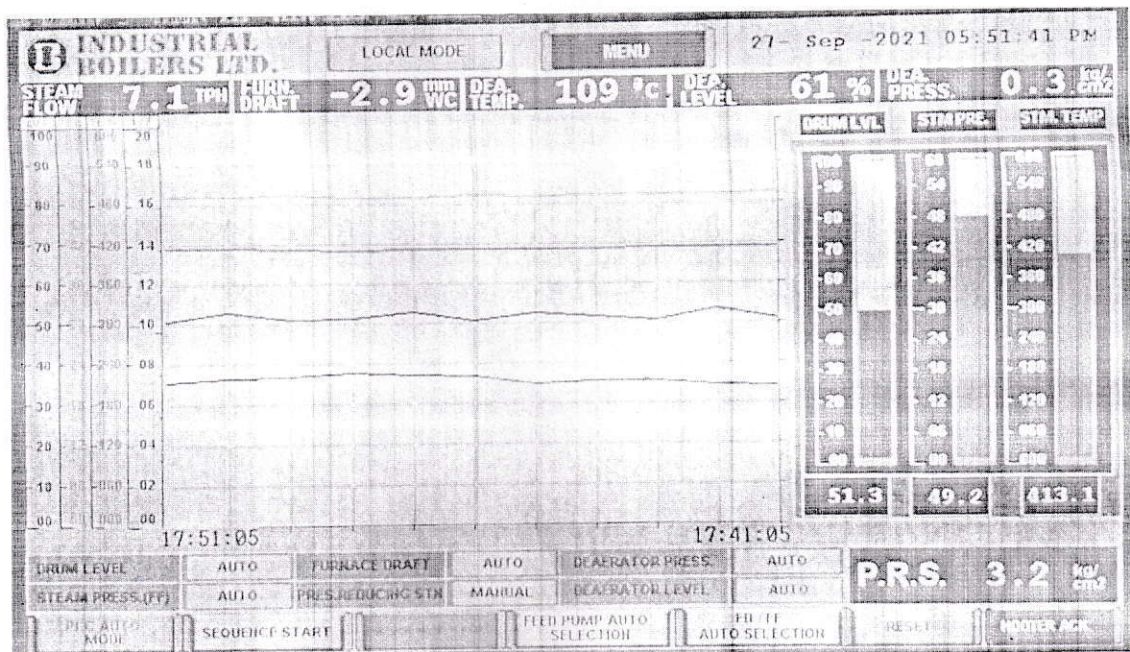
Data acquired by the PLC will be displayed on a Touch Colour HMI Screen –  
10 inch size as well as on a SCADA based computer. (PC in Clients' scope)

The PLC interfaces with various Boiler parameters and Controls the boiler as well as indicates its Performance with Trends.

Amongst the important Displays are

1. Steam Flow.
2. Totalised Steam Flow.
3. Feed Water Flow.
4. Steam Drum Pressure.
5. Superheater Header Pressure.
6. Superheated Steam Temperature.
7. Flue Gas Temperature.
8. Feed Water Temperature.
9. Economiser Water Outlet Temperature.
10. Drum Level.
11. Deaerator Level.
12. Deaerator Pressure.
13. Furnace Pressure.

All field instruments required for Data acquisition for these displays will be provided.





EXCLUSIONS	
#	Water treatment plant, Feed water Tank.
#	All Feed Water Piping.
#	Main Chimney.
#	All Flue and Air Ducts.
#	Low Pressure Steam Pipe Line
#	High Pressure Steam Pipe Line
#	Steam Header for distribution of process steam
#	Blow down and Drain Piping from terminal Valves on the boiler.
#	Fuel Handling system – Conveyors, Elevator.
#	Ash Handling System with Silo
#	Refractory.
#	Insulation.
#	Structural Supports. Platform and Ladders.
#	Bunker( Fuel & Bed Material), Ash Hoppers etc....
#	All Electrical cables. Earthing
#	Compressed Dry and Oil Free air Supply.
#	All Civil work and structural design work/Shed.
#	First fill of Lubricants and chemicals for boil out.
#	First fill and Flushing Oil for Turbine.
#	Painting at Site.
#	Condensate return system.
#	Pressure Reducing & Desuperheating Station.
#	IBR inspection / or any other Govt. inspection and registration at Site.
#	Erection of the Boiler and other accessories.
#	Hotel Accommodation for our Site Engineers.
#	All Taxes & Duties as applicable at the time of dispatch.
#	Any other item which is not specifically mentioned in the Offer.

**ANNEXURE – III  
TECHNICAL SPECIFICATIONS OF BOILER  
MAGNUM – FBC**

Max. Continuous rating	:	40,000 Kg/hr (From 120°C)
Type of Boiler	:	Single Drum FBC
Model No.	:	<b>MAGNUM - FBC - 400</b>
Design Code	:	Indian Boiler Regulations
Design Pressure	:	79 Kg/cm <sup>2</sup>
Hydraulic Test Pressure	:	118.5 Kg/cm <sup>2</sup>
Feed water Temperature	:	105 - 120°C
Thermal Efficiency (+/-2%) (As per BS: 845 Pt.1 Indirect Method)	:	80% On Mustard Husk 82% On Coal
<b>Material Specifications :</b>		
Boiler Drum	:	ASTM 515/516 Gr 70
Headers	:	ASTM 106 Gr B <u>Seamless</u>
Boiler Tubes	:	BS 3059 <u>Seamless - 6.35mm Thk</u>
Superheater	:	BS 3059 and <u>T - 22</u>
Economiser	:	BS 3059 <u>Seamless</u>
<b>F.D. Fan details :</b>		
Type	:	Centrifugal Direct Drive
Motor	:	100 HP
Pressure	:	600 mm
CFM	:	18000
Quantity	:	2 Nos
<b>I.D. Fan details :</b>		
Type	:	Centrifugal V- Belt Drive
Motor	:	150 HP
Pressure	:	225 mm
CFM	:	31000
Quantity	:	1 No.
<b>P.A. Fan details :</b>		
Type	:	Centrifugal Direct Drive
Motor	:	20 HP
Pressure	:	1100 mm
CFM	:	1400
Quantity	:	2 Nos



**Feed Pump details**

Type	:	Multistage
Flow	:	44 m <sup>3</sup> /hr
Head	:	80 Kg/cm <sup>2</sup>
Motor	:	As per pump manufacturer
No. of pumps	:	2 Nos.

**Fuel Feeder details – Overbed Fuel Feeding**

Type	:	Screw Feeders
Motor	:	3 HP
Quantity	:	4 Nos.

**Fuel Feeder details – Underbed Fuel Feeding**

Motor	:	5 HP
Quantity	:	6 Nos.

**Velocity Profile :**

Fluidised Bed	:	3 – 2 m/sec
Freeboard Zone	:	6 – 8 m/sec
Super Heater Bank	:	8 – 10 m/sec
Economizer Bank	:	8 – 10 m/sec
Gas Ducting	:	8 – 10 m/sec
Chimney	:	6 – 8 m/sec

**Temperature Profile**

Fluidised Bed	:	900 – 975°C
Free Board Area	:	1200 – 1400°C
At Chimney	:	120 – 140°C

**BOILER VALVE SIZING**
**MOUNTINGS & FITTINGS**

Main Steam Stop Valve.	:	150 mm
Air Vent Valves.	:	25 mm
Single Post Safety Valves.	:	50 mm
Water level gauges.	:	20 mm
Pressure gauges with siphon and cock.	:	15 mm
Blow down valve.	:	50 mm
Feed line valves.	:	100 mm
Drain valves.	:	25 mm

**CHIMNEY**

Recommended Chimney diameter	:	2.5 meters on Top
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**FEED WATER SPECIFICATIONS**

Deaerated and Demineralised water is recommended for the boiler.

Feed water should meet the following requirements.

Water Hardness	:	0.01 ppm max.
pH	:	8.5 - 9.5
Dissolved Oxygen	:	0.01 ppm max.
Oil Content	:	Nil
TDS	:	0.1 ppm max.
Silica	:	0.009 (Max.)

**BOILER WATER SPECIFICATIONS**

Water Hardness	:	0.01 ppm max.
Total Alkalinity ( as $\text{CaCO}_3$ )	:	300 ppm max. but not exceeding 20% of TDS
Caustic Alkalinity ( as $\text{CaCO}_3$ )	:	150 ppm max.
pH	:	11 - 12
Unreacted Sodium Sulphate (as $\text{Na}_2\text{SO}_3$ )	:	30 - 50 ppm.
Phosphates ( as $\text{PO}_4$ )	:	20 - 40 ppm.
TDS	:	1000 ppm max.,
Residual Hydrazine ( as $\text{N}_2\text{H}_4$ )	:	0.5 ppm max.



**ANNEXURE – IV  
COMMERCIAL OFFER**

<p>Supply of One No. IBL, Water Tube, Single Drum, Model <b>MAGNUM-400</b> FBC Fired Steam Boiler capable of generating <b>40000 Kg/hr</b> of Steam (From 120°C) at the Superheater outlet pressure of <b>72 Kg/cm<sup>2</sup>(g)</b> and Steam temperature of <b>480°C</b> at Super heater outlet as per standard scope of supply along with</p> <p>Pressurised Economiser Superheater Air Pre Heater Under Bed &amp; Overbed Firing System ID &amp; FD Fan Deaerator 30 min storage Tank with Valves &amp; instruments Feed Pumps 2 Nos. LP and HP Doser Sample Coolers VFD For ID &amp; FD Fan Blow Down Tank PLC Based Control Panel.</p>	<p align="center"><b>Rs. 5,28,00,000/-</b> (Rupees Five Crores Twenty Eight Lacs Only)</p> <p align="center">Ex-Works Vapi</p>
<p>Supply of 4 Field Electrostatic Precipitator Complete with Erection, Electricals, Insulation etc.</p>	<p align="center"><b>Rs. 2,01,03,000/-</b></p>
<p>Local Hotel, Conveyance and To and Fro for all supervisors.</p>	<p align="center">At Actuals</p>

**Note :**

Freight	-	Client Scope
Price Basis	-	Ex-works Vapi
Taxes & Duties	-	As applicable at the time of dispatch

for **INDUSTRIAL BOILERS LTD.**

**MARKETING DIVISION**

## **ANNEXURE - VI GENERAL TERMS & CONDITIONS**

**PRICE :** The Prices quoted are Ex-works Vapi. Insurance, Freight, Taxes are extra. GST and Bank charges are also payable by you as applicable.

### **DELIVERY :**

The delivery will be 8 – 12 months from the date of receipt of your technically and commercially clear order accompanied by necessary advance.

We are not responsible for any delay caused by extraneous circumstances or Acts of God beyond our control and cannot pay any damages or penalties on this account. The equipment ordered will be dispatched in lots. If required we can undertake the dispatch of the equipment on behalf of the buyer by road transport only to any destination given by the buyer on freight TO - PAY basis, on the clear understanding that we will not be liable for any damages whatsoever. The freight charges contracted by us on behalf of the buyer will be deemed as negotiated under the buyer's authority and therefore it shall be binding on the Buyer to make full payment.

### **WARRANTY :**

Our products are warranted for a period of ONE YEAR from the date of dispatch, against any manufacturing defect or faulty workmanship reported in writing during the Warranty Period, The Warranty does not extend to consequential damages or losses. The Warranty is NULL & VOID if repairs and/or replacements are carried out without our consent in writing. It also does not cover bought-out items.

This warranty is not applicable if full payment has not been given to us.

### **CONFIDENTIALITY :**

The client shall treat all quotations, drawings, data, technical information etc. received from Industrial Boilers Ltd. as strictly confidential and shall take all precautions necessary to prevent the unauthorised disclosure in part or parcel of any of the above mentioned, to any third party.

### **TERMS OF PAYMENT :**

First 40% of the order value is payable as Advance with your firm order.

Second Advance 20% after 2 Months

The balance amount as per our Proforma Invoice, including all costs and levies, such as price increase if any, GST and Insurance charges etc. is payable before the materials are dispatched from our works.

Any delay in payment of advance will lead to delay in delivery of the equipment and we not be held liable to pay damages.

### **PLACE OF JURISDICTION**

In the event of any dispute arising as a result of contracting to supply against this offer and quotation, the place of Jurisdiction will be Greater Bombay and no other place.



**ARBITRATION**

All disputes or differences whatsoever arising between the parties out of or relating to the construction, meaning and operation or effect of this contract or the breach thereof shall be settled by arbitration in accordance with the Rules of Arbitration of the Indian Council of Arbitration and the Award made in pursuance thereof shall be binding on both the parties.

All orders will only be accepted after the realisation after of the agreed advance which shall not be subject to any interest under any circumstances whatsoever. We however reserve the right to adjust such advance against any payments which might fall due because of delay in lifting of the ordered equipment or on account of incidental expenses incurred on buyer's behalf. An order placed with us cannot be canceled for any reason whatsoever without our consent in writing. Any cancellation of order without or consent will result in the forfeiture of Advance, without prejudice to our claim for compensation and other legal remedies.

for INDUSTRIAL BOILERS LTD.

MARKETING DIVISION