

# Project Report

REUSE REDUCE RECYCLE





# FAB-INDIA INDUSTRIES

AN ISO 9001: 2015 CERTIFIED COMPANY
Manufacturer Of Waste Tyre Recycling Plant

### Welcome to Fab-India Industries

Fab-India Industries Is a Pioneer in the Field Of Designing, Developing and Quality Manufacturing with more than 23 years experience situated at Ahmedabad, Gujarat. Fab-India Industries is professional and high-tech company to manufacture Waste Tyre/Plastic Recycling Plant with a wide range (5 ton, 7.5 ton, 10 ton, 12 ton and 15 ton), good quality, reasonable prices, all the safety precautions and stylish designs, This ISO 9001:2015, ISO 14001:2004, ISO 18001:2007 company has achieved this stature with over a decade of total commitment and continuous improvement and introduction of new products. Fab-India Industries follows the globally approved QMS (Quality Management System).

### **Company Profile**

Established in the year 1991, we Fab-India Industries is a Dominant firm involved in manufacturing, supplying and installation of Pyrolysis Equipment and Waste Tyre/Plastic Recycling Plant. We are group of 3 company which has been operating since 1991 associated with Manufacturing of AAC Plants, Pharmaceutical Chemicals company, Food Industries, Textile Industries, Fly Ash Plants, M.S.W. etc. Moreover, This ISO 9001:2015, ISO 14001:2004, ISO 18001:2007 Company has introduced the most viable process for recycling plastic scrap and used tyre into fuel oil, carbon black, steel wire and hydrocarbon gas. Our Eco-friendly technology is known for transforming over 10 billion squirrel away tyres around the world into energy.

At our ultra modern infrastructure, we have been manufacturing a premium range (≅13 to 15/ month) of recycling equipment. We are known for providing complete recycling solutions to clients with proven technologies. Along with this, we possess vast experience in Designing, Developing and Quality of equipment, along with technical analysis. Our pyrolysis plants are constructed & examine under the Diligence of our qualified experts, who ensure to dispatch only a qualitative range to customers. We also provide customized solutions to clients as per their specifications.

Under the constant support of our Director, 'Mr. Suresh Patel'. We have been growing in this industry. His tremendous knowledge, leadership, expertise skills and experience has enabled us to export our products to all over India and Overseas like Nepal, Bangladesh, Kenya, South Africa and Iran etc.



# Fab-India Industries workshop



### Pyrolysis process

- Pyrolysis is the chemical decomposition of organic materials by heating in the absence of oxygen or any other reagents, except possibly steam.
- Pyrolysis can be used to reprocess the tyres into fuel oil, fuel gas, solid residue (steel wire) and carbon black.
- The waste tyres are mainly composed of long chain of C-H molecules..
- Under normal process conditions the heat transfer will be done by radiation.
- The technology of pyrolysis, cracking, and monomerisation of used tyres is always a hot topic.

#### ☆ Tyre pyrolysis

End-of-life tyres contain a lot of chemical bound energy.

As a result of pyrolysis of waste tyres one obtains: high-energy gas, Pyrolysis oils, carbon black and steel wire. The ratios of the first three products depend on process conditions, mainly on temperature.

- The pyrolysis method for recycling used tyres is a technique, which heats whole or shredded tyres in a reactor vessel containing an oxygen free atmosphere and a heat source.
- In the reactor the rubber is softened after which the rubber polymers continuously breakdown into smaller molecules.
- These smaller molecules eventually vaporize and exit from the reactor.
- These vapors can be burned directly to produce power or condensed into an oily type liquid, generally used as a fuel.
- Some molecules are too small to condense. They remain as a gas, which can be burned as fuel which can be reused in the same plant.
- The minerals that were part of the tyre, about 40 to 45 % by weight, are removed as a solid.
- When performed well a tyre pyrolysis process is a very clean operation and has nearly no emissions or waste.
- The properties of the gas, liquid and solid output are determined by the type of feedstock used and the process conditions.
- For instance, whole tyres contain fibers and steel. Shredded tyres have most of the steel and sometimes most of the fiber removed.
- Batch wise Process is done by tyre pyrolysis.
- The steel can be removed from the solid stream with magnets for recycling. The remaining solid material often referred to as "charcoal".



#### ❖ Variety of polymer waste material is suitable as a raw material. Given below is the list of suitable raw materials for pyrolysis:

- Waste tyres
- Rubber or rubber parts from vehicles
- Electronic scrap
- Mixed (HDPE, LDPE, PE, PP, Nylon, Teflon, PS,ABS,FRP etc)
- Multi lavered
- Plastic disposable bottle
- The choice of feedstock and process (mainly operating temperature) can affect the value of the finished products.

Type of Material	Total Quantity	Finish quantity
Nylon scrap tyres	1000 kgs	-550 to 600 liter of Pyrolysis oil -50 to 80 kg of Hydrocarbon Gas -300 to 350 kg of Carbon Black
Radial scrap tyres	1000 kgs	-400 to 450 of Pyrolysis oil -50 to 80 kg of Hydrocarbon Gas -300 to 350 kg of Carbon Black -150 to 200 kgs of Mild steel tyre scrap

#### ☆ Yield of pyrolysis process:

#### **★ Pyrolysis oil (Fuel oil)**

- The essential product of tyre pyrolysis process is pyrolysis oil referred as fuel oil (40 to 45 % of total quantity feed) which is used as a fuel component in Furnace Industry, casting Industry, Rolling Industry and Crude oil Distillation. Pyrolysis oil has flash Point between 60 to 93.3 °C.
- Purest quality of pyrolysis oil comparable to industrial diesel: selling price comparable to industrial diesel LDO( light diesel oil)

#### **★ Carbon Black**

The vital product of pyrolysis plant is carbon black referred as "charcoal" (30 to 35% of total quantity feed).carbon black has Industrial and commercial use.

#### **★ Steel wire**

- For instance, whole tyres contain fibers and steel. Shredded tyres have most of the steel and sometimes most of the fiber removed.
- The steel wire(15 to 20%) can be removed from the carbon black with magnets for recycling after pyrolysis process & sold to the steel dealer

#### ★ Hydrocarbon Gas

The smaller molecules eventually vaporize and exit from the reactor. These vapors can be burned directly to produce power or condensed into an oily type liquid, generally used as a fuel. Some molecules are too small to condense. They remain as a gas (5 to 8% of total quantity feed) which can be burned as fuel.



### **Pyrolysis plant**

Pyrolysis plant is renewable energy generation system. Pyrolysis plants are designed to generate quality fuel from polymer waste. Pyrolysis system or pyrolysis plant is an industry for conversion of waste and tyre into usable products like:

- Pyrolysis oil (Fuel oil)
- Carbon black

- Steel wire
- Hydrocarbon gas

#### ★ Advantages of pyrolysis plants

- Purest quality of pyrolysis oil as finished product.
- Use of green technology to achieve environment friendly processes.
- Automatic safely valve (pressure and temperature valve) use to improve safely, profitability & ease of operation.
- Industry is energy self-sufficient.
- No external fuel required for heating.

#### ★ Benefits of pyrolysis plant

- Recover energy and value from waste in form of fuel, steel wire and charcoal.
- Reduce tyre land pollution.
- Eco-friendly recycling of tyre.
- Commercially viable process.
- Product is used as substitute to LDO/furnace oil.
- Perfect solution for polymer waste management.
- Raw material available

#### **★ Basic function of pyrolysis plant is to achieve following process conditions:**

- Operating temperature of Reactor is between 300 to 350 degree c.
- Duration period of pyrolysis batch is between 10 to 12 hours.
- Pyrolysis of tyre is done in the absence of oxygen.
- Scrubbing of pyrolysis oil, hydrocarbon gases and fuel gases to prevent pollution.

#### **★ Pyrolysis plant needs following machinery & equipment:**

- Raw material handing section.
- Pyrolysis reactor
- Hydraulic cutter.
- Hydraulic auto feeder.
- Condensation system.
- Scrubbing system.
- Hydrocarbon gas cleaning & storage system.

- Pyrolysis oil storage system.
- Cooling tower.
- Control panel and alarm systems.
- Equipment line in commercial pyrolysis plants is further modified to suite customer's requirements.



### B. Q. Plate SA 516 Gr. 70 Test Report



#### STEEL AUTHORITY OF INDIA LIMITED **BHILAI STEEL PLANT**

MTL-II/QR-2 Page No :D-1 of 1

#### FORM IV

periora 16 STEEL MAKER'S CERTIFICATE OF MANUFACTURE & RESULTS OF TESTS REGULATION 4(c)(iv), IBR APPROVAL CERTIFICATE NO: 124 DATED 16/05/2011

T.C.No

: RCL/MTL/PLM/62004497

: 12.08.2016

CENTRAL MARKETING ORGANISATION SAIL

Sales Order No

: 1100224002

MARBLE ARCH 8TH FLOOR RACE COURSE CIRCLE

DA No

BARODA 390007

Wagon No / Trailer No : SE21071157776

62004497

Ship-to-Party: WHM KHODIYAR FOR BARODA, Gandhinagar.

Process of Manufacture: Basic Oxygen Converter Continuous Cast fully Killed Steel

Normalising Rolling.

Fine Grain Practice

We hereby certify that the material as described below has been made by Basic Oxygen process followed by continuous casting and rolled by us, has been satisfactorily tested in presences of Inspecting officer or Test House Manager, in accordance with the standard test procedure and the material is found conforming to the specification:

#### IS 2041:2009 GRADE R260 / ASTM A 516:2010 GR.70.

This also satisfy the requirement of Indian Boiler Regulations: 1950

CHARGE / HEAT No: 229973

TEST RESULTS

	SECTIO	N (NOMIN	AL SIZE)		MECHANICAL PROPERTIES		Bend	M. Dia						
Plate No	THICK	WIDTH	LENGTH	YS	UTS	%E	%E2	CHAR	PY V NO	TCH () Im	pact Valu	es (J)	Test	
/ Pc. No.	mm	. mm	mm	260 MPa	490-620 MPa	GL5.65V SO 21% min	m	11	12	13	lavg 27 J	°C		
2034916/1	16	2500	12500	383	523	25	22	-	- 22	-			O.K.	3.0 T

Heat No		CHEMICAL COMPOSITION (LADLE ANALYSIS)														
	С	s	Р	Mn	Si	Al	Cu	Cr	Ni	Мо	Nb	V	Ti	N <sub>2</sub>	В	CE
	%	%	%	%	%	%	%	%	%	%	%	%	%	ppm	%	%
229973	0.21	0.015	0.010	1 16	0.25	0.029	- 0.02	< 0.015	- 0.015	0.015	< 0.010	- 0 010	- 0.005	80	< 0.0005	0

Total No. Of Pieces Page / Sales Order : 1 / 1

Total Pieces / TC : 22 MATERIAL SPECIFICATION (a) Temp Range :

(b) Soaking Time :

SAIL WAREHOUSE, KHODIYAR This Test Certificate has been issued

MT somered under Involce No.

in the vehicle no.

CE CALCULATED BY FORMULA:[C+ Mn/6+ (Cr+ Mo+ V)/5+ (Ni+ Cu)/15].

ULTRASONIC TEST AS PERASTM A 578 Level B : Satisfactory & level of acceptance as per TDC.

NOTE: "M = MANDRIL Dia., T = PLATE THICKNESS. "E.T.T; ELEVATED TEMP. TESTING, LENGTH IS THE ROLLING DIRECTION OF THE PLATE.

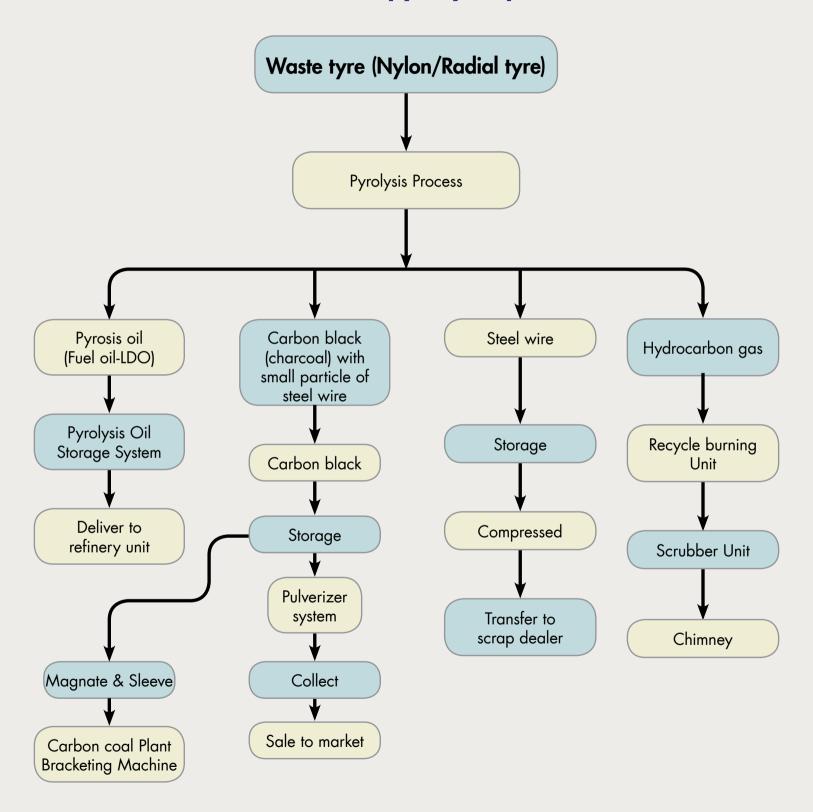
This certificate is being issued by Bhilial Steel Plant as a WELL KNOWN STEEL MAKER, IDENTIFICATION MARK OF INSPECTION OFFICER IS STAMPED THUS ON THE ABOVE PLATES.

Yield Strength determined by 0.2% offset method.



SHARAD KUMAR SAHU Authorized Signatory

### Flowchart for pyrolysis process





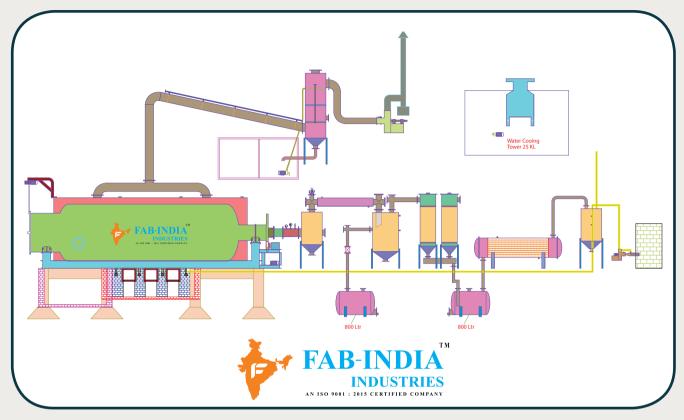
# Technical detail of 12 ton Pyrolysis Plant

S.N	Item	Contraction	Description
1	Main Reactor-12 ton	16 mm BQ Plate Capsule Type (FI-RC-12)	6.6 Meter(I) x 2.8 Meter(w), Plate Thickness-16 mm
2	Reactor cover	Insulated with Cerawool	Capacity of Cerawool 1260 Degree Celsius with 25 mm Two Layer
3	Pipe condenser	Electric Resistance Welded Pipe (ERW) – MS	6" Pipe 24 Nos condenser with carbon Holding Tank - 3 Nos (150 Liter capacity)
4	Insulation tank	5 mm MS Plate	800 mm x 1550 mm
5	Heavy Oil Tank	5 mm MS Plate	500 mm x 1250 mm - 250 Liter
6	Water seal tank	5 mm MS Plate	1200 mm x 2000 mm With 4" Water Jacket
7	Gas tank	5 mm MS Plate	800 mm x 1550 mm
8	Oil Tank	5 mm MS Plate	1470 x 3000 (5.0 KL) 2 Nos.
9	Water coolant pipe	C Class Pipe - 5 mm MS Pipe	(15'X8" & 12'X16") [15 Feet ], jacketed pipe
10	Scrubber Reactor Top Pipe	Electric Resistance Welded Pipe (ERW) – MS	Top Pipe 12" X 23 Feet
11	Scrubber Fan Pipe	Electric Resistance Welded Pipe (ERW) – MS	12" X 10 Feet
12	Scrubber Joint Pipe	Electric Resistance Welded Pipe (ERW) – MS	12" x 10 Feet
13	Scrubber Coolant Pipe	Electric Resistance Welded Pipe (ERW) – MS	12" X 15 Feet
14	Scrubber Tank (Dust Tank)	Electric Resistance Welded Pipe (ERW) – MS	1000 mm x 2800 mm with Water Spray Pipe
15	High Pressure Vacuum Blower (Dust Blower)	5 mm MS Plate	5 HP 1440 RPM Standard Electric Motor
16	Centrifugal Cooling Blower	5 mm MS Plate	5 HP 1440 RPM Electric MOTOR

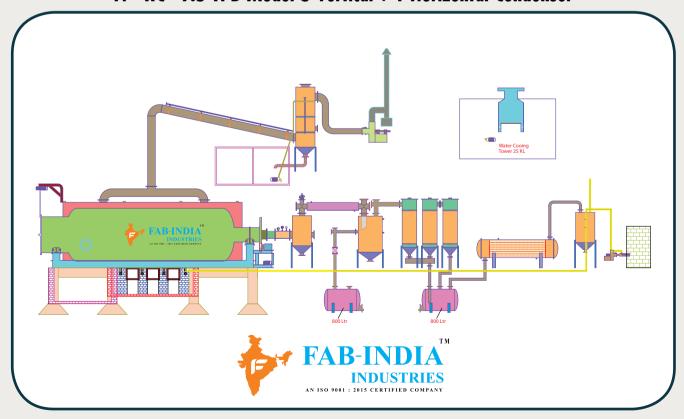
# Technical detail of 12 ton Pyrolysis Plant

17	Hoist	5 mm MS Fabricated	5"Gear Box With 5 HP Electric Motor With Wire Roap 100 Feet(L), 10mm(T)
18	Chain block	2 Tons Chain block	2 Tons chain block with 10 Feet chain for reactor door
19	Penal board	Reactor Penal board With Dual Motor Arrangement	Total motor Controller, Temp. Indicator & controller with hooter System, Pressure Indication
20	Submersible Water pump	Pump Atlas brand	5 HP 3 Phase Electric Motor for cold water supply in condenser
21	Gear pump	Pump Atlas brand	3 HP 3 Phase Electric Motor for oil transfer
22	Mud pump	Pump Atlas brand	3 HP 3 Phase Electric Motor for scrubber systems
23	Chimney	Electric Resistance Welded Pipe (ERW) – MS	60 Feet- Chimney
24	Gas Blower	1 Nos Gas Blower 0.5 HP	0.5 HP Motor 3 Phase for Extra Gas Burning
25	Gas Burner	Electric Resistance Welded Pipe (ERW) – MS	100x450 mm for Extra Gas Burning Situated at Extra 0.5 HP Blower
26	Fire Chamber with 3 HP Blower & Gas Burner	Electric Resistance Welded Pipe (ERW) – MS	3 HP 1440 RPM Electric Motor, 100x450 mm
27	Cooling tower	Capacity 80 TR	3 HP 2880 RPM Motor
28	Hardware	As per annexure I	Hardware for reactor pipe and pipe fitting
29	Electric Motor	Standard make	As per annexure II
30	Foundation	As per drawing	Price not including in basic Price
31	Reactor Gear box	Shricon Brand with Casting Body	180 Center with 4 Reduction Helical Gear Box
32	Fire Brick & Cast able cement	550 Nos Fire Brick and Castable Cement - 5+5 bags	For fire system

### FI - RC - 5 TPD Model 2 Vertical + 1 Horizontal Condenser



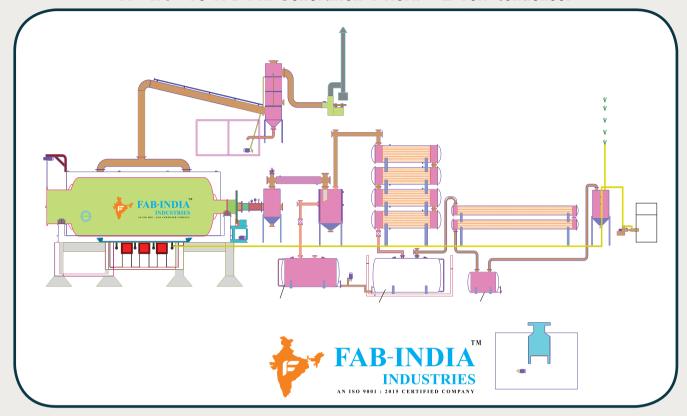
FI - RC - 7.5 TPD Model 3 Vertical + 1 Horizontal Condenser



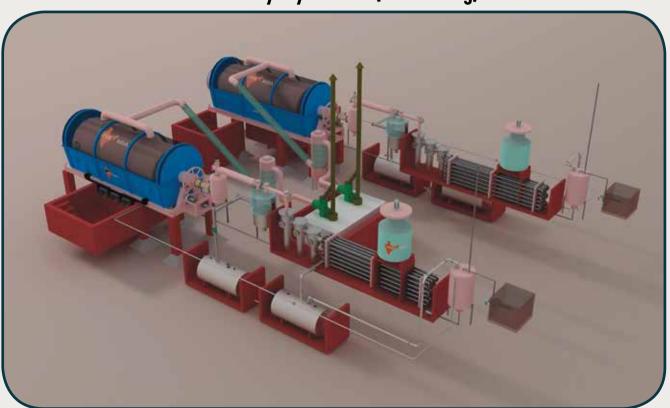
# -

### **Assembly Drawing for Pyrolysis Plant**

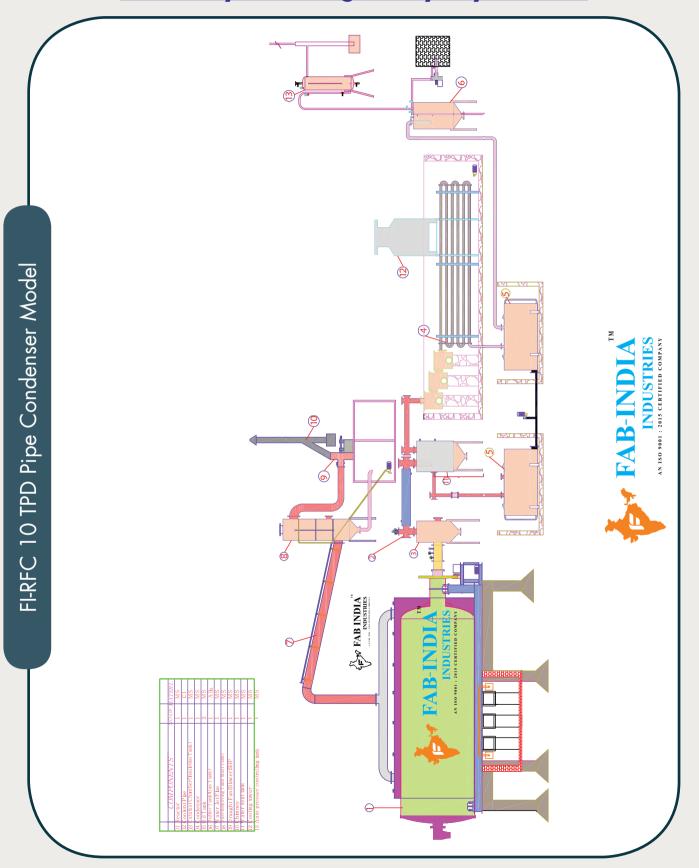
FI - RC - 10 TPD 7th Generation 4 Hori. + 2 Ver. Condenser

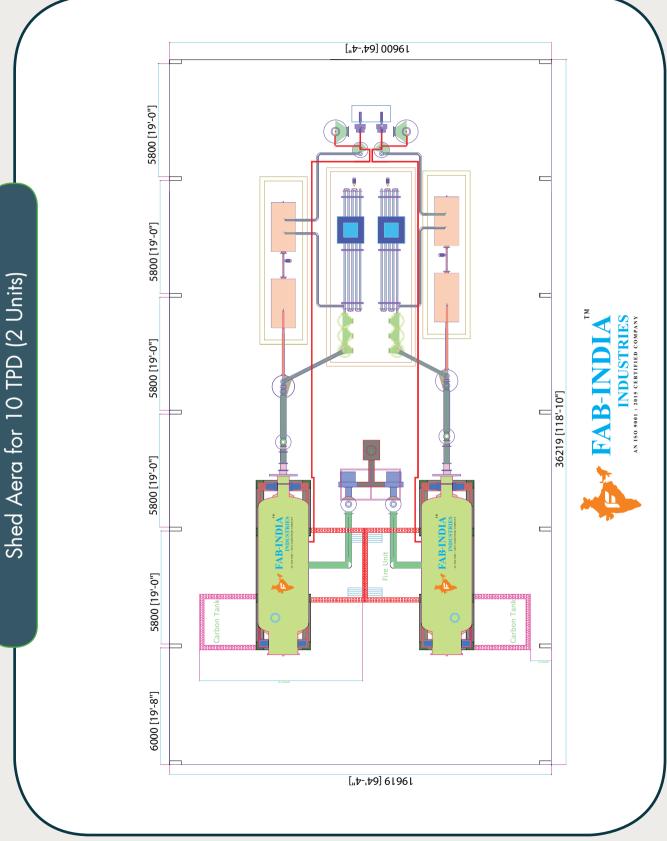


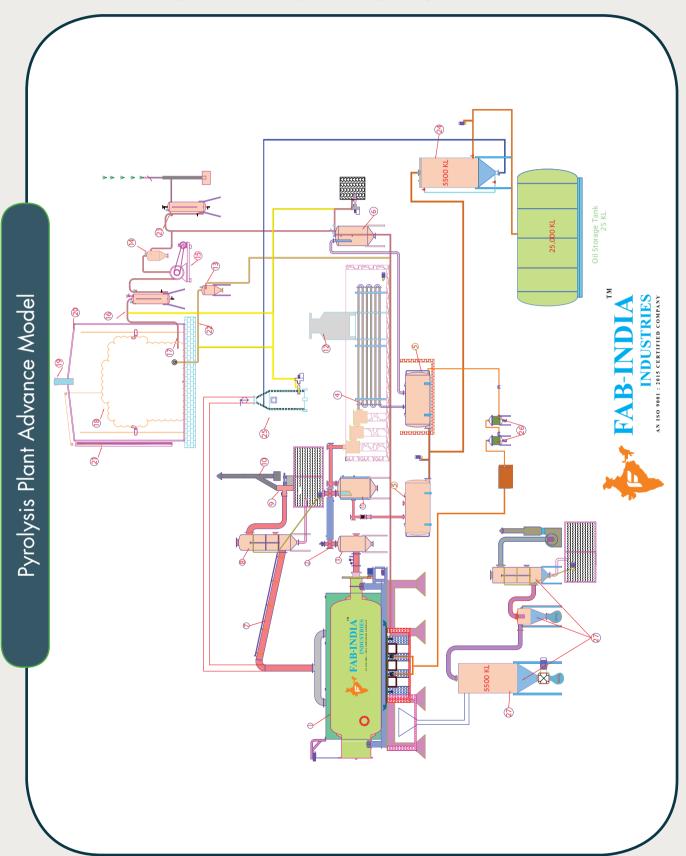
### 2 Set of Pyrolysis Plant (3D Drawing)



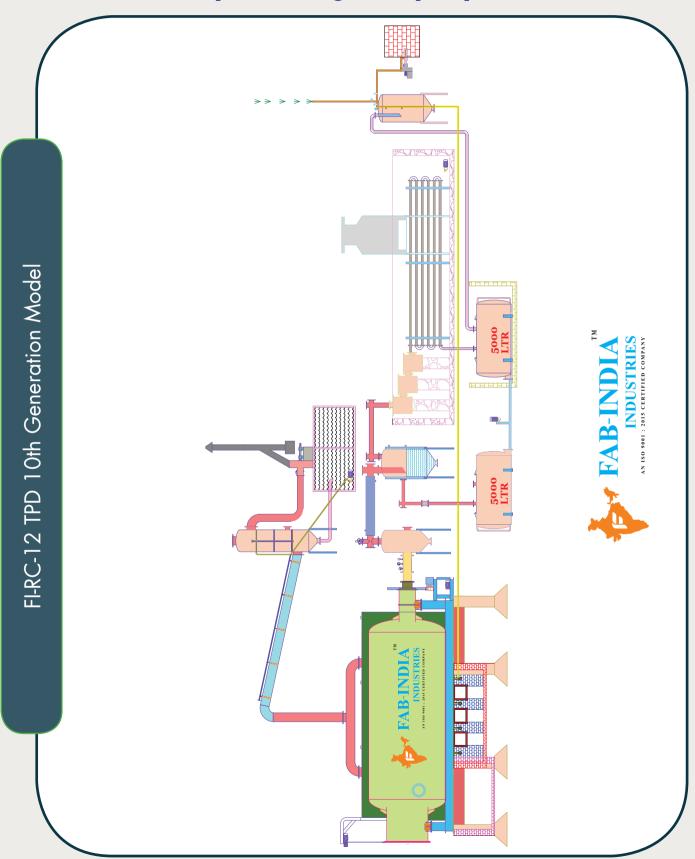














# **Technical Parameter**

Sr No	Item	Model	Model	Model	
1	Equipment type	FI - RF-5	FI - RC-10	FI-RC-12	
2	Raw material	Nylon / Radial Tyre	Nylon / Radial Tyre	Nylon / Radial Tyre	
3	Structural form	Horizontal rotation	Horizontal rotation	Horizontal rotation	
4	24-hour Capacity	4.3 ton	8.5 ton	10.5 ton	
5	Oil yield [40 to 45% oil]	1.72 ton	3.8 ton	4.4 ton	
6	Steel Scrap [15 to 20%]	0.86 ton	1.7 ton	1.6 ton	
7	Carbon [30 to 35 %]	1.29 ton	2.5 ton	3.6 ton	
8	Operating pressure	Normal ( 0.1 To 0.3 Kg)	Normal ( 0.1 To 0.3 Kg)	Normal ( 0.1 To 0.3 Kg)	
9	Material of Reactor	B.Q.Plates SA 516 Gr.70	B.Q.Plate SA 516 Gr.70	B.Q.Plate SA 516 Gr.70	
10	Thickness of Reactor	12 mm	14 mm	16 mm	
11	Rotate speed of Reactor	0.3turn/minute	0.3turn/minute	0.3turn/minute	
12	Total power	20KW	25KW	33KW	
13	Mode of Water cooling	Circular cooling	Circular cooling	Circular cooling	
14	Cooling area of condenser	20 Sq.Meter	51 Sq.Meter	77 Sq.Meter	
15	Kind of transmission	Dual speed motort	Dual speed motor	Dual speed motor	
16	Noise dB(A)	≤85	≤85	≤85	
17	Size of Reactor(D×L)	2.2×6.0 Mt.	2.6×6.6 Mt.	2.8 × 6.6 Mt.	
18	Working form	Intermittent operation	Intermittent operation	Intermittent operation	
19	Lend Requirement	10,800 Sq Feet.	10,800 SqFeet.	15,000 SqFeet.	
20	Delivery time	10 Days	10 Days	10 Days	
21	Installation Time	15 to 20 Day	15 to 20 Day	15 to 20 Day	
22	Training Time	5 Days	5 Days	5 Days	

#### **Waste Tyre Pyrolysis Plant- Model List**

Sr No.	Model	Size in Meter	Model Name
1	5 Tons	2.2 × 6.0	FI-RC-5 Ton (2 Vertical Condenser + 1 Horizontal Condenser)
2	7.5 Tons	2.2 × 7.5	FI-RC-7.5 Ton ( 3 Vertical Condenser-1 Horizontal Condenser)
3	10 Tons	2.6 x 6.6	FI-RF-10 Tons 4 th Generation (4 + 1 Vertical Condenser)
4	10 Tons	2.6 x 6.6	FI-RC-10 Tons 10th Generation Model
5	10 Tons	2.6 x 6.6	FI-RFC-10 Tons 10th Generation Model
6	12 Tons	2.8 x 6.6	FI-RC-12 Tons 10th Generation Model
7	12 Tons	2.8 x 7.5	FI-RFC-12 Tons 10th Generation Model
8	15 Tons	3.0 x 7.1	FI-RF-15 Tons Pipe - (Pipe Condenser - 6" - 32 pipe)

#### **Abbreviation**

FI = FAB INDIA RF = Reactor Flat Type RC = Reactor Capsule Type RFC = Reactor Flat Capsule Type

Auxilliary Equipments					
Tyre Cutting Equipment	<ol> <li>Tyre Side wall Cutter</li> <li>Hydraulic Tyre Cutter</li> <li>Tyre Ring Cutter</li> <li>Tyre Steel Removing Machine</li> <li>Tyre Block Cutting Machine</li> </ol>				
Tyre Feeding Equipment	<ol> <li>Belt conveyor for cutting tyre</li> <li>Hydraulic Auto Feeder Machine</li> </ol>				
Carbon Handling Equipment	<ol> <li>Carbon Screw 18 Feet</li> <li>Carbon Vacuum System</li> <li>Carbon Briquetting Machine.</li> </ol>				
Pollution Regulating Equipment	<ol> <li>Oil water Separater system with waste water Evoparating System.</li> <li>LDO Bunner system for heating chamber</li> <li>Hydrocarbon Gas storage device (balloon)</li> <li>Industrial Chimney 100 Feet</li> <li>Nitrogen Punching Device</li> </ol>				

#### **Payment & Other Terms**

- 30% advance booking against order confirmation
- 70% before Delivery
- Transportation and all taxes extra
- Erection / Installation in scope of supplier



# **Evaluation of Expenses and Gross Profit**

S.N	Other Contingent Expenses (per	month)		Amount (Rs.)
1	Postage and Stationery			2,000.00
2	Telephone			5,000.00
3	Traveling and freight			28,000.00
4	Consumables			20,000.00
5	Repair and Renewals			20,000.00
6	Insurance fire and Employee			20,000.00
7	Rent			NIL
	Total Amount 1		Total	95,000.00
	Utilities (per month)			
S.N	Personnel	Salary (Rs.)	Nos.	Amount (Rs.)
1	Manager(Production)	25000	1	25,000.00
2	Maintenance engineer	18000	1	18,000.00
3	Purchase Manager	25000	1	25,000.00
4	Semi-Skilled Workers	15000	6	90,000.00
5	Watchman	10000	1	10,000.00
6	Additional perquisites @ 20%		33,600.00	
7	Waste Tyre 10500 kg. per day x 22days x		20,79,000.00	
8	Coal/wood 1800 kg. per day x 22days x F	Rs 4/kg		1,58,400.00
9	Power 45HP $\times$ 0.8 $\times$ 24hours $\times$ 22 days $\times$ R	ls 6		40,000.00
10	Water			8,000.00
	Total Amount 2		Total Amount	24,87,000.00
Tota	Recurring Expenditure (per month) Rs. To	otal Amount 1		25,82,000.00
	Turnover per Monthly		Presented	Per Month
1	By selling Oil 4410 Ltrs*22 days*Rs 32/Ltr.	42 to 45%	31,04,640.00	
2	By selling steel scrap 1575kg*22days*Rs8/l	15 to 20%	2,77,200.00	
3	By selling Carbon 3465Kg *22days*Rs 1.5	30 to 35%	1,14,345.00	
4	Gas Around Recycling	5 to 10%	Nil	
	Turnover per Monthly		34,96,185.00	
	Total Recurring Expenditure (per Monthly) R		25,82,000.00	
	Monthly Gross Profit			9,14,185.00
		Gross Annu	Jally Profit	1,09,70,220.00

### 12 Tons Pyrolysis Plant Total Investment in one Plant [without land]

S.N	Details		Approximate Price
1	12 Tons Machine Cost	Without tax	52,00,000.00*
2	Transportation cost	Trailer/ trucks	1,50,000.00
3	Shed fabrication works [open shed]	50 Feet x 100 Feet	5,00,000.00
4	Oil Storage Tank 25000 Ltr.		1,50,000.00
5	Foundation cost only Machine	As per dwg	3,50,000.00
6	D.G. Generation set [40 KW]	Standard	3,50,000.00
7	Site Office [medium]	10 x 10 Feet x 2 Room	3,25,000.00
8	Pollution certificate		50,000.00
9	Electric Connection/Cable/Wiring Connection charge		25,000.00
10	Other Expenses		1,00,000.00
Tot	al Investment of 10 Tons Plant (Without la Investment working capital	72,00,000.00	

Minimum Land Requirement for Plant : 50' X 120'(Feet)
Total Land Requirement for Plant : 90' x 120'(Feet)
Foundation drawing will be send by us

# "Your Challenge is our Progress"



Works: Plot No.16, Khodiyar Estate, I/S. Shakriba Estate, Phase - IV, Vatva G.I.D.C, Ahmedabad.

Contact: +91 8980014621, Other Contact: +91 8980014640, +91 9725012741,

Tel No: +91 79 40301472, Skype ID: fabindia3133 Email Id: info@fabindiaindustries.com, info@wastetyreplant.com, Web Site: www.wastetyreplant.com, www.fabindiaindustries.com