THERMOTECH SYSTEMS LIMITED

An ISO 9001, 14001 & 45001 Company

PROPOSAL DESCRIPTION	
System	Thermic Fluid Heater
Capacity	2.5 MM Kcal/Hr. x 1 Nos.
Model	TSBB-2500
Fuel	Imported Coal (<8 mm Size)
Industry	Packaging
Proposal No.	TSL/2122/Q21369, Rev. 01
Proposal Date	03-02-2022

CUSTOMER DETAILS	
Company Name	Aakash Polyfilms Ltd
Location	Surat
Enquiry Ref. No.	Thermic Fluid Heater 2.5 M Kcal/hr. (1 No) Coal base
Contact Person & Designation	Mr. D K Gupta Plant & Project Head
Phone **Email**	+91-76239 92831 dkgupta@aakashpolyfilms.com

SUPPLIER DETAILS	
Company Name	Thermotech Systems Limited
Correspondence Details	Plot No. 2607-08, Phase-4, GIDC Vatva, Ahmedabad – 382 445, Gujarat, India.
Phone **Email**	+91-79-25840233, 25842387 sales@thermotechsystems.com
Website	www.thermotechsystems.com
Corporate Video	YouTube Ctrl + Click to follow link)




THINK OF FUEL ECONOMY: THINK OF THERMOTECH

Dear Customer,

We, at Thermotech Systems Ltd., are pleased to submit our Technical Proposal of Thermic Fluid Heating System

After understanding the technical requirements of the project, we propose 1 Nos. x Thermic Fluid Heater of 2.5 Million Kcal/hr. capacity suitable for Imported Coal as a fuel.

Based on the enquiry documents provided, we have enclosed our detailed Technical Proposal for design, procurement, manufacturing, Inspection, testing & supply of Thermic Fluid Heating System (TFH) as per scope mentioned in proposal.

We hope that you will find our offer in line with your requirements. In case you need any additional information/support, we shall be pleased to furnish the same.

We look forward to have a further discussion with you on this subject.

Thanking you & assuring you our best services at all times.

Yours faithfully,
THERMOTECH SYSTEMS LTD.

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REVISION HISTORY

Rev. No.	Date	Changes	Page No.	Requested By

1. COMPANY BRIEF

- **THERMOTECH SYSTEMS LIMITED (TSL)** is an Internationally Renowned Eco-Energy company hailing from India
- Began its operation in 1988 & has established its rock solid foothold in fabricating cutting edge industrial process heating equipment & systems for wide scope of industries.
- Served more than ***3,200 industries in India & Abroad*** & numbers are increasing every day.
- An ***ISO 9001 – 2015, 45001 – 2018, 14001 – 2015*** company with quality, delivery & performance commitment.
- Manufacturing space of 4,800 Sq. Yard + 2,400 Sq. Yard with 20 Mtrs. Height shed
- Manufacturing Infrastructure of delivering 300 Tons per Month
- 200 + Strong Team Members
- State of Art Manufacturing with major TPI clearance like BVIL, SGS, TPL, TUV, L&T, TPL etc.
- Well experienced team backed by Engineering Consultants for smooth project execution

MAJOR CLIENTELE

SHELL, PETROFAC, CAIRN, OIL, L&T, RELIANCE, BASF, IFFCO, TOYO, INEOS, ADANI, THRUMAILAI CHEMICALS, GODREJ GROUP, VVF, ANSELL, HALEYS, RAYMONDS, RECKITT BENKISER, BALAJI WAFFERS, UFLEX LTD., FORBES MARSHALL, DNO MIDDLE EAST, GPS, FINLAYS, EMAMI, MULTITEX & MANY MORE…

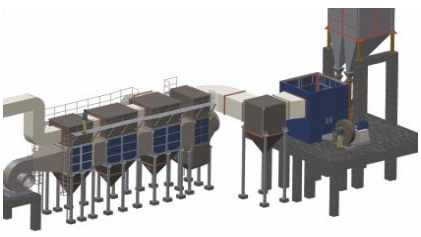
MAJOR PRODUCT RANGE

1. **THERMIC FLUID HEATER (DIN 4754)**
2. **FIRED HEATER (API 560)**
3. **HOT WATER GENERATOR**
4. **HOT AIR GENERATOR**
5. **WATER BATH HEATER (API 12K)**

FUEL:
SOLID (COAL, BIO-MASS, AGRO WASTE etc.)
LIQUID (FO, LDO, HAS, CRUDE OIL etc.)
GAS (LPG, FUEL GAS, H_2, OFF-GAS etc.)
CAPACITY: Up to 50 MM Kcal/hr.







2. TECHNICAL SPECIFICATION

BASIC CONFIGURATION			
1.	Heat Energy Output	kcal/hr.	25,00,000
2.	Model	--	TSBB 2500
3.	Type	--	Vertical - 4 Pass system
4.	Fuel Type	--	Imported Coal
5.	Fuel Size	mm	≤ 8 mm Diameter
6.	Mode of Feeding	--	Auto through Screw Feeder for over bed feeding
7.	Ash Collection	--	• Manual through Sliding Damper for Furnace Bottom. • Auto through Rotary Airlock Valve (RAV) for APH & DC.
OPERATING & DESIGN PARAMETERS			
1.	TFH Turndown Ratio	--	1 : 3
2.	TF Outlet Temperature (Operating / Design)	°C	300 / 310
3.	TF Temperature Difference	°C	20 (Max)
4.	Flow Rate (Operating)	$m^3/hr.$	248
5.	Pressure Available at Heater Outlet (1)	mlc	50
6.	TF Pressure (Max Design)	$kg/cm^2(g)$	10
7.	Flue Gas Outlet (Stack) Temperature	°C	210 ± 20
8.	Efficiency at Full Load on NCV basis : BS 845	%	81 ± 2
9.	Expansion Tank Capacity / Holdup Estimated (2)	m^3	4 / 10
10.	Expansion Tank Temperature	°C	< 85
11.	Outlet Emission after Bag Filter : Coal	mg/Nm^3	< 100
12.	Outlet Emission after Wet Scrubber : Coal	mg/Nm^3	< 100

HEAT EXCHANGER (COILS)			
1.	Heat Energy Output	kcal/hr.	25,00,000
2.	Coils Material (MOC) (3)	--	Seamless Pipe: SA 106 Gr B, Sch. 40
3.	Type of Coil Structure	--	Series
4.	Heat Flux	kcal/hr-m^2	11,200
5.	Coil Volume (holdup cap.)	m^3	3.8
6.	TF residence time	Seconds	75
THERMIC FLUID CIRCULATING PUMP – SINGLE MECHANICAL SEAL PUMPS (1W + 1S)			
1.	Type	--	C.S. Body, Centrifugal, Air-Cooled
2.	Flow (Capacity)	m^3/hr.	248
3.	Head	MLC	80
4.	Motor	KW	75
INDUCED DRAFT (ID) FAN SUITABLE TO BE OPERATED WITH BAGHOUSE & WET SCRUBBER			
1.	Flow	m^3/hr.	16,000
2.	Head (@ 20°C)	mmWC	720
3.	Motor	KW	55
4.	Type/RPM	--	Centrifugal, Belt Driven, 1440 RPM x IE2 TEFC
FORCED DRAFT (FD) FAN			
1.	Flow	m^3/hr.	9,000
2.	Head (@ 20°C)	mmWC	400
3.	Motor	KW	15
4.	Type/RPM	--	Centrifugal, Direct Coupled, 2800 RPM x IE2 TEFC

AIR PRE-HEATER (APH)			
1.	Type	--	Vertical Smoke Tube Type
2.	Heat Transfer Area	m^2	60
UTILITY CONSUMPTION			
1.	Connected Electric Load (With Bag Filter & Fuel Handling System)	KW	~ 171 (Total for 1 Nos. x TSFB-2500 TFH System)
2.	Fuel: Imported Coal @ GCV – 5,500 Kcal/Kg (4)	kg/hr.	590
3.	Compressed Air / Nitrogen	$kg/cm^2(g)$	4.5 – 6.5
SITE CONDITIONS (ASSUMED)			
1.	Ambient Temperature	°C	25
2.	Electric Power Supply		415 V (± 10%) / 50 ± 5 Hz / 3 Ph. – 4 Wire
3.	Control Power design		230 V (± 10%) / 50 ± 5 Hz / 1 Ph. – 2 Wire

NOTES:

(1) Outlet Pressure can be changes as per client process requirement, which will change power consumption of TF pump.

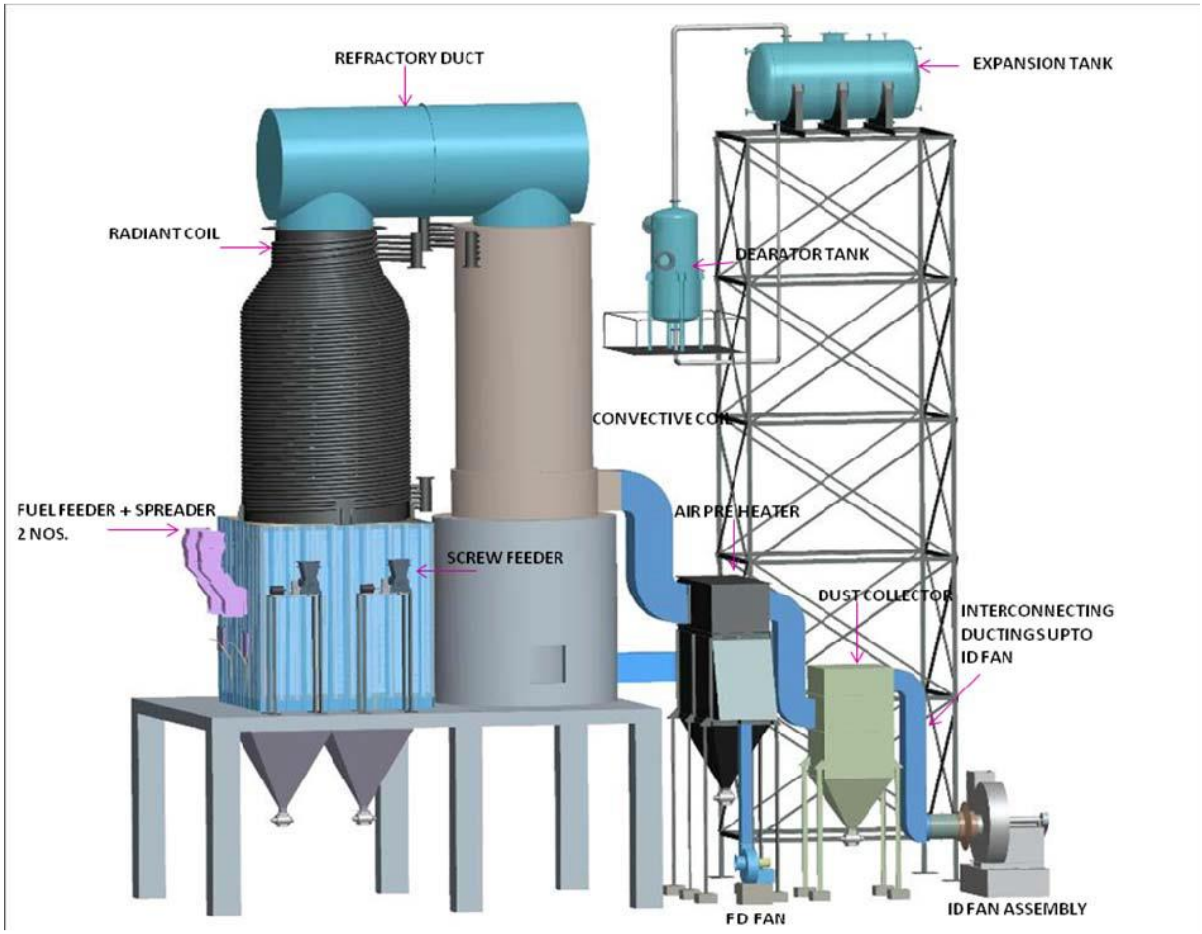
(2) Holdup estimation shall change as per client's piping & process equipment holdup. In case holdup is more than specified by us, Expansion tank capacity needs to be changed.

(3) Optional Coil MOC available are Seamless Tubes / Seamless Pipes as per client requirement.

(4) Fuel consumption varies as per actual fuel NCV.

(5) In view of constant R&D to improve the quality of products the technical specifications are subject to alterations without prior notice

3. SCOPE OF SUPPLY



TYPICAL LAYOUT OF THERMIC FLUID HEATER

NOTE:

Above representation of Thermic Fluid Heating System is only for understanding of customer. It may be possible that all parts shown may not be included in the scope of Thermotech Systems Ltd. (TSL). Please refer detailed scope of supply and scope matrix provide along with proposal for better understanding of scope of supply.

MANDATORY SCOPE OF SUPPLY (FOR 1 NOS. X TSBB-2500 TFH SYSTEM)

No.	EQUIPMENT DESCRIPTION	QTY.
1.	**FURNACE:** Furnace suitable for Crushed Coal as a fuel for combustion having Bubbling bed assembly. The Furnace comprises of: • M.S. Structure of channel / angle as required • Bubbling bed assembly with SS Nozzle • Primary & secondary combustion air distribution nozzles	01 Set
2.	**FUEL FEEDING SYSTEM (OVER BED):** Fuel Feeder mounted on Furnace for Coal feeding in auto mode, comprising of: • Screw type feeder with gear, drive motor, base frame assembly; • Gear motor connected with VFD to control feed speed of fuel as per load demand.	01 Set
3.	**RADIANT HEAT EXCHANGER:** Single Helical Type Coil mounted directly over furnace for Maximum radiation heat absorption. Coil is Single Pass: • MOC: Pipe: Seamless Pipes : SA 106 Gr. B (Sch-40) • Pneumatic Pressure test @ 10 Kg/cm2	01 Set
4.	**CONVECTIVE HEAT EXCHANGER (COIL WITH SHELL ASSEMBLY):** Twin Concentric Helical Type Coil mounted by side of Radiant Coil, where flue gas transfers heat in convection mode with Thermic fluid. The Coil is housed in Shell fabricated from M.S. Plates (IS 2062) with Top & Bottom shell refractory done. Coil is Three Pass: • MOC: Pipe : Seamless Pipes : SA 106 Gr. B (Sch-40) • Pneumatic Pressure test @ 10 Kg/cm2	01 Set
5.	**REFRACTORY DUCTING:** M.S. Plates (IS 2062) Fabricated (Refractory Duct connecting Radiant & Convective Heat Exchanger Coils with anchors inbuilt to hold refractory bricks & cement properly.	01 Set
6.	**AIR PRE-HEATER ASSEMBLY (APH):** APH is 2 pass smoke tube type heat exchanger, which preheats combustion air by hot flue gas coming from Convective Heat Exchanger assembly & thus increases overall TFH System efficiency by 4-6%. • APH pipes MOC = IS 3074 / BS 6323 • All construction of M.S. Plates (IS 2062), channel & angles	01 Set
7.	**POLLUTION CONTROL EQUIPMENT (DUST COLLECTOR):** Multi Cyclone Type Dust collector is a pollution control equipment, which ensures ash removal from outlet flue gas. • MOC: M.S. Plates (IS 2062) • Hopper below Dust Collector for ash collection • RAV below hopper.	01 Set

No.	EQUIPMENT DESCRIPTION	QTY.
8.	**BAG FILTER SYSTEM for <100 mg/nm³ of Emission Levels:** Bag Filter System with Filter Bags (High Temp. suitable) with its mounting plate, housing, supporting structure, bypass damper, interconnecting ducting, Insulation, Rotary Air Lock Valve, etc. as a complete assembly for maintaining Flue Gas Outlet Emission @ <100 mg/nm³ to meet local pollution norms.	01 Set
9.	**WET SCRUBBER SYSTEM (POLLUTION CONTROL EQUIPMENT):** Wet scrubber as a complete assembly for maintaining Flue Gas Outlet Emission to meet local pollution norms. • MOC of Scrubber: SS 304 • Water Pump: 20 m³/hr. (To be confirmed during detailed engineering) • Quality of Water Required: >10 pH • Inclusion: → Complete scrubber assembly with support structures, railing, platform, ladders etc. → Water circulation pump & motor assembly → Flue gas ducting → All electrical cabling • Exclusions: → Water supply to water header → Contaminated water from wet scrubber to clients ETP along with pumping system	01 Set
10.	**INDUCED DRAFT (ID) FAN ASSEMBLY:** ID Fan assembly comprising of: • ID Fan with coupling, drive motor, pulley, belt drive assembly, coupling guard mounted on base frame. • MOC: M.S. Plates (IS 2062 Gr. A/B) • Motor : TEFC Induction type IE2 Efficiency : 1440 rpm	01 Set
11.	**VFD FOR ID FAN:** Variable Frequency Drive (VFD) provided for ID Fan operation to: • Start ID Fan in slow speed & make power saving in ON-OFF Operation of TFH. • Control ID Fan speed to modulate Flue Gas during Start-up & Operational mode for Power Saving & TFH Control in MODULATION Operation of TFH.	01 Set
12.	**FORCED DRAFT (FD) FAN ASSEMBLY:** Separate FD Fan assembly for Wood, comprising of: • FD Fan with coupling, drive motor, direct drive assembly, mounted on base frame. • FD Fan MOC: M.S. Plates (IS 2062 Gr. A/B) • Motor : TEFC Induction IE2 Efficiency : 2800 rpm	01 Set

No.	EQUIPMENT DESCRIPTION	QTY.
13.	**VFD FOR FD FAN:** Variable Frequency Drive (VFD) provided for FD Fan operation to: • Start FD Fan in slow speed & make power saving in ON-OFF Operation of TFH. • Control FD Fan speed to modulate Combustion Air during Start-up & Operational mode for Power Saving & TFH Control in MODULATION Operation of TFH.	01 Set
14.	**SOOT BLOWER (SB) ASSEMBLY:** Soot Blower assembly for removal of Ash & Other Solid Particles deposited between gap of Convective Coils, comprising of: • Blower Fan with coupling, drive motor, direct drive assembly, mounted on base frame. • Blower Fan MOC: M.S. Plates (IS 2062 Gr. A/B) • Motor : TEFC Induction IE2 Efficiency : 2800 rpm	01 Set
15.	**THERMIC FLUID CIRCULATION PUMP & MOTOR ASSEMBLY (WORKING):** Thermic Fluid Circulation Pump assembly comprising of: • Centrifugal type circulating pump with motor assembly. • Pump is of Air Cooled type. • Motor: TEFC Induction IE2 Efficiency: 2800 rpm • Pump coupled with motor by pullout coupling, coupling guard & mounted on base frame assembly.	01 Set
16.	**THERMIC FLUID CIRCULATION PUMP & MOTOR ASSEMBLY (STANDBY):** Standby Thermic Fluid Circulation Pump assembly comprising of: • Same Specification of Working Thermic Pump with Motor Assembly. • Electrical Starter of same capacity with changeover arrangement	01 Set
17.	**DIESEL ENGINE DRIVE (DED):** Diesel Engine Drive with Pulley arrangement is supplied to maintain minimum flow of Thermic Fluid inside Radiant & Convective coils in case of power failure in plant. Diesel Engine to be coupled with working Thermic Pump only.	01 Set
18.	**REFRACTORY MATERIAL SUPPLY with LABOUR:** Material supply of Refractory for Furnace & Refractory Ducting: • Refractory Bricks, Insulation Bricks • Refractory Cement: Accoset 50, Fire Crate, Fire Clay etc. • Lining Labor: 2 Persons for Refractory lining of Furnace & Refractory Ducting at site. (Unskilled labors, Scaffolding, mixing vessel, etc. supply in Purchaser scope)	01 Set
19.	**INSULATION MATERIAL SUPPLY with LINING LABOUR:** Supply Insulation Material with cladding for Furnace Internal, Radiant & Convective Coils, Air-Preheater, Baghouse, Interconnecting Ducting (Flue Gas, Up-to ID Fan Inlet): • MOC of Insulation: LRB (96 kg/m^3 Density or 128 kg/m^3 Density) • Cladding Material: Aluminum Cladding Sheet of 24 SWG thickness	01 Set

No.	EQUIPMENT DESCRIPTION	QTY.
	• Lining Labor: 2 Persons for Insulation lining of Furnace Internal, Radiant & Convective Coils, Air Pre-Heater, Baghouse and Interconnecting Ducting. (Unskilled labors, Scaffolding, etc. supply in Purchaser scope)	
20.	**INTERCONNECTING DUCTING:** All Interconnecting Ducting up to ID Fan Inlet for all services (Pre-Heated Combustion Air, Flue Gas, Fresh Air) supplied pre-fabricated: • MOC of Ducting: M.S. Plates (IS 2062 Gr. A/B)	01 Set
21.	**EXPANSION & SEPARATE DE-AERATION TANK:** Expansion Tank designed to withstand volumetric thermal expansion of Thermic Fluid at elevated temperatures. De-aeration Tank designed for removal of low boils, vapors & is connected with Expansion Tank: • MOC of Expansion & De-Aerator Tank: M.S. Plates (IS 2062 Gr. A/B)	01 Set
22.	**NITROGEN BLANKETING SYSTEM:** Nitrogen (N_2) Blanketing system, with exposure to oxygen in the **Expansion tank** at elevated temperatures, thermal fluid will oxidize. An inert gas manifold will minimize oxidation of the thermal fluid. The inert gas blanket package consists of the following: • Ball type inlet shut – off valves, Low pressure switch • Pressure regulating valve, Automatic back pressure relief • Pressure gauge, Pressure relief valve (Safety valve) • Vacuum breaker & Seal Pot (As required)	01 Set
23.	**STORAGE TANK:** Storage Tank designed to store Thermic Fluid, for first charging and make up during operation.: • MOC of Tank: M S. Plates (IS 2062) • Hold up of Storage Tank: 5 m^3 (Client to Confirm)	01 Set
24.	**CHARGING PUMP:** Charging Pump (External Gear Type) with Motor Assembly provided Outside of Storage Down Tank to recharge TF Oil back into the System. • Capacity = 10 m3/hr., Discharge Pressure = 3 kg/cm^2.	01 Set
25.	**COAL STORAGE BUNKER:** Bunker with conical bottom suitable for storage of Fuel with sufficient fuel storage capacity of 12 Hrs. Bunker will be having level switches for measuring level of fuel inside bunker. • Fuel Size: ≤ 6-20 mm • Bunker Capacity: 10 m^3	01 Set
26.	**FUEL HANDLING SYSTEM:** Fuel Handling System consisting of Feed Hopper with Grizzly, Feed Belt Conveyor, Suspension Magnet, Knittle Crusher, Product Bucket Elevator, Control Panel etc. • Fuel Handling System Capacity: 3 Tons per hour	01 Set

No.	EQUIPMENT DESCRIPTION	QTY.
	→ Input Fuel Size: <50 mm → Output Fuel Size: ≤ 6-8 mm • Feed Hopper with Grizzly → Capacity: 0.5 m³ → Accessories: Manual Operated Slide Gate for Flow Control • Feed Belt Conveyor (BC-1) → Type: 20° Troughing → Take up: Screw Type → Capacity: 3,000 kg/hr. (Operational) → Belt Size: 500 mm (W) → Motor: 2 HP • Suspension Magnet → Type: Permeant Suspension Magnet → Operating Height: 200 – 250 mm → Installation: Above Belt Conveyor → Suspension Body MOC: SS & MS → Bottom Material Contact: SS 304 • Knittle Crusher → Capacity: 3,000 kg/hr. (Operational) → Initial Feed Size: Up-to 50 mm → Product Size: 6-8 mm → Motor: 10 HP x 900 RPM • Product Bucket Elevator → Capacity: 3,000 kg/hr. (Operational) → Height: 15 Mtrs. → Motor: 5.0 HP → Take up: Screw Type → Accessories: Feed Hopper, Discharge Chute, Drive Platform • Running Time of Fuel Handling System → 12 Hrs. / Day	
27.	**ELECTRICAL CONTROL PANEL (MCC+VFD):** Dust protected, powder coated, Pre-wired, Electrical & Control Panel (Compartment Type) supplied with necessary switchgears: • MCC Comprising of Contactors, Overload Relays, Isolation Switches etc. for all Motors. • VFD for ID Fan, FD Fan & Fuel Feeders • Control Functions for Temperatures, pressure, level switch for coil etc. • Ampere and Volt meter – common complete panel • Panel shall be of IP 42 type, to be kept in Safe Area by Client.	01 Set

No.	EQUIPMENT DESCRIPTION	QTY.
28.	**INTERNAL CABLING OF TFH SYSTEM:** **Loose Supply** of Electrical & Instrument Cabling along with its accessories from & up to our Control Panel, motors & instruments etc. within **heater room only**. Panel should be installed within 15 Mtrs. Radius of Heater Room. • Power Cable & its Accessories from MCC Panel to TFH's all Motors & Switches. • Instrumentation & Control Cables and its accessories from Panel to all Instruments of TFH. • All power cables shall be of copper / aluminum as per size requirement. • All Instrumentation cables to be screened and be Cu multi-strand. • Cable Trays shall be of GI – Perforated type • Main cable from Client's mains to TFH MCC Panel shall be in **Purchaser's scope.**	01 Set
29.	**HEATER ROOM PIPELINE & VALVES:** **Loose Supply** of Pipeline with all accessories (Valves, Fittings, Insulation Material and other accessories) for Heater Room: • Pipeline Material: ERW Pipe IS 1239 / 3589, "C" Class thickness • Total Length: 60 Mtrs. (To be Confirmed by Client) • Service & Size: → Forward Line from TFH to O/S Boiler House Battery Limit & Return Line from O/S Boiler House Battery Limit to De-Aerator Tank, De-Aerator Tank to Thermic Pump & Thermic Pump to TFH: 250 NB → De-Aerator Tank to Expansion Tank: 80NB → Drain/Overflow Line: 50NB → Charging Line of Thermic Fluid: 25NB • CS Body (Gland Type) #150 SORF Flanged End Valves with matching flanges & SS 304 Spiral Wound Gaskets: → Gate Valves, Size 250 NB: 4 Nos. → Globe Valves, Size 250 NB: 1 Nos. → Check Valves, Size 250 NB: 3 Nos. → Basket Filter, Size 250 NB: 2 Nos. → Gate valves, Size 50NB: 2 Nos. → Check Valves, Size 80NB: 1 Nos. → Gate valves, Size 25NB: 4 Nos. (#800, SW) → Check Valve, 25 NB: 1 Nos. (#800, SW) → Safety Valve, Size 50NB x 25NB: 1 Nos. → Y Strainer, 25 NB: 1 Nos. • Insulation of Hot Oil Pipeline: LRB of 128 kg/m³ Density with 24/25 SWG Aluminum/CRCA Cladding.	01 Set
30.	**PLATFORM, LADDERS & STRUCTURAL SUPPORTS:** **Loose Supply** of Structural supports, platforms and ladders for below listed equipment for Mounting & ease of operation and maintenance. Structure, platforms and ladders shall be complete with TSL Standard painting scheme and other applicable accessories:	01 Set

No.	EQUIPMENT DESCRIPTION	QTY.
	• Mounting Structures → Bunker → Expansion Tank (Max. Elevation Considered = 13 Mtrs) (Client to Confirm) • O&M Structure → Instrument access → APH, HE Coils	
31.	**CHIMNEY with Ducting from ID fan to Chimney:** Chimney of **750 mm** Top Diameter & overall height of **31 meters** to provide natural draft to flue gas passage and in accordance with Local Pollution Control Board guidelines. Chimney shall be Designed and manufactured as per IS 6533 Part A & B Standard, Seismic Zone III. Chimney will be complete with base plate, pollution sampling point, Ladder with Platform, lightning arrestor, Earthing strip, foundation bolts, and 2 coats of High Temp. Aluminum Paint, etc. • Max. Length of Duct from ID Fan to Chimney = 5 Mtrs. • Instrument Ports for SPM, SOx & NOx Analyzer.	01 Set
32.	**ERECTION & SUPERVISION OF COMMISSIONING OF TFH SYSTEM:** Erection & Supervision of Commissioning of 1 Nos. x 2.5 Million Kcal/hr. TFH, internal structure, Heater Room Cabling, Ducting, Painting, Pipeline, Insulation, Panel Erection, Chimney, Fuel Handling System etc. shall be carried out by TSL team at site considering all applicable safeties & statutory requirement of client. Thermotech will furnish complete team with required local structural support, supervisor engineers, labors, etc. All safety standard shall be maintained as per Good Engineering Practice. • Documentation Scope: → Daily / Weekly Work Report • Inclusion: → 8 Hours Working at Site considering break for Lunch & Tea break. → Documentation as mentioned in the policy. → Pneumatic Testing of Pipeline → All Tools & Tackles for Site Fabrication works & Erection (Crane, Hydra, Welding Equipment Etc.) • Exclusions: → Client should give clear levelled ground space for site fabrication & erection activities. → Civil & Foundation work readiness before erection work commences. → Client to provide adequate space adjoining to TFH area for material storage and site fabrication activities. → Storage space of fabrication & erection material. → Incidentals (Meals etc.) → Gate-pass, Training required → Utilities required for Site Fabrication such as Compressed Air, Power, Water etc. → Client will take responsibility if material damage/stolen from site once it is unloaded in client warehouse/package area.	01 Set

No.	EQUIPMENT DESCRIPTION	QTY.
	• Terms & Conditions → Client will be liable to provide necessary provision to Expat for Thermal Screening, Hand Sanitization, Masks (N-95 Type) due to Pandemic conditions of COVID-19. → One working day shall be equal to 8 Man-hours.	

INSTRUMENTS LIST OF TSL (LOOSE SUPPLIED) (FOR 1 NOS. X TSBB-2500 TFH SYSTEMS)

No.	INSTRUMENTS LIST	QTY
1.	Temperature Sensors: Thermic Oil Forward Header Thermic Oil Return Header Flue Gas Inlet of Chimney Flue Gas Inlet of Baghouse Filter	 1 Nos. 1 Nos. 1 Nos. 1 Nos.
2.	Pressure Gauge with Instrument Tubing mounted near Coils: Thermic Oil Return Header Pressure (Pump Pressure) Thermic Oil Forward Header Pressure (Circuit Pressure)	 1 Nos. 1 Nos.
3.	Differential Pressure Switch (DPS) Across Forward & Return Header of Thermic Oil	1 Nos.
4.	Differential Pressure Switch (DPS) Across Baghouse Flue Gas Side Inlet & Outlet	1 Nos.
5.	Furnace Draft Transmitter	1 Nos.
6.	Level switch (Float Type) on Expansion Tank	2 Nos.
7.	Level Gauge (Glass Tube) Assembly for Expansion tank & Storage Tank	2 Nos.
8.	Instrument tubing and its accessories for DPS, PG, LG, etc.	1 Set
OPTIONAL LIST OF INSTRUMENTS (@ EXTRA COST)		
a.	Expansion Tank Temperature sensor & Indicating Controller	Nil
b.	Temperature Transmitters with Sensors in place of Temperature Switches	Nil
c.	Differential Pressure Transmitters in place of DPS	Nil
d.	Level Transmitter in place of Level Switch & Level Gauge	Nil
e.	Temperature Sensor with Switch / Transmitter @ APH Inlet / Outlet	Nil
f.	SPM, SOx & NOx Analyser (Common for all Heaters)	Nil

OPTIONAL SCOPE OF SUPPLY (PRESENTLY CLIENT SCOPE)

No.	EQUIPMENT DESCRIPTION	QTY.
1.	**ONLINE MONITORING SYSTEM:** IIOT Module to be fitted in Standard or PLC Panel, which will give below details to client in Real-time over Mobile, Computer Dashboard, IPad, etc.: • Data Monitoring & its Analysis • Alarms & Alerts along with its reports • Performance Monitoring, evaluation & recommendation • O&M Scheduling • Historical data & its comparison with current data • Multiple reports on Shift wise, daily, weekly, monthly, quarterly, yearly, etc. available by email & in App.	01 Set
2.	**ELECTRICAL CONTROL PANEL (PLC):** Single Front operated, Dust protected, powder coated, Pre-wired, PLC Panel supplied with necessary configuration & Programming to Control TFH Operations. The Panel consist of: • Relay Based non redundant type PLC panel with Modbus / Ethernet communication to Client's DCS. PLC has 20% spare capacity from designed I/O's. • HMI of Touch Screen System with 10" Display for display & operation of all values, trends, data logger, etc. Indication of Temperature, Pressure, Flow, Level & Motor indication on HMI. • Panel Enclosure suitable for Safe Area operation (IP 52 Type) & Bottom Cable Entry Type.	01 Set
3.	**THERMIC FLUID**	01 Set

MANDATORY CLIENT SCOPE OF SUPPLY

No.	DESCRIPTION
1.	Design & Construction of Civil works, Foundation of all equipment etc.
2.	Design & Supply of Foundation Bolts of all equipment
3.	Shed for housing complete system with roof & side walls
4.	All Pipeline with Valves, Fittings, Insulation, Erection, Testing of Thermic Oil & any other utility (Except as mentioned in our Scope)
~~5.~~	~~All Structural work for Expansion Tank mounting, Interconnecting Pipeline, O&M of Coils, APH, MDC, etc.~~
6.	~~Electric, Control & Instruments cabling from field to Panel &~~ Earthing of all equipment
7.	Power Supply to Panels along with proper Earthing
8.	~~Fuel Handling System up to feed doors~~
9.	Ash Handling System from each Ash discharge zone of TFH to safe location
10.	All Utilities (Power, Water, Compressed Air, Fuel, Lubricants, etc.) required for assembling, erection, testing & commissioning of TFH
~~11.~~	~~Thermic Fluid Storage Tank & its charging pump~~
12.	Transportation of equipment from TSL works to Site & it's Safe Unloading
~~13.~~	~~Erection of all equipment supplied by TSL (Preferred under supervision of TSL)~~
14.	~~Commissioning,~~ Operation & Maintenance of complete Thermic Fluid heating System
15.	Any other equipment / service not mentioned in TSL scope of supply
16.	All the material will be loose supplied until unless specified

INTERLOCK & ALARMS:

INSTRUMENT / MOTOR	CAUSE	EFFECT	TYPE OF ALARM	SAFETY DESCRIPTION
Thermic Oil Pump	Trip	Fuel Feeder, ID & FD Fan Trip	Visual	Low Flow safety
Level Switch (on Expansion tank)	Trip	Fuel Feeder, ID & FD Fan Trip	Audio & Visual	Low fluid safety
Differential Pressure Switch (DPS)	Trip	Fuel Feeder, ID & FD Fan Trip	Audio & Visual	Low Pressure safety
ID Fan	Trip	Fuel Feeder& FD Fan Trip	Visual	Back firing safety
Thermic Oil Forward Temperature	High	Fuel Feeder, ID & FD Fan Trip	Audio & Visual	Thermic Oil High Temperature safety
Thermic Oil Return Temperature	High	Fuel Feeder, ID & FD Fan Trip	Visual	Thermic Oil High Temperature safety
Flue Gas Outlet Temp. to Chimney	High	Fuel Feeder, ID & FD Fan Trip	Audio & Visual	Heater Chocking & Mechanical Safety
Bed Temperature	High/Low	Fuel Feeder Trip	Audio & Visual	Furnace Safety
Mechanical Safety Valve	Open, Lift up	Release Over Pressure		Thermic Oil High Temperature Safety

DOCUMENTATION SCOPE:

No.	DOCUMENTS & DRAWINGS
1.	GA layout of Thermic Fluid Heater system
2.	Foundation Layout with Load Data
3.	Pipeline & Instrument Drawing (P&ID)
4.	Refractory Lining Drawing
5.	Refractory & Insulation material BOM
6.	Panel Drawings (GA, Wiring Diagrams, BOM etc.)
7.	Internal Testing Certificates of HE Coil
8.	Material Test Certificates (Pipes, Motor, Instruments – As Applicable)
9.	Operation and Maintenance Manual

PERFORMANCE GUARANTEE CRITERIA:

→ Thermic Fluid

→ Thermic Oil "Therminol 66" suitable for Bulk Temperature of 345 °C & Film Temperature of 375 °C

→ Fuel for combustion

Fuel	Moisture % (Max.)	Ash % (Max.)	C% (Max.)	H_2% (Max.)	N_2% (Max.)	O_2% (Max.)	S% (Max.)	Size (Max.)	NCV
Imp. Coal	12.55	8.6	59.19	3.09	1.05	15.05	0.47	< 50 mm	~ 4,975 kcal/kg

→ Power Supply

- 415 volts ± 2%, 50 Hz ± 3%, 3 Phase, 4 wire system. In case of voltage fluctuation exceeds the above limits, customer is advised to install a constant voltage transformer (CVT) for protecting electrical components.

4. BATTERY LIMIT

- Thermic Fluid
  - → Forward Header of Heat Exchanger @ Heater Room B/L
  - → Return Header of Heat Exchanger @ Heater Room B/L
- Fresh Air
  - → Air Inlet of FD Fan
- Fuel
  - → Inlet of Fuel Handling System Feeding Point (Max. Coal Size = 50 mm)
- Flue Gas
  - → Outlet of Chimney
- Electrical & Instruments
  - → Incoming and outgoing terminals in Electrical & Control panels
  - → All terminal connections in Motors & Instruments
- Ash
  - → All Ash discharge points of all equipment

5. MAKES OF MAJOR COMPONENT

NO.	COMPONENT	MAKE
1.	HE Coil Pipes/ Tubes	TATA / Jindal / MSL /Equivalent
2.	Electric Motors	BBL / CG / LHP / Havells
3.	Thermic Fluid Circulation pump	KSB / Equivalent
4.	Thermic Fluid Charging / Makeup Pump	Prakash / Entees / Equivalent
5.	A.C. Variable Drive (VFD)	ABB / Siemens / Allen Bradley (Rockwell) / Schneider
6.	FD Fan (Direct Drive)	Thermotech Approved Vendor
7.	ID Fan (Belt Driven)	Thermotech Approved Vendor
8.	Safety Relief Valve	Darling Muesco / Fainger / Equivalent
9.	Temperature Sensor	GIC / Altop / Rays
10.	Pressure/DP Switch	WIKA / Indfoss / Denfoss
11.	Main incomer – SFU	Siemens / Schneider
12.	HRC Fuses	Siemens / L&T
13.	Indicating lamps	Siemens / Schneider
14.	Selector Switches	Salzer / Kaycee / Schneider / Siemens
15.	CT Coils	Trio / Equivalent
16.	MCB / MPCB / MCCB	Siemens / L&T / Schneider
17.	Relays	Siemens / L&T
18.	Contactors	Siemens / L&T
19.	Electric & Control Panel Enclosures	Thermotech Approved Vendor
20.	Programmable Logic Controller (PLC)	Siemens / Allen Bradley / Schneider / Rockwell / Honeywell
21.	HMI	Siemens / Allen Bradley / Honeywell
22.	Flexible cables	Polycab/Finolex/LAPP/ESBEE/Fort-Gloster/CCI/RPG Asian
23.	Orifice Plates	GIC / Scientific Devices / Flowtech / Equivalent.
24.	All Transmitters (PT, TT, DPT, LT)	ABB / Honeywell / Emerson / Fuji/ Yokogawa
25.	Temperature controllers	TSL Approved Vendors
26.	Control Valves	Pneucon / Darling Muesco / Equivalent
27.	Gate / Globe : Valves	Thermotech Approved Vendor
28.	Pipe for Heater House Pipeline	Thermotech Approved Vendor
29.	All Gaskets & Fittings	Thermotech Approved Vendor

NOTE:

The above lists of makes are indicative and not compulsory. Optional makes Indicated would be supplied at the consideration/discretion of Thermotech Systems Limited (TSL). Specific make of components can be offered which will have implication on offer price. The list is of all generic items used in various models of Thermic Fluid Heating Systems (TFH), and may not be part of quoted system of your project.

6. COMMERCIAL BID

a) PRICE BASIS:

ITEM	DESCRIPTION	QTY	UNIT PRICE (INR)	TOTAL PRICE (INR)
1.	Thermic Fluid Heating System as per Mandatory Scope of Supply Model : TSBB-2500	1	Upon confirmation of Technical Specifications and Scope of Supply	
	COMPLETE SUPPLY OF LISTED ITEMS			--
	IN WORDS : INR --			

b) SUPERVISION OF ERECTION & COMMISSIONING

Site Supervision for Civil Marking, Unloading of TSL supplied equipment, Erection, Testing & Commissioning charges are **NOT** included in above quoted prices. Please refer Site Supervision Policy for Charges and related terms.

c) TAXES, FREIGHT & TRANSIT INSURANCE

I. GST: 18% shall be charged extra on above quoted prices.
II. Price Basis: Quoted prices are Ex-Works Thermotech - Ahmedabad Factory basis.
III. Freight: In Purchaser's Scope
IV. Transit Insurance: In Purchaser's Scope.

d) PAYMENT TERMS

I. XX % Advance on Acceptance of Purchase Order
II. XX % + Taxes against Proforma Invoice prior to Dispatch of Unit.

e) DELIVERY SCHEDULE

XX Weeks from the date of receipt of purchase order & approval of PID & GA Layout drawing by Client, which so ever is later.

f) OFFER VALIDITY

This offer is valid for acceptance for a period of 30 days from the date of issue.

g) PACKING & FORWARDING

All material shall be loaded on trailer / truck to ensure safe delivery as per our standard packing procedure. In case of client's specific packing procedure to be followed, it shall be done at extra price.

h) OTHER TERMS & CONDITION

Any order arising from this offer will be subject to TSL standard terms and conditions of Sale - See attachment.

7. TERMS & CONDITIONS

1. ORDER CONFORMATION

All orders placed on us directly or through our regional offices will be binding on us only after our Head Office in Ahmedabad has issued an order confirmation.

2. SPECIFICATIONS ETC.

Specifications, designs, dimensions, descriptions, shades of paints etc. are not binding on us in minute details and are subject to reasonable alterations without prior notice.

3. PRICES

All prices are ex-works, Vatva, Ahmedabad / ex-works of our suppliers for the part of the goods to be manufactured at their works and are exclusive of transit insurance, all taxes excise and other duties & levies as applicable at the time of delivery, which shall be charged separately. Freight & octroi if any, shall be borne by the purchaser. The purchaser registered under the Sales Tax Act are advised to send sales tax registration number and date and also concessional tax form along with the purchase order. Otherwise the state/central tax concession will not be considered.

4. MODE OF DELIVERY

All delivery will be ex-works, Vatva, Ahmedabad – our supplier's works. The goods may be dispatched in one or separate lots at our option. If we are required to dispatch the goods on behalf of the purchaser, on freight to pay basis, on the understanding that no liability is attached to us. The freight charges contracted by us on behalf of the purchaser will be treated as negotiated under the purchaser's authority and shall, therefore be final.

5. PACKING AND FORWARDING

Packing wherever necessary will be done by us in accordance with our standard practice or as specified in our proposal.

6. INSPECTION

If necessary, the goods will be offered for visual inspection only at our works, AHMEDABAD. The date of inspection will be intimated by us by 15 days in advance. If inspection is not carried out on the date so advised, we shall be free to dispatch the consignment as per the terms of delivery.

7. WAREHOUSING CLAUSE

If payment is not made within 15 days of date of proforma invoice, we reserve the right to divert the ordered material. We will give a fresh delivery period and price at the time of diversion which will be binding on the purchaser and the contract cannot be rendered void on this account. If the goods cannot be diverted, charge will be made for storage, insurance and interest at the rate of 1% of the invoice value for each week or part thereof commencing 15 days from the date of proforma invoice. Warehousing charge is subject of a maximum of 5%.

8. PAYMENT

(A) **Advances** paid against an order shall not be subject to any interest. We shall have right to adjust against such advances payments, which might become due to delay in lifting the ordered equipment or because of any incidental expenses we may incur on the purchaser's behalf. The advances shall be forfeited in case request for cancellation of order is accepted by us.
(B**) Interest** at 24% will be charged on overdue bill payment as per P.O. Terms Condition.

9. GENERAL LIEN

We shall be entitled to general lien on goods in our possession or dispatched for all money due to us from the purchaser, both under the contract or any other account and we shall also be entitled to apply any money in our hands under any contract due to us under any other contract or contracts.

10. FORCE MAJEURE

This offer is subjected to force majeure by which it means causes such as war, invasion, civil disobedience, government orders or restrictions, strikes, lockouts, riots, fires, epidemics, sabotages, trade embargoes, earthquakes, floods, accidents, breakdown of machinery, delay or inability to obtain labor, raw materials, wagons, shipping space or any other causes whatsoever beyond our reasonable control, affecting us or our sub-contractors, suppliers etc.

12. WARRANTY

All our equipment is thoroughly inspected before dispatch & therefore can be depended upon for long and trouble-free services. We undertake to make good by replacement or repair, defects arising out of faulty design, material or workmanship within 12 months of the date of dispatch, provided that if we so require, the parts are respect of which a claim is made, must be sent at purchaser's expenses to our works before liability can be entertained under this clause. Such expense will be refunded if our liability is admitted.

Bought out components are guaranteed by us only to the extent of guarantees given to us by our suppliers. Electrical components such as heaters, contactors, motors etc. rubber components & instruments such as pressure gauges, thermometers, combistats etc. are however not covered under this warranty. This warranty is valid subject to:

1. Installation having been completed within 3 months of dispatch of equipment & as per our installation instructions.
2. The supply / installation having been formally accepted as per the handling over clause no. 13 (below).
3. Supply of right fuel as per relevant IS specification available.
4. The equipment being operated & maintained as per our operation & maintenance manual.
5. The equipment or part thereof not being subject to accident, alteration, abuse or misuse.

13. COMMISSIONING

Commissioning service offered at the rate and terms mentioned in the quotation covers reasonable number of visits / meetings to:

1. Help in preparing the user to safely unload the material, when received.
2. Discuss installation details in terms of physical / technical requirements.
3. Make the user conversant with statutory requirements if any.
4. Discuss details of requirements in respect of power supply, feed system, fuel system, etc.
5. Ensure that the installation has finally been made as recommended.
6. Commission the unit for a short run from point of view of mechanical working and to set various controls necessary.
7. Conduct demonstration for the purpose of user's education for equipment operation and maintenance.

14. HANDING OVER

Unless otherwise specified in the order and accepted, handing over the equipment and/or installation would be considered as completed and a formal completion certificate shall be issued by the purchaser/user if: -

1. The material has been supplied as per the terms of scope of supply or with agreed deviations, if any.
2. Erection: If involved, has been completed generally as per the terms of order or with unavoidable deviations.
3. The equipment has been commissioned, if applicable, generally as agreed or the equipment and/or installation has been put to commercial use either with or without the help of our engineer.

The purchaser/user is expected to put the equipment to commercial use only after issuing a formal completion certificate. Our responsibility in terms of warranty shall cease straight away if the equipment is put to use without formal taking over.

15. CANCELLATION

Order received & acknowledge by us shall not be subject to cancellation, either wholly or partly or any reason whatsoever without our consent.

16. JURISDICTION

All contracts between purchasers & ourselves are deemed to be entered into, at Ahmedabad, and are therefore subject to the jurisdiction of courts at Ahmedabad.