Hamada BOILER

# SAVING OF 70-80% OF YOUR COST OF STEAM

## ONLY POSSIBLE BY

## Hamada Coal Fired Boiler

## *FLUIDIZED BED SYSTEM*

***Kazuhiro Hamada***
*Chairman of*
*Hamada Boiler Group*
*hamadalo@attglobal.net*

**Sir / Madam:**

There is a fast evolving trend with regards to alternative fuel utilization now happening in the industrial or manufacturing sector of WHOLE WORLD which we believe you need to know as business owner or decision maker.

**DO YOU KNOW?**

**THAT . . .** due to the consistently rising price of petroleum products, most of government now is encouraging industry to shift to cheaper alternative fuel which is surely "COAL" in most of countries, whether the country has its own coal reserves or source it from outside.

**THAT . . .** among several indigenous alternative fuel available in Asian countries, COAL is the most abundant, cheap and readily available locally even on retail and door-to-door delivery basis.

**THAT . . .** the modern **Fluidized Bed Combustion Coal-Fired Boiler System**, otherwise known as the Clean Coal Technology, is now available in all asian countries by Hamada Boiler. It being fully compliant with environmental and pollution standard of all respective countries, it is presently being used by most industry leaders in paper, textile, food and beverage, chemical and rubber, among others.

**THAT . . .** with the relative calorific values and current prices of Coal and Bunker Oil in all Asian countries, more than 70% savings in fuel cost and an average of 6-months payback on investment is guaranteed when a factory shifts from bunker oil to coal-fired boiler system.

**THAT . . .** the state-of-the-art **HAMADA BUBBLING FLUIDIZED BED COMBUSTION BOILER SYSTEM**, having been introduced to Asian countries since 1985, is the pioneer and market leader in the area for coal-fired industrial process steam boiler and now accounts for more than one hundreds (200) industrial coal-fired boilers users. We have completed 4 powerplants since 2002 at Toray Tangerang(ITS),NIKAWATEX of Karawang (75 ton x 2 units with 30 MW condensing turbine and 35 ton boiler with 6 MW extraction turbine) and EASTERNTEX of Surabaya (75 ton with 15 MW).

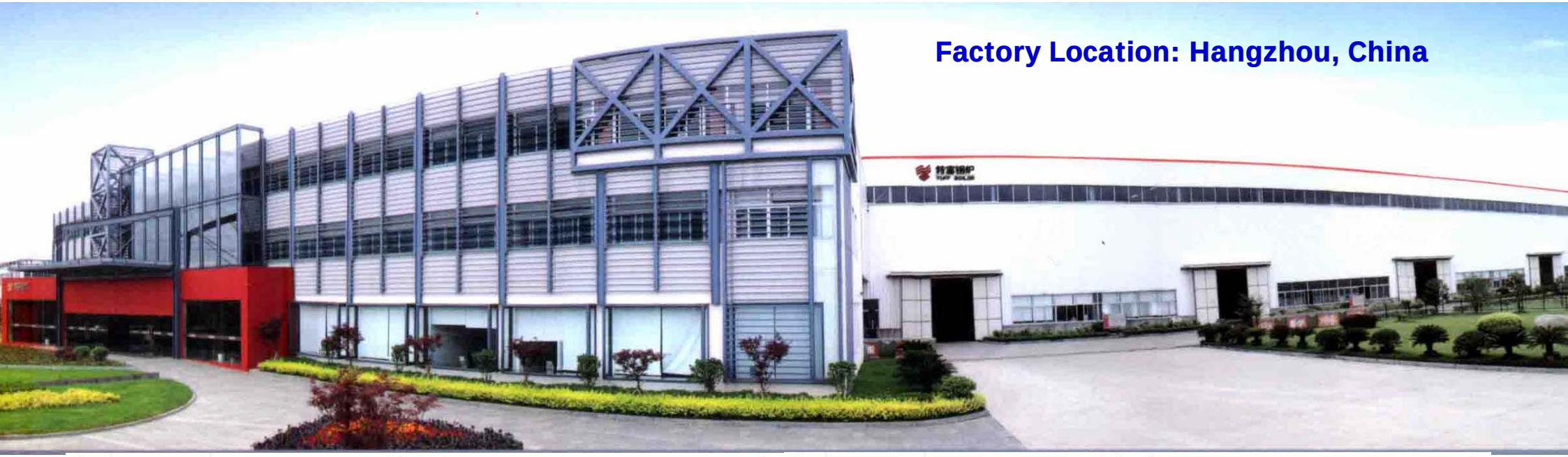
**THAT . . .** to be able to know more about this important trend, you simply go to this website: http://www.hamadaboiler.com or call any of our branch offices for more details.

*For and on behalf of*
SIREGRAND INDUSTRIAL LIMITED
*Authorized Signature(s)*

Kazuhiro Hamada
Chairman of Hamada Boiler Group
hp +62 8161674489

# TUFF-Hamada Boiler Hangzhou China Factory

**Factory Location: Hangzhou, China**



环境管理体系认证证书

浙江特富锅炉有限公司

GB/T24001-2004-ISO 14001:2004

A级锅炉系列产品的设计、生产和服务

ENVIRONMENTAL MANAGEMENT SYSTEM
CERTIFICATE OF CONFORMITY

Zhejiang Tefu Boiler Co., Ltd.

GB/T24001-2004-ISO 14001:2004

Design, development, production and

management activity of A-grade boiler

质量管理体系认证证书

浙江特富锅炉有限公司

GB/T19001-2000—ISO9001:2000

A级锅炉系列产品的设计、生产和服务

QUALITY MANAGEMENT SYSTEM
CERTIFICATE OF CONFORMITY

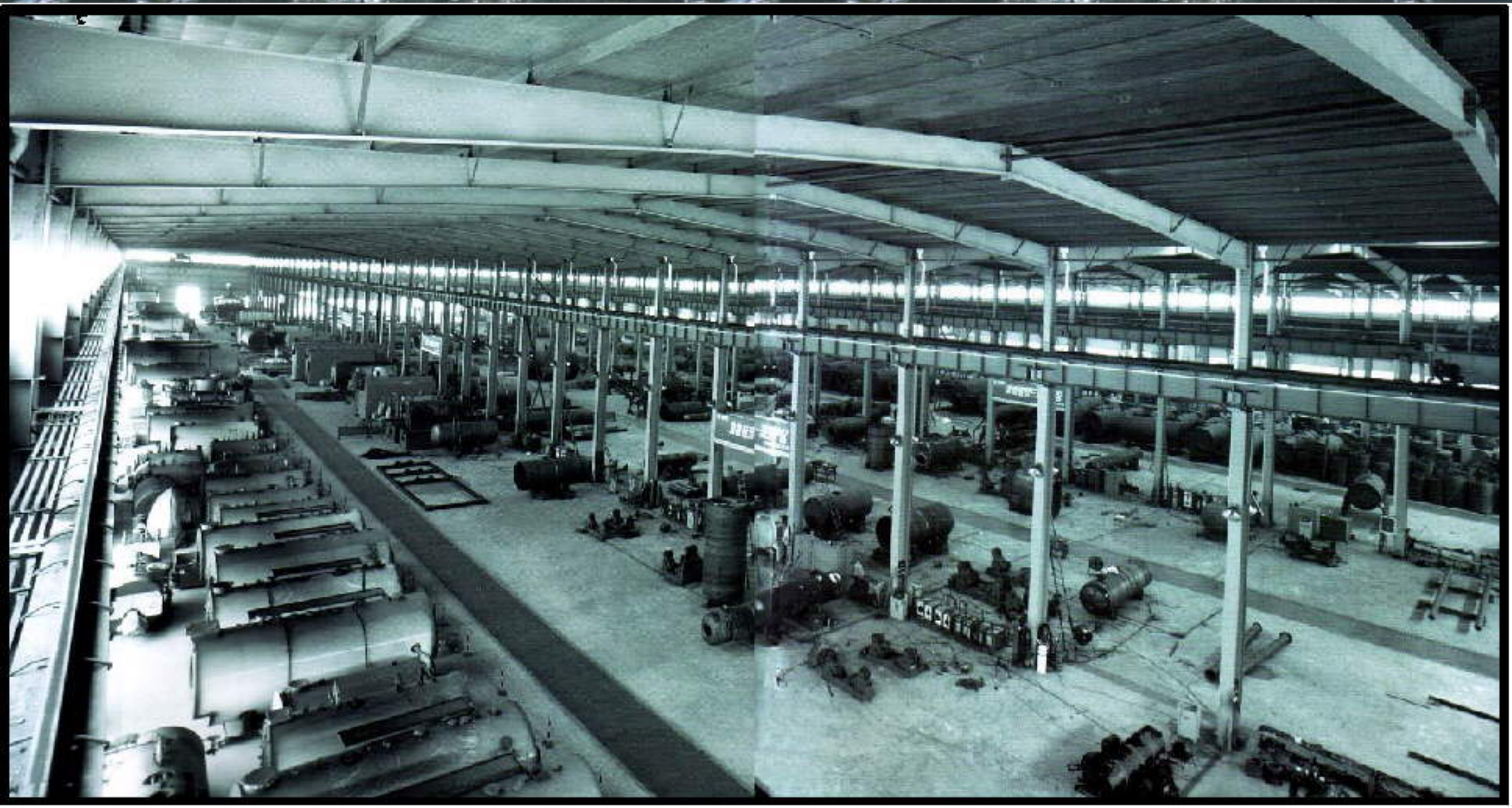
Zhejiang Tefu Boiler Co., Ltd.

GB/T19001-2000—ISO9001:2000

Design, development, production and

management activity of A-grade boiler

# TUFF-Hamada Boiler Hangzhou China Factory



# ASIAN SALES / SERVICE NETWORK as of November 2008

Hamada BOILER

## THAILAND
**HAMADA BOILER (THAILAND) CO.,LTD.**

38 Mooban Seree 3 Soi 5, Rama IX Road
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## MALAYSIA
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**PT. HAMADA DAYATEKNINDO**

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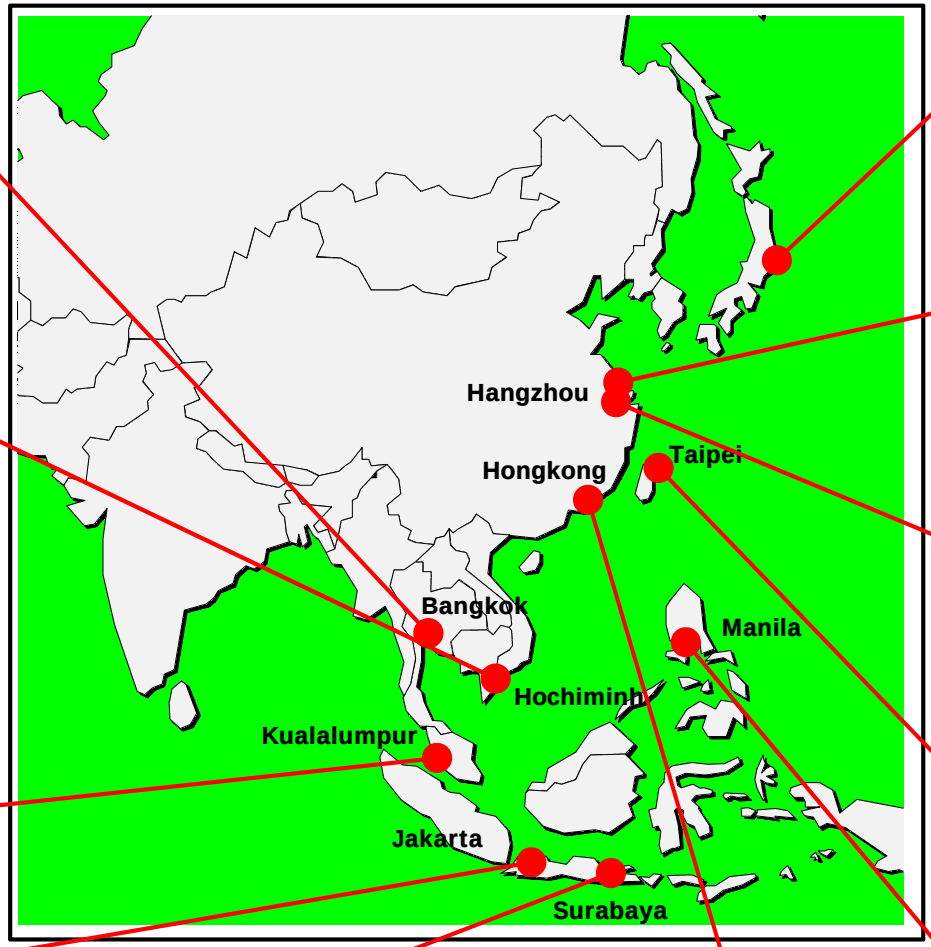
Email: dakila@hamadaboiler.com




## SURABAYA-INDONESIA
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Darmo Sentosa Raya, Surabaya 60229,
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(hp:+852 97637975)
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2-26-18, Kitakarasuyama, Setagayaku, Tokyo, Japan

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Fax. +86-571-8765 5969
Manager: Mr. Lokin
(hp: +86 13805782287)
E-mail: lokin88@tom.com

## CHINA-Factory
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**(TUFF-Hamada Boiler Factory)**

Hangzhou City, Zhejiang Province, China

## TAIWAN-R.O.C.
**HAMADA BOILER TAIWAN OFFICE**

21st Fl, Unit #2, No. 441 Jingguo Road,
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Manager: Mr. Liu Yuchen (Dunkan Liu)
(hp:+886-913135757)
Email: liuyuchen66@yahoo.com.tw

## PHILIPPINES
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Manager: Mr. Kazuhiro Hamada
(hp:+63 9209828303)
Email: hamadalo@attglobal.net
Marketing Office:
Contace person: Mr. Manuel G. Palomo
Tel. +63-2-5842508 Fax. +63-2-4168431

# COMPARISON CHART OF COST OF STEAM IN VARIOUS COUNTRIES

**PHILIPPINES** Conversion Rate : US$1.00=Php 45.00 as of Aug 01, 2008

| COST OF STEAM PER TON | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| KIND OF FUEL | HEAT VALUE | UNIT | PRICE | PRICE | COST | CONSUMPTION | COST OF STEAM | SAVINGS % |
| | KCAL | | (PESO) | US $ | PER/KCAL | PER TON/HR | PESO/ton STEAM | vs COAL |
| DIESEL FUEL | 9,063 | LITER | 56 | 1.2444 | 0.00618 | 77.88 Liter | 4,361.28 | 86.99 |
| BUNKER C OIL | 9,200 | LITER | 37 | 0.8222 | 0.00402 | 76.72 Liter | 2,838.64 | 80.02 |
| COAL 0-50 MM | 5,600 | KG | 4.5 | 0.1000 | 0.00080 | 126.05 Kg | 567.23 | |

Bunker price: Zamboanga is Php40, Davao is 40, Gensan is 39

**THAILAND** Convertion Rate : US$1.00=Baht 33.00 as of Aug 01, 2008

| COST OF STEAM PER TON | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| KIND OF FUEL | HEAT VALUE | UNIT | PRICE | PRICE | COST | CONSUMPTION | COST OF STEAM | SAVINGS % |
| | KCAL | | (BAHT) | US $ | PER/KCAL | PER TON/HR | BAHT/ton STEAM | vs COAL |
| DIESEL FUEL | 9,063 | LITER | 35 | 1.0606 | 0.00386 | 77.88 Liter | 2,726 | 87.05 |
| BUNKER C OIL | 9,200 | LITER | 18 | 0.5455 | 0.00196 | 76.72 Liter | 1,381 | 74.44 |
| COAL 0-50 MM | 5,600 | KG | 2.8 | 0.0848 | 0.00050 | 126.05 Kg | 353 | |

**INDONESIA** Conversion Rate : US$1.00=Rp 9000 as of Aug 01, 2008

| COST OF STEAM PER TON | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| KIND OF FUEL | HEAT VALUE | UNIT | PRICE | PRICE | COST | CONSUMPTION | COST OF STEAM | SAVINGS % |
| | KCAL | | (RP) | US $ | RP/KCAL | PER TON/HR | RP./ton STEAM | vs COAL |
| *INDUSTRIAL Diesel* | 9,063 | LITER | 10700 | 1.1889 | 1.1806 | 77.88 Liter | 833,316 | 89.71 |
| *Medium Furnace Oil* | 9,200 | LITER | 7600 | 0.8444 | 0.8261 | 76.72 Liter | 583,072 | 85.30 |
| COAL 0-50 MM | 6,200 | KG | 1100 | 0.1222 | 0.1774 | 113.85 Kg | 125,235 | 31.56 |
| COAL 0-50 MM | 5,600 | KG | 680 | 0.0756 | 0.1214 | 126.05 Kg | 85,714 | |

Price: ex-Cirebon Coal Terminal

**MALAYSIA** Conversion Rate : US$1.00=Rm 3.20 as of Aug 01, 2008

| COST OF STEAM PER TON | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| KIND OF FUEL | HEAT VALUE | UNIT | PRICE | PRICE | COST (Rm) | CONSUMPTION | COST OF STEAM | SAVINGS % |
| | KCAL | | (RM) | US $ | Per Kcal | PER TON/HR | Rm./TON STEAM | vs COAL |
| Light Fuel Oil | 9,063 | LITER | 2.8 | 0.87500 | 0.00031 | 77.88 Liter | 218.06 | 83.81 |
| MFO (180 grade) | 9,200 | LITER | 2.45 | 0.76563 | 0.00027 | 76.72 Liter | 187.96 | 81.22 |
| Natural GAS | 9,000 | M3 | 0.84 | 0.26250 | 0.00009 | 75 m3 | 63.00 | 43.98 |
| INDO-COAL 0-50MM | 5,600 | KG | 0.28 | 0.08750 | 0.00005 | 126.05 Kg | 35.29 | |

Price ex-terminal Batu Pahat-**Rm. 0.25/kg**, For Northern areas - **Rm. 0.30/kg.** ex-terminal Lumut

**VIETNAM** Conversion Rate : US$1.00=Dong 15600 as of Aug 01, 2008

| COST OF STEAM PER TON | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| KIND OF FUEL | HEAT VALUE | UNIT | PRICE | PRICE | COST | CONSUMPTION | COST OF STEAM | SAVINGS % |
| | KCAL | | (DONG) | US $ | Per Kcal | PER TON/HR | DONG/ton STEAM | vs COAL |
| DIESEL FUEL | 9,063 | LITER | 17,000 | 1.08974 | 1.87576 | 77.88 Liter | 1,323,960 | 84.06 |
| BUNKER C OIL | 9,200 | LITER | 13,500 | 0.86538 | 1.46739 | 76.72 Liter | 1,035,720 | 79.62 |
| VIETNAM COAL 5A | 6,000 | KG | 1,800 | 0.11538 | 0.30000 | 117.25 kg | 211,050 | |
| INDONESIAN COAL | 5,600 | KG | 1,700 | 0.10897 | 0.30357 | 125.63kg | 213,571 | |

*Price: ex-terminal at Ho Chi Minh City*

**TAIWAN R.O.C** Convertion Rate : US$1.00=NT$30.00 as of Aug.. 01, 2008

| COST OF STEAM PER TON | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| KIND OF FUEL | HEAT VALUE | UNIT | PRICE | 5% Tax | Total | CONSUMPTION | COST OF STEAM | SAVINGS % |
| | KCAL | | (NT$) | (NT$) | (NT$) | PER TON/HR | (NT$)/ton STEAM | vs COAL |
| *DIESEL FUEL* | 9,063 | LITER | 30.00 | 1.50 | 31.50 | 77.89 Liter | 2,336.70 | 79.50 |
| *BUNKER C OIL* | 9,200 | LITER | 19.00 | 0.95 | 19.95 | 76.72 Liter | 1,457.68 | 67.14 |
| *COAL 5600 KCAL* | 5,600 | KG | 3.80 | 0.19 | 3.99 | 126.05 Kg | 478.99 | |

# World Oil Price as of July 8, 2008

http://futures.tradingcharts.com/chart/CO/W


**NHK NEWS (JUIY 8, 2008)**

According to the famous economist of Japan, oil price may even go up to **US$200** per barrel by the end of this year 2008. He analyses as follows:

Oil price has rallied strongly last week after the International Energy Agency raised its 2008 forecast for oil demand by 2.5% percent to 88.2 million barrels a day. However, for the past many years OPEC is not responding to the world request to increase its output drastically for the reason that;

1) Due to the collapse of value of US Dollar currency toward most of world's currency, income of OPEC had dropped substantially in US Dollar.

2) Despite of high oil price at present, World economy never shows slowdown, instead, economy of CHINA and EU countries are going up fast. Therefore, there is no need of lowering the oil price to stabilize the world economy at this moment

# Fluidizing Fire

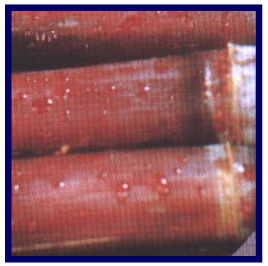
- USE COAL 0-10 mm SIZE
- ALL KIND OF COAL

## Only Fluidized Bed can mix various biomass fuels

Corn Cob

Coconut shell

Rice husk



bamboo

Palm kernel

Wood chip

Wood bark

RDF/RPF





.....(4 kinds of waste from paper factories).....

City waste

Watertreatment waste

LATEST TECHNOLOGY

# FLUIDIZED BED COAL FIRED BOILER

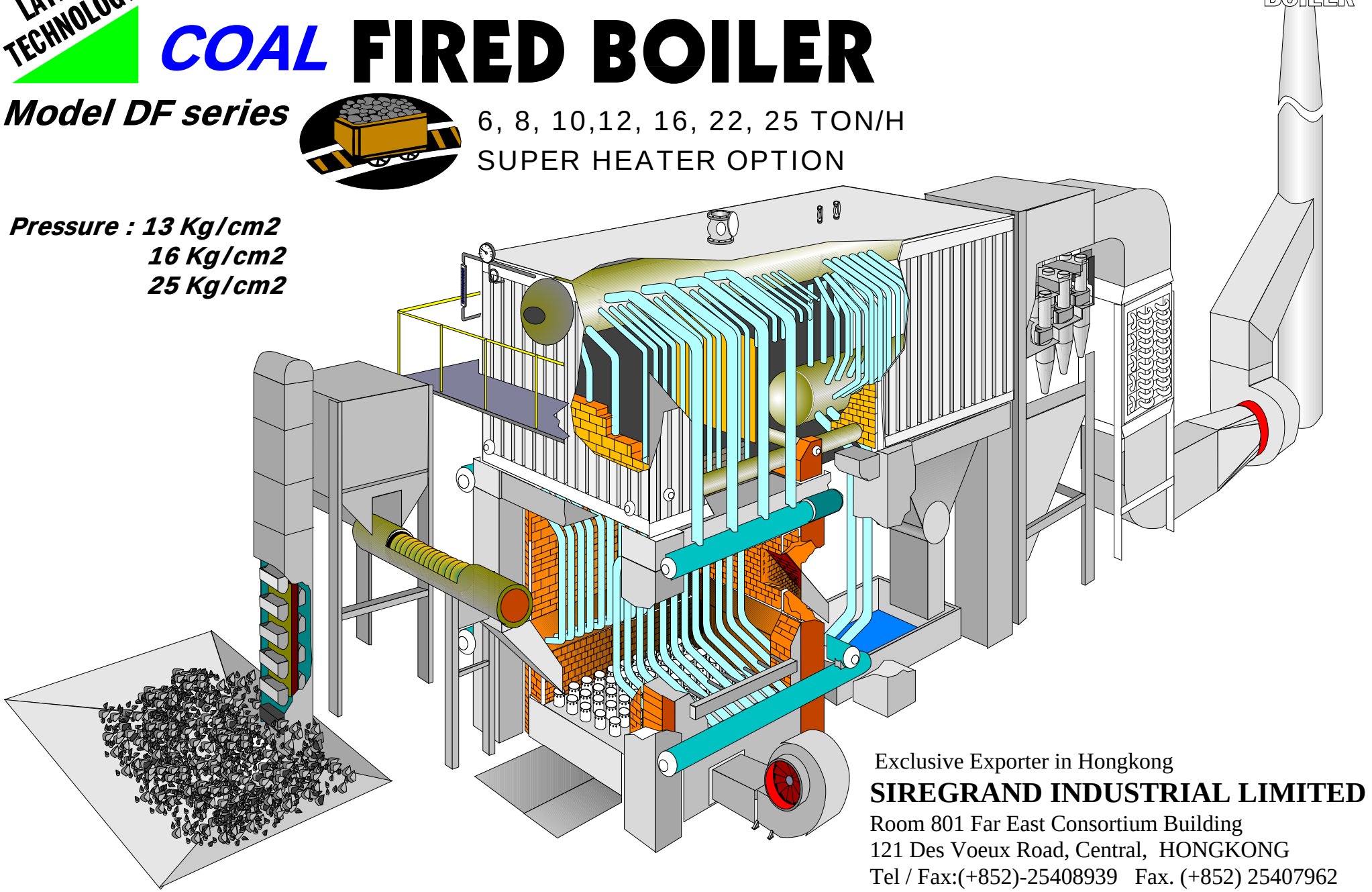
Hamada BOILER

***Model DF series***

6, 8, 10,12, 16, 22, 25 TON/H

SUPER HEATER OPTION

***Pressure : 13 Kg/cm2***
***16 Kg/cm2***
***25 Kg/cm2***

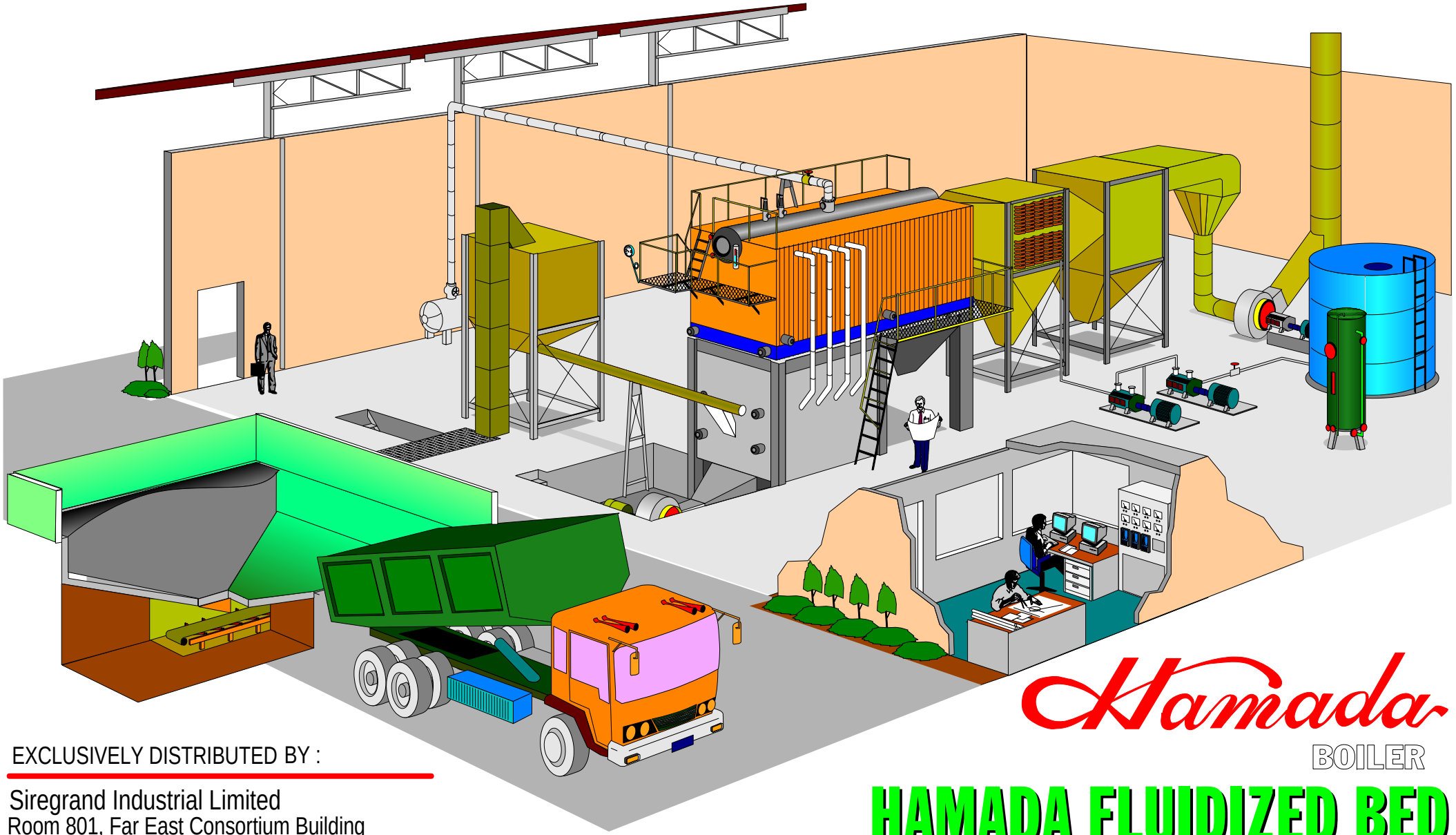



Exclusive Exporter in Hongkong

**SIREGRAND INDUSTRIAL LIMITED**

Room 801 Far East Consortium Building
121 Des Voeux Road, Central, HONGKONG
Tel / Fax:(+852)-25408939 Fax. (+852) 25407962

# *Fluidized Bed Coal Fired Boiler*



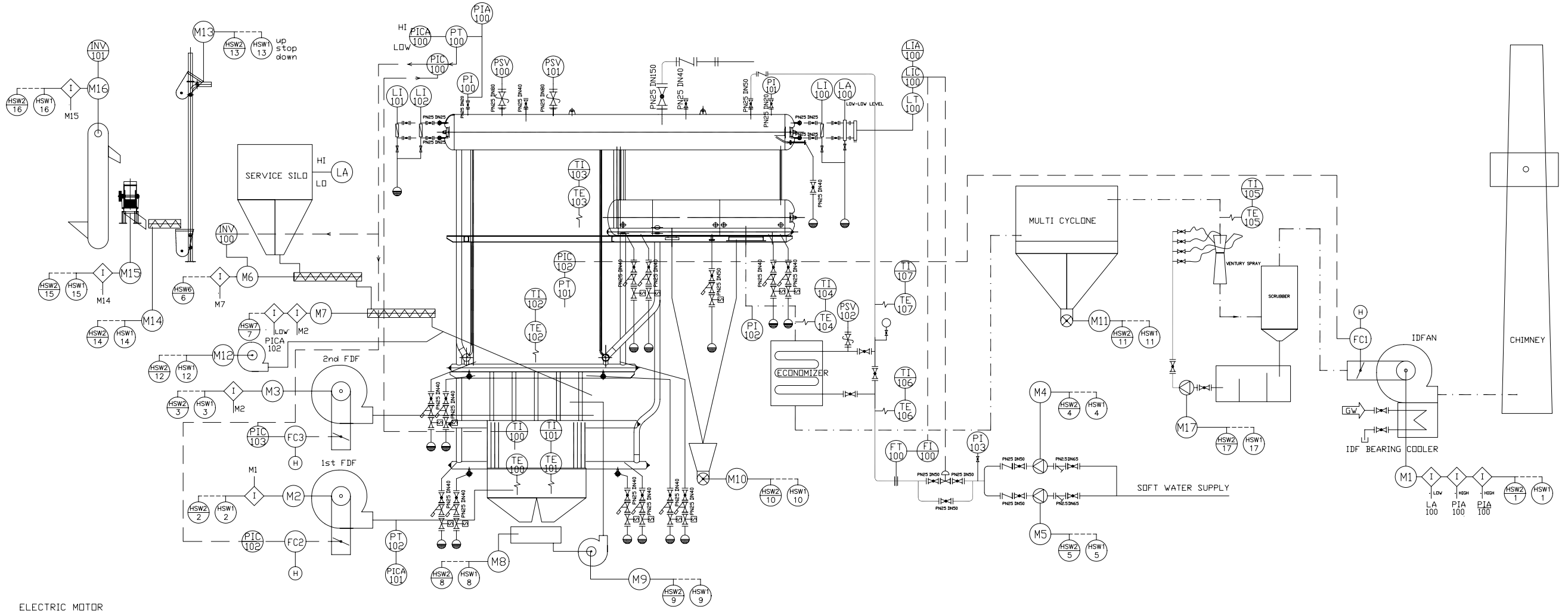
Hamada
BOILER

## HAMADA FLUIDIZED BED COAL-FIRED STEAM BOILER

## MODEL DF 6, 10, 12, 16 & 22 TON per HOUR


EXCLUSIVELY DISTRIBUTED BY :

Siregrand Industrial Limited
Room 801, Far East Consortium Building
121 Des Voeux Road, Central Hongkong
Tel. : (+852) 254008939
Fax. : (+852) 254007962
http://www.hamadaboiler.com *e-mail: hamadalo@attglobal.net*




ELECTRIC MOTOR

- M1 INDUCED DRAFT FAN 380V,1450RPM
- M2 FORCED DRAFT FAN 380V,2900RPM
- M3 2nd FORCED DRAFT FAN 380V,1450RPM
- M4 FEED WATER PUMP 380V,2900RPM
- M5 FEED WATER PUMP 7,5 KW,380V,2900RPM
- M6 COAL FEEDER 1 380V,1450RPM
- M7 COAL FEEDER 2 380V,1450RPM
- M8 SILICA SAND SCREEN 380V,1450RPM
- M9 SILICA SAND BLOWER 380V,1450RPM
- M10 BOILER BELLY ROTARY VALVE 380V,1450RPM
- M11 CYCLONE ROTARY VALVE 380V,1450RPM
- M12 FEED CHUTE BLOWER 380V,1450RPM
- M13 COAL LIFTER 380V,1450RPM
- M14 COAL CRUSHER SCREW 380V,1450RPM
- M15 COAL CRUSHER 380V,1450RPM
- M16 BUCKET CONVEYOR 380V,1450RPM
- M17 SCUBBER PUMP 380V,1450RPM

- HSW1 1 LOCAL SWITCH INDUCED DRAFT FAN
- HSW2 1 REMOTE SWITCH INDUCED DRAFT FAN
- HSW1 2 LOCAL SWITCH FORCED DRAFT FAN
- HSW2 2 REMOTE SWITCH FORCED DRAFT FAN
- HSW1 3 LOCAL SWITCH 2ND FORCE DRAFT FAN
- HSW2 3 REMOTE SWITCH 2ND FORCE DRAFT FAN
- HSW1 4 LOCAL SWITCH BOILER FEED WATER PUMP 1
- HSW2 4 REMOTE SWITCH BOILER FEED WATER PUMP 1
- HSW1 5 LOCAL SWITCH BOILER FEED WATER PUMP 2
- HSW2 5 REMOTE SWITCH BOILER FEED WATER PUMP 2
- HSW6 6 REMOTE SWITCH SCREW FEADER 1
- HSW7 7 REMOTE SWITCH SCREW FEADER 2
- HSW1 8 LOCAL SWITCH SILICA SAND SCREEN
- HSW2 8 REMOTE SWITCH SILICA SAND SCREEN
- HSW1 9 LOCAL SWITCH SILICA SAND BLOWER
- HSW2 9 REMOTE SWITCH SILICA SAND BLOWER
- HSW1 10 LOCAL SWITCH BOILER BELLY ROTARY VALVE
- HSW2 10 REMOTE SWITCH BOILER BELLY ROTARY VALVE
- HSW1 11 LOCAL SWITCH CYCLONE ROTARY VALVE
- HSW2 11 REMOTE SWITCH CYCLONE ROTARY VALVE
- HSW1 12 LOCAL SWITCH FEED CHUTE BLOWER
- HSW2 12 REMOTE SWITCH FEED CHUTE BLOWER
- HSW1 13 LOCAL SWITCH COAL LIFTER
- HSW2 13 REMOTE SWITCH COAL LIFTER
- HSW1 14 LOCAL SWITCH COAL CRUSHER SCREW
- HSW2 14 REMOTE SWITCH COAL CRUSHER SCREW
- HSW1 15 LOCAL SWITCH COAL CRUSHER
- HSW2 15 REMOTE SWITCH COAL CRUSHER
- HSW1 16 LOCAL SWITCH BUCKET CONVEYOR
- HSW2 16 REMOTE SWITCH BUCKET CONVEYOR
- HSW1 17 LOCAL SWITCH SCRUBBER PUMP
- HSW2 17 REMOTE SWITCH SCRUBBER PUMP

- PI 100 PRESSURE INDICATOR BOILER PRESSURE
- PI 101 PRESSURE INDICATOR BOILER PRESSURE
- PI 102 PRESSURE INDICATOR BOILER EXHAUST PRESSURE
- PI 103 PRESSURE INDICATOR FEED WATER PUMP PRESSURE
- PT 100 PRESSURE TRANSMITER BOILER PRESSURE
- PT 101 PRESSURE TRANSMITER FURNACE PRESSURE
- PIC 100 CONTROLLER BOILER PRESSURE
- PIC 101 CONTROLLER FURNACE PRESSURE
- PIC 102 CONTROLLER 1st FDF
- PIC 103 CONTROLLER 2nd FDF
- PICA 100 BOILER PRESSURE INDICATOR AND ALARM
- PICA 101 FDF1 DUCTING PRESS. INDICATOR AND ALARM

- TI 100 TEMPERATURE INDICATOR FBC BED TEMPERATURE
- TE 100 TEMPERATURE ELEMENT FBC BED TEMPERATURE
- TI 101 TEMPERATURE INDICATOR FBC BED TEMPERATURE
- TE 101 TEMPERATURE ELEMENT FBC BED TEMPERATURE
- TI 102 TEMPERATURE INDICATOR FURNACE TEMPERATURE
- TE 102 TEMPERATURE ELEMENT FURNACE TEMPERATURE
- TI 103 TEMPERATURE INDICATOR FURNACE TEMPERATURE EXIT
- TE 103 TEMPERATURE ELEMENT FURNACE TEMPERATURE EXIT
- TI 104 TEMPERATURE INDICATOR BOILER EXHAUST.TEMP
- TE 104 TEMPERATURE ELEMENT BOILER EXHAUST.TEMP
- TI 105 TEMPERATURE INDICATOR MC EXHAUST.TEMP
- TE 105 TEMPERATURE ELEMENT MC EXHAUST.TEMP
- TI 106 TEMPERATURE INDICATOR ECONOMIZER INLET TEMP
- TE 106 TEMPERATURE ELEMENT ECONOMIZER INLET TEMP
- TI 107 TEMPERATURE INDICATOR ECONOMIZER OUTLET TEMP
- TE 107 TEMPERATURE ELEMENT ECONOMIZER OUTLET TEMP

- PSV 100 PRESSURE SAFETYVALVE BOILER
- PSV 101 PRESSURE SAFETYVALVE BOILER
- PSV 102 PRESSURE SAFETYVALVE ECONOMIZER
- LI 100 LEVEL INDICATOR BOILER WATER LEVEL
- LI 101 LEVEL INDICATOR BOILER WATER LEVEL
- LI 102 LEVEL INDICATOR BOILER WATER LEVEL
- LA 100 LEVEL ALARM BOILER WATER LEVEL
- LT 100 LEVEL TRANSMITTER BOILER WATER LEVEL
- LIC 100 CONTROLLER BOILER WATER LEVEL
- LIA 100 LEVEL INDICATOR ALARM BOILER WATER LEVEL

- FI 100 FLOW INDICATOR WATER FLOW
- FT 100 FLOW TRANSMITER WATER FLOW
- FC MOTORIZED DAMPER
- H MANUAL OPERATION LOCAL
- LA LEVEL ALARM
- INV 100 INVERTER SCREW FEEDER
- INV 101 INVERTER BUCKET CONVEYOR
- I INTERLOCK
- CCTV1 CAMERA

| Designed by | Checked by | Approved by - date | Filename | Date | Scale |
|---|---|---|---|---|---|
| JAMIL | RP BORJA | RPB,- | FILENAME | - | NTS |

HAMADA BOILER

MODEL: DF SERIES

PT HAMADA DAYATEKNINDO

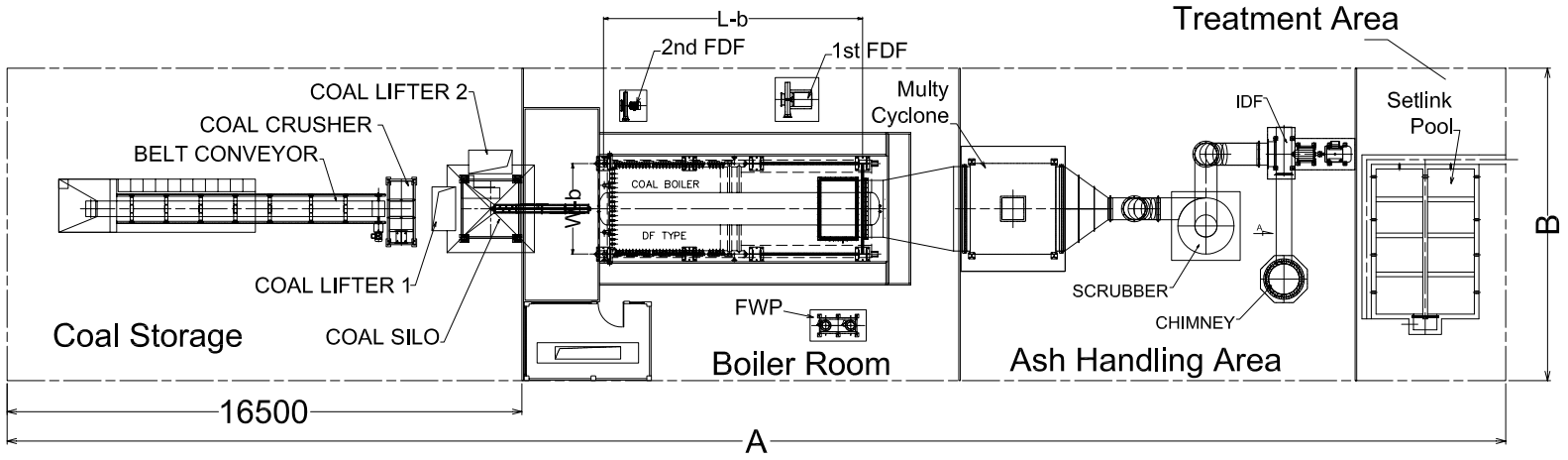
HTTP://WWW.HAMADABOILER.COM

Client: FOR REFERENCE ONLY

PID

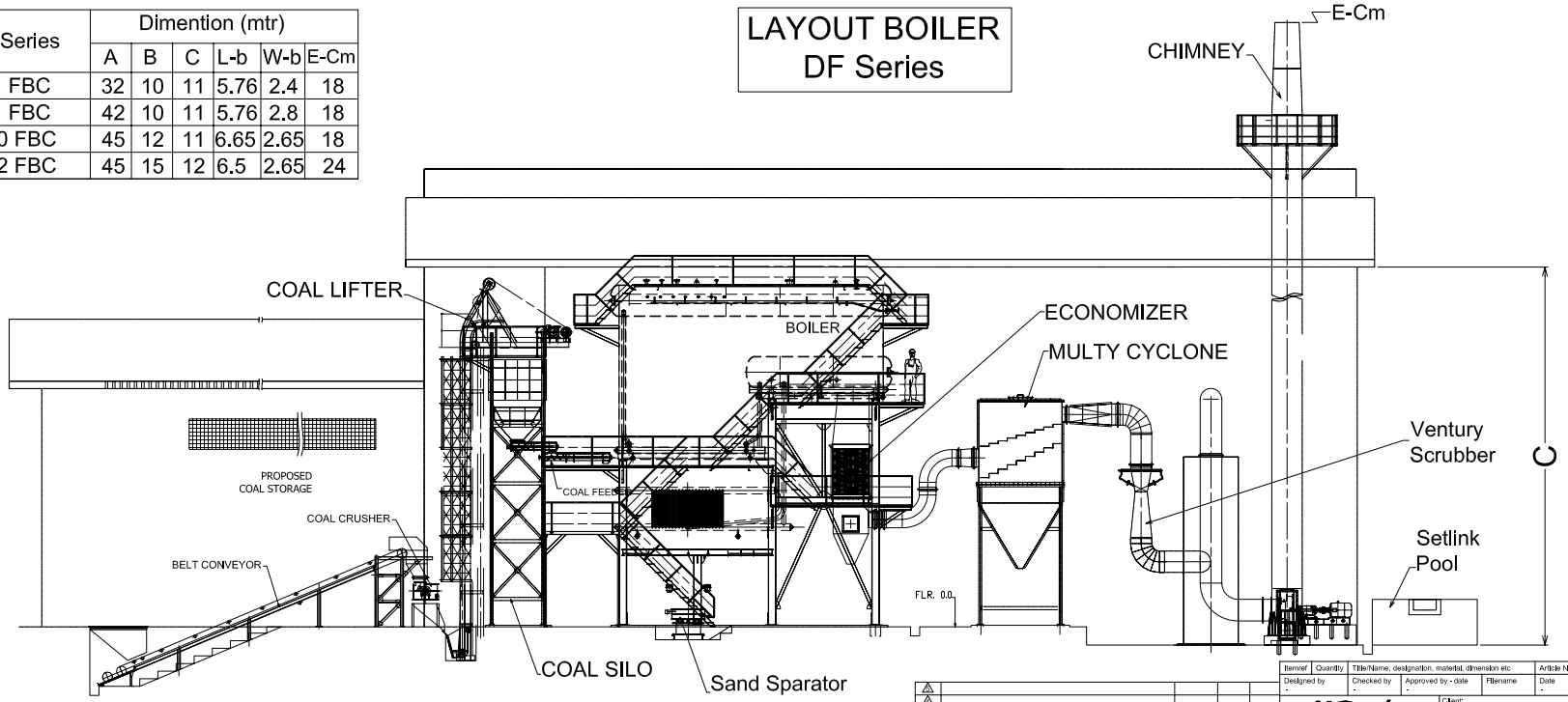
Drawing Number: DF - 0.0 - 1.0

Sheet: 1/1



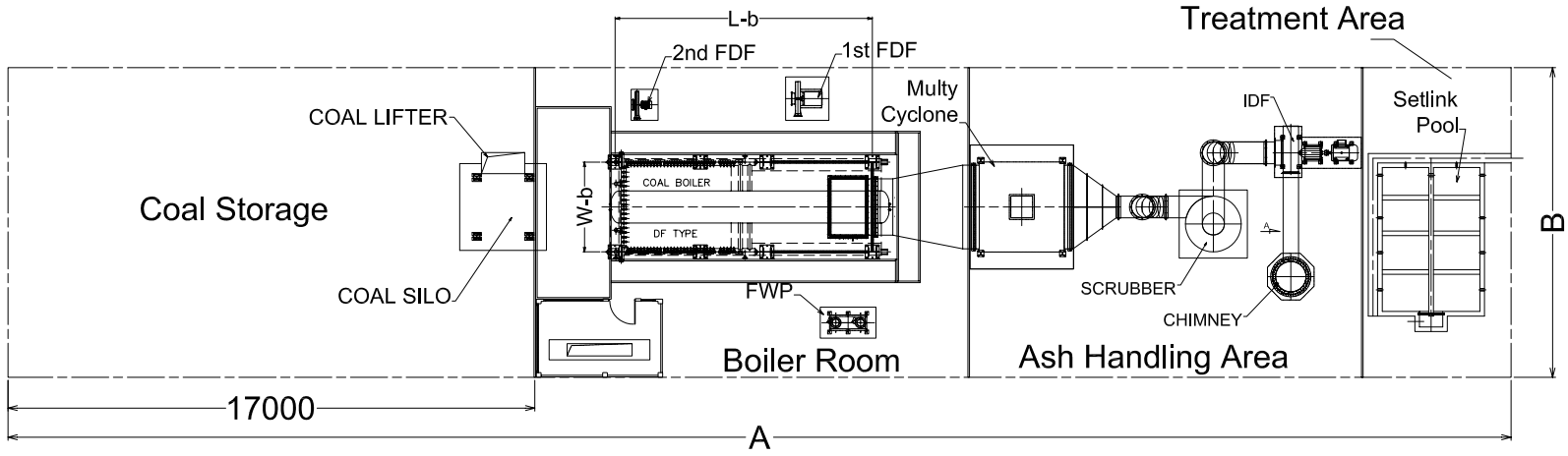

| No | DF Series | Dimention (mtr) | | | | | |
|---|---|---|---|---|---|---|---|
| | | A | B | C | L-b | W-b | E-Cm |
| 1 | DF 6 FBC | 32 | 10 | 11 | 5.76 | 2.4 | 18 |
| 2 | DF 8 FBC | 42 | 10 | 11 | 5.76 | 2.8 | 18 |
| 3 | DF 10 FBC | 45 | 12 | 11 | 6.65 | 2.65 | 18 |
| 4 | DF 12 FBC | 45 | 15 | 12 | 6.5 | 2.65 | 24 |

## LAYOUT BOILER DF Series



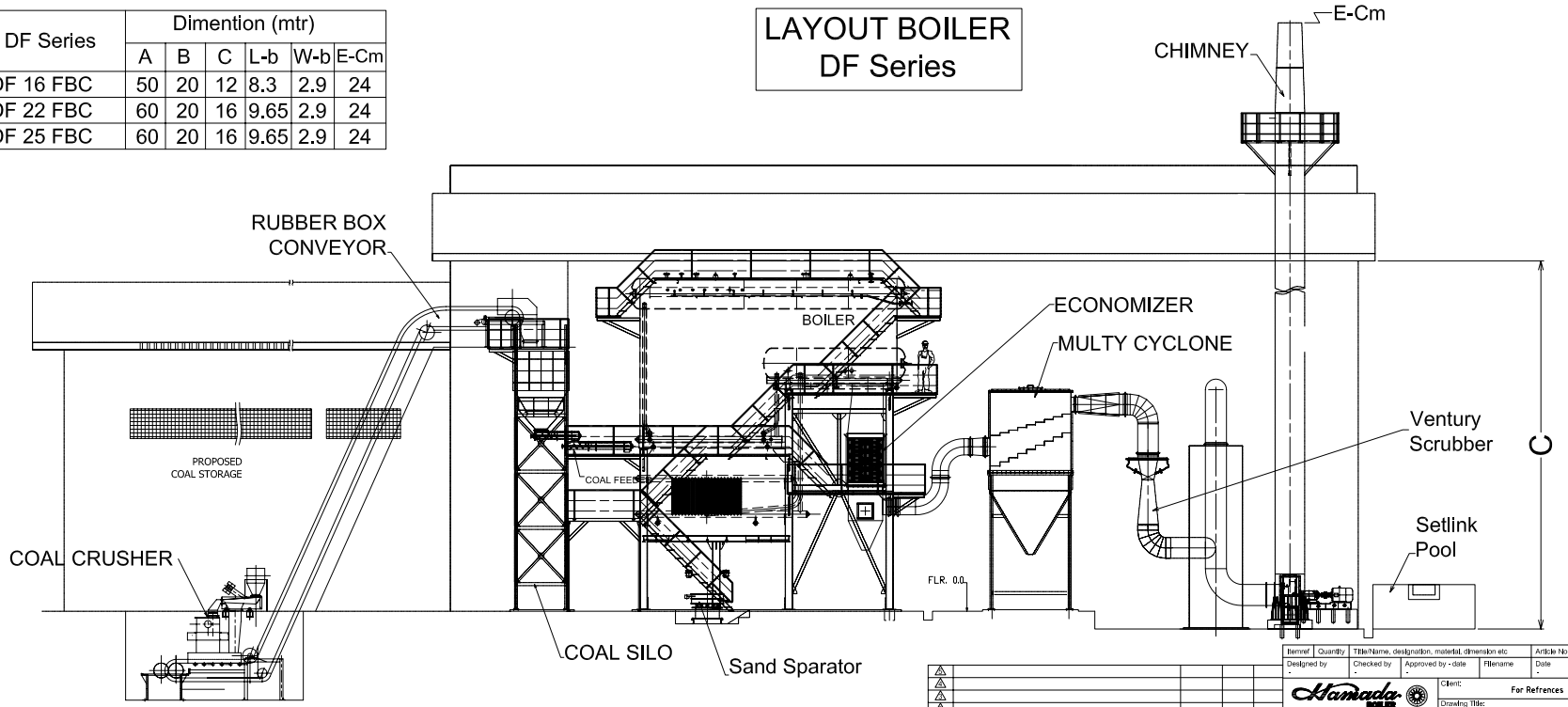

| Itemref. | Quantity | Title/Name, designation, material, dimension etc | | | | Article No./Reference |
|---|---|---|---|---|---|---|
| Designed by - | Checked by - | Approved by - date - | Filename | Date - | Scale NTS | |
| Hamada BOILER MODEL: DF Series HTTP://WWW.HAMADABOILER.COM | | | Client: - For Refrences | | | |
| | | | Drawing Title: LAYOUT BOILER DF Series | | | |
| | | | Drawing Number - | | Sheet A1 | |

| RevNo | Revision note | Date | Signature | Checked |
|---|---|---|---|---|
| 1 | | | | |
| 2 | | | | |
| 3 | | | | |
| 4 | | | | |
| 5 | | | | |




| No | DF Series | Dimention (mtr) | | | | | |
|---|---|---|---|---|---|---|---|
| | | A | B | C | L-b | W-b | E-Cm |
| 1 | DF 16 FBC | 50 | 20 | 12 | 8.3 | 2.9 | 24 |
| 2 | DF 22 FBC | 60 | 20 | 16 | 9.65 | 2.9 | 24 |
| 3 | DF 25 FBC | 60 | 20 | 16 | 9.65 | 2.9 | 24 |

# LAYOUT BOILER DF Series

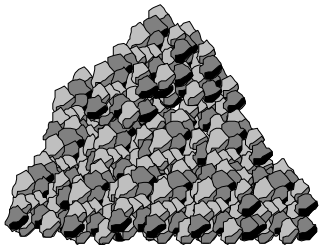


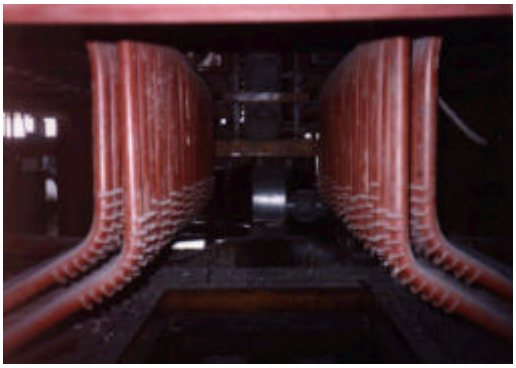

| Itemref. | Quantity | Title/Name, designation, material, dimension etc | | | | Article No./Reference |
|---|---|---|---|---|---|---|
| Designed by - | Checked by - | Approved by - date - | Filename | Date - | Scale NTS | |
| Hamada BOILER MODEL: DF Series HTTP://WWW.HAMADABOILER.COM | | | Client: - For Refrences | | | |
| | | | Drawing Title: LAYOUT BOILER DF Series | | | |
| | | | Drawing Number - | | | Sheet A4 |

| RevNo | Revision note | Date | Signature | Checked |
|---|---|---|---|---|
| | | | | |

# FLUIDIZED BED SYSTEM

- ***USE COAL  0 - 10 mm SIZE***
- ***ASH CONTENT FLEXIBLE***





***FLUDIZED BED SYSTEM:***

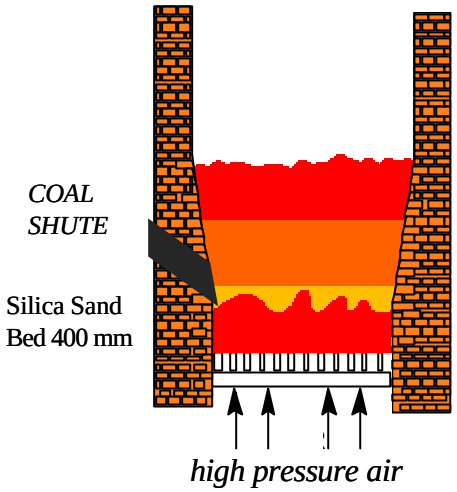
Indonesian  Semi-Bituminus coal, when fired with the conventional furnace, some problem is expected as a result of melting ash.
In order to solve  such problems, we introduce "Fluidized Bed System".
which uses fluidizing “Silica Sand” in order to catch the flying away unburned gas, to give enough time for complete combustion, to distribute heat evenly throughout the combustion area, to enable installation of water tube assembly emerged inside the sand bed to transfer heat from the fluidizing fire to lower the sand bed temperature below 1,000  oC, and to allow injection of Limestone to react with the harmful SO2 gas.

Left picture shows the arrangement of submerged water tube installed inside the sand bed.  Because of this tube, bed temperature can maintain at below 1000  oC  below the ash melting point.  Only the Fluidized Bed System can do this for the total solution of melting ash problem which has been giving mile-stone problem to other combustion method. Moreover, the heat transfer efficiency of the submerged tubes is 5-6 times higher than the co-efficient of heat transfer of the conventional boiler convection tubes.  Almost 30% of the total steam output can be generated from this submerged tube banks because of this.

***Air-distributor***:  Left picture is the view of multiple air-nozzles installed at the bottom of the FBC furnace below the sand bed.  If asked what is the disadvantage of  Fluideized Bed after hearing so many advantages over the other systems, my answer is that FBC need big power to lift up silica sand with the high pressure air of about 1000 mmH2O.  Motor for FDF may be 2 times bigger than the motor used for the other system.  It is, however, such disadvantages can easily be compensated by higher combustion efficiency that will give more benefit to the user.  A big hole shown in the left picture is the sand discharge valve where some big pieces of  sludges  will also fall to be discharged periodically.

**FBC fire/ looks like lava of volcano:**  Inside of lava coming from volcano, nothing remains unburned.  Fluidizing fire is the same status.  No unburned carbon.  For sulfur problem, CaCO3 may be injected for reaction with SO2 to become CaSO4 which is  unharmful. Such injection is not possible for other systems. Nox  problem is also not applicable for Fluidized Bed’s low temperature combustion below 1000 oC. This is why most of the latest power plant in the leading countries adopt Fluidized Bed for it’s advantage in pollution control as environmental protection is the main issue to be solved in every big coal firing plant.

# PRINCIPLE OF FLUIDIZATION

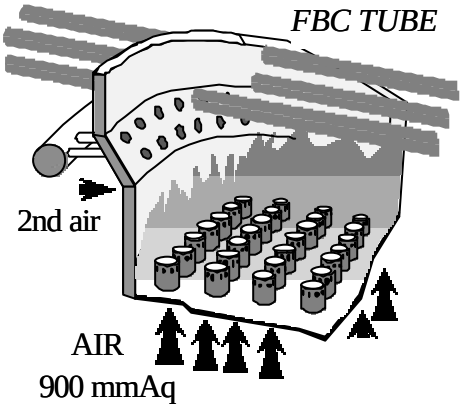



When a bed of fine particles, for example sand, is subjected to an upward stream of air, the particles become suspended as the airflow reaches a certain velocity. This condition is referred to as the minimum fluidizing velocity and it varies according to the particle size and the depth of the bed. When the bed is fluidized it resembles a boiling liquid. Such a turbulent mass of solid particles is named a fluidized bed. Coal can be fed into the bed and as it burns it resembles molten lava. If the gas velocity becomes too high, then the particles are entrained in the gas stream and are lost. A fluidized bed behaves like a liquid, so both the bed level and temperature can be easily controlled.

Coal fuel enters the furnace slightly above the fluid bed splash zone where the rising stream of air and combustion gases burst from the sand bed. The vigorous action of the bed causes the fuel to rapidly mix and be quickly raised on temperature to its igniting point. Solid fuel particles mixing with the rising air stream are jostled by the hot bed material (sand, ash & fuel) causing rapid release of surface moisture and volatile matter from within the fuel.

The relatively large mass of moving bed material continually exposes new surfaces of the fuel particles for combustion, sustaining the rapid combustion within the bed. The rapid combustion enables very good load response to be maintained. (Closely approaches that of oil fuel)

**WHEN** the fluidized bed design is compared with conventional grate systems the following specific capabilities of the former enable a practical unattended control procedure (automatic controls) to be devised and implemented;

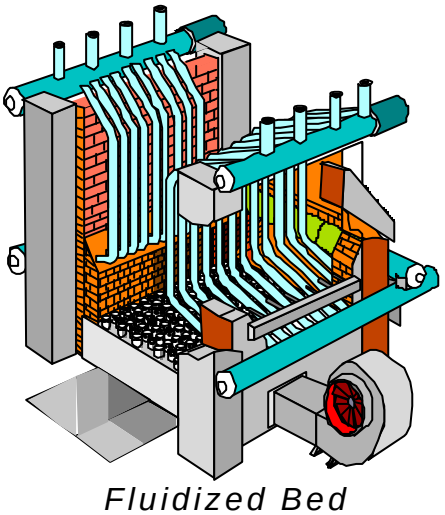



**C**ombustion temperatures are significantly lower and thus much safer conditions are continually maintained (well under 1000 oC)

**T**he nature of a fluid bed ensures that mal-distribution is not likely to occur. Fuel migration through the bed is fast and even. Air distribution is insured by the designed configuration and location of the air nozzles.

**T**he bed combustion can be stopped instantly by turning off the air supply to the bed. This action results in the bed slumping, thereby smothering combustion. The bed is inherently safe because it contains only 3-5% combustible material as a maximum. This is evenly distributed throughout the inert bed material. When slumped, the bed is safe and permits an easy restart even after several hours simply by re-introducing the airflow into the bed. This is possible because of the substantial quantity of entrained heat in the bed material.

# FLUIDIZED BED UNIT



Fluidized Bed

The furnace is located atop the air distribution plenum. It has an overall freeboard height of about 5 meter. At its base, and assembly of In-bed tubes are positioned so that at maximum steam output they are fully immersed in the expanded fluidized bed. As the fluidizing air supply is decreased, the expanded bed depth is reduced and the in-bed tubes are progressively uncovered such that at all outputs approximately 50% of the heat release by combustion is transferred to the in-bed tubes when burning coal fuel. This allows a turndown of at least 3:1 at near constant excess air with the entire bed in operation. Co-efficiency of heat transfer

of the in-bed tubes immersed in the sand bed is 5-6 times higher than that of the conventional convection tube bank area. If design of boiler requires 30 m2 for convection area to generate 1000 Kg of steam per hour, we can safely take 1/6 of it or 5 m2 to generate 1000 Kg of steam from the immersed in-bed tube area.

The fluidizing air enters through air distributors mounted on a flat base plate. The bed material is silica sand having a mean size of 0.9 mm (#3). Bed depth is about 400 mm.

## START-UP

Start-up of the bed is achieved by the firing of an above bed distillate coal layer, which is lit by small quantity of oil at the very start. Start-up is normally achieved in 45 minutes from cold status. Hot starts normally are achieved in less than 10 minutes, 6 minutes of which is needed for purging to ensure there are no pockets of ignitable gas in the boiler passes. If the bed temperature is above 600 oC no oil fuel is needed to re-start the bed. Usually bed can maintain enough heat or above 600 oC for 1-2 hours.

## BED TEMPERATURE

The average bed temperature varies between 950 oC at full load to 750 oC at minimum load. In fluidised bed operation bed temperature is monitored and is in fact a better indication of combustion condition than a flame scanner used for oil burner.

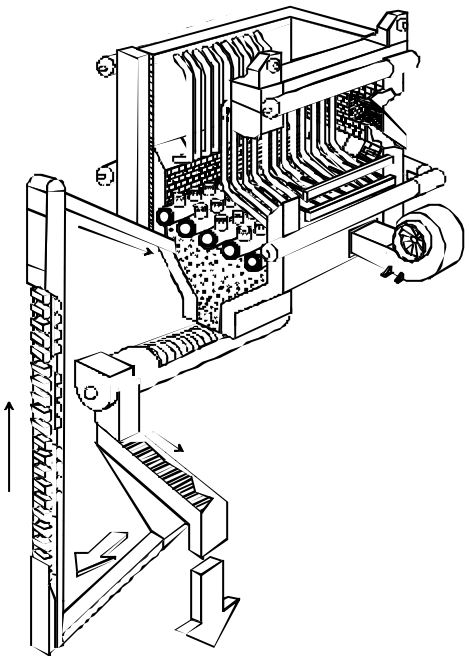
## FREE BOARD ZONE/ OVERFIRE 2ND AIR

The major proportion of the fuel is burnt within the bed, with the remainder burning in the free board zone or disengaging space above the bed. With the injection of overfire 2nd air into the free board zone, disengaging space temperature will rise higher than the temperature of the bed. The final gas temperature leaving the furnace will be similar to the bed temperature as the elevation in temperature due to free board combustion is partially offset by the heat transfer to the uncovered portion of in-bed tubes and cooling effect of the fresh air injection.

## COAL FEEDING SYSTEM

Fine coal is stored on the ground and normally flat conveyor system transport coal from the in-ground hopper to the silo mounted at the front of the boiler. The coal runs from the storage silo by gravity to the screw conveyor with variable speed gear motor, then the coal enters the furnace through an air swept spout.

## COARSE ASH REMOVAL *circulating sand bed*



## SOOTBLOWERS

Soot blowers are not necessary to be installed as the combustion temperature of the fluidized bed is controlled at well below the ash fusion temperature and fly-ash entrained in the gases entering the convection tube banks are dry and non-adhering and possess a self-cleaning action.

Coarse ash which is not elutriated from the bed must be removed. This material is removed continuously by means of circulating sand bed. We call this system as CIRCULATING BED. Air nozzles are screwed in to the multiple air distribution pipes instead of base plate which was used before. Because of this air distribution pipes, coarse ash can fall below the pipe level travelling downward in between the pipes and those materials will be discharged from the rotary valve below together with the silica sand onto the vibrating screen which will segregate those coarse ash and other foreign materials from the pure silica sand. Then the pure silica sand will be returned to the furnace

## CONTROL

through the sand returning pipe by blower.

***a) Fluidized Bed Temperature Control***

The bed temperature is controlled between approximately 750 – 950 oC by varying the speed of the coal screw feeder in response to a signal from the steam pressure and the bed temperature (2 factors)

***b) Free Board Draught Control***

The draught in the free board is controlled at approximately –50 Pa by adjusting the induced draught fan damper located after the multi-cyclone dust collector.

***c) Fluidized Bed Load Control***

Under normal operating conditions, a manual set point forms the load signal. This signal is used to adjust the fluidizing fan damper. As the amount of air is varied to the furnace, the coal feed rate will be regulated to maintain the bed temperature. The fluidizing fan damper control is overiden if the flow measurement indicates a fluidizing velocity of less than 1m/s.

***d) Bed Level Control***

Bed pressure is used to control the bed depth between an effective static height of 120 mm to 180 mm. As the bed pressure reaches the lower limit, the bed material is introduced to the bed by starting the bed material feed screw.

## ACID GAS EMISSION ( FBC, most environmentally friendly system)

One of the main advantages of the fluidized bed boiler is the fact that the temperature spread in the furnace is small due to solid mobility in the fluidized state. This feature is commonly exploited for sulphur capture using limestone;

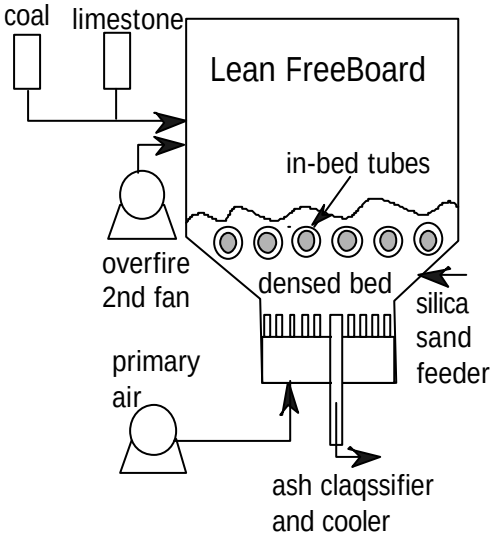
$$CaCO_3 \longrightarrow CaO + CO_2$$

Followed by

$$2CaO + 2SO_2 + O_2 \longrightarrow 2CaSO_4$$

The thermodynamic stability of the sulphur capture product declines sharply as temperature is increased above 900 oC and for this reason, bed temperature is maintained between 800 – 900 oC. Ca/S molar feed ratio of around 2 – 2.5 are typically used and sulphur capture efficiency for this type of system is usually in the range 70-90 percent, depending on limestone reactivity. Soft, dolomitic limestones are generally the most effective for this service.

## ASH / CARBON / SAND / LIMESTONE




In an overall sense, FBC acid gas emissions are dramatically lower than those from other combustion system such as chain grate stoker, underfeed stoker, pulverized coal spreader etc.,( without external flue gas treatment). Emission limits of (typically) 200-300 ppm for Sox and 100-150 ppm for Nox can usually be met without resorting to post treatment of flue gas.

The carbon content of the bed is typically around 2-3 percent (as coal being 5% of the total bed material) and the balance of the bed meterial can be ash, sulphated limestone or sand. The preferred mode of operation is one in which ash and limestone make up the bed. In some instances limestone is not needed and ash content is too low and friable enough to break down to fine particle and be carried out of the bed. This case is specially with the ***"ADARO COAL"*** of Kalimantan, Indonesia, which contains only 1 % ash and 0.1 % sulphur. In such cases it is necessary to add a material such as sand to the bed to maintain a suitable inventory in the system. The performance of a particular coal in relation to bed ash formation can be highly significant from a fuel selection point of view – a boiler operator may not wish to add sand/limestone purely for maintenance of a suitable bed. In such cases the supplier of a coal which does not have good bed-forming properties may need to "spike" the fuel with bed-forming agents.

Ash softening temperature is an important parameter. The fluidized bed must operate in a "Dry" condition since any stickiness has the potential to cause uncontrolled agglomeration and ultimately de-fluidization. Relatively few coals can produce sufficient stickiness below about 900 oC to upset fluidization, though coals which contain appreciable amounts of **chlorine** and/or alkali metals such as **Na** and **K** are known to give problems.

**ONLY FLUIDIZED BED SYSTEM CAN OPERATE JUST LIKE OIL/GAS BURNER (Turn-down ratio 1/4)**

Generation of heat can be adjusted freely up to the turn-down ratio of about 1/4 by controlling coal fuel feeding and forced fan damper openig to the minimum fluidizing velocity. At the minimum fluidizing velocity, sand bed is still fluidizing and continue to generate steam at 1/4 capacity. Between this range of evaporation, Fluidized Bed can react most likely to the Oil/Gas burner among any conventional coal firing system such as chain grate and/or underfeed stoker.

**NO LOSS OF REMAINING FUEL WHEN SHUT DOWN YOUR BOILER**

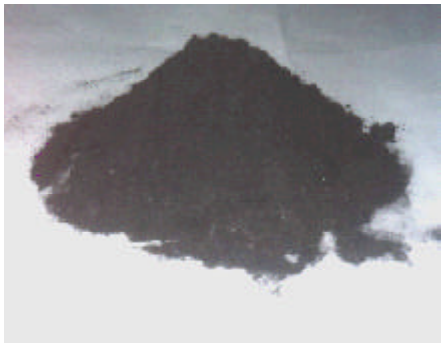
Not like with the other systems, you do not waste any remaining coal fuel when you want to stop the boiler. Remaining coal still inside the sand bed when you turn off the air supply to the bed shall have no more Oxygen supply and trapped inside the hot sand without wasting carbon for no use.

For any other coal fire system like chain grate, all coal fuel already stay on top of the moving chain grate shall have to finish buring even the boiler stop operating and you do not want steam any more. Those loss will count greatly in a long time when comparing Fluidized Bed and Chain Grate.

*Rough & coarse ash from Chain Grate*

All ash will go out of Fluidizing Sand bed in a very dry condition under low temperature of about 900 oC. This condition of ash will never make problems of clinkering and never stick on the surface of boiler tubes. Therefore, soot blower is not needed for Fluidized Bed as mentioned previously. Only fine and dry ash are collected by the multi-cyclone system aftr the boiler and to be discharged through the rotary valve. Since the quality of ash coming out from Fluidized Bed is very fine and equal in its size, ash from the Fluidized Bed Boiler will find commercial value for fertilizer, mixing agent for cement moulded product, construction material, filler for road making etc. Ash from other coal firing system such as chain grate are very rough/coarse due to its high temperature above ash melting point, and can not find its commercial value.

**NO CLINKER, NO ASH FOULING/SLUGGING**



*Fine & dry ash from Fluidized Bed*

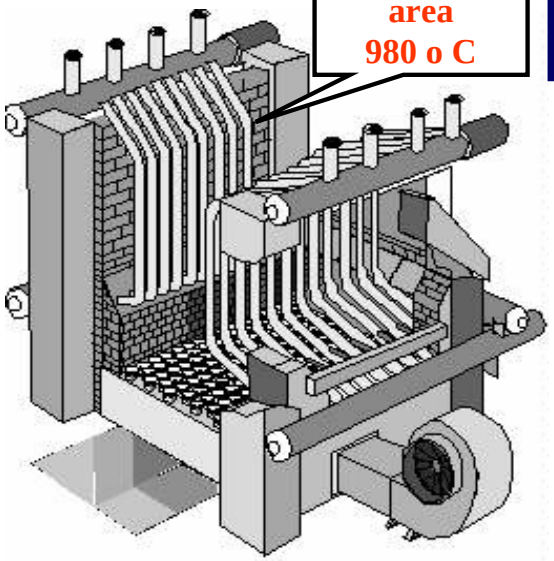
# FBC AIR DISTRIBUTOR

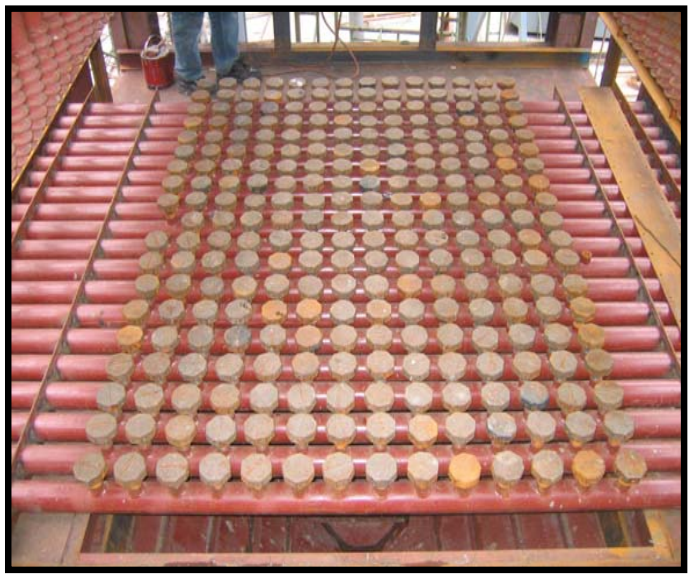

## Low temperature combustion 980 o C

FBC tubes which is emerged inside the dancing hot sand will have 5-6 times better co-efficient of heat transfer, thus enable to maintain the temperature of FBC combustion zone below 1000 o C which is below the ash melting point of most of the biomass and coal fuels.

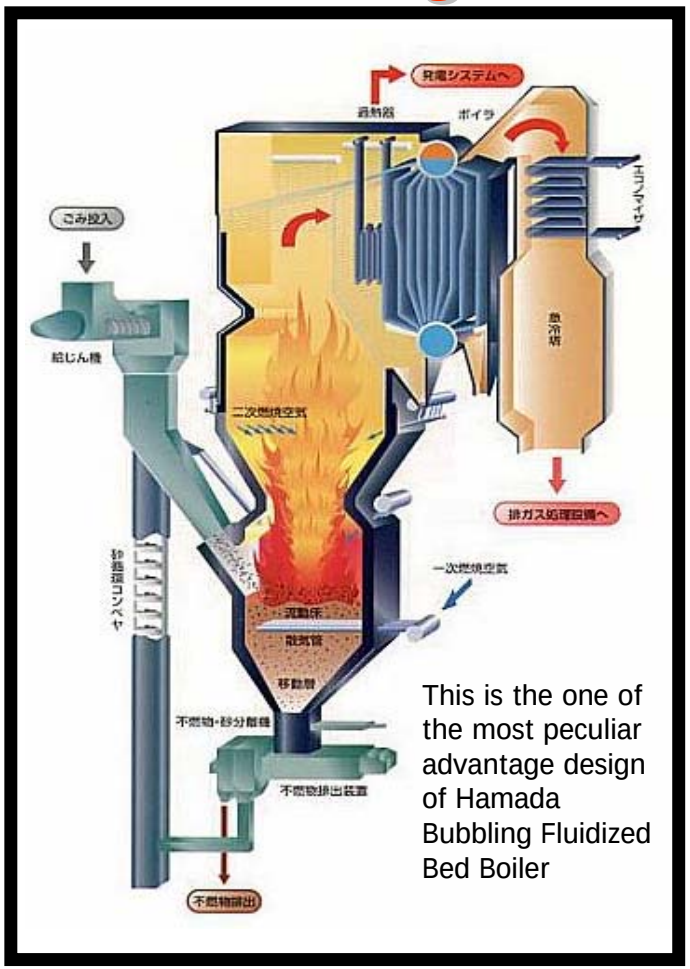
**And NOx will not be formed under this low temperature.**

**Inside veiw of FBC furnace**

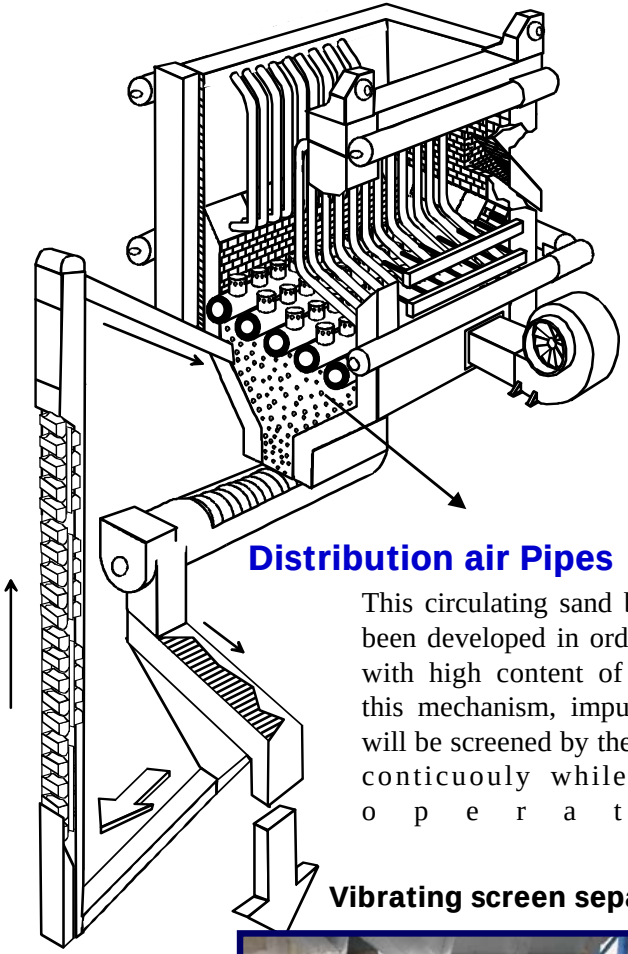


# Circulating sand Bed (@patented)




This is the one of the most peculiar advantage design of Hamada Bubbling Fluidized Bed Boiler



**Distribution air Pipes**

This circulating sand bed system has been developed in order to burn fuels with high content of impurity. With this mechanism, impurity in the fuel will be screened by the vibrator screen conticuouly while boiler is in operation.

Foreign materials and stones are separated by this screen vibrator

Residue from coal

Clean sand for return to the furnace

**Vibrating screen separator**

# Boiler accessories





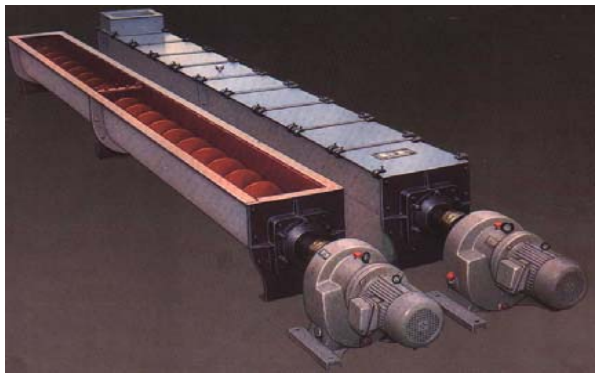




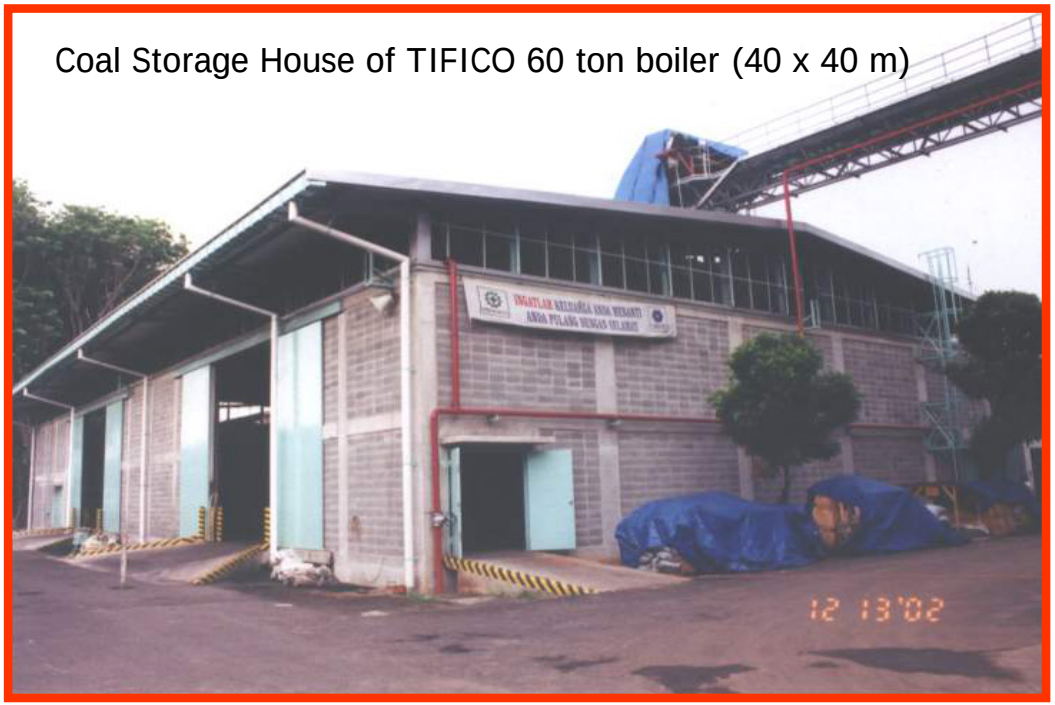





# Coal Feeder screw



# Coal Storage and PLC Control room


Coal Storage House of TIFICO 60 ton boiler (40 x 40 m)


ITS SHL-35 PLC control

# Coal Feeding Flat Conveyor /Coal Crusher and Lifter

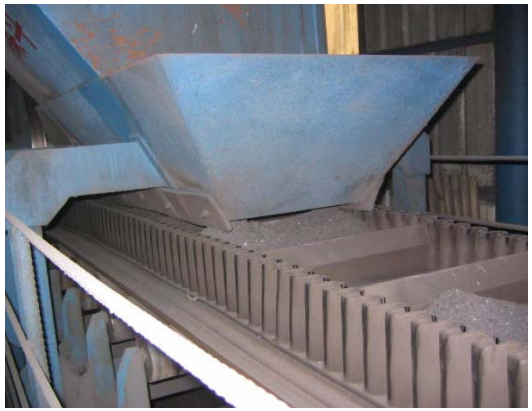

Coal dust suction system

## Coal handling/crusher system

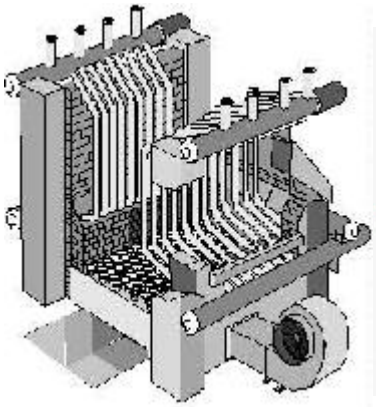
# RUBBER BOX TYPE CONVEYOR

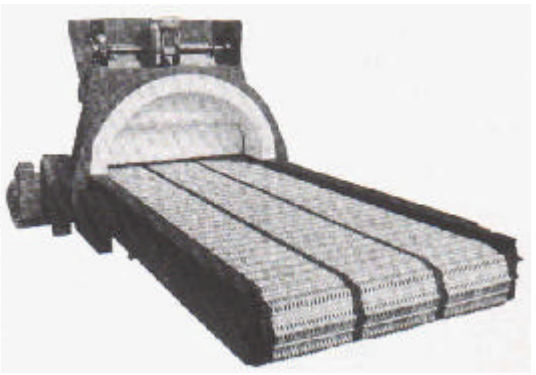
# FOR SHARP INCLINATION





# COMPARISON BETWEEN FLUIDIZED BED AND CHAIN STOKER





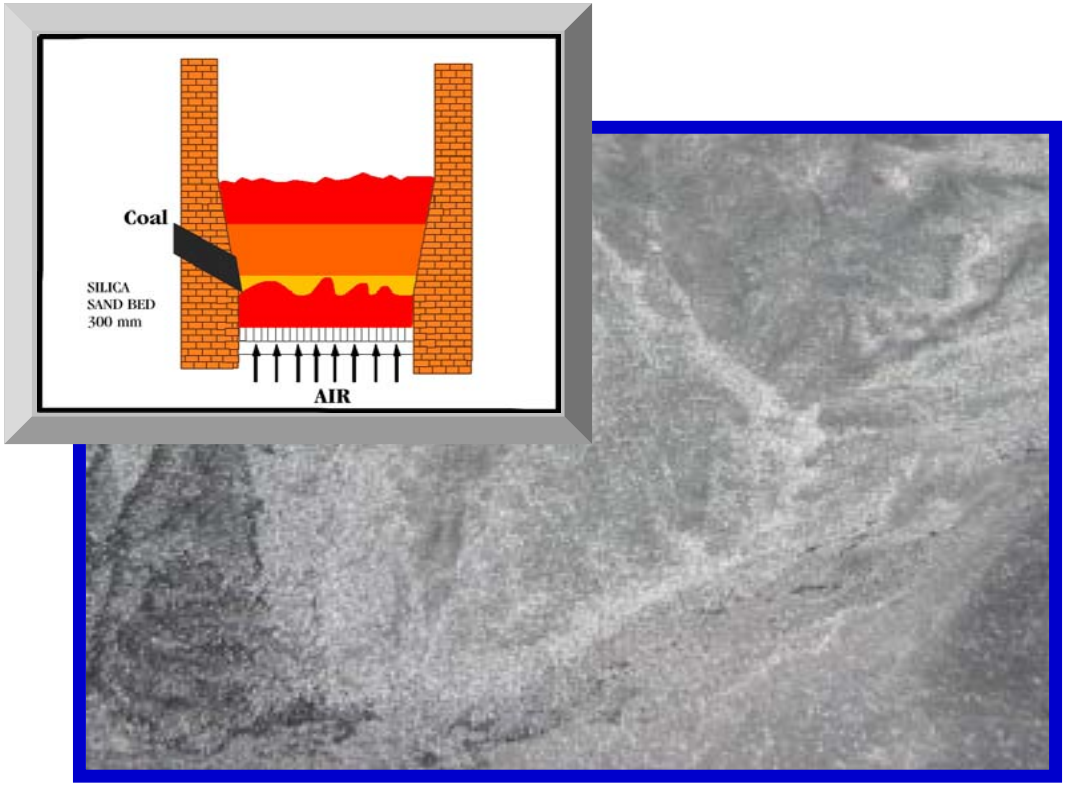
| | | **Hamada Fluidized Bed Combustion** | Travelling Chaingrate |
|---|---|---|---|
| Coal Specification | Coal Size | 0~10 mm | 15 ~50 mm |
| | Coal Price | Cheaper ( ± 23 % ) | More expensive |
| | Ash Content | No Requirement, can use adaro enviro coal with 1 % ash content | 5 ~ 15 %<br>Chain Grate need at least 5% ash content to protect chain from over heating |
| | Volatile | No Requirement | 20 ~ 30 % |
| Combustion System | Furnace Temperature | Below 1000 °C | 1300 - 1400 °C |
| | SOx Problem ? | With Inject $CaCO_3$ can use coal with high sulfur content | Must avoid using Coal with high sulfur content |
| | NOx Problem ? | No, because low temperature at the furnace | Yes, Because high temperature at the furnace |
| | Ash Melting Problem ? | No, Because the combustion temperature below ash melting point. | Yes, Because the combustion temperature is above coal ash melting point ( Indonesian coal is young coal with 1100° ~ 1200° C melting ash temperature ). Melting ash will stick to the chain and Boiler tube, difficult to clean and oiler efficiency become low. |
| | Can Mixed with other Solid | Yes, Because fuel that still can be burn will remain inside silica sand | No, because chain grate need fuel with same size and condition |
| | Combustion Efficiency | Higher, becausefuel can stay long inside the silica sand bed until totally finish combustion | Lower, because bigger coal can not finish burning up to the rear of chain grate and will fall down to ash disposal and fine coal will fly and carried away by the induced draft without burning |

# 25—30% difference in coal consumption

Ash with many unburnt coal
from chain grate boiler


COAL CONSUMPTION :
160-180 Kg/ton of steam

Perfectly burnt gray color ash
from Fluidized Bed Boiler




COAL CONSUMPTION :
120-130 Kg/ton of steam

There are many cheap China Chain Grate Boilers are operating in many countries, simply because the owner decided to buy the cheap China chain grate for its low investment. Bur do you know that such inferior design can not burn the coal 100%. Look at the above pictures!!

Taiwan YFY Chingshui Plant (DF16-25)

Indonesia Grandtex Bandung

LOC Lautan Otsuka Chemical (Merak)

Gudang Garam Factory

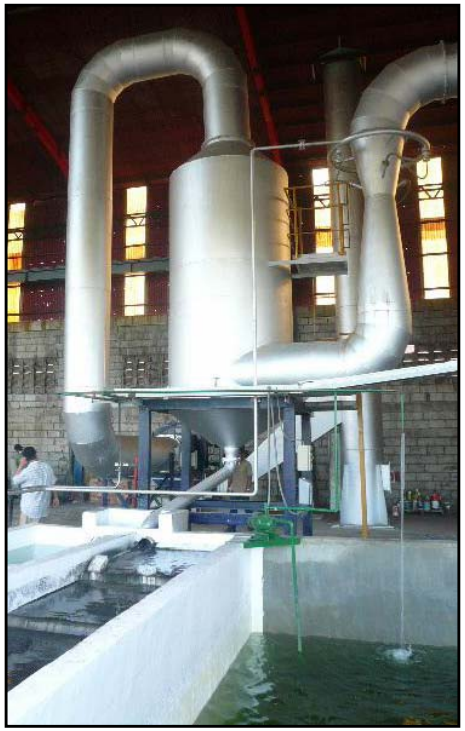
TEIJIN Indonesia Fiber Corporation
(TIFICO) DF22 x 3 units=66 ton/H

PT. BATAMTEX (Semarang)

# DF Installation

**DF22-25 x 2 units at TIFICO**

# **Multi Cyclon dust collector (cast iron)** and Venturi wet scrubber



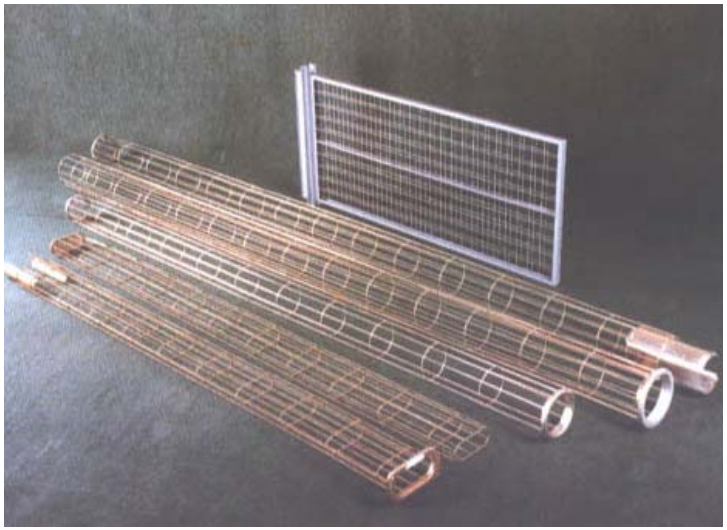
# Bag Filter

Special Filter material with coating: Picture (a) is with coating which can totally stop yhr smoke to get through (b) is without coating smoke can go through.

(a) (b)

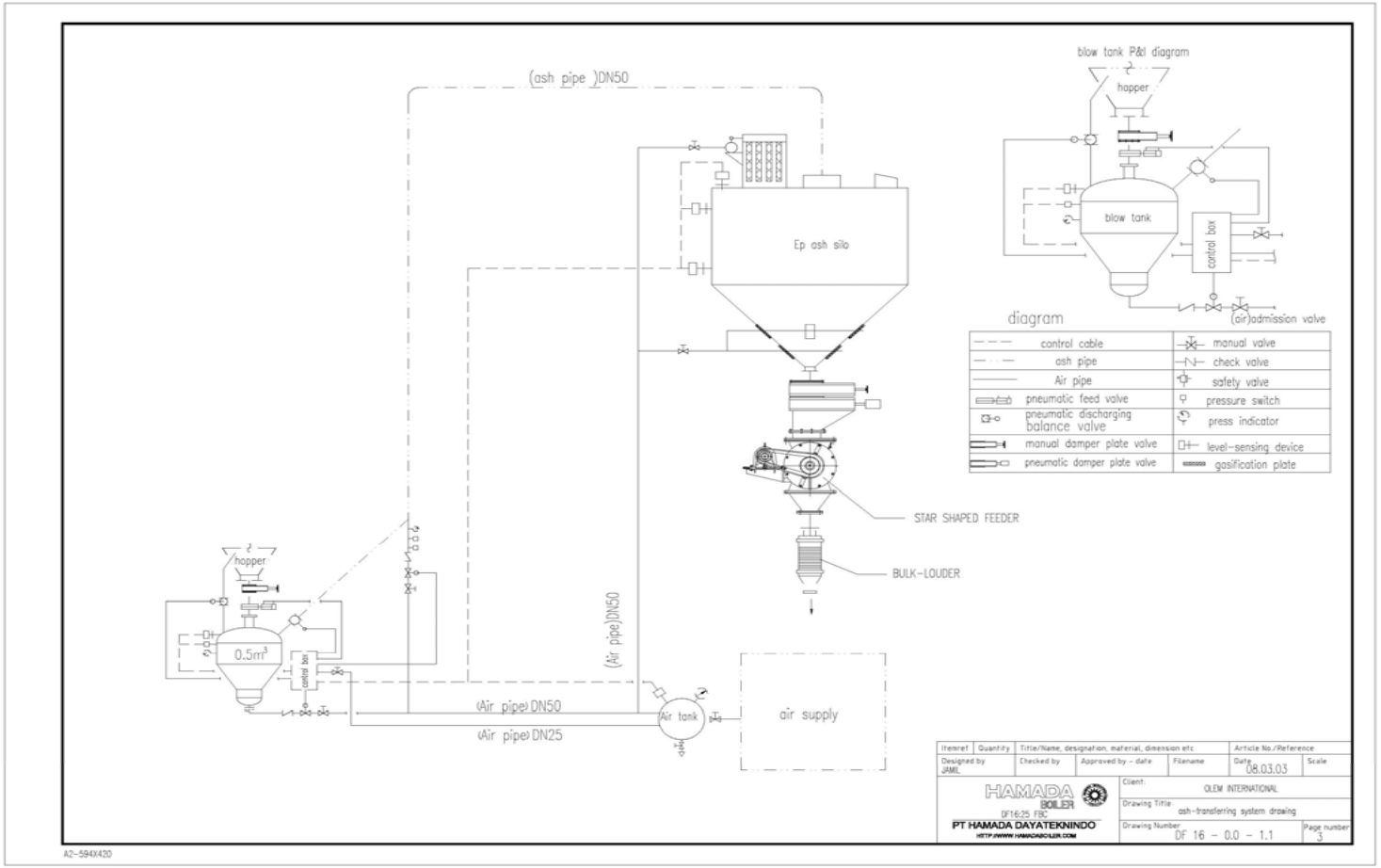
Bag filter material

| Bagfilter material | Specification |
|---|---|
| 1 | Code: TFM04—5(B) coating |
| 2 | Weight: 800g/m2 |
| 3 | Thickness: 1.8-2.0mm |
| 4 | Air permeability: ≤60dm3/m2/s |
| 5 | Warp tensile force: 1400N/5×20cm |
| 6 | Weft tensile force: 1600N/5×20cm |
| 7 | Working temperature: 200-250℃, Max temperature 280℃ |
| 8 | Wind speed: 1.0—1.2m/min |
| 9 | Material: Glass fiber base cloth/P84+ glass fiber |
| 10 | Treatment: PTFE treatment, coating |
| 11 | Service life: 2 years |
| 12 | Application: coal fired boiler |

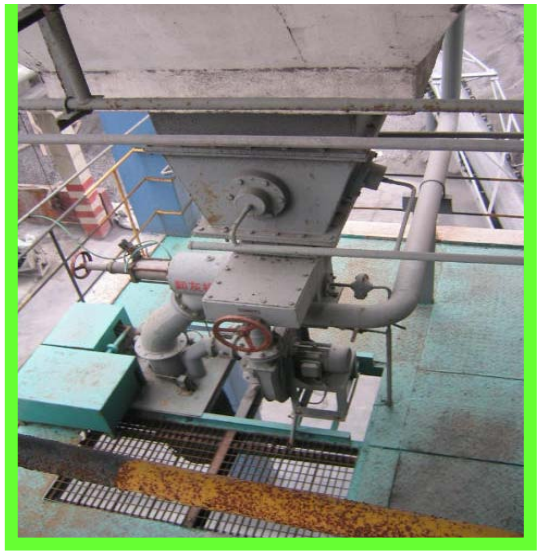


**TFM04-5(B) P84/PTFE+Fiber Glass Coating**

# Ash bin pump and air conveyor/steel ash silo




This arrangement is a standard set-up of single unit of ash bin pump at the bottom of Bag Filter or EP connected to Steel made ash silo for automatic discharge of ash. Ash inside the silo has a bag filter to release excess air and keeps ash all the time fluidizing to maintain fluidity of ash.



# Ash bin pump and air conveyor/concrete ash silo

Concrete silo is used for this set-up. Due to the Sulfur content of coal ash, concrete silo is recommended rather than steel silo for longer life and easy maintenance. Most of China's power plant uses concrete silo because of this reason.

Picture above is ash silo for 35 ton CFBC boiler.

Auto ash discharge to truck

Ash Bin Pump Automatic system

Concrete ash silo for DF25 model

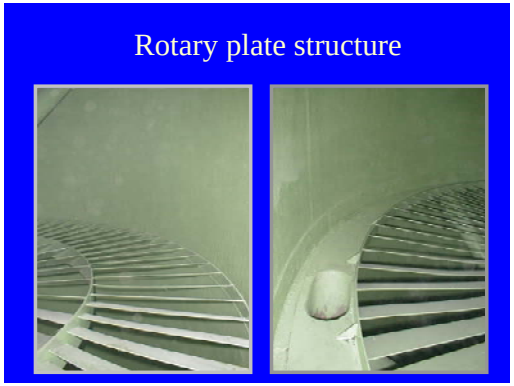
# 正隆製紙脱硫装置

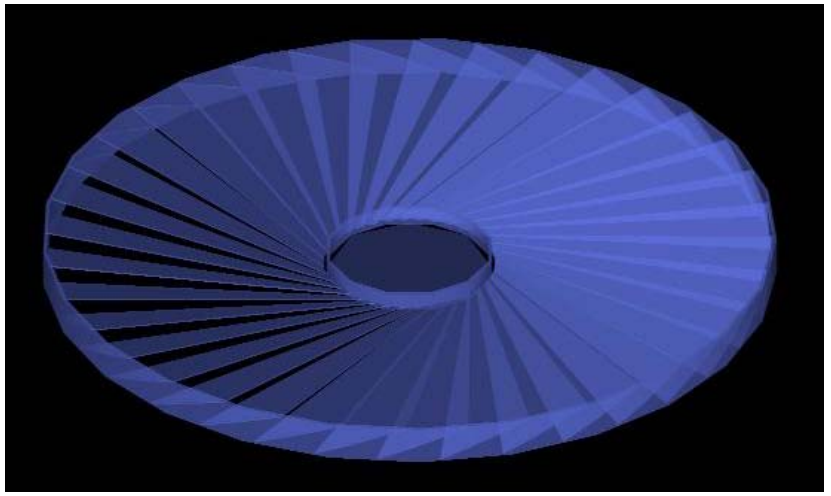
## DeSOx Tower

**(CHENGLOONG PAPER OF TAIWAN)**

NaOH treatment

-Multi Blades



## 1 OPTION I: Desulfurization at FBC furnace by injection of CaCO3

SOx solution

$CaCO_3 \Rightarrow CaO + CO_2$

$2CaO + 2SO_2 + O_2 \Rightarrow 2CaSO_4$

**CaCO3 Needed to inject into FBC bed**

$$Bs = \frac{Bj * Sy * K}{CaCO_3 * N} * 100 = 86.8 \text{ kg/h}$$

**Coal Consumption**

**Bj = 1000 kg/h**

**Sulfur content Sy = 1%**

**Ratio K =2.5**

**CaCO3 = 32**

**Efficiency N = 90%**

## 2 OPTION II: Desulfurization at the Venturi Scrubber by Mixing NaOH

**Use the Na solution :**

$2NaOH + SO_2 = Na_2SO_3 + H_2O$

$Na_2SO_3 + SO_2 + H_2O = 2NaHSO_3$

$2NaSO_3 + O_2 = 2NaSO_4$

For DF Series, Most of the case, we use Multi cyclone and venturi wet scrubber only,without employment of expensive DeSOx tower. Specially if you use Indonesian coal of below 1% sulfur content, SO2 level is lower than the government set value. You have two(2) Options to remove SO2 acording to the content. 1st OPTION is to inject CaCO3 into the Furnace. 2nd OPTION is NaOH solution to be injected to the venturi water scrubber for reaction as indicated in this paper. In anyway, FBC boiler does not require expensive DeSOx tower at the exhaust gas area. This is a remarkable advantage of FBC system.

# NOx solution

## How to reduce NOx

*** Combustion Modifications**

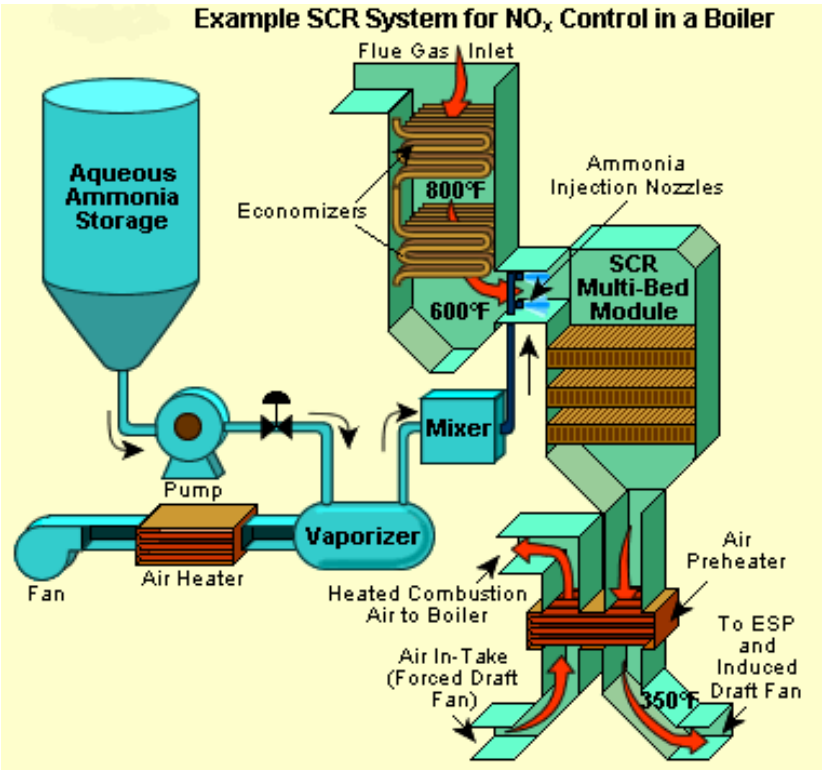
Reducing the flame temperature at the peak combustion area will mean reduction of NOx formation. This is the most effective method to control NOx and Fluidized Bed Combustion which maintains low temperature **(850-950 oC)** combusiton area is proven to be the best method to combat NOx problem.

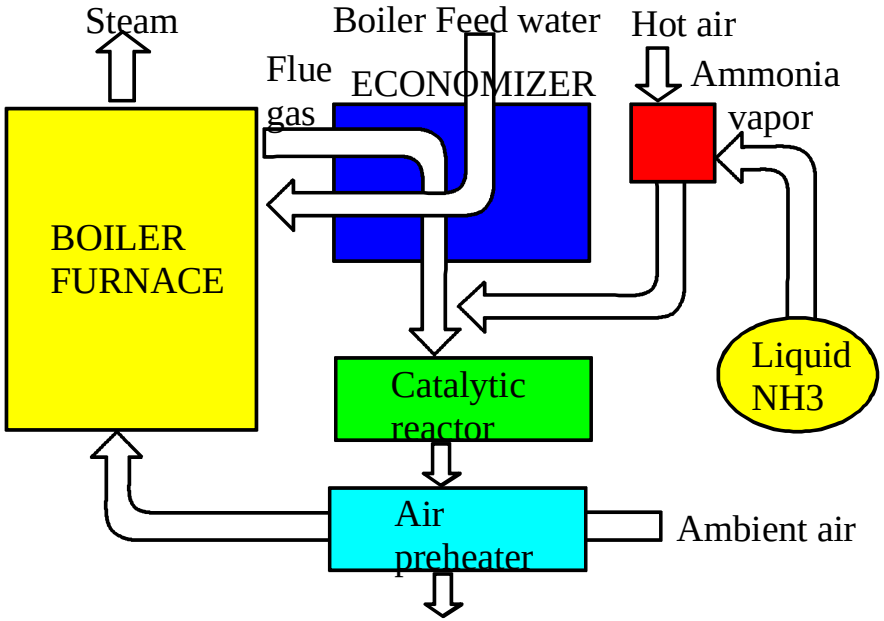
*** Flue gas treatment**

Flue gas treatment to remove NOx is useful in cases in which higher removal efficiencies are required than can be achieved with combustion control. Selective Catalytic Reduction (SCR) is the most advanced and effective method for reducing NOx emmissions. In selective catalytic reduction, the NOx species are reduced by NH3, ultimately to N2 gas. The predominant reactions are; **4NO + 4NH3 + O2 -- 4N2 + 6H2O**

**2NO2 + 4NH3 + O2 -- 3N2 + 6H2O**

Ammonia is vaporized and injected down steam from the boiler feed water preheater as shown in the figure below.



# 工程竣工驗收證書

正隆股份有限公司 2xDF22-1.6-AⅡ鍋爐房專案 工程

竣工驗收日期： 2007 年 12 月 31 日

| | | | |
|---|---|---|---|
| 工 程 名 稱 | 正隆股份有限公司-AⅡ鍋爐房專案 | | |
| 工 程 地 點 | 正隆股份有限公司竹北廠 | | |
| 建 設 規 模 | 2 台 DF22-1.6 鍋爐 | | |
| 開 工 日 期 | 2007 年 4 月 15 日 | 竣工日期 | 2007 年 12 月 31 日 |

工程概況：

本工程已按合同的約定和技術要求，完成了系統供貨、安裝、調試；鍋爐經過性能滿載測試，並經過滿載 72 小時運行，整個系統符合設計。鍋爐性能測試：鍋爐效率、帶負載能力滿足合同的約定的各項內容；空汙測試：NOx、Sox、煙氣粒狀物含量，滿足合同的約定的各項內容。

竣工驗收意見：

1.本工程尚有部份變更事項請依2007.12.17會議記錄內容儘速排定時間完成即可做工程結案.

2.1#爐於2007.12.12測效率87.96%合格. 2#爐於2007.12.29測效率85.29%合格

3.空污檢測. DENOX=189.7PPM合格. DESOX 136.3PPM合格. 粒狀物10 PPM合格. 脫硫效率(CAT. Ca/S)測77.1%未達85%以上不合格

參 加 工 程 建 設 的 單 位 代 表 簽 名

| 正隆股份有限公司： | 香港歲昌實業有限公司: |
|---|---|
| 陳嘉輝 2008.01.04. | 許清波 2008.01.06 |

# 台湾正隆製紙竹北廠
# 検査検収証書
# Taiwan Chengloong paper test report

**Test report:**

**CHENGLOONG PAPERMILL**

**(CHUPEI PLANT) TAIWAN**

**<Translation>**

**December 17, 2007**

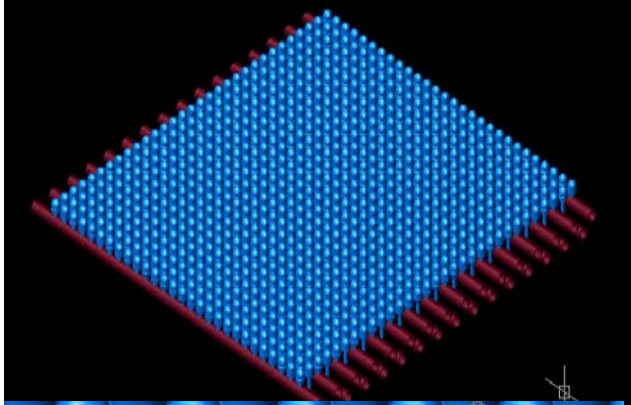
**- Boiler efficiency is tested : #1 Boiler= 87.96%(passed) #2 Boiler= 85.29%(passed)**

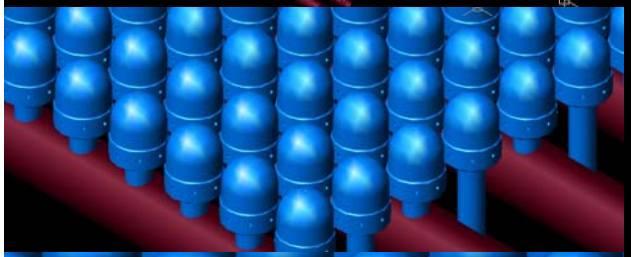
**- NOx : 189.7 ppm (passed)**

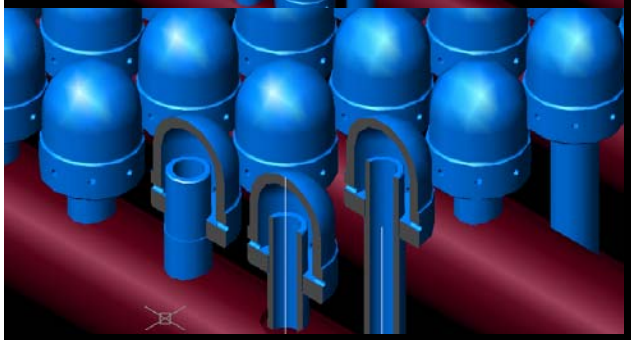
**- SOx : 136.3 ppm (passed)**

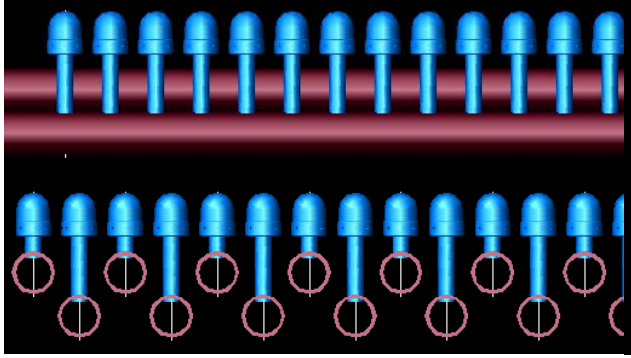
**- Particle : 10 ppm （passed)**

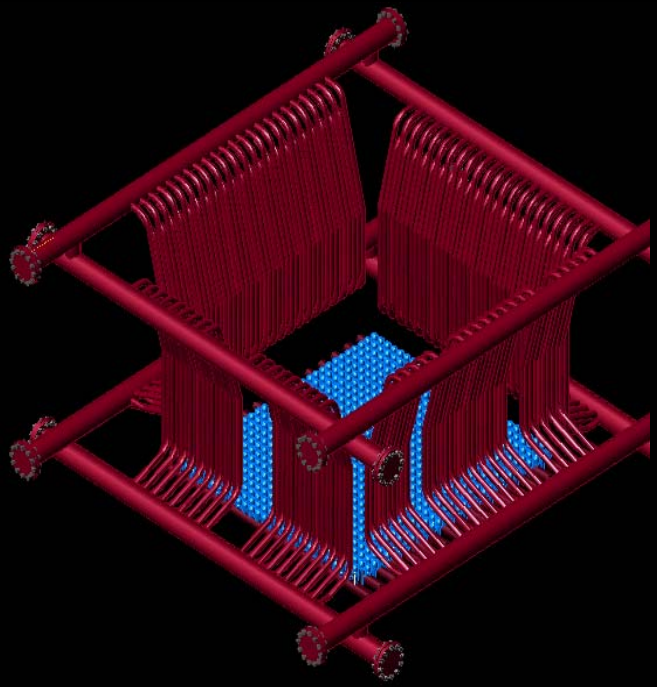
# Specially designed FBC furnace for plastic waste firing

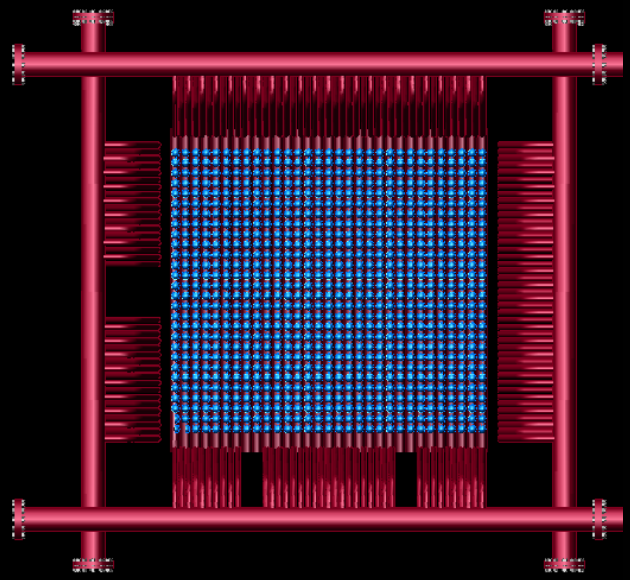


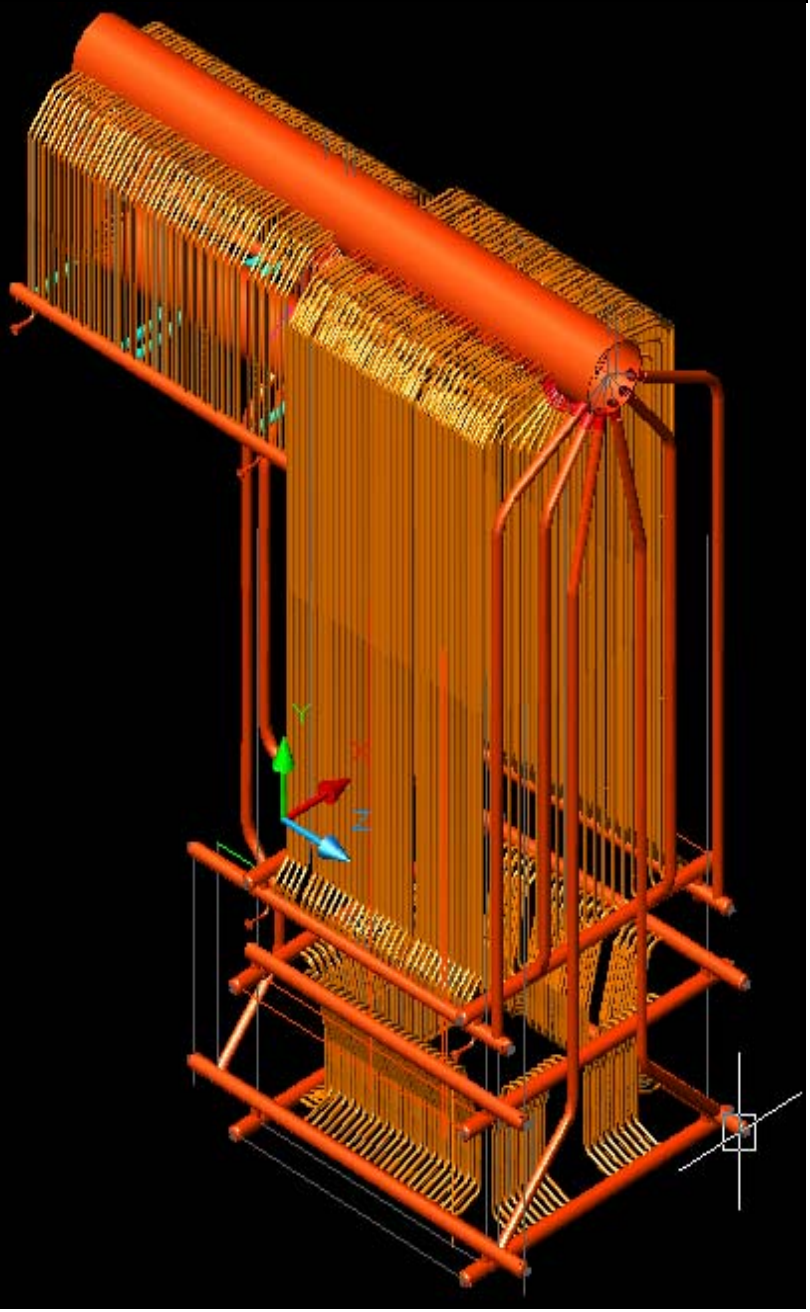








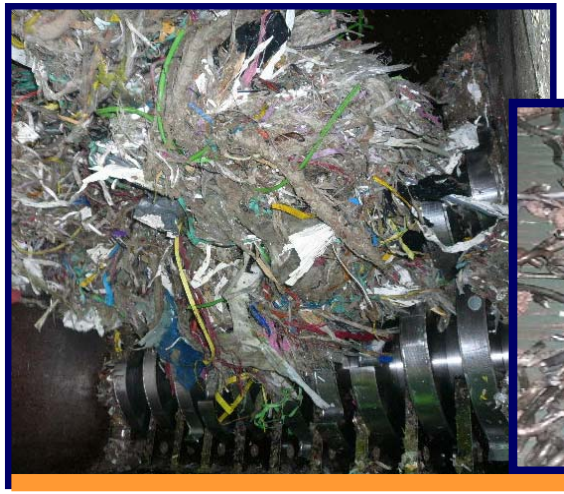




# Thailand Hiangseng Papermill - waste to energy project

**Before plastic wastes are thrown outside the factory by hired truck -**

**---Now turn to precious ENERGY!!!!!!!!!!**


## Rag Rope

**=20T/day with 10% wire content**
**9000Kcal/Kg dried basis with 30% water content**

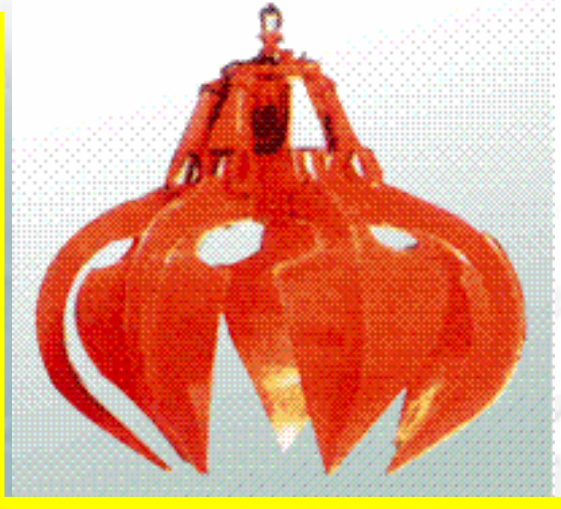
## Pulper Reject

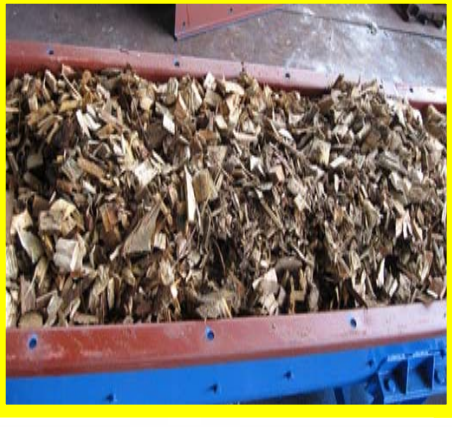
**=30 ton/day**

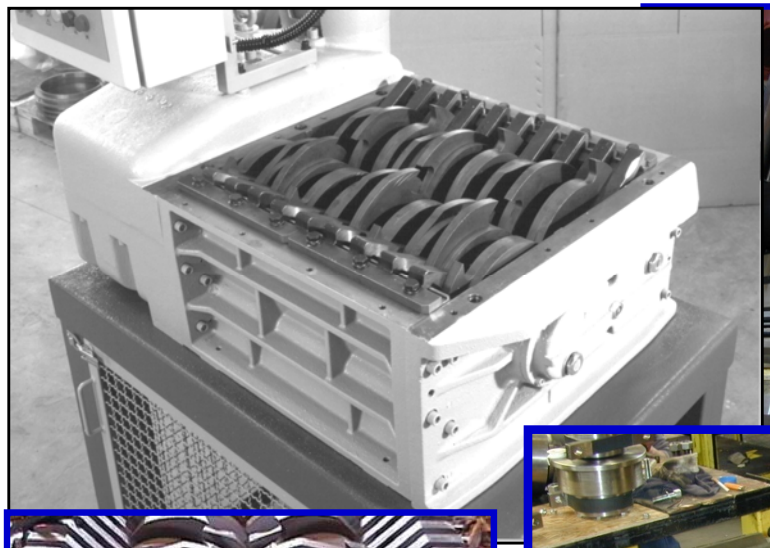
**9000Kcal/Kgdried basis**

**with 30% water content**

# Shaftless Screw Conveyor System for Citywaste firing

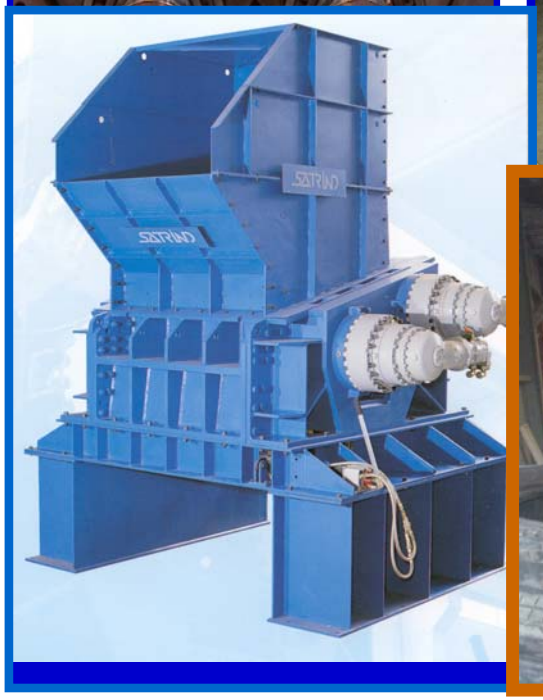












SATRIND


35噸/時洗煤泥流化床鍋爐

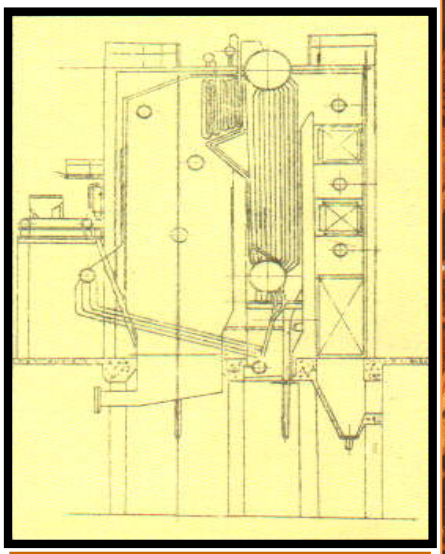
# Sludge Coal Fired FBC Boiler

## WASTE SLUDGE COAL

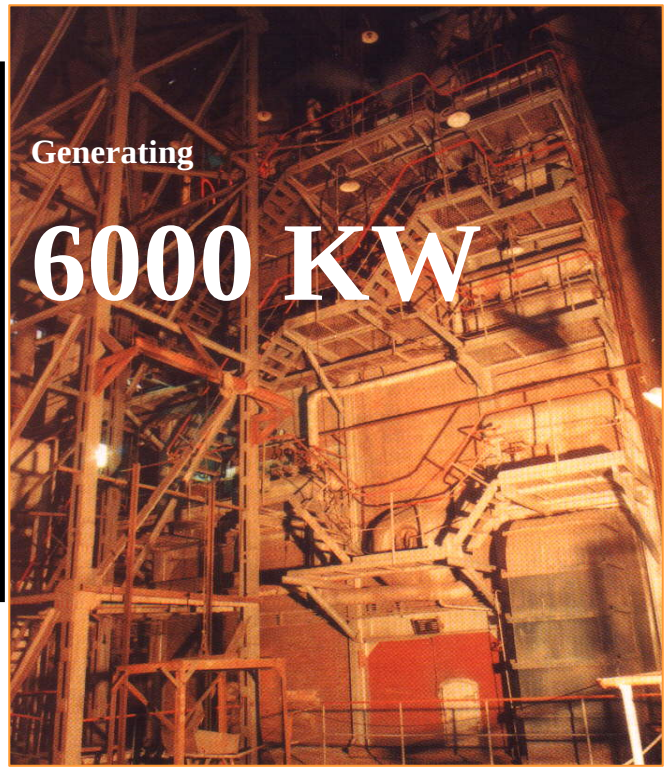
FROM WASHING PROCESS

* 0-0.5 mm
* 20-40% ASH
* 3500-4000 Kcal/Kg
* Mixed with sand

**5% of washed coal will go to waste settling pond in eveery coal mining.**

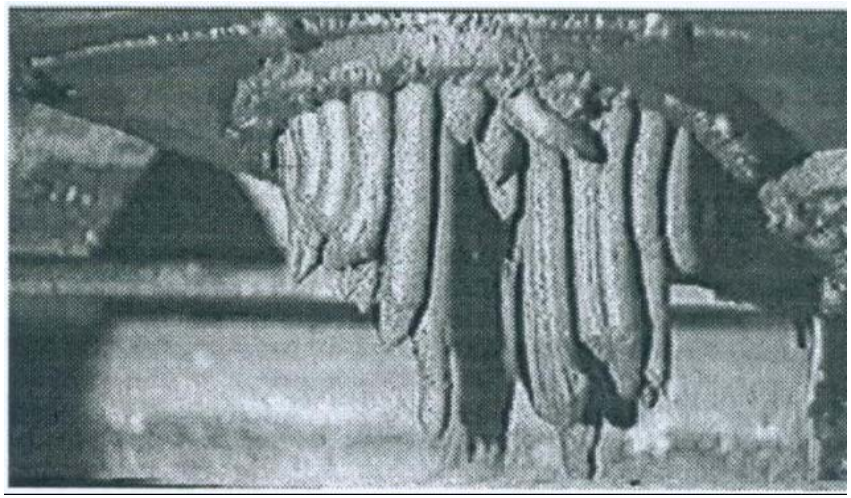


**CAPACITY : 35 TON/H**
**PRESSURE ; 39 KG/CM2**
**SUPERHEATED 450 oC**
**SYSTEM :FLUIDIZED BED**
**FUEL : SLUDGE COAL**




Model NG-35-39/450

60% wet sludge coal (by-product of coal washing process of all coal mining) can not just be burnt in any other conventional method. This is the special way developed by **HAMADA BOILER**

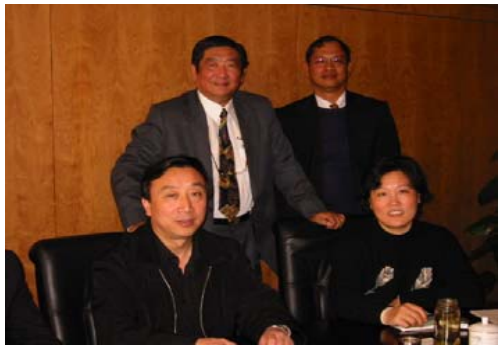


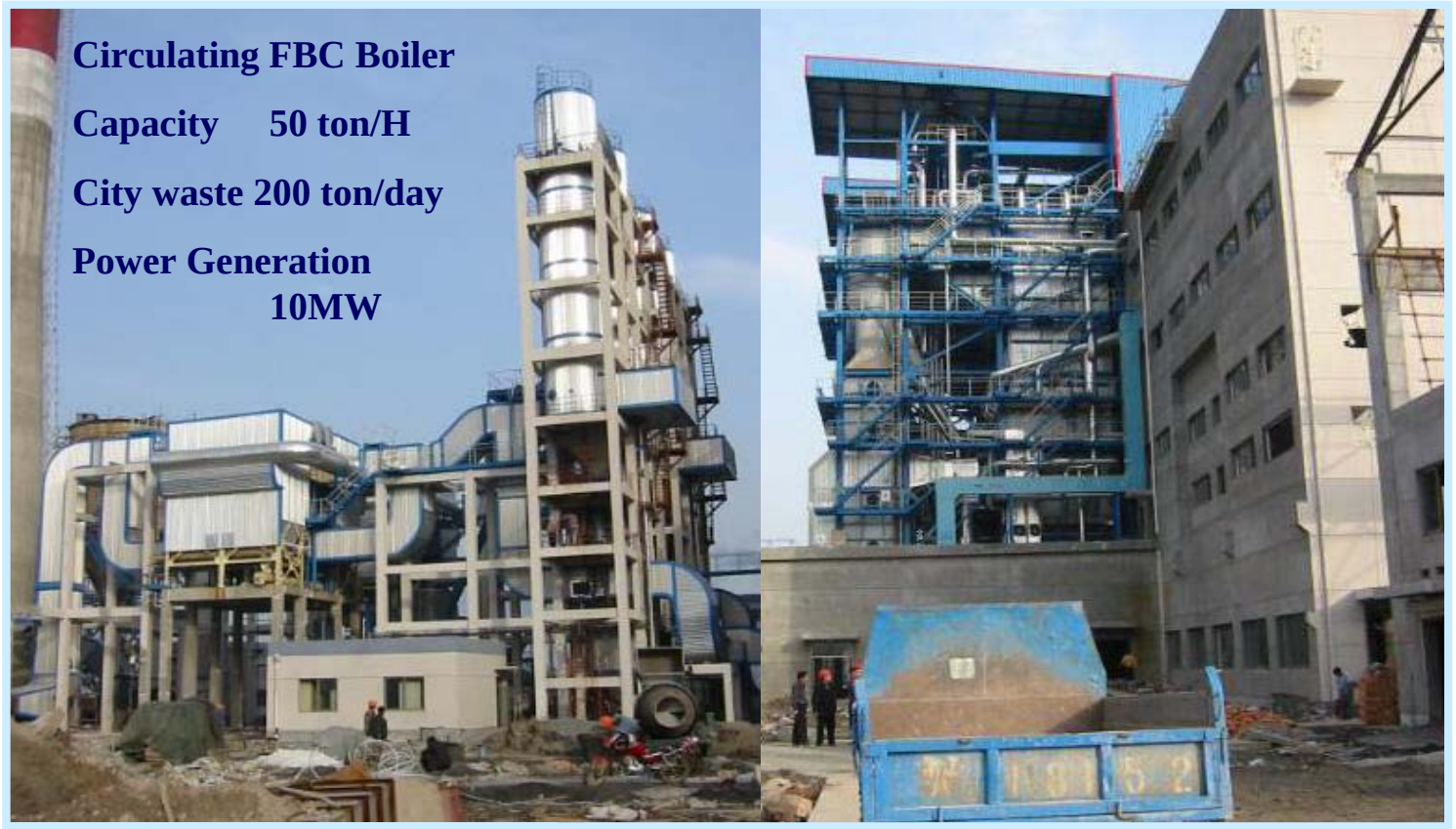
This technology is one of the most remarkable achievement of Hamada Boiler in cooperation with the Zhejiang University. Almost 60% water content coal sludge will be passing the mud pump to go to the top of the 35 meter high CFBC furnace where the specially designed extrudeer is located. When the sludge is extruded, it will fall automatically after reaching certain length due to its own gravity. Then while dropping 35 meter to the FBC bed, its surface will dry and solidified and Accumulated steam inside will build up pressure and will burst into poieces just before reaching the bottom to fluidize.

# Citywaste Power Plant

RAW CITY WASTE

RDF/RPF





# PULVERIZED COAL BURNER for AMP (Asphalt Mixer Plant)

**OIL TO COAL**

Demonsgtration unit of coal burner and combuster which was demonstrated to many AMP (asphalt mixer plant) operator of Indonesia

This picture shows most of the AMP in the world are still using expensive oil as fuel. Do you know you can save as much as 70% if you change the fuel to coal? It's unbelievable, but it's true

This picture shows the AMP plant operating already with coal fuel using Hamada coal burner system and saving as much as 70%.

This system is not only for AMP, but we have already successfully applied the same system to Brick dryer, tile dryer, Kaolin industries, any kinbd of rocks and pwder drying rotary kiln etc. Please contact us for details.

# PULVERIZED COAL BURNER for COALMAC BOILER


**Conversion** : Many customers may wish to convert their ixinsting fire tube boiler with this system, but the pressure vessel has a limitation which is possibly converted. Pictues below are all possible for conversion.

If smoke tube type, dry-back is easy to convert. Wet-back need to make the stomach open for ash disposal which need a big operation

This is a very unique application of Pulverized coal burner to the fire tube boiler shell (Dry-Back Type) to conver the oil fired boiler to coal fired at the lower investment for smnall capacity of 5 – 10 ton with low pressure4 of below 13 bar pressure

Above picture is showing the coal pulverizer to make coal powder to 0.4 mm size from delivered fine coal of 10 mm. Left tp picture is the rotating system for the rotating furnace/combustor to enable complete combustion and prevent accumulation of ash

Left middle picture is the specially designed coal burner distributor to create swirling effect to the spray of coal powder into the combustor.

Left below is the removable design of the coal burner from the combustor

# Paperland of the Philippines

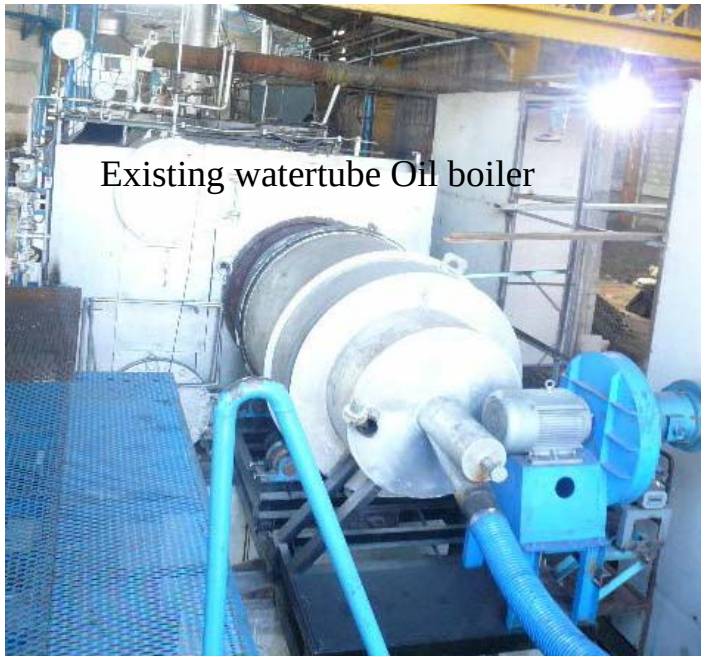
(convertion 0f existing water tube boielr)


Clean emmission

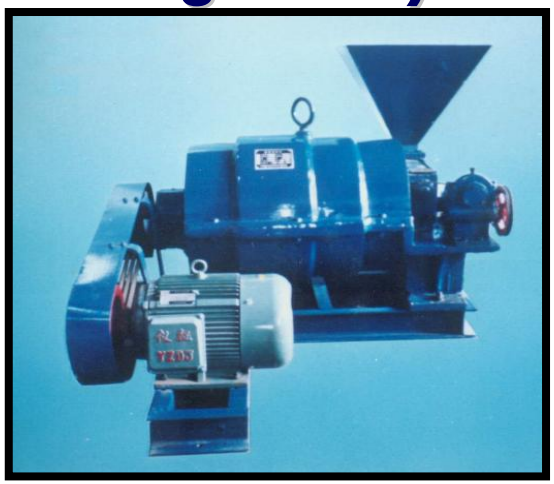
View from rear peeping hole

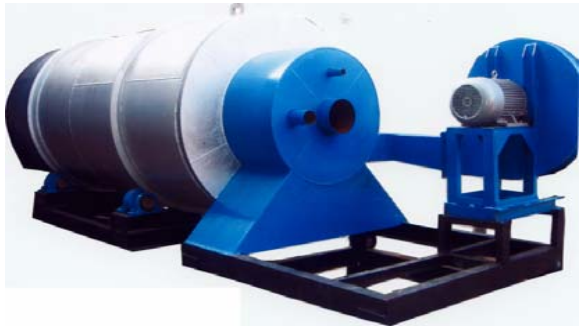
This is a very unique and latest technology developed by Hamada Group to convert Dry back and water tube oil boilers to coal firing

**Hamada Convertion Kit**



# Rotary Furnace for AMP (Asphalt Mixing Plant)



Automatic oil start up burner kit includeed in the supply can ignite this system in 10 min time

# Pulverized Coal Burner Specification

| | MODEL | CB3-34RF | CB3-56RF | CB3-78RF | CB3-9010RF | CB3-1112RF |
|---|---|---|---|---|---|---|
| | | (Single Pulverizer) | (Single Pulverizer) | (Single Pulverizer) | (Double Pulverizer) | (Double Pulverizer) |
| 1 | MAX. CAPACITY | 30-40 tons/H | 50-60 tons/H | 70-80 tons/H | 90-100 tons/H | 110-120 tons/H |
| 2 | MAX. THERMAL HEAT | 4,300,000 Kcal/H | 6,500,000 Kcal/H | 8,600,000 Kcal/H | 10,800,000 Kcal/H | 13,000,000 Kcal/H |
| 3 | PULVERIZER CAPACITY | 600 - 900 kgs/H | 1,000 - 1200 kgs/H | 1,400 - 1600 kgs/H | 1,800 - 2,000 kgs/H | 2,200 - 2400 kgs/H |
| 4 | COAL CONSUMPTION | 18 - 25 kgs/ton | 18 - 25 kgs/ton | 18 - 25 kgs/ton | 18 - 25 kgs/ton | 18 - 25 kgs/ton |
| 5 | FURNACE TYPE | Rotary w/ Louver Airbox | Rotary w/ Louver Airbox | Rotary w/ Louver Airbox | Rotary w/ Louver Airbox | Rotary w/ Louver Airbox |
| 6 | PULVERIZER MOTOR | 30 KW | 37 KW | 45 KW | 30 KW X 2 | 37 KW X 2 |
| 7 | COAL CRUSHER MOTOR | 7.5 KW | 7.5 KW | 11 KW | 11 KW | 11 KW |
| 8 | FORCED FAN MOTOR | 7.5 KW | 11 KW | 15 KW | 15 KW | 15 KW |
| 9 | DRIVE GEARMOTOR | 1.5 KW | 1.5 KW | 2.2 KW | 2.2 KW | 2.2 KW |
| 10 | CONVEYOR MOTOR | 2.2 KW | 2.2 KW | 2.2 KW | 2.2 KW | 2.2 KW |
| 11 | COAL LIFTER MOTOR | 2.2 KW | 2.2 KW | 2.2 KW | 2.2 KW | 2.2 KW |
| 12 | COAL FEEDER MOTOR | 0.75 | 0.75 KW | 0.75 KW | 0.75 KW | 0.75 KW |
| 13 | START-UP BURNER | 0.37 KW | 0.37 KW | 0.37 KW | 0.37 KW | 0.37 KW |

**SCOPE OF SUPPLY:**

1 ROTARY FURNACE COMPLETE W/ REFRACTORY WORKS, WHEELED ROLLERS, CHAIN-DRIVE BY GEARMOTOR.
2 COMBUSTION AIRBOX, LOUVER-TYPE, ADJUSTABLE WHEEL, STRUCTURE & FORCED DRAFT FAN
3 MAIN PULVERIZER WITH MOTOR, SCREW FEEDER WITH GEARMOTOR, BASE PLATE, ETC.
4 COAL CRUSHER WITH MOTOR WITH DISCHARGE SCREW, COMPLETE WITH BASE FRAME & STRUCTURE
5 ELEVATED COAL SILO, COMPLETE WITH STRUCTURE & CLIMBING LADDER
6 COAL LIFTER, 300 KGS/LIFT, DRIVEN BY GEAR MOTOR WITH DOUBLE WINCH DRUM
7 COAL CONVEYOR WITH RECEIVING HOPPER, DRIVEN BY GEARMOTOR
8 START-UP BURNER ASSEMBLY
9 CONTROL PANEL WITH CONTROLLER
10 THERMOCOUPLE SENSOR & CABLING
11 SITE ELECTRICAL WIRES & CABLES
12 INCLUDING INSTALLATION & COMMISSIONING

NOTE: ABOVE PRICES DOES NOT INCLUDE FOUNDATION AND ALL CIVIL WORKS

# THERMAL OIL HEATE
# FLUIDIZED BED

Multi tubular type heat exchanger vessel, designed for coal combustion, which is more efficient than the coil type

6,000,000 Kcal/H installed at PT. PURNAMA TEXTILE at Majalaya, Bandung

Oil Circulation Pump

Air Pre-heater unit

# RC MODEL

Hamada BOILER

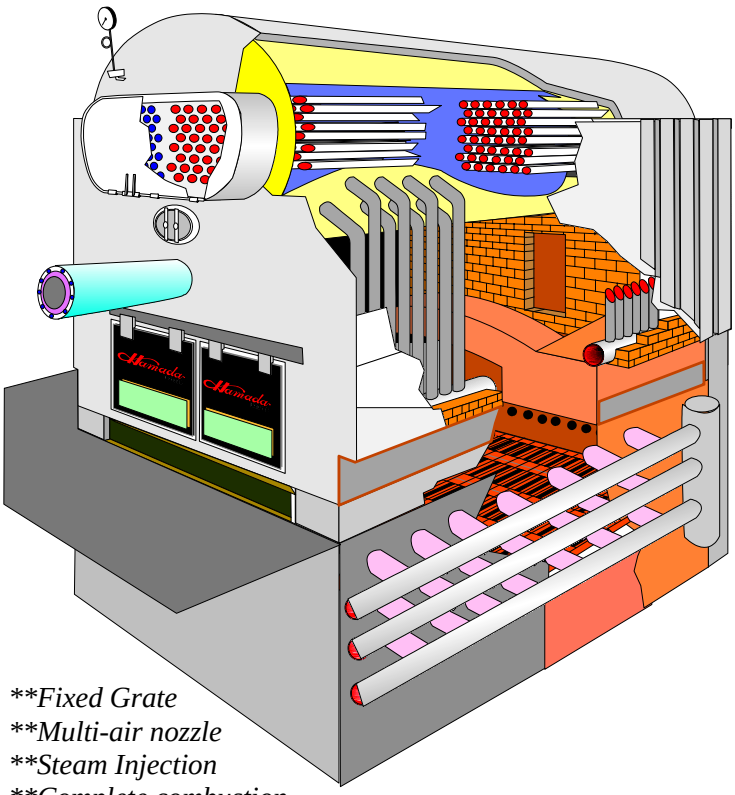
## WOODWASTE / SAWDUST-FIRED BOILER

*2 to 5 TON/H CAPACITY*
*13 KG/CM2 PRESSURE*

Firetube/watertube combination

## *Model RC Series*

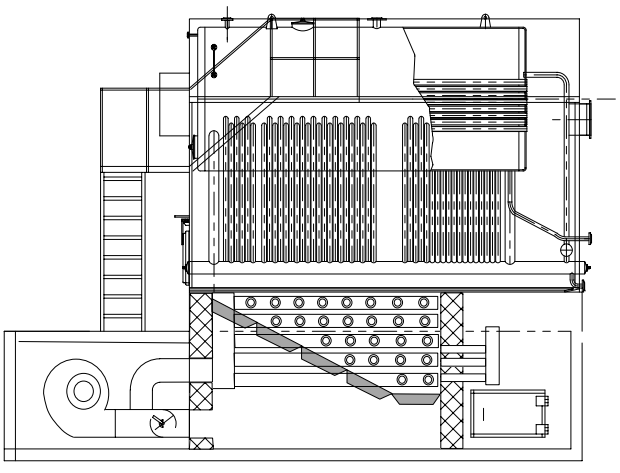
| ***MODEL NAME*** | | | ***RC2000*** | ***RC5000*** |
|---|---|---|---|---|
| GRATING SYSTEM | | | ***FIXED GRATE*** | |
| STEAM QUALITY | | | saturated | saturated |
| Steam Evaporation | | kg/hr | 2000 | 5000 |
| Working Pressure | | kg/cm2 | 13 | 13 |
| Feed Water Temp. | | deg.C | 25 | 25 |
| Furnace Volume | | m3 | 6.84 | 13.68 |
| Furnace Heat Release | | kcal/m3/hr | 225,000 | 225,000 |
| Grate Area | | m2 | 1.63 | 3.27 |
| Heating Surface | Radiation | m2 | 20 | 28 |
| | Convection | m2 | 60 | 150 |
| | Economizer | m2 | 20 | 40 |
| | Total H. Sur. | m2 | 100 | 188 |
| Exhaust Gas Temp. | | deg.C | 180 | 180 |
| Steam Shell | Diameter | mm | 1500 | 1832 |
| | Thickness | mm | 12 | 16 |
| | Lenght | mm | 3200 | 4436 |
| Header: | Diameter | mm | 159 | 159 |
| | Thickness | mm | 6 | 6 |
| Type of Fuel | | | wood | wood |
| Induced Draft Fan | Model | | GY3-1 | GY6-1 |
| | Capacity | m3/hr | 9112 | 16000 |
| | Static Pressure | mmWG | 196 | 313-338 |
| | Electric Motor | Kw | 11 | 30 |
| Forced Draft Fan | Model | | | 4-72-11-4.5A |
| | Capacity | m3/hr | 4200 | 8000 |
| | Static Pressure | mmWG | 165 | 258 |
| | Electric Motor | Kw | 5.5 | 7.5 kw |
| Feed Water Pump | Brand | | 1 1/2GC 5x6 | 1 1/2GC-5x7 |
| | Capacity | m3/hr | 4 | 6 |
| | Head | m | 138 | 161 |
| | Electric Motor | Kw | 7.5 | 7.5 |
| Main Steam Outlet | | | DN100 | DN150 |

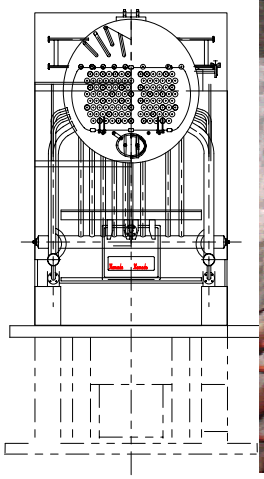


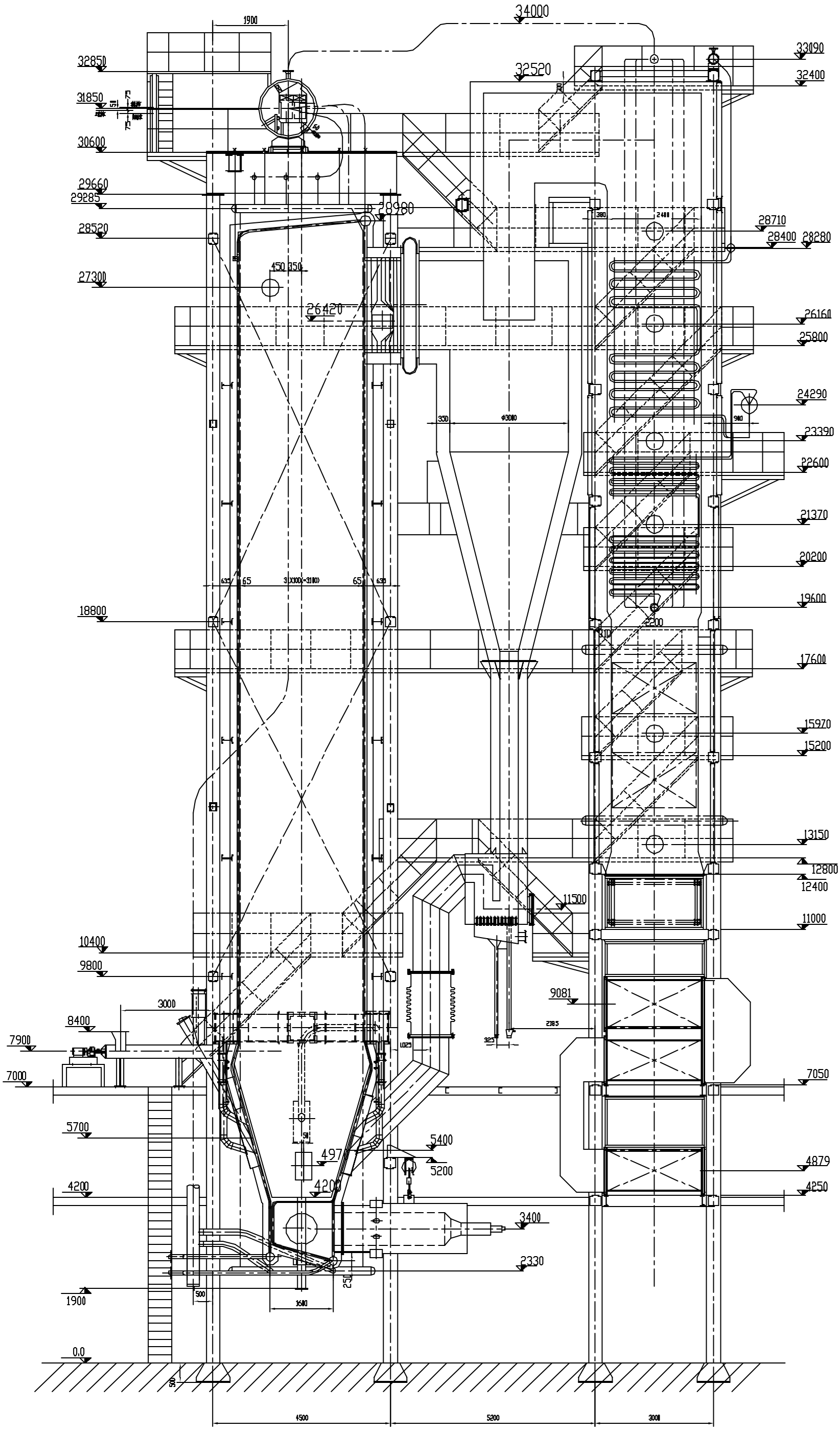
***Fixed Grate*
***Multi-air nozzle*
***Steam Injection*
***Complete combustion*
***Pollution Free system*
***Environmental friendly operation*

***Specially designed for sawdust suspension firing***

Below the smoke tube shell, large combustion furnace is placed to allow free movement of combustion gas for complete combustion. Radiation heat is absorbed by the waterwall on the both side. Multi-air nozzles are installed al around the furnace to create turbulance for mixing enough O2.



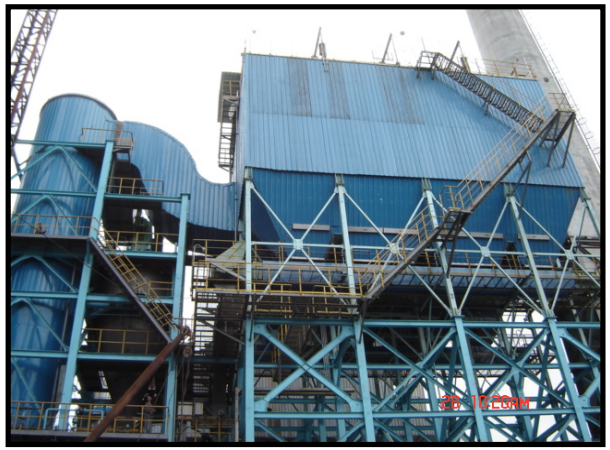



34000
1900
32850
32520
33090
32400
31850
30600
29660
29285
28980
28710
28400
28280
28520
27300
26420
26160
25800
24290
23390
22600
21370
20200
19600
18800
17600
15970
15200
13150
12800
12400
11500
11000
10400
9800
9081
8400
7900
7000
7050
5700
5400
5200
4879
4250
4200
3400
2330
1900
0.0
4500
5200
3000

# Indonesia TORAY power plant

## by Hamada Boiler  35T/H x 2 and 75 T/H CFBC x 2 (30 MW)

## TOTAL ENGINEERING OF ENVIRONMENTAL PROTECTION (PARTICLE, SOX, NOX, DIOXIN, HCL)

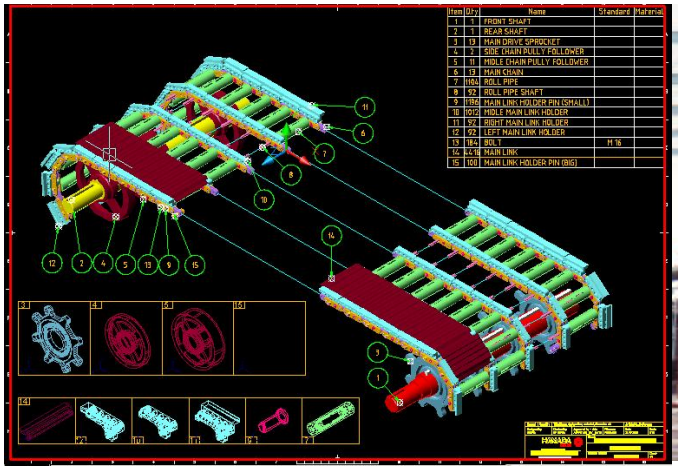
# Heavy duty chain grate Boiler

SHL35 power boiler at PT ITS(Toray) of Indonesia


Fully automatic PLC control with scada

3 x SHL20-25 sidee by side at PT Kertas Basuki Rahmat

Model D-10 10ton chain grate (Indonesia)



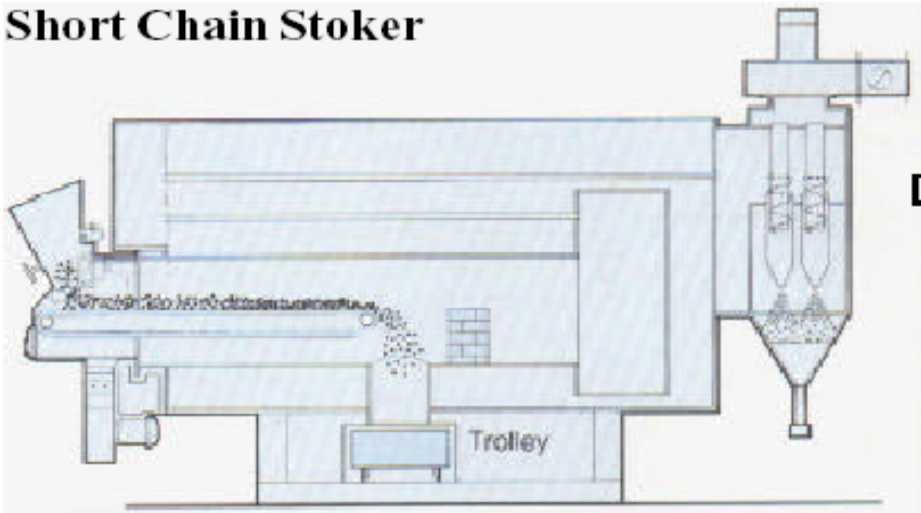
# COALMAC BOILER


Mr. K. Hamada, a chairman of Hamada Boiler started to manufacturer the internal chain stoker boiler in China in 1999. This is the first unit exported to indonesia.

This unit has 7 meter long chain grate for 10 ton boiler which is almost double the length of competing brand from UK and South Africa at that time.

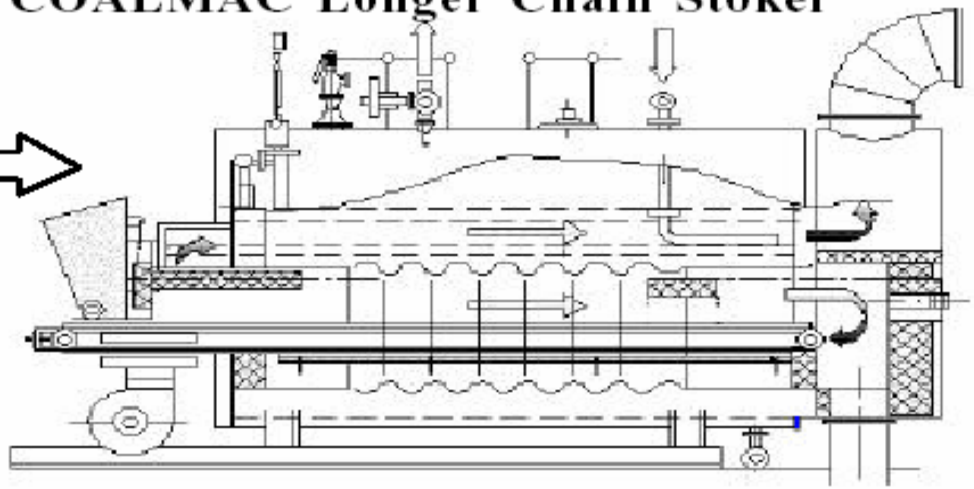
# COALMAC BOILER

**Short Chain Stoker**




Originally the Chain stoker was too short for the bituminus coal of China

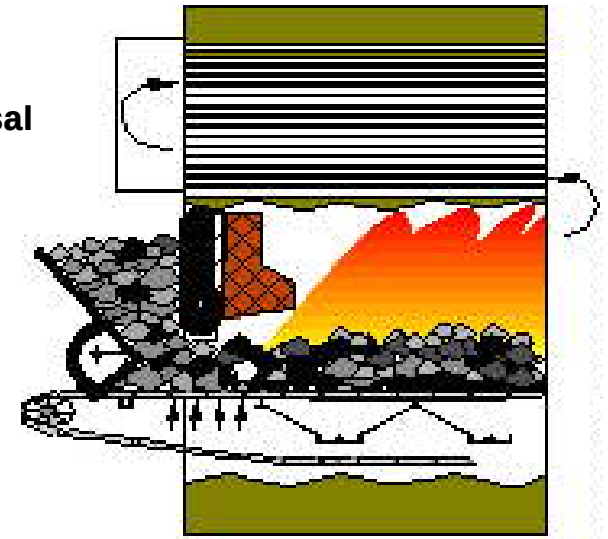
**COALMAC Longer Chain Stoker**



After improvement was made to extend the length of Chain Stoker to the end of the boiler shell

**This picture was taken at one of the European boiler operating in Malaysia. Due to the short chain grate, there are a lot of unburn coal mixed in the ash disposal at the center of the boiler belly.**

**When high pressure is required for the short chain grate, another big problem is observed. That is tremendous increase of unburnt coal. One tire factory who used this short chain gratre boiler was forced to fire his oil boiler just to back up to maintain the pressure. Short chain grate is not fitted to the Indonesian semi bituminus coal and fine coals. Left foto shows surprising unburnt coal.**



# COALMAC BOILER

# COALMAC BOILER

Left picture shows foundation work done by the customer while waiting for the imported boiler to arrive.

Picture below is power box and instrument box of COALMAC Boiler using Honeywell UDC Microprocessor. It is fullky automatic.

Hamada Boiler Hangzhou China Factory is in mass production of this COALMAC Boiler to enable the fast delivery when coal boiler demand is so high at this time of oil crisis

# EFB (empty bunch) firing



Price of rice husk (deliver within 20 KM)

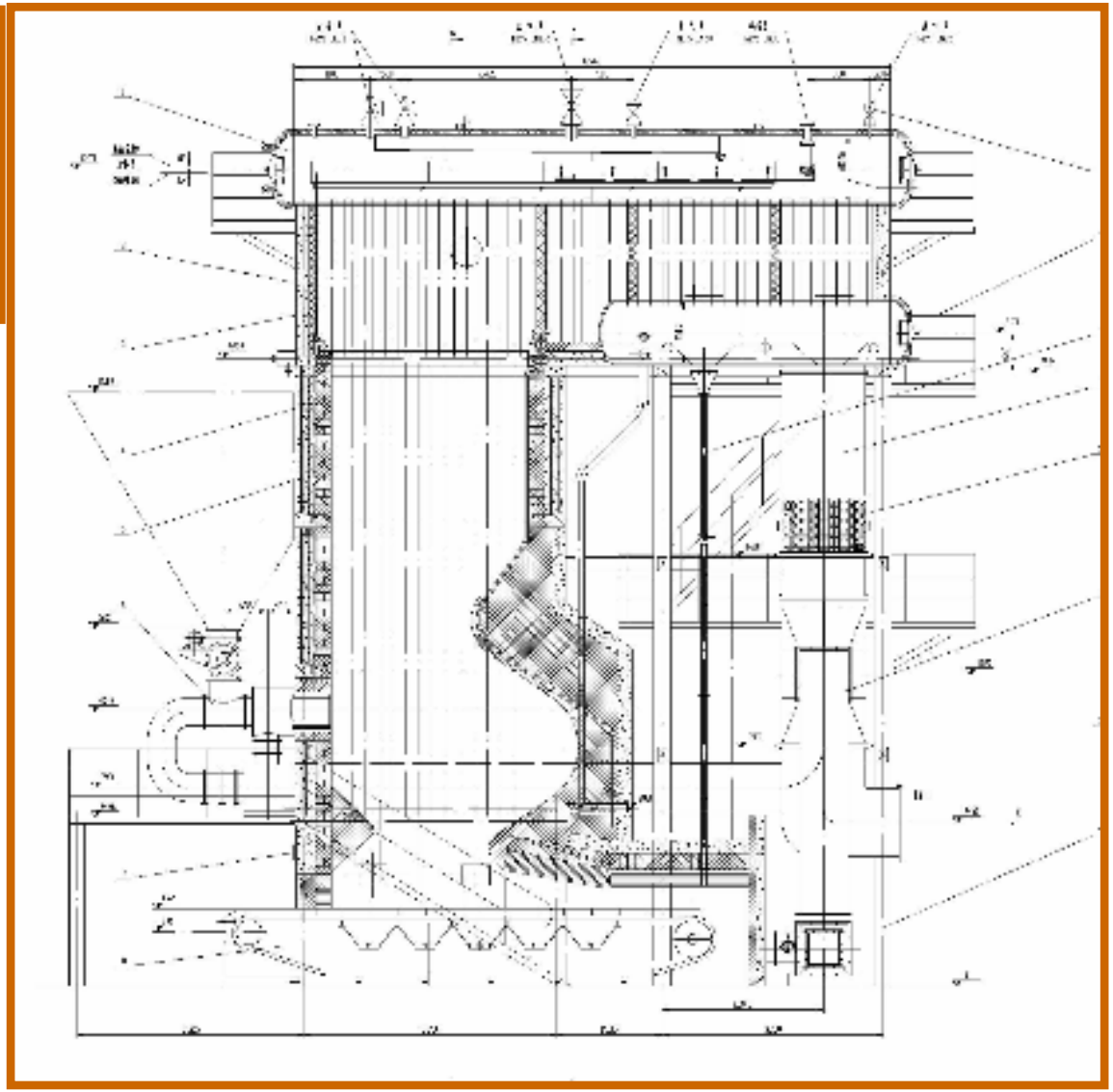
1) Philippine Php 1.20/Kg (US$0.0272/Kg)

2) Vietnam Dong 500/Kg (US$0.02777/Kg)

Rice husk delivery by river (Vietnam)


## RICE HUSK BURNER

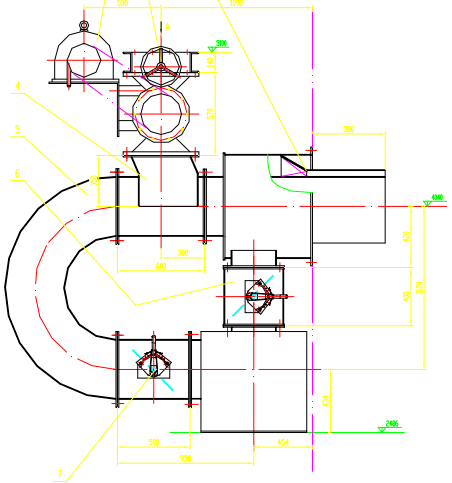
Rice husk delivery by river

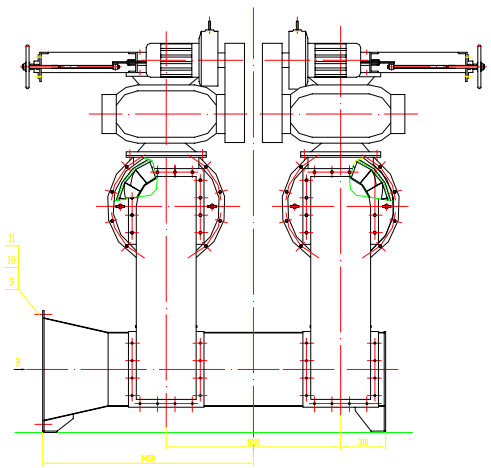


# Specially designed rice husk Burner

With superheated air

**This burner can be used for other biomass fuel such as EFB short fiber**





# Calofic-CAI LAN-CAN THO (Vietnam ) –Rice Husk Boiler
# Flue Gas Analysis

| No | Date | Rice Husk Consumption (Kg) | Steam Flow (Ton) | Rice Husk Consumption per-Ton Steam (Kg/Ton-Steam) |
|---|---|---|---|---|
| 1 | 2008-02-28 | 34922.0 | 137.8 | 253.4 |
| 2 | 2008-02-29 | 39441.0 | 153.0 | 257.8 |
| 3 | 2008-03-01 | 37795.0 | 152.0 | 248.7 |
| 4 | 2008-03-02 | 34659.0 | 156.8 | 221.0 |
| 5 | 2008-03-03 | 6259.0 | 79.1 | 79.1 |
| 6 | 2008-03-04 | 35837.0 | 154.9 | 231.4 |
| 7 | 2008-03-05 | 36600.0 | 149.2 | 245.3 |
| 8 | 2008-03-06 | 36614.0 | 178.0 | 205.7 |
| 9 | 2008-03-07 | 37571.0 | 163.4 | 229.9 |
| 10 | 2008-03-08 | 38982.0 | 165.3 | 235.8 |
| 11 | 2008-03-09 | 38940.0 | 162.0 | 240.4 |
| 12 | 2008-03-10 | 38803.0 | 158.7 | 244.6 |
| 13 | 2008-03-11 | 39006.0 | 165.3 | 236.0 |
| 14 | 2008-03-12 | 38752.0 | 173.9 | 222.9 |
| 15 | 2008-03-13 | 38877 | 171.95 | 226.1 |
| 16 | 2008-03-14 | 39204 | 170 | 230.6 |

**This is the rice husk consumption record and exhaust flue gas emission test**

**Rice husk consumption average : 240 Kg / ton steam**

**Particle, Sox and NOx are all within the Vietnam government set regulation as shown in the test report.**

## Flue Gas-Hamada Boiler Guarantee AND VIETNAM GOVERNMENT RULE

| NO. | ITEM | VALUE |
|---|---|---|
| 1 | Particle | **350** $mg/m^3$ |
| 2 | $NO_2$ | **400** mg/m3 |
| 3 | $SO_2$ | **500** mg/m3 |

## Flue Gas-Hamada Boiler Guarantee ACTUAL TEST RECORD

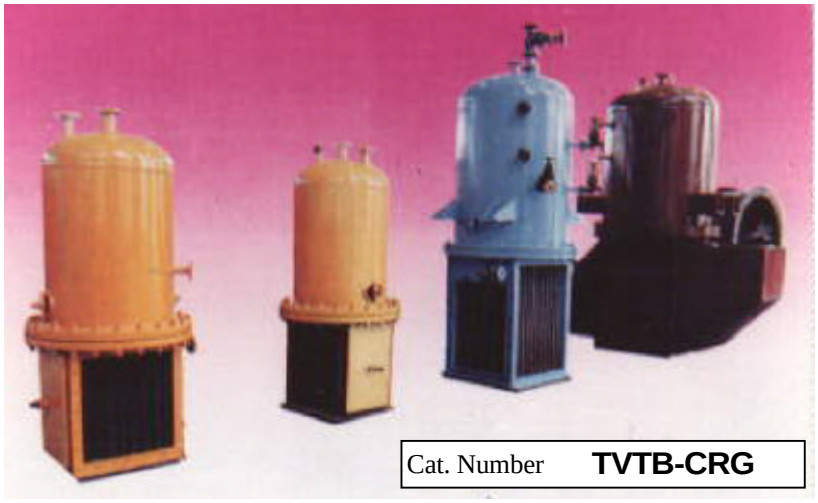
| NO. | ITEM | VALUE |
|---|---|---|
| 1 | Particle | **92.89** $mg/m^3$ |
| 2 | $NO_2$ | **24.664** mg/m3 |
| 3 | $SO_2$ | **34.744** mg/m3 |

## Heat Pipe Waste Heat Recovery Boiler

# *For waste gas of Diesel Generator*

Hamada BOILER

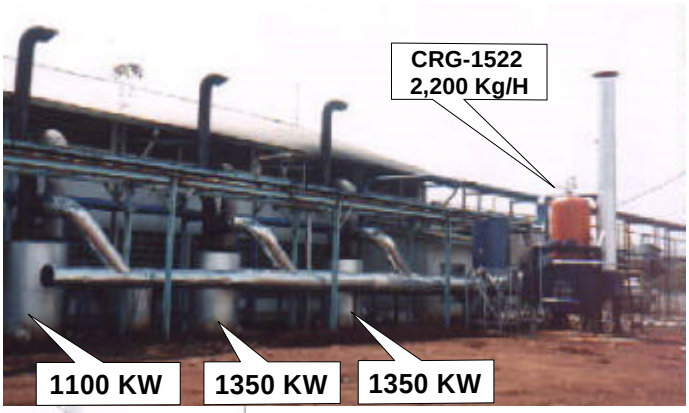
| MODEL | Weight Ton | | Exhaust Gas Temp. ( $^0$C ) | Dimension L x H x W ( mtr. ) | Heating Surface ( M2 ) | No. of Thermal Tubes | Steam (Kg/cm2) | AIR Resistance ( mmH2O ) | GENSET Diesel Generation Capacity KW | TVTB-BOILER EVAPORATION Kg/Hour |
|---|---|---|---|---|---|---|---|---|---|---|
| | Net | Ton | | | | | | | | |
| CRG - 152 | 0.6 | 0.9 | 320-380 | 1.47 x 2.1 x 1.08 | 18.6 | 56 | 6 | 20 | 330 | 150-220 |
| CRG - 203 | 1.0 | 1.4 | 320-380 | 1.8 x 2.55 x 1.29 | 36 | 77 | 6 | 20 | 450 | 250- 300 |
| CRG - 345 | 1.7 | 2.2 | 320-380 | 1.97 x 2.63 x 1.31 | 52.8 | 115 | 6 | 30 | 675 | 400- 450 |
| CRG - 406 | 2.0 | 2.4 | 320-380 | 2.2 x 2.83 x 1.31 | 66 | 115 | 6 | 30 | 900 | 520- 600 |
| CRG - 575 | 2.2 | 2.8 | 320-380 | 2.3 x 3.2 x 1.52 | 128 | 115 | 6 | 40 | 1125 | 680- 750 |
| CRG - 609 | 2.6 | 3.4 | 320-380 | 2.53 x 3.0 x 1.52 | 165 | 115 | 6 | 40 | 1350 | 800- 900 |
| CRG - 710 | 2.8 | 3.4 | 320-380 | 2.5 x 3.0 x 1.4 | 170 | 138 | 6 | 50 | 1500 | 900-1050 |
| CRG - 812 | 3.2 | 4.0 | 320-380 | 3.02 x 4.05 x 1.6 | 180 | 138 | 6 | 50 | 1800 | 1100-1200 |
| CRG - 1015 | 4.5 | 5.3 | 320-380 | 3.2 x 4.25 x 1.8 | 200 | 138 | 6 | 50 | 2250 | 1400-1500 |
| CRG - 1522 | 6.2 | 7.4 | 320-380 | 3.6 x 4.5 x 1.9 | 220 | 160 | 6 | 60 | 3300 | 2100- 2200 |
| CRG - 2030 | 7.75 | 9.35 | 320-380 | 3.9 x 4.7 x 2.0 | 240 | 160 | 6 | 60 | 4500 | 2900- 3000 |
| CRG - 2537 | 9.25 | 11.3 | 320-380 | 4.2 x 4.8 x 2.2 | 260 | 160 | 6 | 60 | 5600 | 3600- 3750 |

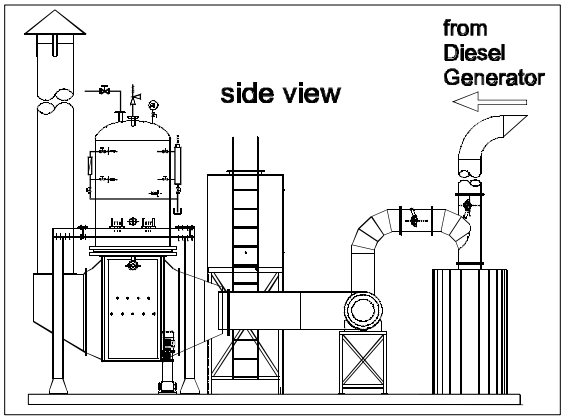


Cat. Number **TVTB-CRG**

For inquiry, please state the following information.

| Selected CRG | ***CRG-*** |
|---|---|
| Genset year | |
| Genset capacity（KW) | **KW** |
| Exhaust gas temp. | **oC** |
| Exhaust gas volume | **m3/h** |
| Steam press. required | **kg/cm2** |
| Purpose of steam | |



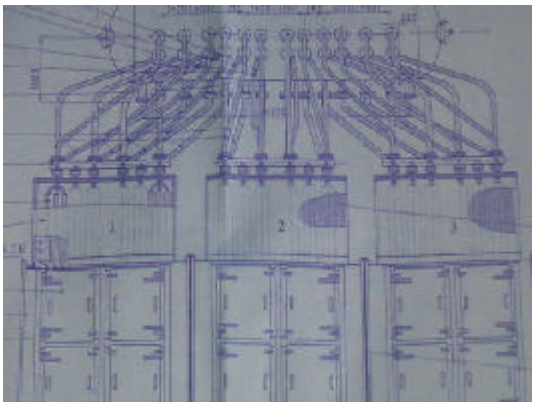

HAMADA BOILER model CRG1522 is installed for 3 units of Yanmar Diesel Generator of 1350 KW, 1350 KW, and 1100 KW (total of 3800 KW). With the waste gas temperature of 320 oC at the entrance of the Boiler, TVTB boiler can generating 2,200 Kg/H of steam at the pressure of 6 Kg/cm2 constantly.

**PT. INDONESIA ASAHI CHEMICAL INDUSTRY (INDACI)**
**Ubrug, Jatiluhur, Purwakarta, Jawa Barat**

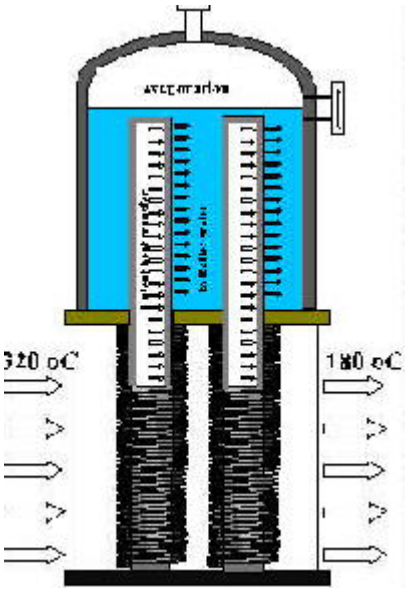

**PT. HAMADA DAYATEKNINDO**
**Sabgrila Indah II JL. Saki II No. 15, Ciledug Raya Kebayoran Lama, Jakarta Selatan 12270, Indonesia**
**TEL. (021)735-3167 7388-3546 FAX.(021) 7388-3402**

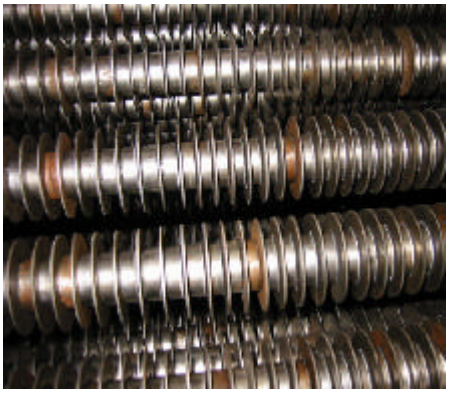
# (Heat Pipe Boiler)

Heat Pipe Boiler in opearation



Tube arrangement drawing



CRG-1500 operating at PT. SUMIRUBBER (DUNLOP), Cikampek

# THERMAL VACUUM TUBE BOILER *(Heat Pipe)*

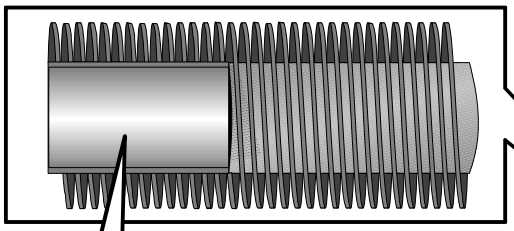
## WASTE HEAT RECOVERY BOILER

Hamada ILE

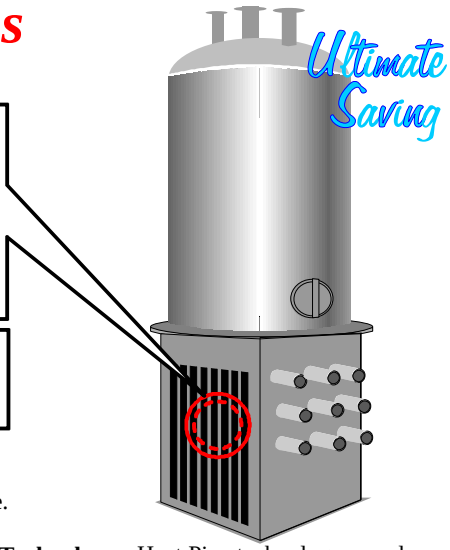
## *Generate steam out of waste flue gas*

### *from Steam Boiler and/or Diesel Generator*

Liquid evaporates much lower temperature under vacuum condition than under atmosph-eric pressure. This is the basic principle of vacuum tube heat exchanger used forlow tempera-ture waste gas of about 300 oC to extract highest possible energy out of exhaust gas of Steam Boiler and/or Diesel Generator.

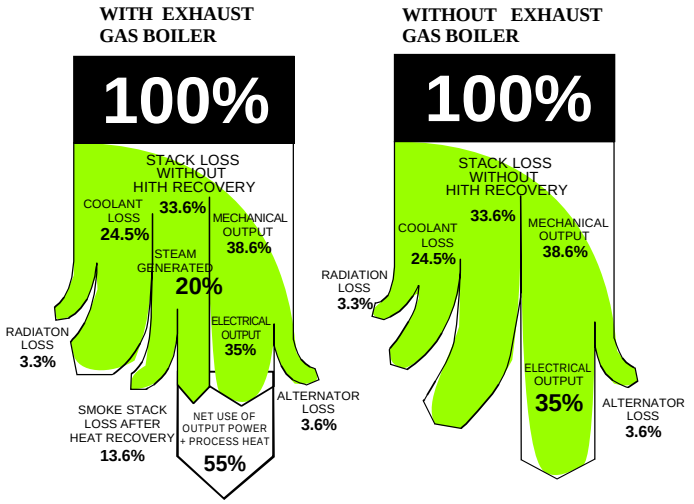


FINNED VACUUM TUBE (Heat Pipe)
Gas will get in touch with the completely sealed straight tubes (finned) with total vacuum inside and filled with special chemical.



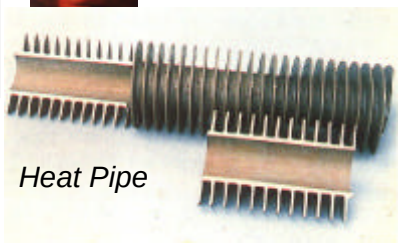

***Principle of Heat Pipe Heat Transfer:***
*Low evaporation temperature inside Vacuum tube
*Heat transfer by "***Latent Heat***" of the liquid inside the vacuum tube.

Loss from the exhaust manifold of diesel engine is 33.6% of the total heat input. Setting aside the chimney loss of 13.6%, 20% can be recovered by heat pipe waste receovery boiler.




**Heat Pipe Technology:** Heat Pipe technology was dev-eloped by NASA of USA for space industry. It's exce-llent heat transfer efficiency has been utilized in many parts of space shattle body. When used for heat recovery from relatively low temperature waste gas of 200-400 oC, heat pipe gives unbeatable excellency over any other conventional method. 1/3rd of Vacuum heat pipe is filled with water and lower portion is exposed to the waste gas.

Water inside the tube start evaporating at as low as 60 oC and it transfer the heat by latent heat of the evaporation to the higher portion of tube emerged into the boiler water. It main-tains always slightly higher pressure than the pressure of the boiler, thus transfer of latent heat will be constant. Application of Heat Pipe is very wide. It can also be used to recover the waste heat of the room airconditioning unit when heat pipe unit is connected to the frion gas circulation kit to heat up the water for home use.

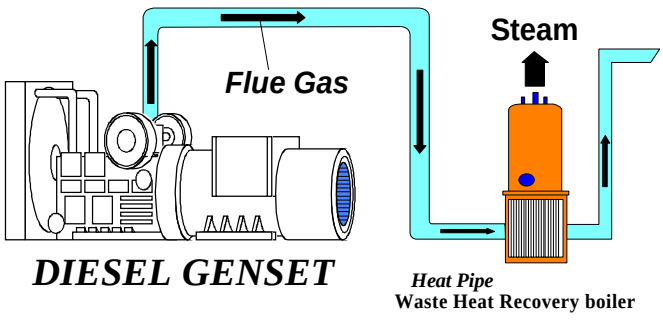



***Gas Temp.***

| | |
|---|---|
| *Low* | *20 - 100 oC* |
| *Med-Low* | *100 - 250 oC* |
| *Med- High* | *250 - 400 oC* |
| *High* | *500 -1000 oC* |

We also supply Vacuum Tube only. Please specify the purpose and size /material of tube.

## GENERATOR SET + THERMAL VACUUM TUBE BOILER




| | |
|---|---|
| Material of pipe | Carbon steel, Stainless steel |
| OD of base pipe (mm) | OD ⌀ 25 - 219 mm |
| Length of Fin pipe(m) | 0.5 - 1.4 Meter |
| Materia of Fin | Carbon steel, Stainless steel |
| Height of Fin(mm) | 13, 15, 18, 20, 25, 30 mm |
| Thickness of Fin(mm) | 1, 1.3, 1.6, 2, 3 mm |
| Density of Fin(mm) | 5 - 20 mm |

# LIST OF USERS HAMADA BIOMASS FIRED BOILER - 1 (INDONESIA)

| NO | COMPANIES NAME | PRODUCT | MODEL | FUEL | CAPACITY | UNIT | year |
|---|---|---|---|---|---|---|---|
| 81 | **PT. ALBA PARAHYANGAN**<br>Bandung | Kiln Dry | **Fixed Grate**<br>RC 3000 | Wood | 3 Ton/hr.<br>10 Kg/cm2 | 1 | 1989 |
| 82 | **PT. ARGO DAYA SEJATI**<br>Palembang | Kiln Dry | **Fixed Grate**<br>RC 5000 | Wood | 5 Ton/hr.<br>10 Kg/cm2 | 1 | 1990 |
| 83 | **PT. BIO NUSANTARA TEKNOLOGI**<br>Bengkulu | Palm Oil Mill | **Dumping Grate**<br>SHL 20 DG | Palm<br>Waste | 20 Ton/hr.<br>25 Kg/cm2 | 1 | 1990 |
| 84 | **BPPT, BANDUNG RESEARCH INSTITUTE OF ENERGY** | Ministry of Energy | **Cyclonic Furnace**<br>LSG-1500 | Biomass | 1.5 Ton/hr.<br>10 Kg/cm2 | 1 | 1992 |
| 85 | **PT. EXCELSIOR FURNITURE**<br>Jakarta | Kiln Dry | **Fixed Grate**<br>LSG 1500 | Wood | 1.5 Ton/hr.<br>10 Kg/cm2 | 1 | 1991 |
| 86 | **PT. FAJAR SUBUR**<br>Bandung | Chopstick | **Fixed Grate**<br>RC 2500 | Wood | 2.5 Ton/hr.<br>10 Kg/cm2 | 1 | 1991 |
| 87 | **PT. HUTAN KINTAP**<br>Banjarmasin | Kiln Dry | **Fixed Grate**<br>LSG 1500 | Wood | 1.5 Ton/hr.<br>10 Kg/cm2 | 1 | 1992 |
| 88 | **PT. IDEC ABADI**<br>Tarakan | Plywood | **Fixed Grate**<br>D 10:16 | Wood | 10 Ton/hr.<br>16 Kg/cm2 | 1 | 1992 |
| 89 | **PT. INDACI**<br>Purwakarta | Textile | Waste Heat Recovery<br>Heat Pipe Boiler | | 1.5 Ton<br>10 Kg/cm2 | 2 | 1993 |
| 90 | **PT. INDOCOCO LTD.**<br>Jakarta | Kiln Dry | **Fixed Grate**<br>HRV 1500 | Wood | 1.5 Ton/hr.<br>10 Kg/cm2 | 1 | 1992 |
| 91 | **PT. INDOWANA CITRA PERSADA**<br>Tangerang | Kiln Dry | **Fixed Grate**<br>HRV 1500 | Wood | 1.5 Ton/hr.<br>10 Kg/cm2 | 1 | 1994 |
| 92 | **PT. INDOTROPIC PERDANA**<br>Serang | Woos | **Fixed Grate**<br>LGW 1500 | Wood | 1,5 Ton/ht<br>10 Kg/cm2 | 1 | 1994 |
| 93 | **PT. SUMIRUBBER (DUNLOP) INDONESIA**<br>Cikampek | | **Heat Pipe**<br>CRG2000 | waste gas<br>Heat recovery | 2 Ton/hr. | 1 | 1995 |
| 94 | **PT. KAYAN PATRIA PRATAMA**<br>Surabaya | Kiln Dry | **Fixed Grate**<br>RC 4000 | Wood | 4 Ton/hr.<br>10 Kg/cm2 | 1 | 1995 |
| 95 | **PT. KAYU LAPIS ASLI MURNI**<br>Banjarmasin | Kiln Dry | **Fixed Grate**<br>D 6:16 | Sawdust | 6 Ton/hr.<br>10 Kg/cm2 | 1 | 1995 |
| 96 | **PT. KAYU LAPIS INDONESIA**<br>Semarang | Plywood | **Fixed Grate**<br>D 10:17 | Wood | 10 Ton/hr.<br>16 Kg/cm2 | 1 | 1994 |
| 97 | **PT. KUTAI TIMBER**<br>Probolinggo | Wood | **Fixed Grate**<br>D 10:17 | Wood | 150000 kcal<br>Thermal Oil | 1 | 1995 |
| 98 | **PT. LANCAR BUANA**<br>Jakarta | Kiln Dry | **Fixed Grate**<br>LSG 1500 | Wood | 1.5 Ton/hr.<br>10 Kg/cm2 | 1 | 1996 |
| 99 | **PT. LONTAR PAPYRUS IND.**<br>Medan | Papermill | **Inclined Grate**<br>LGW 6000 | Wood | 6 Ton/hr.<br>10 Kg/cm2 | 1 | 1993 |
| 100 | **PT. MAJU KARYA KITA**<br>Pontianak | Kiln Dry | **Inclined Grate**<br>RC 2000 | Wood | 2 Ton/hr.<br>10 Kg/cm2 | 1 | 1994 |
| 101 | **PT. MERATUS KAL. TIMBER**<br>Samarinda | Wood Ind. | **Fixed Grate**<br>RC 5000 | Wood Chip | Kiln Dry<br>10 Kg/cm2 | 1 | 1995 |
| 102 | **PT. METROPOLITAN TEXTILE**<br>Tangerang | Textile | **Inclined Grate**<br>WF 8000 | Wood | 8 Ton/hr.<br>10 Kg/cm2 | 1 | 1995 |
| 103 | **PT. MINTAWI**<br>Pontianak | Oil Mill | **Fixed Grate**<br>RC5000 | Wood | 5 Ton/hr.<br>10 Kg/cm2 | 1 | 1995 |
| 104 | **PT. MIRA RANTIH**<br>Lampung | D. Coconut | **Fixed Grate**<br>LSG 1500 | Cocoshell | 1.5 Ton/hr.<br>10 Kg/cm2 | 1 | 1996 |
| 105 | **PT. MULIA JAYA**<br>Pontianak | Oil Refinery | **Fixed Grate**<br>LGW 5000 | Wood | 5 Ton/hr.<br>10 Kg/cm2 | 1 | 1996 |
| 106 | **PT. MULTI CONSERVINDO**<br>Surabaya | Kiln Dry | **Fixed Grate**<br>LSG 1501 | Wood | 1.5 Ton/hr.<br>10 Kg/cm2 | 1 | 1995 |
| 107 | **PT. MUTIARA TIMBUL SAKTI**<br>Pontianak | Kiln Dry | **Fixed Grate**<br>LSG 1501 | Wood | 1.5 Ton/hr.<br>10 Kg/cm2 | 1 | 1996 |
| 108 | **PT. INDOSEPAMAS ADIDAS**<br>Cibinong | Shoe Manuf. | **Fixed Grate**<br>RC 4000 | Rubber | 4 Ton/hr.<br>10 Kg/cm2 | 1 | 1997 |
| 109 | **PT. PADANG SARI KELAPAINDO**<br>Padang | D.Coconut | **Fixed Grate**<br>D 6:16 | Wood | 6 Ton/hr.<br>10 Kg/cm2 | 1 | 1997 |
| 110 | **PT. PAMOLITE ADHESIVE**<br>Surabaya | Chemical | **Fixed Grate**<br>KSZS 10:13 | Oil/Gas<br>waste gas | 10 Ton/hr.<br>10 Kg/cm2 | 1 | 1996 |
| 111 | **PT. PAPAPINDO**<br>Palembang | Pencil Slats | **Fixed Grate**<br>RC 5000 | Woodchip | 5 Ton/hr.<br>10 Kg/cm2 | 1 | 1995 |
| 112 | **PT. PERSERO INHUTANI**<br>Banjarmasin | Kiln Dry | LSG 1500 | Wood | 1.5 Ton/hr.<br>10 Kg/cm2 | 1 | 1995 |

# LIST OF USERS HAMADA BIOMASS FIRED BOILER - 2 (INDONESIA)

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 113 | **PT. POLWOOD FOREST IND.**<br>U. Pandang | Kiln Dry | **Fixed Grate**<br>RC5000 | Wood | 5 Ton/hr.<br>10 Kg/cm2 | 1 | 1996 |
| 114 | **PT. PONTI ABADI**<br>Pontianak | Kiln Dry | **Fixed Grate**<br>LSG1500 | Wood | 1.5 Ton/hr.<br>10 Kg/cm2 | 1 | 1996 |
| 115 | **PT. PULAU SAMBU**<br>Riau | Oil Mill | **Fixed Grate**<br>RC5000 | Wood | 5 Ton/hr.<br>10 Kg/cm2 | 2 | 1994 |
| 116 | **PT. RIMBA RAMIN**<br>Pontianak | Plywood | **Fixed Grate**<br>LGW8000 | Wood | 8 Ton/hr.<br>10 Kg/cm2 | 2 | 1993 |
| 117 | **PT. GUNUNG JAYA AGUNG**<br>Tangerang | Papermill | **Fixed Grate**<br>D-10-16 | Coal | 10 ton/H<br>16 Kg/cm2 | 2 | 1994 |
| 118 | **PT. SARI HIJAU MUTIARA**<br>Tagerang | Kiln Dry | **Fixed Grate**<br>HRV1500 | Wood | 1.5 Ton/hr.<br>10 Kg/cm2 | 1 | 1996 |
| 119 | **PT. SATRIA BANGUN SEJATI**<br>Banjarmasin | Kiln Dry | **Fixed Grate**<br>HRV1500 | Wood | 1.5 Ton/hr.<br>10 Kg/cm2 | 1 | 1995 |
| 120 | **PT. SERBAGUNA PRIMA**<br>Surabaya | Wood Ind. | **Fixed Grate**<br>RC4000 | Wood | 4 Ton/hr.<br>10 Kg/cm2 | 2 | 1994 |
| 121 | **PT. SERBAGUNA PRIMA**<br>Semarang | Plastic | **Fixed Grate**<br>LGW2000 | Plastic waste | 200 kg<br>waste | 1 | 1994 |
| 122 | **PT. SINAR ALAM PERMAI**<br>Palembang | Oil Mill | **Fixed Grate**<br>D-6-16 | Wood | 6 Ton/hr.<br>10 Kg/cm2 | 1 | 1993 |
| 123 | **PT. SONG JAYA**<br>Jakarta | Kiln Dry | **Fixed Grate**<br>RC5000 | Wood | 5 Ton/hr.<br>10 Kg/cm2 | 1 | 1993 |
| 124 | **PT. SUKOWATI**<br>JawaTengah | Textile, Fin. | **Fixed Grate**<br>RC2500 | Wood | 2.5 Ton/hr.<br>10 Kg/cm2 | 1 | 1994 |
| 125 | **PT. SULAWESI RAHAJA**<br>Tangerang | Rattan | **Fixed Grate**<br>HRV2500 | Wood | 1 Ton/hr.<br>10 Kg/cm2 | 1 | 1999 |
| 126 | **PT. SUMBER KAYU PERSADA**<br>Jakarta | Kiln Dry | **Fixed Grate**<br>RC2500 | Wood | 5 Ton/hr.<br>10 Kg/cm2 | 1 | 1995 |
| 127 | **PT. SUPARMA PAPER**<br>Surabaya | Papermill | **Fixed Grate**<br>D-10-16 | Wood | 10 Ton/hr.<br>16 Kg/cm2 | 1 | 1997 |
| 128 | **PT. SURA INDAH WOOD IND.**<br>Surabaya | Kiln Dry | **Fixed Grate**<br>D-10-16 | Wood | 10 Ton/hr.<br>16 Kg/cm2 | 1 | 1996 |
| 129 | **PT. SUWARAN JAYA**<br>Tarakan | Kiln Dry | **Fixed Grate**<br>LGW6000 | Wood | 6 Ton/hr.<br>16 Kg/cm2 | 1 | 1996 |
| 130 | **PT. TELAGA ALAM JAYA**<br>Jakarta | Kiln Dry | **Fixed Grate**<br>LSG1500 | Wood | 1.5 Ton/hr.<br>10 Kg/cm2 | 1 | 1996 |
| 131 | **PT. TIMBUL PERKASA**<br>Surabaya | Kiln Dry | **Fixed Grate**<br>HRV1500 | Wood | 1.5 Ton/hr.<br>10 Kg/cm2 | 1 | 1997 |
| 132 | **PT. TIMUR SELATAN**<br>Surabaya | Kiln Dry | **Fixed Grate**<br>RC4000 | Wood | 4 Ton/hr.<br>10 Kg/cm2 | 1 | 1998 |
| 133 | **PT. TJIWI KIMIA**<br>Surabaya | Papermill | **Fixed Grate**<br>RC6000 | Wood | 6 Ton/hr.<br>10 Kg/cm2 | 1 | 1999 |
| 134 | **PT. WENANG SAKTI (YAMAHA)**<br>Surabaya | Kiln Dry | **Fixed Grate**<br>LSG1500 | Wood | 1.5 Ton/hr.<br>10 Kg/cm2 | 1 | 1998 |
| 135 | **PT. WIDJAYA TRI UTAMA**<br>U. Pandang | Plywood | **Fixed Grate**<br>D-10-16 | Wood | 10 Ton/hr.<br>16 Kg/cm2 | 1 | 1997 |
| 136 | **CV. WILLIS**<br>Pontianak | Oil Mill | **Fixed Grate**<br>D-6-16 | Wood | 6 Ton/hr.<br>16 Kg/cm2 | 1 | 1998 |
| 137 | **PT. SASA INTI**<br>Probolinggo | MSE | **Multi Nozzle**<br>LSG500 | Carbon Waste | 500 Kg/h | 1 | 1999 |
| 138 | **PT. MARUFUJI KENZAI INDONESIA**<br>Mojokerto | Wood Ind. | **Multi Nozzle**<br>LSG500 | Sawdust Wood | 500 Kg/h | 1 | 2001 |
| 139 | **PT. INDONESIA MATSUYA**<br>Pasuruan | Wood Ind. | **Multi Nozzle**<br>LSG500 | Sawdust Wood | 500 Kg/h | 1 | 2000 |
| 140 | **PT. DAIKEN INDONESIA**<br>Pasuruan | Wood Ind. | **Multi Nozzle**<br>LSG500 | Sawdust Wood | 500 Kg/h | 1 | 1998 |
| 141 | **PT. TOYOTAKA INDONESIA**<br>Tangerang | Wood Ind. | **Multi Nozzle**<br>LSG500 | Sawdust Wood | 500 Kg/h | 1 | 1999 |
| 142 | **PT. MIRA RANTIH**<br>Lampung | COCOA | **FIXED GRATE**<br>LSG2000 | Cocoa wasgte | 2 Ton/Hr<br>10 Kg/cm2 | 1 | 2000 |
| 143 | **PT. MASARI DWISEPAKAT FIBER**<br>Cikampek | Wood Ind. | **Reciprocating**<br>DFR25 | wood | 25 Ton/Hr<br>25 Kg/cm2 | 1 | 2002 |

| | |
|---|---|
| Total Biomass Boiler | 68 |
| Total Coal Fired Boiler | 110 |
| Grand Total (units) | 178 |

# LIST OF HAMADA COAL FIRED BOILER USERS - 1 (INDONESIA)

| NO | COMPANY NAME | PRODUCT | SYSTEM | BOILER CAPACITY | | Year |
|---|---|---|---|---|---|---|
| 1 | **PT. AGUNG TEXTILE**<br>Solo | TEXTILE | ***Fluidized Bed System***<br>Model DF-12-16 | 12 Ton/Hr<br>16 Kg/cm2 | 1 unit | 1990 |
| 2 | **PT. CIPTA PAPERIA**<br>Ciujung, Jawa Barat | PAPER | ***Fluidized Bed System***<br>Model DF-16-16 | 16 Ton/Hr<br>16 Kg/cm2 | 1 unit | 2002 |
| 3 | **BADAN PENGKAJIAN & PENERAPAN TEKNOLOGY (BPPT) Serpong** | Ministry of Energy | ***Fluidized Bed System***<br>Model LSG1500FBC | 1.5 Ton/Hr<br>16 Kg/cm2 | 1 unit | 1991 |
| 4 | **PT. INDONESIA TORAY SYNTHETICS**<br>Tangerang (I.T.S.) | Synthetic Fiber | CHAIN GRATE (EXT.)<br>Model SHL-35-25 | 35 Ton/h<br>25 Kg/cm2 | 2 units | 2003 |
| 5 | **PT. EASTERN STAR**<br>Tangerang | PAPER | CHAIN GRATE (EXT.)<br>Model D-10-16 | 6 Ton/Hr<br>16 Kg/cm2 | 1 unit | 1992 |
| 6 | **PT. GOLDEN SARI CHEMICAL**<br>Lampung | CHEMICAL | CHAIN GRATE (EXT.)<br>Model D-10-16 | 10 Ton/Hr<br>16 Kg/cm2 | 2 units | 1993 |
| 7 | **PT. PUTERA MULYA**<br>majalaya, Bandung | TEXTILE | ***Fluidized Bed System***<br>Model DF-12-16 | 12 Ton/Hr<br>16 Kg/cm2 | 1 units | 2002 |
| 8 | **PT. INDORAYA EVERLATEX**<br>Banjarmasin | GLOVE | ***Fluidized Bed System***<br>QXL 300 FBC | 3,000,000<br>KCal/Hr | 2 units | 1995 |
| 9 | **PT. JAYA KERTAS**<br>Surabaya | PAPER | CHAIN GRATE (EXT.)<br>Model D-10-16 | 10 Ton/Hr<br>16 Kg/cm2 | 4 units | 1993 |
| 10 | **PT. KERTAS BASUKI RACHMAT**<br>Banyuwangi | PAPER | CHAIN GRATE (EXT.)<br>Model D-20-25 | 20 Ton/Hr<br>25 Kg/cm2 | 3 units | 1994 |
| 11 | **PT. LOJIKANATAMA TEXTILE**<br>Pekalongan | TEXTILE | ***Fluidized Bed System***<br>Model DF-12-16 | 12 Ton/Hr<br>16 Kg/cm2 | 2 units | 1990 |
| 12 | **PT. MASAYU MITRA SANDANG**<br>Bandung | TEXTILE | ***Fluidized Bed System***<br>Model LSG2000FBC | 2 Ton/Hr<br>10 Kg/cm2 | 1 unit | 1990 |
| 13 | **PT. TIFICO (TEIJIN Indonesia Fiber Corp) Tangerang** | Synthetic Fiber | ***Fluidized Bed System***<br>Model DF-25-25 | 22 ton/hr<br>25 Kg/cm2 | 2 units | 2002 |
| 14 | **PT. PABRIK KERTAS TJIWI KIMIA**<br>Mojokerto | PAPER | FIXED GRATE<br>Model D-10-16 | 10 Tom/h<br>16 Kg/cm2 | 1 unit | 1993 |
| 15 | **PT. PADANG SARI KELAPA INDO**<br>Padang | FOOD coconut | CHAIN GRATE (EXT.)<br>Model D-10-16 | 6 Ton/Hr<br>16 Kg/cm2 | 1 unit | 1990 |
| 16 | **PT. POLA PULPINDO PAPERMILL**<br>Lampung | PAPER | CHAIN GRATE (EXT.)<br>Model D-10-16 | 10 Ton/Hr<br>16 Kg/cm2 | 2 units | 1994 |
| 17 | **PT. POLLUX INDONESIA TEXTILE IND.**<br>Bekasi | TEXTILE | CHAIN GRATE (EXT.)<br>Model D-10-16 | 10 Ton/Hr<br>16 Kg/cm2 | 1 unit | 1994 |
| 18 | **PT. PURA BARUTAMA**<br>Kudus | PAPER | CHAIN GRATE (EXT.)<br>Model D-10-16 | 10 Ton/Hr<br>16 Kg/cm2 | 2 units | 2000 |
| 19 | **PT. PURA NUSAPERSADA**<br>Pati, Kudus | PAPER | CHAIN GRATE (EXT.)<br>Model D-10-16 | 10 Ton/Hr<br>16 Kg/cm2 | 1 unit | 1995 |
| 20 | **PT. RODA VIVATEX**<br>Cibinong | TEXTILE | CHAIN GRATE (EXT.)<br>Model D-10-16 | 10 Ton/Hr<br>16 Kg/cm2 | 1 unit | 1995 |
| 21 | **PT. SENAYAN SANDANG MAKMUR TEXT**<br>Bandung | TEXTILE | CHAIN GRATE (EXT.)<br>Model D-10-16 | 10 Ton/Hr<br>16 Kg/cm2 | 1 unit | 1994 |
| 22 | **PT. SINAR PLATACO (Semarang)**<br>Semarang | CHEMICAL | ***Fluidized Bed System***<br>Model QXL480FBC | 480,000 Kcal<br>Hot water | 1 unit | 2003 |
| 23 | **PT. ALENATEX**<br>Bandung | TEXTILE | ***Fluidized Bed System***<br>Model DF-12-16 | 16 ton/hr<br>16 Kg/cm2 | 1 unit | 2002 |
| 24 | **PT. SUPARMA PAPERMILL**<br>Surabaya | PAPER | CHAIN GRATE EXT.<br>Model D-10-16 | 10 Ton/Hr<br>16 Kg/cm2 | 4 units | 1992 |
| 25 | **PT. INTAN PRIMA**<br>Lampung | CHEMICAL | ***Fluidized Bed System***<br>convertion FBC | 20 Ton/Hr<br>25 Kg/cm2 | 1 unit | 1996 |
| 26 | **PT. WING SURYA**<br>Surabaya | DETERGEN | CHAIN GRATE EXT.<br>Model D-10-16 | 10 Ton/Hr<br>16 Kg/cm2 | 1 unit | 1995 |
| 27 | **PT. PURA NUSAPERSADA**<br>Pati-Kudus | PAPER | ***Fluidized Bed System***<br>Model DF-12-16 | 12 Ton/Hr<br>16 Kg/cm2 | 1 unit | 2001 |
| 28 | **NEDO PROJECT OF JAPANESE GOVERNMENT - PT. Alas Wiratama** | Briket (government) | ***Fluidized Bed System***<br>Model QXL1000FBC | 1,000,000 KCal/Hr | 1 unit | 2000 |
| 29 | **PT. KESMATEX INDONESIA**<br>Pekalongan | TEXTILE | ***Fluidized Bed System***<br>Model DF-16-16 | 16 Ton/Hr<br>16 Kg/cm2 | 1 unit | 2003 |
| 30 | **PT. ASWINDO JAYA SENTOSA**<br>BANDUNG | TEXTILE | ***COALMAC internal chain***<br>Model CMC-10-13 | 12 Ton/Hr<br>16 Kg/cm2 | 1 unit | 2003 |
| 31 | **PT. DELIMATEX BANDUNG**<br>BANDUNG | TEXTILE | ***Fluidized Bed System***<br>Model DF-12-16 | 12 Ton/Hr<br>16 Kg/cm2 | 1 unit | 2003 |

# LIST OF HAMADA COAL FIRED BOILER USERS-2 (INDONESIA)

| NO | COMPANY NAME | PRODUCT | SYSTEM | BOILER CAPACITY | | Year |
|---|---|---|---|---|---|---|
| 32 | **PT. BETEEN TEXTILE NUSANTARA**<br>BANDUNG | TEXTILE | ***COALMAC internal chain***<br>Model CMC-10-13 | 10 Ton/Hr<br>13 Kg/cm2 | 1 unit | 2003 |
| 33 | **PT. INDO ACIDATAMA**<br>Solo-Sragen | CHEMICAL | ***COALMAC internal chain***<br>Model CMC-10-13 | 10 Ton/Hr<br>13 Kg/cm2 | 2 units | 2003 |
| 34 | **PT. AGUNG KUNCORO**<br>Solo-Sragen | TEXTILE | ***Fluidized Bed System***<br>Model DF-12-16 | 12 Ton/Hr<br>10 Kg/cm2 | 1 unit | 2003 |
| 35 | **PT. ENGGAL MUMBUL KERTAS**<br>Kudus-Pati, Jawa Tengah | PAPER | ***Fluidized Bed System***<br>Model DF-12-16 | 12 Ton/Hr<br>16 Kg/cm2 | 1 unit | 2003 |
| 36 | **PT. PURA BARUTAMA 3&4**<br>Kudus, Jawa Tengah | PAPER | ***COALMAC internal chain***<br>Model CMC-10-13 | 5 Ton/Hr<br>10 Kg/cm2 | 2 units | 2003 |
| 37 | **PT. KANEBO TEXTILE INDONESIA**<br>Cikampek | TEXTILE | ***Fluidized Bed System***<br>Model DF-16-16 | 16 Ton/Hr<br>16 Kg/cm2 | 2 units | 2003 |
| 38 | **PT. FRANS PUTRATEX**<br>Serang | TEXTILE | ***Fluidized Bed System***<br>Model DF-16-16 | 16 Ton/Hr<br>16 Kg/cm2 | 1 unit | 2003 |
| 39 | **CV. EVANAS JAYA**<br>Bandung | TEXTILE | ***Fluidized Bed System***<br>Model DF-12-16 | 12 Ton/Hr<br>16 Kg/cm2 | 1 unit | 2003 |
| 40 | **PT. GRAND TEXTILE INDUSTRY (Grandte**<br>Bandung | TEXTILE | ***Fluidized Bed System***<br>Model DF-16-16 | 16 Ton/Hr<br>16 Kg/cm2 | 1 unit | 2003 |
| 41 | **PT. SABATEX**<br>Bandung | TEXTILE | ***Fluidized Bed System***<br>Model DF-12-16 | 12 Ton/Hr<br>16 Kg/cm2 | 1 unit | 2003 |
| 42 | **PT. PACIFIC HARVEST**<br>Pandaan, Jawa Timur | Noodle | ***Fluidized Bed System***<br>Model DF-12-16 | 12 Ton/Hr<br>16 Kg/cm2 | 1 unit | 2004 |
| 43 | **PT. SRI REJEKI ISMAN (SRITEX)**<br>SOLO | TEXTILE | ***Fluidized Bed System***<br>Model DF-16-16 | 16 Ton/Hr<br>16 Kg/cm2 | 2 units | 2004 |
| 44 | **PT. CAHAYA KALBAR**<br>PONTIANAK | Cooking Oil | ***Fluidized Bed System***<br>Model DF-12-16 | 12 Ton/Hr<br>16 Kg/cm2 | 1 unit | 2004 |
| 45 | **PT. SINAR PLATACO (BEKASI)**<br>BEKASI | Moskito Coil | CHAIN GRATE (EXT)<br>Model QXL240CG | 240 Kcal/H<br>Thermal-oil | 1 unit | 2004 |
| 46 | **PT. BADJATEX**<br>Bandung | TEXTILE | ***Fluidized Bed System***<br>Model DF-16-16 | 16 Ton/Hr<br>16 Kg/cm2 | 1 unit | 2004 |
| 47 | **PT. TIGA PUTRA**<br>KEDIRI | PAPER | ***COALMAC internal chain***<br>Model CMC-5-13 | 5 Ton/Hr<br>13 Kg/cm2 | 1 unit | 2004 |
| 48 | **PT. SETIA KAWAN**<br>Tulungagung | PAPER | ***Fluidized Bed System***<br>Model DF-16-16 | 16 Ton/Hr<br>16 Kg/cm2 | 1 unit | 2004 |
| 49 | **PT. PURNAMA TEXTILE**<br>Bandung | TEXTILE | ***Fluidized Bed System***<br>Model DF-12-16 | 6 M KCAL/h<br>Thermal-oil | 1 unit | 2004 |
| 50 | **PT. ORIENTAL TEXTILE**<br>Bandung | TEXTILE | ***Fluidized Bed System***<br>Model DF-12-16 | 16 Ton/Hr<br>10 Kg/cm2 | 1 unit | 2004 |
| 51 | **PT. KEMASAN SEMPURNA**<br>Pasuruan | Cartonbox | ***COALMAC internal chain***<br>Model CMC-5-13 | 5 Ton/Hr<br>10 Kg/cm2 | 1 unit | 2004 |
| 52 | **PT. MAXFOS PRIMA**<br>Tangerang | Cartonbox | ***COALMAC internal chain***<br>Model CMC-10-13 | 10 Ton/Hr<br>10 Kg/cm2 | 1 unit | 2004 |
| 53 | **PT. GUDANG GARAM**<br>Kediri | Cigarett | ***Fluidized Bed System***<br>Model DF-16-16 | 16 Ton/Hr<br>10 Kg/cm2 | 2 units | 2004 |
| 54 | **PT. LAUTAN OTSUKA CHEMICAL**<br>Merak | Chemical | ***Fluidized Bed System***<br>Model DF-16-16 | 16 Ton/Hr<br>16 Kg/cm2 | 2 units | 2004 |
| 55 | **PT. TOSHIBA POWER PLANT EGNR**<br>Jakarta | power plant | ***Heat Pipe Recovery Boiler***<br>Model CRG1500 | 1.5 Ton/Hr<br>10 Kg/cm2 | 2 units | 2005 |
| 56 | **PT. INDONESIA TORAY SYNTHETICS I**<br>Tangerang | power plant | ***CFBC Fluidized Bed***<br>Model UG-75-60-450 CFBC | 75 Ton/Hr<br>60 Kg/cm2 | 1 unit | 2005 |
| 57 | **PT. NIKAWATEX**<br>Bekasi | power plant | ***CFBC Fluidized Bed***<br>Model UG-35-60-450 CFBC | 38 Ton/Hr<br>60 Kg/cm2 | 1 unit | 2005 |
| 58 | **PT. BONANZA MEGAH LTD**<br>Semarang | Cooking Oil | ***Fluidized Bed System***<br>Model DF-12-16 | 12 Ton/Hr<br>16 Kg/cm2 | 1 unit | 2005 |
| 59 | **PT. KEMASAN SEMPURNA**<br>Pasuruan | Fish Canning | Pulverized Burner Boiler<br>Model PCB-3 | 2,.5 Ton/Hr<br>13 Kg/cm2 | 3 unit | 2005 |
| 60 | **PT. PACIFIC HARVEST**<br>Pandaan, Jawa Timur | Noodle | Pulverized Burner Boiler<br>Model PCB5 | 5 Ton/Hr<br>10 Kg/cm2 | 1 unit | 2005 |
| 61 | **PT. RAPI SARANA TEXPRO**<br>Pandaan, Jawa Timur | Processing | Pulverized Burner Boiler<br>Model PCB-5 | 5 Ton/Hr<br>10 Kg/cm2 | 1 unit | 2005 |
| 62 | **PT. INDONESIA TORAY SYNTHETICS 2**<br>TANGERANG, Jawa Barat | Fiber | ***CFBC Fluidized Bed***<br>CO-GENERATION POWER PLANT | 75 Ton/Hr<br>60 Kg/cm2 | 1 unit | 2005 |

## LIST OF HAMADA COAL FIRED BOILER USERS-3 (INDONESIA)

| NO | COMPANY NAME | PRODUCT | SYSTEM | BOILER CAPACITY | | Year |
|---|---|---|---|---|---|---|
| 63 | **PT. EASTERNTEX**<br>PANDAAN, Jawa Timur | Textile | ***Fluidized Bed (CFBC)***<br>Model UG-75-60-450 CFBC | 75 Ton/Hr<br>60 Kg/cm2 | 1 unit | 2006 |
| 64 | **PT. PUTRA PILE INDONESIA**<br>TANGERANG | Textile | Pulverized Burner Boiler<br>Model PCB-5 | 5 Ton/Hr<br>10 Kg/cm2 | 1 unit | 2006 |
| 65 | **PT. MAS GANDA**<br>TANGERANG | Textile | ***COALMAC internal chain***<br>Model CMC-5-13 | 5 Ton/Hr<br>10 Kg/cm2 | 1 unit | 2006 |
| 66 | **PT. SAMUDRA**<br>PANDAAN, Jawa Timur | Textile | ***Fluidized Bed System***<br>Model DF-8-13 | 8 Ton/Hr<br>10 Kg/cm2 | 1 unit | 2006 |
| 67 | **PT. DELIMATEX**<br>BANDUNG | Textile | ***Fluidized Bed System***<br>Model QXL-400FBC | 400K Kcal/h<br>oil heater | 1 unit | 2006 |
| 68 | **PT. ASIAPLAST**<br>TANGERANG | Plastic | ***Fluidized Bed System***<br>Model QXL-400FBC | 400K Kcal/h<br>oil heater | 1 unit | 2006 |
| 69 | **PT. Mayora food company**<br>BOGOR | FOOD | ***Fluidized Bed System***<br>Model DF-12-13 | 12 TON/H<br>10 Kg/cm2 | 1 unit | 2007 |
| 70 | **PT. HUNG A INDONESIA**<br>LIPO CIKARANG | TIRE | ***Fluidized Bed System***<br>Model DF-16-25 | 16 TON/H<br>25 Kg/cm2 | 1 unit | 2007 |
| 71 | **PT. ARAMI JAYA**<br>LIPO CIKARANG | TIRE | ***COALMAC internal chain***<br>Model CMC-5-16 | 5 TON/H<br>16 Kg/cm2 | 1 unit | 2007 |
| 72 | **PT. WIDJAYA PANCA FOOD**<br>SURABAYA | NOODLE | ***Fluidized Bed System***<br>Model DF-10-13 | 10 TON/H<br>10 Kg/cm2 | 1 unit | 2007 |
| 73 | **PT. SALIM IVO MAS (BIMOLI)**<br>SULAWESI | NOODLE | ***Fluidized Bed System***<br>Model DF-12-13 | 12 TON/H<br>16 Kg/cm2 | 2 unit | 2007 |
| 74 | **PT. MIE JANKAR**<br>JAWA TENGAH | NOODLE | Pulverized Burner Boiler<br>Convertion | 10 TON/H<br>10 Kg/cm2 | 1 unit | 2007 |
| 75 | **PT. GANDA SUKSES**<br>JAWA TENGAH | NOODLE | Pulverized Burner Boiler<br>Model PCB-3 | 3 TON/H<br>10 kg/cm2 | 1 unit | 2007 |
| 76 | **PT. MEGA MARINE TUNA CANNING**<br>PASURUAN | TUNA CANNING | Pulverized Burner Boiler<br>Model PCB-CMC-5 | 5 TON/H<br>10 Kg/cm2 | 1 unit | 2007 |
| 77 | **PT. INTER FORMINDO**<br>JAWA BARAT | STYRO FOAM | Pulverized Burner Boiler<br>Model PCB-3 | 3 TON/H<br>Kg/cm2 | 1 unit | 2007 |
| 78 | **PT. SALIM IVOMAS (BIMOLI)**<br>MOUTONG | COOKING OIL | ***Fluidized Bed System***<br>Model DF-4-13 | 4 TON/H<br>10 Kg/cm2 | 1 unit | 2008 |
| 79 | **PT. SALIM IVOMAS (BIMOLI)**<br>TOBELO | COOKING OIL | ***Fluidized Bed System***<br>Model DF-4-13 | 4 TON/H<br>10 Kg/cm2 | 1 unit | 2008 |
| 80 | **PT. SADHANA ARIFNUSA**<br>PASURUAN, JAWA TIMUR | CIGARET | ***Fluidized Bed System***<br>Model DF6-13 | 6 TON/H<br>13 Kg/cm2 | 2 unit | 2008 |
| 81 | **PT. ARAMI JAYA (REPEAT)**<br>LIPO CIKARANG | TIRE | ***Fluidized Bed System***<br>Model DF-12-25 | 12 TON/H<br>25 Kg/cm2 | 1 unit | 2008 |
| 82 | **PT. HUNG A INDONESIA (REPEAT)**<br>LIPO CIKARANG | TIRE | ***Fluidized Bed System***<br>Model DF-25-20 | 25 TON/H<br>20 Kg/cm2 | 1 unit | 2008 |
| 83 | **PT. INDUSTRI GULA NUSANTARA**<br>SEMARANG | SUGAR | ***Fluidized Bed System***<br>CONVERTION | 25 TON/H<br>25 Kg/cm2 | 2 unit | 2008 |
| | | | as of August 2008 | Total | **110** units | |

## LIST OF HAMADA COAL FIRED BOILER USERS (TAIWAN R.O.C.)

| NO | COMPANY NAME | PRODUCT | SYSTEM | BOILER CAPACITY | | Year |
|---|---|---|---|---|---|---|
| 1 | **CHENG LOONG PAPERMILL**<br>CHUBEI FACTORY | PAPER | ***Fluidized Bed System***<br>COAL FIRED:DF-22-25 | 22 Ton/Hr<br>25 Kg/cm2 | 2 unit | 2007 |
| 2 | **YEONG FONG YI PAPERMILL**<br>YANMEI PLANT 楊梅廠 | PAPER | ***Fluidized Bed System***<br>COAL FIRED:DF-12-20 | 12 Ton/Hr<br>25 Kg/cm2 | 1 unit | 2007 |
| 3 | **YEONG FONG YI PAPERMILL**<br>QINSUI PLANT 清水廠 | PAPER | ***Fluidized Bed System***<br>COAL FIRED:DF-16-20 | 16 Ton/Hr<br>25 Kg/cm2 | 1 unit | 2007 |
| 4 | **YEONG FONG YI PAPERMILL**<br>DOU LIU FACTORY 斗六廠 | PAPER | ***Fluidized Bed System***<br>COAL FIRED:DF-22-25 | 22 Ton/Hr<br>25 Kg/cm2 | 1 unit | 2007 |
| 5 | **CHENG LOONG PAPERMILL**<br>TAYUAN FACTORY | PAPER | ***Fluidized Bed System***<br>COAL FIRED:DF-22-25 | 22 Ton/Hr<br>25 Kg/cm2 | 2 unit | 2008 |
| | | | as of August 2008 | Total | **7** units | |

## LIST OF HAMADA COAL FIRED BOILER USERS (MALAYSIA) 1993-1996

| NO | COMPANY NAME | PRODUCT | SYSTEM | BOILER CAPACITY | | Year |
|---|---|---|---|---|---|---|
| 1 | **H.K.LAMTECH BHD**<br>Kedah | KILN DRY | ***Fixed Grate wood fire***<br>Model LSG 1500 | 1.5 T/H<br>10 Kg/cm2 | 1 unit | 1993 |
| 2 | **TIMBER MASTER SDN.BHD.**<br>Kucing | Plywood | ***Fixed Grate wood fire***<br>Model SHL-35-39 | 35 T/H<br>39 Kg/cm2 | 1 unit | 1994 |
| 3 | **KILANG PAPAN LIM AH SOON**<br>Kuala Lumpur | Plywood | ***Fixed Grate wood fire***<br>Model D-10-16 | 10 T/H<br>16 Kg/cm2 | 1 unit | 1995 |
| 4 | **KIAT LEONG CORP. SDN. BHD.**<br>Sabah | Plywood | ***Fixed Grate wood fire***<br>Model RC-4000 | 4 T/H<br>13 Kg/cm2 | 1 unit | 1994 |
| 5 | **RIDON WOOD PROD. SDN. BHD.**<br>Sabah | Plywood | ***Fixed Grate wood fire***<br>Model RC-4000 | 4 T/H<br>13 Kg/cm2 | 1 unit | 1994 |
| 6 | **SYARIKAT TEONG SHENG S/B**<br>Sabah | Plywood | ***Fixed Grate wood fire***<br>Model D-10-16 | 10 T/H<br>16 Kg/cm2 | 1 unit | 1994 |
| 7 | **MAKESON SDN. BHD.**<br>Sabah | Plywood | ***Fixed Grate wood fire***<br>Model RC-4000 | 4 T/H<br>13 Kg/cm2 | 1 unit | 1995 |
| 8 | **TIMBER MASTER SDN. BHD.**<br>Kucing | Plywood | ***Fixed Grate wood fire***<br>Model D-10-16 | 10 T/H<br>16 Kg/cm2 | 2 units | 1994 |
| 9 | **KILANG KELAPA SAWIT BELL**<br>Sabah | Palm Oil Mill | ***Fixed Grate wood fire***<br>Model SHP-35-35 | 35 T/H<br>35 Kg/cm2 | 1 unit | 1996 |
| 10 | **KILANG SAWIT BAHRU**<br>Negeri Sembilan | Palm Oil Mill | ***Fixed Grate wood fire***<br>Model SHP-35-35 | 35 T/H<br>35 Kg/cm2 | 1 unit | 1996 |
| 11 | **SYARIKAT PERUSAHAAN KELAPA**<br>Sabah | Palm Oil Mill | ***Cyclone Furnace***<br>DBW-FW-40 | 40 T/H<br>39 Kg/cm2 | 1 unit | 1996 |
| | | | | total | 12 units | |

## LIST OF HAMADA BOILER USERS (MALAYSIA) 2008 -

| NO | COMPANY NAME | PRODUCT | SYSTEM | BOILER CAPACITY | | Year |
|---|---|---|---|---|---|---|
| 12 | **WANGSAGA INDUSTRIES**<br>Pinang | PVC mfg | ***Fluidized Bed Combustion***<br>Model QXL-600 | 6M Kcal/H<br>Thermal Oil | 1 unit | 2008 |
| 13 | **MUDA PAPERMILL SDN BHD**<br>Penang | papermill | ***Fluidized Bed Combustion***<br>Model DF-25-13 | 22 T/H<br>13 Kg/cm2 | 3 units | 2008 |
| 14 | **MUDA PAPERMILL SDN BHD**<br>Kajang | papermill | ***Fluidized Bed Combustion***<br>Model DF-25-13 | 22 T/H<br>13 Kg/cm2 | 3 units | 2008 |
| 15 | | | | | | |
| 16 | | | | | | |
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| 18 | | | | | | |
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| 20 | | | | | | |
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# HAMADA COAL FIRED BOILER USERS (PHILIPPINES)

| NO | COMPANY NAME | PRODUCT | SYSTEM | BOILER CAPACITY | | Year |
|---|---|---|---|---|---|---|
| 1 | **EVERGREEN TEXTILE** Valenzuela, Bulacan | TEXTILE FINISHING | ***Fluidized Bed System (BFB)*** MODEL DF-16-13 X 2 | 16 Ton/Hr 13Kg/cm2 | 2 units | 2005 |
| 2 | **MEGAPACK PAPERMILL** Batangas | PAPERMILL CARTONBOX | ***Fluidized Bed System(BFB)*** MODEL DF-22-16 | 22 Ton/Hr 16 Kg/cm2 | 1 unit | 2005 |
| 3 | **NOAH'S PAPERMILL INC** Marikina | PAPERMILL | ***Fluidized Bed System (BFB)*** MODEL DF-16-16 | 16 Ton/Hr 16 Kg/cm2 | 1 unit | 2005 |
| 4 | **CONTAINER CORPORATION OF THI PHILIPPINES (CCP)-** Quezon City | PAPERMILL | ***Fluidized Bed System (BFB)*** MODEL DF-16-16 | 16 Ton/Hr 16 Kg/cm2 | 1 unit | 2005 |
| 5 | **LIBERTY PAPER MILL** Valenzuela | PAPERMILL | ***Fluidized Bed System (BFB)*** MODEL DF-12-13 | 12 Ton/Hr 13Kg/cm2 | 1 unit | 2005 |
| 6 | **SAFRON TEXTILE MILL** Cavite | TEXTILE | ***Fluidized Bed System (BFB)*** MODEL DF-16-13 | 16 Ton/Hr 13Kg/cm2 | 1 unit | 2005 |
| 7 | **SOLID DEVELOPMENT CORP** Valenzuela, Bulacan | PAPERMILL | ***Fluidized Bed System (BFB)*** MODEL DF-8-13 | 8 Ton/Hr 13Kg/cm2 | 1 unit | 2005 |
| 8 | **MILESTONE PAPER -1** Valenzuela, Bulacan | PAPERMILL | ***Fluidized Bed System (BFB)*** MODEL DF-16-13 | 16 Ton/Hr 13Kg/cm2 | 1 unit | 2005 |
| 9 | **MILESTONE PAPER -2** Cabuyao, Laguna | PAPERMILL | ***Fluidized Bed System (BFB)*** MODEL DF-12-13 | 12 Ton/Hr 13Kg/cm2 | 1 unit | 2005 |
| 10 | **ASIA PAPERMILL INCORPORATED** Cavite | PAPERMILL | ***Fluidized Bed System (BFB)*** MODEL DF-8-13 | 8 Ton/Hr 13Kg/cm2 | 1 unit | 2006 |
| 11 | **JUST TEXTILE FINISHING** Caingin, Quezon City | FINISHING TEXTILE | ***Fluidized Bed System (BFB)*** MODEL DF-16-13 | 16 Ton/Hr 13Kg/cm2 | 1 unit | 2006 |
| 12 | **SUPRA TEXTILE FINISHING** Valenzuela | FINISHING TEXTILE | ***Fluidized Bed System (BFB)*** MODEL DF-16-13 | 16 Ton/Hr 13Kg/cm2 | 1 unit | 2006 |
| 13 | **TANTUCO VEGETABLE OIL MILL** Lucena City | Oil Mill | ***Fluidized Bed System (BFB)*** MODEL DF-12-13 | 12 Ton/Hr 13Kg/cm2 | 1 unit | 2006 |
| 14 | **MANHATTAN RUBBER TIRE** Valenzuela | RUBBER | ***Fluidized Bed System (BFB)*** MODEL DF-12-13 | 12 Ton/Hr 13Kg/cm2 | 1 unit | 2006 |
| 15 | **PAPERLAND INDUSTRIES INC** Quezon City | PAPERMILL | ***PULVERIZED COALBURNER*** MODEL PCB-5 | 5 TON/H 10 Kg/cm2 | 1 unit | 2006 |
| 16 | **PERMEX PRODUCERS & EXP. CORI** Zamboanga | Tuna Canning | ***Fluidized Bed System (BFB)*** MODEL DF-22-13 | 22 TON/H 16 Kg/cm2 | 1 unit | 2006 |
| 17 | **LIGO Sardin Canning** Zamboanga | Sardin canning | ***Fluidized Bed System (BFB)*** MODEL DF-12-13 | 12 13 | 1 unit | 2007 |
| 18 | **ZEST-O CORPORATION** Valenzuela | Food | ***Fluidized Bed System (BFB)*** MODEL DF-12-13 | 12 ton/H 13 Kg/cm2 | 1 unit | 2007 |
| 19 | **ATLANTIC CANNING CORP** Zamboanga | Tuna Canning | ***Fluidized Bed System (BFB)*** MODEL DF-12-13 | 12 ton/H 13 Kg/cm2 | 1 unit | 2007 |
| 20 | **UNIVERSAL TUNA CANNING** Zamboanga | Tuna Canning | ***Fluidized Bed System (BFB)*** MODEL DF-16-13 | 16 ton/H 13 Kg/cm2 | 1 unit | 2007 |
| 21 | **COLON House of Noodles** CEBU | Bihon | ***Fluidized Bed System (BFB)*** MODEL DF-8-13 | 8 ton/H 13 Kg/cm2 | 1 unit | 2007 |
| 23 | **SPRINT(HEINZ-UFC-DATU PUTI)** Meycauayan, Bulacan | Rent-a-Boiler | ***Fluidized Bed System (BFB)*** MODEL DF-8-10 | 8 ton/H 10 Kg/cm2 | 1 unit | 2007 |
| 25 | **GOLDEN SWAN PAPERMILL** Cavite | PAPERMILL | ***Fluidized Bed System (BFB)*** MODEL DF-22-13 | 22 ton/H 13 Kg/cm2 | 1 unit | 2008 |

as of February 2008 Toral: 24 units

# HAMADA BOILER USERS (VIETNAM)

| NO | COMPANY NAME | PRODUCT | SYSTEM | BOILER CAPACITY | | Year |
|---|---|---|---|---|---|---|
| 1 | **CALOFIN OIL & FATS INDUSTRIES** CAN THO CITY-1st unit | VEG. OIL rice husk | ***Travelloing Chain Grate*** SZL-12-16 | 10 Ton/Hr 13 Kg/cm2 | 1 unit | 2006 |
| 2 | **CALOFIN OIL & FATS INDUSTRIES** CAN THO CITY- 2nd unit | VEG. OIL rice husk | ***Travelloing Chain Grate*** SZL-12-16 | 10 Ton/Hr 13 Kg/cm2 | 1 unit | 2006 |
| 3 | **TPC VINA Plastic & Chemicals Co., L** Go Dau IZ, Long Thanh, Dong Nai | PVC COAL | ***Fluidized Bed System*** DF-22-16 | 22 Ton/Hr 13 Kg/cm2 | 1 unit | 2007 |
| 4 | **PHU MY Plastic & Chemicals Co., Lt** Cai Mep Industrial Park, Dong Nai Province | PVC COAL | ***Fluidized Bed System*** DF-22-16 | 22 Ton/Hr 13 Kg/cm2 | 1 unit | 2008 |
| 5 | **CALOFIN OIL & FATS INDUSTRIES** CAN THO CITY- 3rd unit | VEG. OIL rice husk | ***Travelloing Chain Grate*** SZL-6-16 | 6 Ton/Hr 13 Kg/cm2 | 1 unit | 2008 |
| 6 | **CALOFIN OIL & FATS INDUSTRIES** CAN THO CITY- 4th unit | VEG. OIL coal | ***Travelloing Chain Grate*** DF-22-16 | 22 Ton/Hr 13 Kg/cm2 | 1 unit | 2008 |

as of August 2008 Total 6 units

## LIST OF HAMADA COAL FIRED BOILER USERS (THAILAND)

| NO | COMPANY NAME | PRODUCT | SYSTEM | BOILER CAPACITY | | Year |
|---|---|---|---|---|---|---|
| 1 | **PACIFIC MARINE FOOD PRODUCTS** Thailand | Tuna Canning | ***Fluidized Bed System*** Model DF-12-13 | 12 Ton/Hr 13Kg/cm2 | 1 unit | 2004 |
| 2 | **TIPCO** Thailand | FOOD | ***Fluidized Bed System*** Model DF-22-13 | 22 Ton/Hr 13 Kg/cm2 | 2 units | 2005 |
| 3 | **SIAM RUBBER COMPANY** Thailand | RUBBER | ***Fluidized Bed System*** Model DF-12-16 | 12 Ton/Hr 16 Kg/cm2 | 1 unit | 2005 |
| 4 | **ASIAN ALLIANCE** Thailand | Tuna Canning | ***Fluidized Bed System*** Model DF-16-16 | 16 Ton/h 13Kg/cm2 | 2 units | 2005 |
| 5 | **SUPATRTANAGORN PAPER MILL** Thailand | PAPER | ***Fluidized Bed System*** Model DF-22-16 | 22 Ton/Hr 16 Kg/cm2 | 1 unit | 2005 |
| 6 | **ASIAN KRAFT PAPER MILL** Thailand | PAPER | ***Fluidized Bed System*** Model DF-22-13 | 22 Ton/Hr 16 Kg/cm2 | 2 units | 2005 |
| 7 | **THAI UNION** Thailand | Tuna Canning | ***Fluidized Bed System*** Model DF-22-13 | 22 Ton/Hr 13Kg/cm2 | 1 unit | 2005 |
| 8 | **SUPTRTANAGORN PAPER MILL** Thailand | PAPER | ***Fluidized Bed System*** Model DF-16-16 | 16 Ton/Hr 16 Kg/cm2 | 1 unit | 2005 |
| 9 | **SUPTRTANAGORN PAPER MILL** Thailand | PAPER | ***Fluidized Bed System*** Model DF-16-16 | 16 Ton/Hr 16 Kg/cm2 | 1 unit | 2005 |
| 10 | **KONGSIRI TANNERY** Thailand | TANNERY | ***Fluidized Bed System*** Model DF-10-16 | 10 Ton/Hr 8 Kg/cm2 | 1 unit | 2006 |
| 11 | **THAI THEPAROD** Thailand | SOY SAUCE | ***Fluidized Bed System*** Model DF-10-16 | 10 Ton/Hr 8 Kg/cm2 | 1 unit | 2006 |
| 12 | **SK FOOD** Thailand | CANNING | ***Fluidized Bed System*** Model DF-12-13 | 12 Ton/Hr 10 Kg/cm2 | 1 unit | 2007 |
| 13 | **PB FISHERY** Thailand | CANNING | ***Fluidized Bed System*** Model DF-12-13 | 12 Ton/Hr 10 Kg/cm2 | 1 unit | 2008 |
| 14 | **HIANGSENG PAPER CO., LTD** Thailand | PAPERMILL | ***Fluidized Bed System*** Model DF-25-13 | 25 Ton/Hr 13 Kg/cm2 | 1 unit | 2008 |
| | | | as of MAY 2008 | Total | **17** units | |

## LIST OF HAMADA COAL FIRED POWER PLANT BOILERS (CFBC)

| NO | USERS | PRODUCT | SYSTEM | BOILER CAPACITY | | Year |
|---|---|---|---|---|---|---|
| 1 | **TORAY SYNTHETIC INDONESIA #1** INDONESIA | SYNTHETIC FIBER | ***Fluidized Bed System*** 60 KG/CM2 | 75 Ton/Hr 450 oC | 1 unit | 2004 |
| 2 | **TORAY SYNTHETIC INDONESIA #2** INDONESIA | SYNTHETIC FIBER | ***Fluidized Bed System*** 60 KG/CM2 | 75 Ton/Hr 450 oC | 1 unit | 2006 |
| 3 | **NIKAWATEXTILE INDONESIA** INDONESIA | TEXTILE | ***Fluidized Bed System*** 60 KG/CM2 | 35 Ton/Hr 450 oC | 1 unit | 2006 |
| 4 | **EASTERN TREXTILE (TORAY GROUI** INDONESIA | TEXTILE | ***Fluidized Bed System*** 60 KG/CM2 | 75 Ton/h 450 oC | 1 unit | 2007 |

## LIST OF HAMADA HEAT PIPE WASTE HEAT RECOVERY BOILERS

| NO | USERS | PRODUCT | SYSTEM | BOILER CAPACITY | | Year |
|---|---|---|---|---|---|---|
| 1 | **INDONESIA ASAHI CHEMICALS** INDONESIA | SYNTHETIC FIBER | ***HEAT PIPE*** | 2.5 Ton/Hr 10 KG/CM2 | 2 unit | 1998 |
| 2 | **SUMITOMO RUBBER (DUNLOP)** INDONESIA | SYNTHETIC FIBER | ***HEAT PIPE*** | 2 Ton/Hr 10 KG/CM2 | 1 unit | 2001 |
| 3 | **TOSHIBA POWER PLANT** INDONESIA | INDUSTRIAL ESTATE | ***HEAT PIPE*** | 2 Ton/Hr 10 KG/CM2 | 1 unit | 2005 |

**株式会社　ジャコム**（日本燃焼技術株式会社）

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Welcome
Hamada Boiler HISTORY
Hamada Boiler USER'S LIST
Hamada Boiler PRODUCTS
Hamada Boiler INQUIRY SHEET
Fuel Kcal
Water Treatment

浜田ボイラー　ユーザーリスト　日系企業取引実績リスト

| 国別ユーザーリスト | 目次 |

## 日系企業取引実績リスト

| 会社名<br>事業内容 | 使用国 | ボイラーの種類 | ボイラーの大きさ | 完成年 |
|---|---|---|---|---|
| **東芝発電部門**<br>－エネルギー事業 | インドネシア | WASTE HEAT RECOVERY BOILER | 2 X 2 TON | 2004年 |
| **カネボー(株)**<br>－繊維工業 | インドネシア | FLUIDIZED BED COAL FIRED BOILER | 16 TON/H X 2 | 2002年 |
| **旭化成**<br>－繊維工業 | インドネシア | WASTE HEAT RECOVERY BOILER | 1.5 TONX 2 | 1997年 |
| **住友ゴム**<br>－ゴム製品 | インドネシア | WASTE HEAT RECOVERY BOILER | 2 TON /H | 1999年 |
| **住友鉱山**<br>－豆炭製造 | インドネシア | FLUIDIZED BED COAL FIRED THERMAL HEATER | 1,000,000 KCAL/H | 1997年 |
| **野田合板**<br>－合板工業 | インドネシア | D MODEL WOOD FIRED BOILER | 10 TON/H | 1990年 |
| **帝人**<br>－繊維工業 | インドネシア | BUBBLING FBC BOILER X 2 UNITS | 22 TON /H X 2 | 2002年 |
| **帝人**<br>－繊維工業 | インドネシア | BUBBLING FBC BOILER X 1 UNITS | 22 TON /H X 1 | 2006年 |
| **東レ**<br>－繊維工業 | インドネシア | CHAIN GRATE COAL FIRED BOILER | 35 TON /H X 2 | 2002年 |
| **東レ**<br>－繊維工業 | インドネシア | CIRCULATING CFBC BOILER | 75 TON /H X 1 | 2004年 |
| **東レ**<br>－繊維工業 | インドネシア | CIRCULATING CFBC BOILER | 75 TON /H X 1 | 2006年 |
| **東レ**<br>－繊維工業 | インドネシア | CFBC BOILER X 1 UNITS | 75 TON /H X 1 | 2006年 |
| **日清紡**<br>－繊維工業 | インドネシア | CIRCULATING CFBC BOILER X 1 UNITS | 35 TON /H X 1 | 2005年 |
| **大塚化学**<br>－化学薬品 | インドネシア | BUBBLING BFB FLUIDIZED BED BOILER | 16 TON /H X 2 | 2003年 |
| | | | Total Units | 20 |

History　User's List　Products　Inquiry Sheet

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