

CORRIGENDUM

With reference to **e-tender ref. No 53/UPF/PRO.FIN/NANAUTA/42 dated 19/09/2022** regarding Techno-commercial proven technical upgradation jobs for improvement in working efficiency /modernization of **The Kisan Sahkari Chini Mills Ltd., Nanauta, Dist. Saharanpur, Uttar Pradesh** in specific areas to achieve technically targeted identified qualitative parameters on EPC basis (Supply, erection and commissioning including designing, engineering, manufacturing, procurement of bought out items, all civil and structural works etc.) as per specifications and scope of work given in the bid document and discussion during Pre-Bid meeting dated 29/09/2022, necessary amendments are as follows :-

25. Pre-qualification of the bidder (Eligibility Criteria):

1. The Bidder during the last five years must have successfully completed two similar type of upgradation, modernization/expansion work in existing sugar mills, on Turnkey/EPC basis including Designing, Engineering, manufacture / procurement, supply, erection, and commissioning (including Civil Work) with satisfactory performance in India with target steam consumption@45 (± 2) % on cane in executed projects.

The bidder will submit the Performance certificate for successful completion/executed similar type of projects from the clients in technical bid. The bidder will also submit the HMBD fuel-steam-power balance, evaporator bodies configuration (including additional and existing heating surface) in order to achieve the desired steam consumption on cane in nanauta sugar mill.

2. Bidder blacklisted or engaged in any legal proceedings with U.P. Cooperative Sugar Factories Federation, Lucknow/Cooperative Sugar Mill/NCDC/NFCSF or by any Central/State Government organizations are not eligible. The bidder will furnish undertaking about this.
3. The turnover of the bidder during last five financial years should be not less than Rs. 08 crores (minimum) for each year **OR** average turnover of Rs. 10 crores (minimum) for above mentioned five year. The Bidder will submit the details of last five year turnover duly certified by Chartered Accountant (with UDIN No.), along with last five years Audited Balance Sheet.
4. The bidder shall submit the copies of the last five years filled Income Tax Return alongwith self-certified copy of PAN card.
5. The Net Worth of the bidder should be at least Rs. 10 crores as on the date of bidding duly certified by banker as per Performa given in technical Bid. The Bank networth of the Bidder shall be atleast Rs. 10 crores (Rupees ten crores) issued by the banker (Nationalized/Scheduled Commercial bank) and Chartered Accountant (with UDIN No.) not earlier than 3 months from the bidding date.

6. Other conditions which are necessary to be fulfilled by the Bidder.
 - a) EMD will be Rs. 22,00,000.00 (Twenty two lacs only) through RTGS/NEFT.
 - b) Price of e-bid document will be Rs. 35,000.00+GST(18%)through RTGS/NEFT.
 - c) Tender without EMD and e-bid Document fee will be rejected.
 - d) All required documents as per tender document.

WILL BE READ AS:

25. Pre-qualification of the bidder (Eligibility Criteria):

1. The Bidder during the last five years must have successfully completed one similar type of upgradation, modernization/expansion work in existing sugar mills, on Turnkey/EPC basis including Designing, Engineering, manufacture / procurement, supply, erection, and commissioning (including Civil Work) with satisfactory performance in India with target steam consumption@45 (±2) % on cane in executed projects.

The bidder will submit the Performance certificate for successful completion/executed similar type of projects from the clients in technical bid. The bidder will also submit the HMBD fuel-steam-power balance, evaporator bodies configuration (including additional and existing heating surface) in order to achieve the desired steam consumption on cane in nanauta sugar mill.

2. Bidder blacklisted or engaged in any legal proceedings with U.P. Cooperative Sugar Factories Federation, Lucknow/Cooperative Sugar Mill/NCDC/NFCSF or by any Central/State Government organizations are not eligible. The bidder will furnish undertaking about this.
3. The turnover of the bidder during last five financial years should be not less than Rs. 08 crores (minimum) for each year **OR** average turnover of Rs. 10 crores(minimum) for above mentioned five year.The Bidder will submit the details of last five year turnover duly certified by Chartered Accountant (with UDIN No.), along with last five years Audited Balance Sheet.
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 - c) Tender without EMD and e-bid Document fee will be rejected.
 - d) All required documents as per tender document.

Clause No.-9.8 :

The Performance Security should be equivalent to 10 % (ten percent) of the value of the Total contract price (including GST) rounded to the nearest multiple of hundred in form of F.D.R. pledged in the name of Nanauta Sugar Mill. (Auto Renewed).

WILL BE READ AS:

The Performance Security should be equivalent to 5 % (Five percent) of the value of the Total contract price (including GST) rounded to the nearest multiple of hundred in form of F.D.R. pledged in the name of Nanauta Sugar Mill. (Auto Renewed).

ANNEXURE –I

SCOPE OF WORK

Technical upgradation jobs for improvement in working efficiency /modernization of The KisanSahkariChini Mills Ltd., Nanauta, Dist. Saharanpur, Uttar Pradesh in specific areas to achieve technically targeted identified qualitative parameters on EPC basis (Supply, erection and commissioning including designing, engineering, manufacturing, procurement of bought out items, all civil and structural works etc.) as per specifications and scope of work given in the bid document.

The Successful bidder shall also operate and maintain the newly installed system and equipment/machinery for 24 months after commissioning. the warranty of the equipment/systems will be also for 24 months from commissioning date and the non performing/defective parts/equipment will be replaced free of cost during this period. The performance parameters shall be achieved as mentioned in this bid document.

The bidder will give details of schemes including complete Heat and Mass balances (HMBD's) showing Fuel, steam, power, water and condensate balance in order to achieve desired steam consumption @ 45 % (± 2) on cane (maximum) in technical bid and other performance parameters. The exhaust steam generation should match the exhaust steam consumption (including De-super heating gains). The essence of this tender is to crush the cane on rated capacity (5000 TCD in 22 hrs.) with steam consumption% cane 45%($\pm 2\%$). The newly installed evaporator bodies juice, vapor bleeding connections, valves will be connected with old existing system in order to make trouble free operation.

Technical Up-gradation of Mill House Plant &Machinery

Design Basis:

- | | | |
|---|---|-------------------------------------|
| 1) Plant Utilization | - | + 95 % |
| 2) Plant Capacity | - | 5000 TCD (22 hours working) |
| | - | 227 TCH |
| 3) Imbibition % Cane | - | 270 % on Fiber or 40 % on Cane |
| 4) Mixed Juice % Cane | - | + 107 (Expected) |
| 5) Pol % Bagasse | - | < 2.0 |
| 6) Moisture % Bagasse | - | < 50 |
| 7) Steam Consumption % Cane | - | 45 %($\pm 2\%$) |
| 8) Exhaust Pressure at Evaporator station(first effect) | - | 0.80 Kg/Cm ² g (Desired) |

S.N.	Equipment Description	Qty.
A.	Mill Section:	
1.	Tippler Replacement of existing Tippler by new Tippler of 55T/tip & new head on cutter on auxiliary carrier, cutter having 62 knives & drive 300 HP x 2 nos. motors, installation & required f'u"lation and up to commissioning.	01 set
2.	Mill Automation & Imbibition control system: <ul style="list-style-type: none"> ACFC up to 1st mill: New ACFC system based on DCS up to 1st mill, GRPF and Donnelly chute, for mill 2nd to 4th: Donnelly chute & mill load based mill control, Imbibition control and tank level control: Existing flow meters and control valves used and new control valve and hot water tank level to be provided. For above required chest pressure sense and Turbine RPM, Donnelly chute senses and mill roller lift indicators, DCS system, control valve, level sensors, cabling, and installation and up to commissioning of above mill automation must be provided. 	01 Set
3.	Fibrizer <ul style="list-style-type: none"> Existing Swing diameter of fibrizer 1830 mm to be increased by to 2130 mm by replacing hammer with new shaft and accordingly new suitable anvil plate. The anvil plate wrap angle 160° and pocket size 275 mm x 275mm x150mm deep and plate thickness 28 mm. Modification at head of cane to accommodate increased swing dia. The carrier feeding angle i.e axis passing through centre of carrier and fibrizer centre with horizontal shall be 40°. 	
4.	Tram Iron Separator Replacing existing tramp iron separator with new.	01 Set
5.	Mill no 2, 3 and 4: Three roller TRPF in place of existing UFR. TRPF shall be driven by chain & sprockets and drive from mill top & feed roller and TRPF speed 30% than the mill speed. The chain shall be triplex and 3.5 inches. Drum shall be 28 mm thick and teeth and drum fully hard faced. The drum shall be welded on through and through shaft of 40C8 material. Bottom roller must be fully porous/ lotus. Addition of new Donnelly chute (MOC –SS-409) and modification of IRC head to match the feeding to TRPF. Provide new SS409 nose plates (8mm thick) to existing Donnelly chute shall be provided	03Set
6.	Mill no 1 to 4: <ul style="list-style-type: none"> Reshelling of Top & discharge rollers with 3 nozzle lotus (semi – couch- 4 nos. top(Three Nozzles) Lotus roller – 4 nos. discharge (single nozzles) Chevron grooves to top & feed roller Top roller scraper lifting above horizontal line Roughening of rollers (arc welding) up to ½ depth of roller groove to top, feed and discharge roller Tear drop (Spigot spot) welding on landing of top roller grooves. Trash plate heel clearance of 40-50 mm on discharge roller OD Providing box type juice imbibition trays – 02nos. 	

	<ul style="list-style-type: none"> Replacement of all mill A frame. 	
B)	Boiler & Powerhouse Section	
1.	i. Boiler Automation based on DCS by sensing and controlling furnace draft and ID, FD control for 3 boilers. ii. Auto drum water level control for 30TPH -1 no iii. Required Panels for monitoring and indications and DCS system and its consoles at boilers of 20 TPH and 40 TPH & mill section iv. A complete AC room for DCS.	01 Set
2.	AC VFD Provide AC VFD to all motors of ID, & FD to 03 nos. Boilers and required motor conversion to make VFD suitable and one each no. spare VFD and connections required. Complete AC room for DCS.	
3.	Steam Flow meters Provision of steam flow meters of suitable capacity for live steam line from boiler to mills, fibrizer turbine, and powerhouse turbine sand PRD station total 10 nos. flow meter	
4.	Economizer modification: replacement of fin type economizer with coil type economizer for each 20 Tons boiler	02 Nos.
5.	Soot blowers to 3 no boilers of Retractable to Super Heater, Bank Tubes and Economizer of total 4 nos. of each boilers.	
6.	Powerhouse: Auto factor power control unit and 500KVA capacitors each to 3 no TG sets.	3 Nos.
7.	Modifications jobs in order to keep pressure drop from boiler header to all turbine of steam line to turbines maximum 1kg. per sq. cm., All HP steam piping upgradation.	
C.)	Boiling House	
1.	Addition of return condensate flow meter for measurement of exhaust condensate, capacity-150 MT/Hr.	1 no
2.	Addition of PRDS automation & Exhaust de super heating system.	1 Set
3.	Addition of raw juice pump an TJ pump-400 m3/hr with VFD system	1 set
4.	Addition of raw juice mass flow meter -300 MT/hr capacity with mega display	1no.
5.	Addition of Juice flow stabilization system for controlling raw juice flow	1 set
6.	Addition of DCH for SJ final heating & CJ heating	2 set
7.	Addition of evaporator bodies- 4000m2 FFE- 1 no & 2500 m2 robert-1 no and rearrangement of evaporator bodies with all connecting pipelines to old system of juice, vapor, exhaust etc. with valves and condensate system with valves and pipelines for proper bleeding arrangement in order to get desired steam consumption. The old and new system should run satisfactorily to get desired steam consumption.	2 nos.
8.	Vacuum filter of capacity 14x28 feet with all accessories	1 no.
9.	Batch type centrifugal machine 1750 kgs/cycle with non lube type air compressor suitable capacity for A- massecuite.	1 no.
10.	Injection Header replacement & modification	1 set
11.	Addition of vertical injection pumps- 3000 m3	1 set
12.	Addition of spray pump-1 no- 3000 m3 capacity & modification in spray condensate & cooling system to reduce power & water consumption	1 set

13.	Centralized PLC system for pressure , temperature of juice, live steam, exhaust steam, vapor etc.	1 set
14.	Replacement of existing 10 MT capacity grader & elevator by new one- 35 MT/hr capacity with structure	1 set
15.	Lagging & cladding work of old equipment's-Evaporator, juice heater, vapour piping, clarifier, vacuum pans (total covering area of 1000 sq. m)	1 set
16.	Staging, structure & vapour, exhaust, juice, condensate etc piping & valves modification work at evaporator & juice heater station.	1 set
17.	All type of civil works including dismantling of old structure, if any, civil foundation for evaporators bodies and other civil works related to complete the project	1 set
18.	Proper insulation with aluminium cladding of new evaporators bodies, juice heaters, new exhaust and vapor pipelines. All new pipe lines will be painted as per norms of industry.	1 set
19.	Platform, ladders and other approach in order to make trouble free operation of newly erected equipments.	1 set

WILL BE READ AS:

ANNEXURE –I

SCOPE OF WORK

Technical upgradation jobs for improvement in working efficiency /modernization of The Kisan Sahkari Chini Mills Ltd., Nanauta, Dist. Saharanpur, Uttar Pradesh in specific areas to achieve technically targeted identified qualitative parameters on EPC basis (Supply, erection and commissioning including designing, engineering, manufacturing, procurement of bought out items, all civil and structural works etc.) as per specifications and scope of work given in the bid document.

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Technical Up-gradation of Mill House Plant & Machinery

Design Basis:

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| 1) Plant Utilization | - | + 95 % |
| 2) Plant Capacity | - | 5000 TCD (22 hours working) |
| | - | 227 TCH |

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| 3) Imbibition % Cane | - | 270 % on Fiber or 40 % on Cane |
| 4) Mixed Juice % Cane | - | + 107 (Expected) |
| 5) Pol % Bagasse | - | < 2.0 |
| 6) Moisture % Bagasse | - | < 50 |
| 7) Steam Consumption % Cane | - | 45 % (±2%) |
| 8) Exhaust Pressure at Evaporator station(first effect) | - | 0.80 Kg/Cm ² g (Desired) |

S.N.	Equipment Description	Qty.
A.	Mill Section:	
1.	Mill Automation & Imbibition control system: <ul style="list-style-type: none"> ACFC up to 1st mill: New ACFC system based on DCS up to 1st mill, GRPF and Donnelly chute, for mill 2nd to 4th: Donnelly chute & mill load based mill control, Imbibition control and tank level control: Existing flow meters and control valves used and new control valve and hot water tank level to be provided. For above required chest pressure sense and Turbine RPM, Donnelly chute senses and mill roller lift indicators, DCS system, control valve, level sensors, cabling, and installation and up to commissioning of above mill automation must be provided. 	01 Set
2.	Fibrizer <ul style="list-style-type: none"> Existing Swing diameter of fibrizer 1830 mm to be increased by to 2200 mm by replacing hammer (132 Hammers, weight 19 Kg. per Hammer) with new shaft and accordingly new suitable anvil plate. The anvil plate wrap angle 160° and pocket size 275 mm x 275mm x 150mm deep and plate thickness 28 mm. Modification at head of cane to accommodate increased swing dia. The carrier feeding angle i.e axis passing through centre of carrier and fibrizer centre with horizontal shall be 40°. Specification may vary with approval of NFCSF to get desired cane preparation. 	
3.	Tram Iron Separator Replacing existing tramp iron separator with new self cleaning Belt type Tramp Iron Separator with suitable structure and addition of equalizer over belt conveyor to equalise level of Bagasse.	01 Set
4.	Mill no 1 to 4: <ul style="list-style-type: none"> Reshelling of Top & discharge rollers with 3 nozzle lotus (semi – couch- 4 nos. top(Three Nozzles) Lotus roller – 4 nos. discharge (single nozzles) Chevron grooves to top & feed roller Top roller scraper lifting above horizontal line Roughening of rollers (arc welding) up to ½ depth of roller groove to top, feed and discharge roller Tear drop (Spigot spot) welding on landing of top roller grooves. Trash plate heel clearance of 40-50 mm on discharge roller OD Providing box type juice imbibition trays – 02nos. Strengthening / Repair of all A frames for ovality of holes, Hydraulic Piston with new pins. 	
B)	Boiler & Powerhouse Section	

1.	v. Boiler Automation based on DCS by sensing and controlling furnace draft and ID, FD control for 3 boilers. vi. Auto drum water level control for 30TPH -1 no vii. Required Panels for monitoring and indications and DCS system and its consoles at boilers of 20 TPH and 40 TPH & mill section viii. A complete AC room for DCS.	01 Set
2.	AC VFD Provide AC VFD to all motors of ID, & FD to 03 nos. Boilers and required motor conversion to make VFD suitable and one each no. spare VFD and connections required. Complete AC room for DCS.	
3.	Steam Flow meters Provision of steam flow meters of suitable capacity for live steam line from boiler to mills, fibrizer turbine, and powerhouse turbine sand PRD station total 10 nos. flow meter	
4.	Economizer modification: replacement of fin type economizer with coil type economizer for each 20 Tons boiler	02 Nos.
5.	Soot blowers to 3 no boilers of Retractable to Super Heater, Bank Tubes and Economizer of total 4 nos.of each boilers.	
6.	Powerhouse: Auto factor power control unit and 500KVA capacitors each to 3 no TG sets.	3 Nos.
7.	Modifications jobs in order to keep pressure drop from boiler header to all turbine of steam line to turbines maximum 1kg. per sq. cm., All HP steam piping upgradation.	
C.)	Boiling House	
1.	Addition of return condensate flow meter for measurement of exhaust condensate, capacity-150 MT/Hr.	1 no
2.	Addition of PRDS automation & Exhaust de super heating system.	1 Set
3.	Addition of raw juice pump and TJ pump-400 m3/hr with VFD system	4 set
4.	Addition of raw juice mass flow meter -300 MT/hr capacity with mega display	2 no.
5.	Addition of Juice flow stabilization system for controlling raw juice flow	1 set
6.	Addition of DCH for SJ final heating & CJ heating	2 set
7.	Addition of evaporator bodies- 4000m2 FFE- 1 no & 2500 m2 robert-1 no and rearrangement of evaporator bodies with all connecting pipelines to old system of juice, vapor, exhaust etc. with valves and condensate system with valves and pipelines for proper bleeding arrangement in order to get desired steam consumption. The old and new system should run satisfactorily to get desired steam consumption.	2 nos.
8.	Vacuum filter of capacity 14x28 feet with all accessories	1 no.
9.	Batch type centrifugal machine 1750 kgs/cycle with non lube type air compressor suitable capacity for A- massecuite.	1 no.
10.	Injection Header replacement & modification	1 set
11.	Addition of vertical injection pumps- 3000 m3	1 set
12.	Addition of spray pump-1 no- 3000 m3 capacity& modification in spray condensate & cooling system to reduce power & water consumption	1 set
13.	Centralized PLC system for pressure , temperature of juice, live	1 set

	steam, exhaust steam, vapor etc.	
14.	Replacement of existing 10 MT capacity grader & elevator by new one- 35 MT/hr capacity with structure	1 set
15.	Lagging & cladding work of old equipment's-Evaporator, juice heater, vapour piping, clarifier, vacuum pans (total covering area of 1000 sq. m)	1 set
16.	Staging, structure & vapour, exhaust, juice, condensate etc piping & valves modification work at evaporator & juice heater station.	1 set
17.	All type of civil works including dismantling of old structure, if any, civil foundation for evaporators bodies and other civil works related to complete the project	1 set
18.	Proper insulation with aluminium cladding of new evaporators bodies, juice heaters, new exhaust and vapor pipelines. All new pipe lines will be painted as per norms of industry.	1 set
19.	Platform, ladders and other approach in order to make trouble free operation of newly erected equipments.	1 set

ANNEXURE II

TECHNICAL SPECIFICATION OF EQUIPMENT/SYSTEM AND MACHINERY TO BE SUPPLIED

The specifications of the various equipment are outlined below. All specifications should be as per best standard practices of industry and national federation specifications. In case of any dispute/differences, the National Federation, New Delhi decision will be final.

A- Mill Section:

1. Tippler - 1 No.

The Sugar mill is having Truck Tippler of loading capacity 30 tons/tip with an angle of 55 deg. The trolleys are coming with more than 40 ton loads. Hence the existing truck tippler shall be replaced with new one with following specifications.

Specifications:

The truck/Trolley tippler having loading capacity 55 tons/tip with an angle of 55 deg. max, complete with platform suiting the truck & trolley size, tilting gear mechanism complete with hydraulic equipment, rear stops, front hooks and power pack with control system shall be provided.

The tippler shall be suitable for 10 to 12 tips per hour.

Tippler shall provide the feed to the existing auxiliary cane carrier.

One Head on Cutter set shall be installed at the head of existing auxiliary cane carrier with not less than 62 knives secured to cast steel hubs of IS :1030 grade 280 – 520 W mounted on a forged steel shaft of minimum 250 mm dia. of 45 C8 quality. The dia. over the tips of knives shall not be less than **1600 mm** having width of **3960 mm**. The knife shaft shall be supported at 200 mm bore, heavy duty self aligning double row spherical roller bearings with adapter/withdrawal sleeve in cast steel Plummer blocks. The knives shall be of special shock resisting steel having hard faced cutting edges, hardness 45 to 48 HRC and tenoned into the hubs eliminating the shear on the bolts which should be of EN8 steel or of equivalent strength with nylock nuts. The knives shall conform to IS; 8461. A suitable flywheel of CI grade FG 260, IS- 210 duly machined and well balanced shall be provided at the outer end of the shaft.

Head on Cutter set shall be driven by a continuously rated CACA slip ring motor of **300 HP x 02 Nos.** and 1440 R.P.M. synchronous speed at a total slip of 15 percent. It shall be coupled to the geared coupling through suitable helical gearbox having service factor not less than 2.0 by means of gear coupling to get final speed of **300 RPM** capable of transmitting **300HP each** continuously. The

motor shall be complete with starter (current not exceeding 300% of FLC) and suitable buffer resistance.

The Head on Cutter shall be interlocked sequentially with auxiliary cane carrier and run smoothly.

2. Mill House Automation:

All four mills are driven by Steam Turbine TEW Make, 750 BHP each with inlet steam Pressure of 42 Kg/cm², 400 °C with exhaust steam pressure 01 Kg/cm² & input and output RPM of 4000/750 RPM.

Auto cane feed control system for 1st mill

One set DCS based automatic cane feeding device to ensure uniform feed rate to first mill with provision to change the feed rate at any time having a variation not more than +/- 5% of set rate. Primary cane carrier shall follow speed of secondary cane carrier/Rake carrier in a fixed ratio. Load of all cane preparation devices shall override the speed signal of each cane carrier and rake carrier. When load of any cane preparation device exceeds 80% of rated load, the speed of that cane carrier shall be proportionately reduced. If load exceeds 100% of rated load, that cane carrier will stop. It will restart automatically when overload condition on that cane preparation device becomes normal. These overload settings shall be adjustable from the control panel. Also cane carrier speed shall reduce proportionally with level in mixed juice tank. The necessary field instruments shall be provided. The system shall have the following provisions.

Sensors :

For load sensing of cane preparatory devices such as chopper, leveler, fibrizer and 1st mill, suitable current transformers / two wire electronic analogue pressure transmitters with capacitance sensing technology with 4-20 mA DC output and configurable for calibration to the required pressure ranges within the designed pressure span of the transmitter. In addition to this, level sensing of prepared cane at **donnelly chute** may be considered and supplied accordingly.

Control Action:

The system should be provided with two control actions i.e. proportional and ON-OFF control actions. Proportional control as per the 1st mill load. ON- OFF control as per the high load settings of the cane preparatory devices and first mill. The necessary field instruments required shall be provided.

Set Point :

Following settings are to be provided,

For loads of various cane preparatory devices and 1st mill steam drives precision load setters of 1 K 10 Turns helipots with dial knobs.

For average height and feed rate precision 10 K 10 Turns helipots with dial knobs.

Visual Indication: Coloured lamp indicators for the high set load values.

Carrier Speed Adjustments: The speed of the cane carriers can be adjusted from zero to the rated RPM with the settings provided on the control panel at operators console.

Indicators : Analogue load indicators (i.e. current or pressure indicators) and speed indicators.

Power Supply: 230 V AC, 50 Hz

The device shall be capable to achieve performance even under extreme conditions of shock, vibration, humidity, electrical interference. The necessary Donnelly chute sensors, field instruments required shall be provided.

All electrical / electronic components used in the device shall conform to the existing Indian specifications.

Speed Control of Balance Three Mills

Individual mill speed control system shall be provided to maintain a constant level in the Donnelly chute and sensing the chest pressure and turbine RPM of each mill. The mill shall be operating on the base of top roller load. The desired load is set by user from DCS. The feed and discharge roller is operated according to set ratio of Top roller set load. The desired ratio is set by user from DCS. The mill will operate between min and Max limits. There is compensation for different process parameters for controlling Mills RPM. If chute level is greater than the set level then RPM of Mill will increase.

Mill Top Roller Lift Indicators shall be provided and shall be displayed on DCS System

Auto Imbibition Water Flow & Temp. Control.

Imbibition water flow will be controlled to maintain a fixed ratio of imbibition water to cane. The desired ratio will be fed through the keyboard and the load on the third Mill will be measured. The flow of imbibition water will be regulated to maintain the ratio at various loads. If load of third Mill is below the minimum running load, imbibition water flow will stop. If third mill is bypassed, the system will automatically be controlled by second mill load through software program without any extra hardware cost. The level of the tank should also be monitored and controlled through VFD at pump and temperature of the maceration water is to be controlled between 70 – 90 degrees.

New DCS Control System for Mills

Entire Mill control system shall be monitored/controlled from the plant DCS System through the remote control station located in mill control room.

DCS control system should include display of complete gimmick diagram of all the moving parts from cane carrier to bagasse carrier at milling station in motion. All the parameters like cane feed control speed control motor load amperage, levels of all the Donnelly chutes, mill RPM, top roller lift indications, mix juice and imbibition water flow indications. Level in mix juice tank along with juice stabilization system.

All these parameters should be sensed and data logging and printing arrangement shall be provided. The entire display and control logging and printing system should be on DCS system and computerized control from air conditioned and dust proof control cabin.

3. Modification in Existing Swing Fibrizer

The sugar mill is having Swing hammer type fibrizer with 111 Nos. hammers driven by 2000 BHP Steam turbine at output speed of 750 RPM with swing diameter of 1830mm.

To achieve better PI of more than 85 for improvement in mill performance, it is proposed to increase swing diameter from 1830 mm to 2130 mm by replacing hammers on new shaft and accordingly new suitable anvil plate. The anvil plate wrap angle 160° and pocket size 275 mm x 275 mm x 150 mm deep and plate thickness of 28 mm.

The existing steam turbine drive shall be used.

The necessary modification at head of cane carrier to accommodate increased swing dia. shall be done. The carrier feeding angle i.e. axis passing through centre of carrier and fibrizer centre with horizontal shall be 40° as existing one.

4. Tramp iron separator

Electromagnetic type tramp iron separator shall be provided on the belt conveyor to pick up any iron piece up to a maximum weight of **30 Kg.** from a distance of 350 mm will be from top of belt a cane blanket of 300 mm thickness over the belt conveyor.

5. TRPF system

A pair of tooth roller shall be minimum 1000 mm outside diameter 1980 mm shell length. The roller shall be fabricated out of 28 mm thick shell plate. The Journal size shall be minimum Dia. 350mm x 420 mm the shaft shall be of 40 C-8 qualities confirming to IS1570-1979 or equivalent bearing min strength 58kg mm². Shaft shall be complete throughout the length of TRPF Roller. The roller surface shall be hard faced to 40 to 45 RC. Bottom roller shall be fully porous/lotus type. The roller shall be supported on Cast steel bearing of IS-1030 grade II with Gunmetal bush, necessary oil Lubrication arrangement shall be provided.

Head stock shall be fabricated out of IS2062 weld able quality mild steel plate. Head stock shall be stress relieved by induction method & machined to suit TRPF roller. Taper wedge shall be provided in between top & bottom roller bearing to adjust the setting between the TRPF rollers. Pressure chute shall be made out of 28mm thick m. s. plate of IS-2062 quality material. Inside surface of pressure chute shall be lined with 5 mm thick stainless steel plate of AISI-304 quality. The pressure chute shall be suitable reinforced to withstand maximum pressure of 7 kg/cm² pressure chute shall have arrangement to change of setting.

The TRPF drive shall consist of 3.5" pitch Triplex chain sprocket with 3.5" pitch Triplex chain. The pressure feeder top & bottom rollers shall be driven by mill top & bottom rollers respectively. Surface speed of TRPF roller shall be about 30% higher than mill roller speed.

The existing mill steam turbine of 750 BHP shall be suitable modified to increase capacity due to increase in power requirement because of addition of TRPF System.

Addition of new Donnelly chute (MOC –SS-409) and modification of IRC head to match the feeding to TRPF shall be done. New SS409 nose plates (8mm thk) to existing Donnelly chute shall be provided.

These three mills shall be provided with Donnelly chute, fabricated out of 6 mm thick stainless steel plate of 409 grade with stiffeners and shall have arrangement to adjust the blanket thickness from top. The height of each chute shall be about 3 meter. **Each Donnelly type chute shall have level sensors having ON/OFF control of intermediate rake carriers drives, sequencing interlock.**

6. **Modifications in Mills 1 to 4**

- Reshelling of Top rollers with 3 nozzle lotus (semi-couch – 4 nos top (Three nozzles)
The composition of the shell material shall conform to IS : 11202 - 1985 and shall be:

Total carbon	-	3.20 to 3.6 percent.
Manganese	-	2.2 to 3.2 percent
Silicon	-	1.2 to 2.2 percent
Phosphorus	-	0.5 per cent Max.
Sulphur	-	0.15 percent Max.
- Lotus roller – 4 nos. discharge (single nozzles)
The composition of the shell material shall conform to IS : 11202 - 1985 and shall be:

Total carbon	-	3.20 to 3.6 percent.
Manganese	-	2.2 to 3.2 percent
Silicon	-	1.2 to 2.2 percent
Phosphorus	-	0.5 per cent Max.
Sulphur	-	0.15 percent Max.
- Chevron grooves to top & feed roller

- Top roller scraper lifting above horizontal line
- Roughening of rollers (arc welding) up to ½ depth of roller groove to top, feed and discharge roller
- Tear drop (Spigot spot) welding on landing of top roller grooves.
- Trash plate heel clearance of 40-50 mm on discharge roller OD
- Providing box type juice imbibition trays – 02 nos.
- Replacement of mill 1 & 4 A frame.

B.) Technical Up-gradation of Boiler & Power House Plant

The details of existing boilers are as given below:-

1) 40 TPH Boiler : 02 Nos.

Make	LIPI
Quantity	02 Nos.
Type of fuel	Bagasse
Capacity	40 TPH Each
Steam pressure	45 Kg/cm ² g
Steam temperature	415°C±15
Type	Travelling Grate Type
HSA of Boiler Bank	903.93 m ² Each
HSA of Furnace	386.58 m ² Each
HSA of Super Heater	182.88 m ² Each
HSA of Economiser	372.86 m ² Each
HSA of Air Heater	1206.1 m ² Each
Super Heater Steam Temperature	415°C±15
ID Fan	25 m ² Each- 02 Nos., 180 H.P Motor
FD Fan	75 KW
PS Fan	15 HP
SA Fan	37 KW
Feed Pump	Cap. 60 m ³ /Hr., Head-650 m, Motor-148 KW, 2950 RPM Qty. 03 Nos. Turbo Feed Pump – 01 No. – 500 BHP Steam Driven
Chimney	RCC 3 mtr Dia. x 45 m Height with wet scrubber

2) 30 TPH Boiler : 01 No.

Make	Texmaco
Quantity	01 No.
Type of fuel	Bagasse
Capacity	30 TPH
Steam pressure	21 Kg/cm ² g
Steam temperature	315°C±15
Type	Dumping Grate Type
HSA of Boiler Bank	1068 m ²

HSA of Super Heater	107.89 m ²
HSA of Economiser	261.3 m ²
HSA of Air Heater	1206.1 m ² Each
Super Heater Steam Temperature	315°C±15
ID Fan	30 m ³ /Sec., 250 H.P Motor
FD Fan	75 HP
SA Fan	50 HP
Feed Pump	Cap. 50 m ³ /Hr., Head-300 m, Motor-75HP ,2950 RPM Qty. 02 Nos.
Chimney	MS2.61mtr Dia. x 32 m Height

3) 20 TPH Boiler : 02Nos.

Make	ISGEC
Quantity	02 Nos.
Type of fuel	Bagasse
Capacity	20 TPH
Steam pressure	21 Kg/cm ² g
Steam temperature	315°C±15
Type	Dumping Grate Type
HSA of Boiler Bank	850.75 m ²
HSA of Super Heater	53 m ²
HSA of Economizer	310.26 m ²
Super Heater Steam Temperature	315°C±15
ID Fan	150 H.P Motor
FD Fan	40HP

BoilerAutomation:

The following automation shall be provided for existing 30 TPH – 01No. Texmacomake & 40 TPH – 02 Nos. Lipi make Boilers.

- i) **Three element drum level control system for existing 30 TPH Boiler – 01No:** Drum level shall be automatically controlled using the three element control philosophy to ensure quick response of the system. In case of drum level falls below minimum level, the feed water control valve will open fully. In case drum level rises above maximum level, the feed water control valve will closefully.
- ii) **Combustion control system & Furnace pressure controlsystem:**
The following automation shall be provided for existing 30 TPH – 01No. Texmaco make & 40 TPH – 02 Nos. Lipi make Boilers.
This will be an integrated control loop for maintaining the steam pressure. According to the steam pressure the master controller will adjust speed of AC VFD to feed more or less fuel to the Boiler and FD fan to control amount of primary air sent to the furnace respectively. To ensure that this adjustment is correct, the signal of O₂ % in flue gases will be taken in the loop to make the final correction in the speed of FD fan.
ID fan speed shall be controlled to maintain draft inside the furnace to – 5 mmWC.
Required Panels for monitoring and indications and DCS system and its consoles at boilers of 30 TPH and 40 TPH shall be provided.

Two air compressors (one as standby) shall be provided to supply oil and moisture free air through refrigeration dryer system, for pneumatically controlled instruments. Spare air filtering and drying system shall also be provided along with standby compressor set.

COMPUTERIZED BOILER AUTOMATION: -

All the above mentioned indication, monitoring and control systems to be hooked on distributed control system (DCS). All control monitoring and interlock function will be provided for smooth functioning of the Boilers. Comprehensive instrumentation and control equipment shall be provided for each system of the plant. The controls will be located in the central control room. Instrumentation will broadly cover the following functions:

- Local indication by gauges
- Remote indications through transmitters
- Interlocks for safety of personnel / equipment
- Closed loop control system using single loop controller/DCS
- Status indicators
- Alarm annunciation

Controls and interlocking will be through microprocessor based hardware. Actuation will be done generally through pneumatic actuators.

The DCS shall be provided keeping in view the safety, reliability and availability for comprehensive presentation of plant operation status, trends and essential operation interacting facility.

Transmitters for the measurement and control will be of electronic type using solid state hardware. Field signal transmission will be 4-20 mA, two wire system suitable for long distance transmission and compatibility with computer interface and ease conversion into voltage signals using simple resistor.

The control system will be designed to facilitate manual operation of the plant from the control panel. Necessary hardware indicators and recorders will be provided on the control panel located in the control room.

Closed loop control system will be provided for Boiler and their auxiliaries with processor and sensor level redundancy.

All control valves and damper operations will be of pneumatic type with fast response and have ease of maintenance and should be remote controlled from control desk.

All operations of the Boiler and turbines should be indicated on computer screen for different sections indicating all the operating parameters on MIMIC diagram. Control room should be provided with water cooled air conditioning system.

1. AC VFD Drives for ID & FD Fans for 3 Nos. Boilers

AC VFD Drives shall be provided for existing 30 TPH – 01 No. Texmaco make & 40 TPH – 02 Nos. Lipi make Boilers. The motor details are provided as above. The required motor conversion to make VFD suitable shall be done as required and one no. spare VFD of highest capacity shall be provided.

2. Steam Flow meters:

10 Nos. Steam flow meters shall be provided to measure steam flow of suitable capacity for live steam line from all boiler to mills, fibrizor turbine, and power house turbines and PRD station.

3. Economizer modification:

Setting up coil type economizer by replacing fin type economizer in each 20 ton boiler.

4. Soot Blowers

Motorized automatic adequate Soot Blowers of retractable type complete with PRS, piping, drain and other accessories are to be provided 04 nos. at appropriate location for effective cleaning of Super Heater coils, bank tubes, economizer coil etc. Motorized automatic retractable Soot Blower for Super Heater elements each covering half of the furnace width shall be provided. This shall be provided for existing 30 TPH – 01 No. Texmaco make & 40 TPH – 02 Nos. Lipi make Boilers.

5. Power House Works :

The Auto factor power control unit and 500 KVA capacitors each to 3 no TG sets shall be provided.

Suitable number and rating low loss power capacitors APP double layer type shall be supplied to improve the plant power factor to 0.92, at 5000 TCD (22 Hrs. Basis) crushing capacity. The power capacitors shall conform to IS-2834 specifications. Suitable capacity capacitors shall be connected to main distribution panel through APFC panel.

Capacitors shall be connected to main distribution panel through auto power factor correction relay and capacitor switching shall be by contactors / thyristered switching. If thyristered switching is used capacitors shall be MPP type.

6. Modifications for pressure drop of steam line to turbine:

The existing piping from steam header to turbine shall be redesigned and redeveloped in order to keep pressure drop from boiler header to all turbine maximum 1kg. per sq. cm., All HP steam piping shall be provided with insulation wherever required.

C.) Technical Up-gradation of Boiling House Plant & Machinery

The Evaporator configuration in the Boiling house shall be designed for crushing 5000 Tons of cane per day (TCD) on 22 hrs. basis i.e. 227.27 TCH to produce white plantation sugar. The overall steam consumption of sugar plant shall be around 47% on cane at 270% imbibition on fibre.

1. Condensate Flow meter

One No. return condensate flow meter for measurement of exhaust condensate, capacity-150 MT/Hr shall be provided.

2. Pressure Reducing & De-superheating Station & Exhaust De-super Heating System:

Pressure Reducing & De-superheating control valves shall be provided for controlling the temperature and pressure of the steam for Boiling House. The quantity of live steam to the PRDS should be monitored with flow meter and totalizer.

Exhaust de-superheating system shall be installed to maintain the exhaust steam temperature at around 125° C to the process house from Mill & Power turbine.

3. Raw juice pump and TJ pump

Raw juice pumps and treated juice pumps of capacity 400m³ /hr. with 75 mtr. Head should be supplied. One raw juice pump and treated juice pump will be spare.

4. Juice Weighment

Mass flowmeter capacity	:	300 cu.m/hr.
Accuracy	:	± 0.10% of mass flowrate.
Indication facilities	:	i) Flow rate in cu.m./hr. ii) Current hour flow in tonnes iii) Last hour flow in tonnes

The various parameters shall be hooked up in PLC/DCS.

5. **JuiceFlowstabilization:**

For ensuring regular screened juice flow to the process which will stabilize regular flow of juice to clarification and evaporator stations in boiling house, juice flow stabilization system shall be installed, details as below.

Juice flowstabilizationcapacity	: 370 cum./hr.
Controlrangeaccuracy	: 30% to100%
Juiceflowvariation	: ± 5 % of presetvalue

The system shall include the necessary control units, flow indication at mills and boiling house, flow recorder etc. and shall be compatible for centralized control DCS system.

6. **Direct Contact Juice Heater(DCH):**

Two DCH of suitable capacity with automation to be provided for SJ 3 heating. The direct contact juice heaters (DCH) shall be of all SS-304 construction designed at designated rate of sulphited juice and clear juice for ultimate capacity), complete in in-built entrainment separators, NRV in vapour line, control valves, auto control of temperature with all accessories. Thickness of DCH shell & internals shall be as per design but shall not be less than 6 mm

7. **Addition of evaporator bodies:**

The present evaporator configuration is such that the steam demand to the process house is very much on higher side and it may be around 56 – 58 % on cane and the live steam bled through PRDS may be around 35 Tons/hr.

The new evaporator configuration is so designed that the steam demand to the process house will be around 50 % on cane and the live steam bleeding to the boiling house will be minimum.

In the new evaporator configuration, One evaporator SK body of 4000 sq. m HS will be added to the existing 2300 SK body so that the new SK body will be the main body and 2 Nos. of existing SK bodies (2300 & 800) will be working as a standby when the new body of 4000 sq. m is taken up for cleaning.

In the 2nd body of the quintuple system, one radial flow type Roberts body of 2750sq. m HS will be added to the existing two Nos. of RB of 1750 sq. m HS and in the all the three bodies, two bodies will be working and one old body 1750 sqm will be used as a floating body. The necessary isolation valves to be provided as per the requirement.

General specifications of Falling Film Evaporator (FFE)

The FFE vessel shall be of efficient design shall be provided with suitable transfer pumps, circulation pumps with respect to standard wetting ratio. All pumps shall have standby arrangement.

The tubes shall be SS-304, 1.2 mm thick, fully annealed after final drawing.

The tube size must be OD 45 mm, thickness 1.2 mm & length 10000 mm.

The pitch of the tubes shall be such that ligament shall not be less than 16 mm in any case.

Fabrication parameters:

Material of construction shall be Carbon steel plates as per IS: 2062-2011.

S.No.	Units	Minimum thickness of mild steel plates for construction of FFE (mm)
1)	Body shell, Calandria shell & steam jacket	16
2)	Top cone (dished type)	22
3)	Bottom cone /dish	22
4)	Shell of vapour space and support skirt	16
5)	Tube plate (Top & bottom)	36
6)	Base plate ring	36
7)	Skirt shell	16

Juice distributor shall be of SS 304.

The design must ensure that the expansion of tubes in the bottom tube plate is carried out without any difficulty and Hassel free tube replacement.

An efficient and proven juice distribution system should be provided to ensure uniform distribution of juice on top tube plate.

The internal save-all must be of efficient design and must not impart drop in vapour pressure.

The evaporator vessel shall have sight and light glasses. Location of light glasses should be such that it illuminates the whole tube plate / inside system of FFE.

Pressure gauges, temperature gauges and thermo well for thermometer/ RTDs in calandria steam inlet and vapour space of heat exchanger vessels shall be provided.

All gauges shall be mounted on an aesthetically looking gauge board only.

All manholes shall be hinged and quick opening / closing type.

The steam safety valves shall be of butterfly auto controlled type compatible to DCS.

All the sight & light glasses shall be of minimum 200 mm dia. The 1st sight glass shall be 250 mm.

The light and heavy nox. Outlets shall be arranged and connected in separate headers with separate valves. All Nox gas pipe lines, headers shall be of SS 304 grade schedule 10 in case of pipe dia less than 80 mm and of schedule 20 above 80 mm pipe dia.

Continuous juice / syrup sampler shall be provided.

There shall be only one vapour outlet from the catchall of entrainment separator vessel.

Suitably sturdy base ring shall be provided.

The equipment must be designed in such a manner that the outlet juice is taken out from the heat exchanger vessel / vapour separator. Compact entrainment separator, internal or external shall be as per vapour capacities. There shall not be any chance of entrainment from the system.

The FFE vessel shall be complete in every respect with necessary fittings for satisfactory operation.

Suitable pump with receiver bottle for exhaust condensate extraction with standby arrangement shall be provided. Pump capacity not less than 80 cu.m./ hr., with AC VFD drive RPM not exceeding 1500 and shall be compatible to centralized control DCS system.

On line conductivity measurement of condensate water shall be provided so that any sugar trace detected in exhaust condensate for boiler shall be drained to save boiler water contamination with alarm in control room.

Efficient condensate extraction shall be provided with efficient flash heat recovery system

Heat recovery from exhaust steam condensate through free flow plate type heat exchange shall be done. By pass arrangement shall also be provided.

A total CIP system for cleaning of all FFE bodies complete in all respects shall be provided.

General specification common to all conventional (Robert type) evaporator

Efficient design with peripheral juice, condensate and noxious gas outlets. The tubes shall be SS-304, 1.2 mm thick, fully annealed after final drawing. The pitch of the tubes shall be such that ligament is not less than 12 mm in any case.

Minimum thickness of mild steel plate of calandria and body shall be of 16 mm, bottom saucer 22 mm and tube plate 32 mm. The bottom saucer shall be welded to the calandria. The design must ensure that the expansion of tubes in the bottom tube plate is carried out without any difficulty.

8. Vacuum filter:

Vacuum filter assembly including the shell, S.S. decking, screen, scrapping arrangement, vacuum regulating system, juice withdrawal, S.S. piping assembly, juice trough with stirrer, juice separator in the vacuum line, driving arrangement, electric motors, gear boxes etc.

9. Batch type centrifugal Machine:

One flat bottom fully automatic recycling batch type centrifugal machines capacity 1750 kg/charge and 20 charges per hour shall be provided for curing refinery massecuite. Both of the two machines shall be utilized for curing R1 massecuite. The centrifugal machines shall be driven by AC variable frequency drive motor.

Specification of High grade fully automatic plough discharge centrifugal machines with AC VFD drive

Batch type, high grade centrifugal machines, each of 1750 kg / charge, minimum 20 cycles / hr, fully automatic recycling type centrifugal machines shall be supplied for single curing of Á' massecuite with 9495 deg. Brix. Massecuite to pugmill shall flow by gravity. Magnetic flow meter with indicating, integrating and recording facility for hot water (SHWW) use in A-Centrifugal machines shall be provided.

Basket shall be SS DIN Standard 1.4462 / SS Standard metaullergy.

Working screen – Brass, Backing screen – S.S. Backing screen, 4 mesh DOVEX R Type

Spindle- material specification – Forged steel as per IS 2004 CLASS IV

The machines will be driven by suitable power AC VFD.

All operations of the automatic recycling type machines including charging and discharging, changing the speed, application of superheated wash water, molasses separation, operation, bottom valve closing etc. Shall be automatic. Manually operated brakes shall also be provided with process logical control programme such that the plough should not be operated at higher basket speed than ploughing speed of 60 RPM. Manually controlled steaming arrangement of monitor casing shall be provided.

Each machine shall have individual switch fuse isolator of suitable rating, an ammeter, and thyristorised/ air break-contactor for operating the machine in manual and fully automatic recycling with a separate selector switch. All operations such as charging, bringing the machine at different speeds, retardation, water wash, pugmill gate opening and closing, syrup separation, cycle over etc. Shall be given on control box and indicated by different lamps. All these applications shall also be possible to be applied by push button/rotary switch in manual or automatic position of the selector switch from the control box except bringing the machines at different speeds, retardation and cycle over. Control box shall have speed indicator etc. Necessary arrangement in the panel shall be provided for tripping of the machine in case of high temperature on sensing through ETDs of the motors. AC VFD motor panel board & drive shall be equipped with AC's with standby arrangements.

The machines shall be complete with all accessories, auxiliaries, including support, structure, platform pug mill with drive, super – heated wash water system (PHE) with stand-by arrangement, air compressors with standby (1+1), run-off tanks, run-off pumps (1+1) with drive,

incoming and control panels etc. Air compressor for A – centrifugal machines shall be independent of Air compressor for instrumentations of boiling house. The centrifugal station shall be complete in all respects and shall have necessary accessories namely Air compressor 7 kg/cm² (g) with standby arrangement with receiver and refrigeration dryer system to supply moisture free air for pneumatic control of centrifugal machines.

All pumps shall have standby arrangements. Mono rail with suitable capacity for hoisting shall be provided

Structure, pug-mill, molasses gutters and all other accessories suitable for installation of one no. Similar machines shall be provided for ultimate capacity.

‘Auto – manual’ switch shall be provided for manual operation in case of failure of control system. Necessary manual controls shall be provided.

Manually operated power actuated brakes shall also be provided for emergency.

Necessary arrangement in the panel shall be provided for tripping of the machine in case of high temperature on sensing through ETD, of the motors and excessive vibrations / wobbling.

Suitable interlocking arrangement shall be provided in panels so that not more than one machine start at a time.

Provision shall be made in lay out suitable for ultimate capacity of 7500 TCD

Molasses Run-off Tanks

Two (2) sets of vertical cylindrical, 8mm thick of Mild Steel IS 2062 construction molasses run-off tanks each of 3 m³ capacity, one for AH molasses and one for AL molasses shall be supplied.

Molasses Pumps

Two (2) sets of molasses run-off pumps of suitable capacity and head for each duty, one operating and one standby, complete in all respect with AC motor shall be provided.

Pug Mill

The pug-mill shall be made out of 8 mm thick mild steel plate and provided having paddle type stirring arrangement, driven by Ac electric motors through shaft mounted planetary gearbox.

10. Injection water pumps Header Replacement & Modification and new Injection waterpump:

Injection pumps of different characteristics for eg, different Heads are being run together which will deteriorate the performance of low head Injection pumps. Due to this more Injection pumps are being operated continuously to achieve the required vacuum in Evaporators & Pans. Batch Pans restarting after the dropping of pans is around 45 minutes which will reduce the capacity of the pans.

For vacuum creation in vacuum pans & evaporators, one vertical mixed flow type pump 3000 m³/hr with 22 mtrs head, one pump of 2500 m³/hr with 15 mtrshead& one separate pump for Evaporator (i.e) 1000 m³/hr with 22 mtrs head are in operation.

To rectify all these issues in the injection water station, the following recommendations are suggested

1. All the pumps Head should be made equal and for that the pump supplier to be called and 15mtrs head pump should be raised to 22 mtrs head so that pump pressure will improve and

this will ultimately improve the performance of the panstation.

2. The MS injection water header of lower dimension should be replaced with higher sizing of minimum of 1200 mm dia with 12 mm thickness to maintain the required pressure.
3. Both the Injection water headers should be in the same level and also all the condensers should be in the equal level.

The header pressure should be around 1 Kg/sqcm and around 0.4 Kg/sq cm at the inlet of condenser for efficient pan boiling.

11. One New vertical mixed flow type pump 3000 m³/hr with 22 mtrs head with motor shall be provided.

However new vertical injection pump which is to be run continuously for reducing water consumption and for automation.

The delivery pipeline of each pump shall be individually connected to the respective headers with tangential connection.

The pumps shall have CI casting, SS impeller and SS-410 shaft & sleeves.

Suction strainer of stainless steel construction 304 grade, NRV and isolation valves in the delivery lines shall be provided.

Thickness of injection headers M.S. fabricated pipeline shall be of 12mm..

12. Spray pump.

One MF 40 x 45 spray pump with motor of capacity 3000 cum/hr capacity with 18 mtrs Head to be provided as a replacement of old obsolete spray pump. The new pump shall have CI casting, SS impeller and SS-410 shaft & sleeves. Modification in spray condensate & cooling system to reduce power & water consumption.

13. Centralized PLC System for Boiling House-

Centralized PLC system for Pressure & Temperature of juice, Live steam, Exhaust steam, Vapour etc indication, monitoring and control systems to be hooked on distributed control system (DCS). All control monitoring and interlock function will be provided for smooth functioning of the Boiling House equipment. Comprehensive instrumentation and control equipment shall be provided for each section of boiling house. The controls will be located in the central control room. Instrumentation will broadly cover the following functions:

- Local indication by gauges
- Remote indications through transmitters
- Interlocks for safety of personnel / equipment
- Closed loop control system using single loop controller/DCS
- Status indicators
- Alarm annunciation

Controls and interlocking will be through microprocessor based hardware. Actuation will be done generally through pneumatic actuators.

The DCS shall be provided keeping in view the safety, reliability and availability for comprehensive presentation of plant operation status, trends and essential operation interacting facility.

Transmitters for the measurement and control will be of electronic type using solid state hardware. Field signal transmission will be 4-20 mA, two wire system suitable for long distance transmission and compatibility with computer interface and ease conversion into voltage signals using simple resistor.

The control system will be designed to facilitate manual operation of the plant from the control panel. Necessary hardware indicators and recorders will be provided on the control panel located in the control room.

Closed loop control system will be provided for Boiling house equipments with processor and sensor level redundancy.

All control valves will be of pneumatic type with fast response and have ease of maintenance and should be remote controlled from control room.

All operations of the Boiling House equipments should be indicated on computer screen for different sections indicating all the operating parameters on MIMIC diagram. Control room should be provided with water cooled air conditioning system.

14. SUGAR GRADER

Presently, Two sugar graders of 10 Tons/hr and 20 Tons/hr capacity are available for grading of sugar.

Proposal:

One sugar grader of Mogensen type of 35 tons/hr capacity is to be provided to improve the grading efficiency replacing existing 10 Tons/hr grader.

15. Insulation & Lagging

Insulation and lagging of all new equipment, pipes and fittings etc. of the sugar plant shall be supplied.

All the new equipment and pipelines surfaces in the sugar plant above 55 deg. C temperature shall be effectively lagged.

Lagging of boiling house equipment & piping shall be from factory made mattresses of Bonded Mineral wool of readymade mattresses specifications. All lagging shall be clad with minimum 22 gauge aluminium sheet cladding.

Glass wool/Mineral wool for vessels and piping shall be provided. The thickness shall be to suit the temperature and diameter of pipe. Lagging of all the heat exchange equipment, steam and condensate pipes, valves having high temperature fluids such as juice, condensate, vapour etc., pipes, flanges and fittings for new equipment shall be provided.

Will be read as:

ANNEXURE II

TECHNICAL SPECIFICATION OF EQUIPMENT/SYSTEM AND MACHINERY TO BE SUPPLIED

The specifications of the various equipment are outlined below. All specifications should be as per best standard practices of industry and national federation specifications. In case of any dispute/differences, the National Federation, New Delhi decision will be final.

A- Mill Section:

1. Mill House Automation:

All four mills are driven by Steam Turbine TEW Make, 750 BHP each with inlet steam Pressure of 42 Kg/cm², 400 °C with exhaust steam pressure 01 Kg/cm² & input and output RPM of 4000/750 RPM.

Auto cane feed control system for 1st mill

One set DCS based automatic cane feeding device to ensure uniform feed rate to first mill with provision to change the feed rate at any time having a variation not more than +/- 5% of set rate. Primary cane carrier shall follow speed of secondary cane carrier/Rake carrier in a fixed ratio. Load of all cane preparation devices shall override the speed signal of each cane carrier and rake carrier. When load of any cane preparation device exceeds 80% of rated load, the speed of that cane carrier shall be proportionately reduced. If load exceeds 100% of rated load, that cane carrier will stop. It will restart automatically when overload condition on that cane preparation device becomes normal. These overload settings shall be adjustable from the control panel. Also cane

carrier speed shall reduce proportionally with level in mixed juice tank. The necessary field instruments shall be provided. The system shall have the following provisions.

Sensors :For load sensing of cane preparatory devices such as chopper, leveler, fibrizer and 1st mill, suitable current transformers / two wire electronic analogue pressure transmitters with capacitance sensing technology with 4-20 mA DC output and configurable for calibration to the required pressure ranges within the designed pressure span of the transmitter. In addition to this, level sensing of prepared cane at **Donnelly chute** may be considered and supplied accordingly.

Control Action: The system should be provided with two control actions i.e. proportional and ON-OFF control actions. Proportional control as per the 1st mill load. ON- OFF control as per the high load settings of the cane preparatory devices and first mill. The necessary field instruments required shall be provided.

Set Point :Following settings are to be provided,

For loads of various cane preparatory devices and 1st mill steam drives precision load setters of 1 K 10 Turns helipot with dial knobs.

For average height and feed rate precision 10 K 10 Turns helipot with dial knobs.

Visual Indication: Coloured lamp indicators for the high set load values.

Carrier Speed Adjustments: The speed of the cane carriers can be adjusted from zero to the rated RPM with the settings provided on the control panel at operator's console.

Indicators :Analogue load indicators (i.e. current or pressure indicators) and speed indicators.

Power Supply: 230 V AC, 50 Hz

The device shall be capable to achieve performance even under extreme conditions of shock, vibration, humidity, electrical interference. The necessary Donnelly chute sensors, field instruments required shall be provided.

All electrical / electronic components used in the device shall conform to the existing Indian specifications.

Speed Control of Balance Three Mills

Individual mill speed control system shall be provided to maintain a constant level in the Donnelly chute and sensing the chest pressure and turbine RPM of each mill. The mill shall be operating on the basis of top roller load. The desired load is set by user from DCS. The feed and discharge roller is operated according to set ratio of Top roller set load. The desired ratio is set by user from DCS. The mill will operate between min and Max limits. There is compensation for different process parameters for controlling Mills RPM. If chute level is greater than the set level then RPM of Mill will increase.

Mill Top Roller Lift Indicators shall be provided and shall be displayed on DCS System

Auto Imbibition Water Flow &Temp.Control.

Imbibition water flow will be controlled to maintain a fixed ratio of imbibition water to cane. The desired ratio will be fed through the keyboard and the load on the third Mill will be measured. The flow of imbibition water will be regulated to maintain the ratio at various loads. If load of third Mill is below the minimum running load, imbibition water flow will stop. If third mill is bypassed, the system will automatically be controlled by second mill load through software program without any extra hardware cost. The level of the tank should also be monitored and controlled through VFD at pump and temperature of the maceration water is to be controlled between 70 – 90 degrees Celsius.

New DCS Control System for Mills

Entire Mill control system shall be monitored/controlled from the plant DCS System through the remote control station located in mill control room.

DCS control system should include display of complete gimmick diagram of all the moving parts from cane carrier to bagasse carrier at milling station in motion. All the parameters like cane feed control speed control motor load amperage, levels of all the Donnelly chutes, mill RPM, top roller lift indications, mix juice and imbibitions water flow indications. Level in mix juice tank along with juice stabilization system.

All these parameters should be sensed and data logging and printing arrangement shall be provided. The entire display and control logging and printing system should be on DCS system and computerized control from air conditioned and dust proof control cabin.

2. Modification in Existing Swing Fibrizor

The sugar mill is having Swing hammer type fibrizor with 111 Nos. hammers driven by 2000 BHP Steam turbine at output speed of 750 RPM with swing diameter of 1830mm.

To achieve better PI 88(±1) for improvement in mill performance, it is proposed to increase swing diameter from 1830 mm to 2200 mm by replacing hammers on new shaft and accordingly new suitable anvil plate. The anvil plate wrap angle 160° and pocket size 275 mm x 275 mm x 150 mm deep and plate thickness of 28 mm. The Hammers will be increased to 132(max. weight 19 Kg. per hammer) as per load.

The existing steam turbine drive shall be used.

The necessary modification at head of cane carrier to accommodate increased swing dia. shall be done. The carrier feeding angle i.e axis passing through centre of carrier and fibrizer centre with horizontal shall be 40° as existing one.

3. Tramp iron separator

Electromagnetic type tramp iron separator shall be provided on the belt conveyor with suitable structure and with self cleaning device to pick up any iron piece up to a maximum weight of **30 Kg.** from a distance of 350 mm will be from top of belt a cane blanket of 300 mm thickness over the belt conveyor. Addition of equalizer over belt conveyor to equalise level of Bagasse will also be there.

4. Modifications in Mills 1 to 4

- Reshelling of Top rollers with 3 nozzle lotus (semi-couch – 4 nos top (Three nozzles)
The composition of the shell material shall conform to IS : 11202 - 1985 and shall be:

Total carbon	-	3.20 to 3.6 percent.
Manganese	-	2.2 to 3.2 percent
Silicon	-	1.2 to 2.2 percent
Phosphorus	-	0.5 per cent Max.
Sulphur	-	0.15 percent Max.
- Lotus roller – 4 nos. discharge (single nozzles)
The composition of the shell material shall conform to IS : 11202 - 1985 and shall be:

Total carbon	-	3.20 to 3.6 percent.
Manganese	-	2.2 to 3.2 percent
Silicon	-	1.2 to 2.2 percent
Phosphorus	-	0.5 per cent Max.

- Sulphur - 0.15 percentMax.
- Chevron grooves to top & feed roller
- Top roller scraper lifting above horizontal line
- Roughening of rollers (arc welding) up to ½ depth of roller groove to top, feed and discharge roller
- Tear drop (Spigot spot) welding on landing of top roller grooves.
- Trash plate heel clearance of 40-50 mm on discharge roller OD
- Providing box type juice imbibition trays – 02 nos.
- Replacement of mill 1 & 4 A frame.

B.) Technical Up-gradation of Boiler & Power House Plant

The details of existing boilers are as given below:-

1) 40 TPH Boiler : 02 Nos.

Make	LIPI
Quantity	02 Nos.
Type of fuel	Bagasse
Capacity	40 TPH Each
Steam pressure	45 Kg/cm ² g
Steam temperature	415°C±15
Type	Travelling Grate Type
HSA of Boiler Bank	903.93 m ² Each
HSA of Furnace	386.58 m ² Each
HSA of Super Heater	182.88 m ² Each
HSA of Economiser	372.86 m ² Each
HSA of Air Heater	1206.1 m ² Each
Super Heater Steam Temperature	415°C±15
ID Fan	25 m ² Each- 02 Nos., 180 H.P Motor
FD Fan	75 KW
PS Fan	15 HP
SA Fan	37 KW
Feed Pump	Cap. 60 m ³ /Hr., Head-650 m, Motor-148 KW, 2950 RPM Qty. 03 Nos. Turbo Feed Pump – 01 No. – 500 BHP Steam Driven
Chimney	RCC 3 mtr Dia. x 45 m Height with wet scrubber

2) 30 TPH Boiler : 01 No.

Make	Texmaco
Quantity	01 No.
Type of fuel	Bagasse
Capacity	30 TPH
Steam pressure	21 Kg/cm ² g
Steam temperature	315°C±15

Type	Dumping Grate Type
HSA of Boiler Bank	1068 m ²
HSA of Super Heater	107.89 m ²
HSA of Economiser	261.3 m ²
HSA of Air Heater	1206.1 m ² Each
Super Heater Steam Temperature	315°C±15
ID Fan	30 m ³ /Sec., 250 H.P Motor
FD Fan	75 HP
SA Fan	50 HP
Feed Pump	Cap. 50 m ³ /Hr., Head-300 m, Motor- 75HP ,2950 RPM Qty. 02 Nos.
Chimney	MS2.61mtr Dia. x 32 m Height

3) 20 TPH Boiler : 02Nos.

Make	ISGEC
Quantity	02 Nos.
Type of fuel	Bagasse
Capacity	20 TPH
Steam pressure	21 Kg/cm ² g
Steam temperature	315°C±15
Type	Dumping Grate Type
HSA of Boiler Bank	850.75 m ²
HSA of Super Heater	53 m ²
HSA of Economizer	310.26 m ²
Super Heater Steam Temperature	315°C±15
ID Fan	150 H.P Motor
FD Fan	40HP

BoilerAutomation:

The following automation shall be provided for existing 30 TPH – 01No. Texmacomake & 40 TPH – 02 Nos. LipimakeBoilers.

- i) **Three element drum level control system for existing 30 TPH Boiler – 01No:**
Drum level shall be automatically controlled using the three element control philosophy to ensure quick response of the system. In case of drum level falls below minimum level, the feed water control valve will open fully. In case drum level rises above maximum level, the feed water control valve will closefully.
- ii) **Combustion control system &Furnace pressure controlsystem:**
The following automation shall be provided for existing 30 TPH – 01No. Texmaco make & 40 TPH – 02 Nos. Lipi make Boilers.
This will be an integrated control loop for maintaining the steam pressure. According to the steam pressure the master controller will adjust speed of AC VFD to feed more or less fuel to the Boiler and FD fan to control amount of primary air sent to the furnace respectively. To ensure that this adjustment is correct, the signal of O₂ % in flue gases will be taken in the loop to make the final correction in the speed of FD fan.
ID fan speed shall be controlled to maintain draft inside the furnace to – 5 mmWC.

Required Panels for monitoring and indications and DCS system and its consoles at boilers of 30 TPH and 40 TPH shall be provided.

Two air compressors (one as standby) shall be provided to supply oil and moisture free air through refrigeration dryer system, for pneumatically controlled instruments. Spare air filtering and drying system shall also be provided along with standby compressor set.

COMPUTERIZED BOILER AUTOMATION: -

All the above mentioned indication, monitoring and control systems to be hooked on distributed control system (DCS). All control monitoring and interlock function will be provided for smooth functioning of the Boilers. Comprehensive instrumentation and control equipment shall be provided for each system of the plant. The controls will be located in the central control room. Instrumentation will broadly cover the following functions:

- Local indication by gauges
- Remote indications through transmitters
- Interlocks for safety of personnel / equipment
- Closed loop control system using single loop controller/DCS
- Status indicators
- Alarm annunciation

Controls and interlocking will be through microprocessor based hardware. Actuation will be done generally through pneumatic actuators.

The DCS shall be provided keeping in view the safety, reliability and availability for comprehensive presentation of plant operation status, trends and essential operation interacting facility.

Transmitters for the measurement and control will be of electronic type using solid state hardware. Field signal transmission will be 4-20 mA, two wire system suitable for long distance transmission and compatibility with computer interface and ease conversion into voltage signals using simple resistor.

The control system will be designed to facilitate manual operation of the plant from the control panel. Necessary hardware indicators and recorders will be provided on the control panel located in the control room.

Closed loop control system will be provided for Boiler and their auxiliaries with processor and sensor level redundancy.

All control valves and damper operations will be of pneumatic type with fast response and have ease of maintenance and should be remote controlled from control desk.

All operations of the Boiler and turbines should be indicated on computer screen for different sections indicating all the operating parameters on MIMIC diagram. **Control room should be provided with water cooled air conditioning system.**

1. AC VFD Drives for ID & FD Fans for 3 Nos. Boilers

AC VFD Drives shall be provided for existing 30 TPH – 01 No. Texmaco make & 40 TPH – 02 Nos. Lipi make Boilers. The motor details are provided as above. The required motor conversion to make VFD suitable shall be done as required and one no. spare VFD of highest capacity shall be provided.

2. Steam Flow meters:

10 Nos. Steam flow meters shall be provided to measure steam flow of suitable capacity for live steam line from all boiler to mills, fibrisor turbine, and power house turbines and PRD station.

3. Economizer modification:

Setting up coil type economizer by replacing fin type economizer in each 20 ton boiler.

4. SootBlowers

Motorized automatic adequate Soot Blowers of retractable type complete with PRS, piping, drain and other accessories are to be provided 04 nos. at appropriate location for effective cleaning of Super Heater coils, bank tubes, economizer coil etc. Motorized automatic retractable Soot Blower for Super Heater elements each covering half of the furnace width shall be provided.

This shall be provided for existing 30 TPH – 01 No. Texmaco make & 40 TPH – 02 Nos. Lipi make Boilers.

5. Power House Works :

The Auto factor power control unit and 500 KVA capacitors each to 3 no TG sets shall be provided.

Suitable number and rating low loss power capacitors APP double layer type shall be supplied to improve the plant power factor to 0.92, at 5000 TCD (22 Hrs. Basis) crushing capacity. The power capacitors shall conform to IS-2834 specifications. Suitable capacity capacitors shall be connected to main distribution panel through APFC panel.

Capacitors shall be connected to main distribution panel through auto power factor correction relay and capacitor switching shall be by contactors / thyristeried switching. If thyristeried switching is used capacitors shall be MPP type.

6. Modifications for pressure drop of steam line to turbine:

The existing piping from steam header to turbine shall be redesigned and redeveloped in order to keep pressure drop from boiler header to all turbine maximum 1kg. per sq. cm., All HP steam piping shall be provided with insulation wherever required.

C.) Technical Up-gradation of Boiling House Plant & Machinery

The Evaporator configuration in the Boiling house shall be designed for crushing 5000 Tons of cane per day (TCD) on 22 hrs. basis i.e. 227.27 TCH to produce white plantation sugar. The overall steam consumption of sugar plant shall be around 47% on cane at 270% imbibition on fibre.

1. Condensate Flow meter

One No. return condensate flow meter for measurement of exhaust condensate, capacity-150 MT/Hr shall be provided.

2. Pressure Reducing & De-superheating Station & Exhaust De-super Heating System:

Pressure Reducing & De-superheating control valves shall be provided for controlling the temperature and pressure of the steam for Boiling House. The quantity of live steam to the PRDS should be monitored with flow meter and totalizer.

Exhaust de-superheating system shall be installed to maintain the exhaust steam temperature at around 125° C to the process house from Mill & Power turbine.

3. Raw juice pump and TJ pump

Raw juice pumps and treated juice pumps of capacity 400m³ /hr. with 75 mtr. Head should be supplied. One raw juice pump and treated juice pump will be spare.

4. Juice Weighment

Mass flowmeter capacity	:	300 cu.m/hr.
Accuracy	:	± 0.10% of mass flowrate.
Indication facilities	:	i) Flow rate in cu.m./hr. ii) Current hour flow in tonnes iii) Last hour flow in tonnes

The various parameters shall be hooked up in PLC/DCS.

5. Juice Flow stabilization:

For ensuring regular screened juice flow to the process which will stabilize regular flow of juice to clarification and evaporator stations in boiling house, juice flow stabilization system shall be installed, details as below.

Juice flow stabilization capacity	: 370 cum./hr.
Control range accuracy	: 30% to 100%
Juice flow variation	: ± 5 % of preset value

The system shall include the necessary control units, flow indication at mills and boiling house, flow recorder etc. and shall be compatible for centralized control DCS system.

6. Direct Contact Juice Heater (DCH):

Two DCH of suitable capacity with automation to be provided for SJ heating as per bleeding arrangement. The direct contact juice heaters (DCH) shall be of all SS-304 construction designed at designated rate of sulphited juice and clear juice for ultimate capacity), complete in in-built entrainment separators, NRV in vapour line, control valves, auto control of temperature with all accessories. Thickness of DCH shell & internals shall be as per design but shall not be less than 6 mm

7. Addition of evaporator bodies:

The new evaporator configuration is so designed that the steam demand to the process house will be around 45 % (± 2) on cane and the live steam bleeding to the boiling house will be minimum.

In the new evaporator configuration, One FFE of 4000 sq. m HS and one 2500 sq. m heating surface robot body will be added to existing system as given in scope of work to get desired results and facility of cleaning.

General specifications of Falling Film Evaporator (FFE)

The FFE vessel shall be of efficient design shall be provided with suitable transfer pumps, circulation pumps with respect to standard wetting ratio. All pumps shall have standby arrangement.

The tubes shall be SS-304, 1.2 mm thick, fully annealed after final drawing.

The tube size must be OD 45 mm, thickness 1.2 mm & length 10000 mm.

The pitch of the tubes shall be such that ligament shall not be less than 16 mm in any case.

Fabrication parameters:

Material of construction shall be Carbon steel plates as per IS: 2062-2011.

S.No.	Units	Minimum thickness of mild steel plates for construction of FFE (mm)
1)	Body shell, Calandria shell & steam jacket	16
2)	Top cone (dished type)	22
3)	Bottom cone /dish	22
4)	Shell of vapour space and support skirt	16
5)	Tube plate (Top & bottom)	36
6)	Base plate ring	36
7)	Skirt shell	16

Juice distributor shall be of SS 304.

The design must ensure that the expansion of tubes in the bottom tube plate is carried out without any difficulty and Hassel free tube replacement.

An efficient and proven juice distribution system should be provided to ensure uniform distribution of juice on top tube plate.

The internal save-all must be of efficient design and must not impart drop in vapour pressure.

The evaporator vessel shall have sight and light glasses. Location of light glasses should be such that it illuminates the whole tube plate / inside system of FFE.

Pressure gauges, temperature gauges and thermo well for thermometer/ RTDs in calandria steam inlet and vapour space of heat exchanger vessels shall be provided.

All gauges shall be mounted on an aesthetically looking gauge board only.

All manholes shall be hinged and quick opening / closing type.

The steam safety valves shall be of butterfly auto controlled type compatible to DCS.

All the sight & light glasses shall be of minimum 200 mm dia. The 1st sight glass shall be 250 mm.

The light and heavy nox. Outlets shall be arranged and connected in separate headers with separate valves. All Nox gas pipe lines, headers shall be of SS 304 grade schedule 10 in case of pipe dia less than 80 mm and of schedule 20 above 80 mm pipe dia.

Continuous juice / syrup sampler shall be provided.

There shall be only one vapour outlet from the catchall of entrainment separator vessel.

Suitably sturdy base ring shall be provided.

The equipment must be designed in such a manner that the outlet juice is taken out from the heat exchanger vessel / vapour separator. Compact entrainment separator, internal or external shall be as per vapour capacities. There shall not be any chance of entrainment from the system.

The FFE vessel shall be complete in every respect with necessary fittings for satisfactory operation.

Suitable pump with receiver bottle for exhaust condensate extraction with standby arrangement shall be provided. Pump capacity not less than 80 cu.m./ hr., with AC VFD drive RPM not exceeding 1500 and shall be compatible to centralized control DCS system.

On line conductivity measurement of condensate water shall be provided so that any sugar trace detected in exhaust condensate for boiler shall be drained to save boiler water contamination with alarm in control room.

Efficient condensate extraction shall be provided with efficient flash heat recovery system

Heat recovery from exhaust steam condensate through free flow plate type heat exchange shall be done. By pass arrangement shall also be provided.

A total CIP system for cleaning of all FFE bodies complete in all respects shall be provided.

General specification common to all conventional (Robert type) evaporator

Efficient design with peripheral juice, condensate and noxious gas outlets. The tubes shall be SS-304, 1.2 mm thick, fully annealed after final drawing. The pitch of the tubes shall be such that ligament is not less than 12 mm in any case. Tube size will be 45mm OD x 1.2mm Thk x 2500 mm length.

Minimum thickness of mild steel plate of calandria and body shall be of 16 mm, bottom saucer 22 mm and tube plate 32 mm. The bottom saucer shall be welded to the calandria. The design must ensure that the expansion of tubes in the bottom tube plate is carried out without any difficulty.

8. Vacuum filter:

Vacuum filter assembly including the shell, S.S. decking, screen, scrapping arrangement, vacuum regulating system, juice withdrawal, S.S. piping assembly, juice trough with stirrer, juice separator in the vacuum line, driving arrangement, electric motors, gear boxes etc.

9. Batch type centrifugal Machine:

One flat bottom fully automatic recycling batch type centrifugal machines capacity 1750 kg/charge and 20 charges per hour shall be provided for curing refinery massecuite. Both of the two machines shall be utilized for curing R1 massecuite. The centrifugal machines shall be driven by AC variable frequency drive motor.

Specification of High grade fully automatic plough discharge centrifugal machines with AC VFD drive

Batch type, high grade centrifugal machines, each of 1750 kg / charge, minimum 20 cycles / hr, fully automatic recycling type centrifugal machines shall be supplied for single curing of Á' massecuite with 9495 deg. Brix. Massecuite to pugmill shall flow by gravity. Magnetic flow meter with indicating, integrating and recording facility for hot water (SHWW) use in A-Centrifugal machines shall be provided.

Basket shall be SS DIN Standard 1.4462 / SS Standard metaullergy.

Working screen – Brass, Backing screen – S.S. Backing screen, 4 mesh DOVEX R Type

Spindle- material specification – Forged steel as per IS 2004 CLASS IV

The machines will be driven by suitable power AC VFD.

All operations of the automatic recycling type machines including charging and discharging, changing the speed, application of superheated wash water, molasses separation, operation, bottom valve closing etc. Shall be automatic. Manually operated brakes shall also be provided with process logical control programme such that the plough should not be operated at higher basket speed than ploughing speed of 60 RPM. Manually controlled steaming arrangement of monitor casing shall be provided.

Each machine shall have individual switch fuse isolator of suitable rating, an ammeter, and thyristorised/ air break-contactor for operating the machine in manual and fully automatic recycling with a separate selector switch. All operations such as charging, bringing the machine at different speeds, retardation, water wash, pugmill gate opening and closing, syrup separation, cycle over etc. Shall be given on control box and indicated by different lamps. All these applications shall also be possible to be applied by push button/rotary switch in manual or automatic position of the selector switch from the control box except bringing the machines at different speeds, retardation and cycle over. Control box shall have speed indicator etc. Necessary arrangement in the panel shall be provided for tripping of the machine in case of high temperature on sensing through ETDs of the motors. AC VFD motor panel board & drive shall be equipped with AC's with standby arrangements.

The machines shall be complete with all accessories, auxiliaries, including support, structure, platform pug mill with drive, super – heated wash water system (PHE) with stand-by arrangement, air compressors with standby (1+1), run-off tanks, run-off pumps (1+1) with drive, incoming and control panels etc. Air compressor for A – centrifugal machines shall be independent of Air compressor for instrumentations of boiling house. The centrifugal station shall be complete in all respects and shall have necessary accessories namely Air compressor 7 kg/cm² (g) with standby arrangement with receiver and refrigeration dryer system to supply moisture free air for pneumatic control of centrifugal machines.

All pumps shall have standby arrangements. Mono rail with suitable capacity for hoisting shall be provided

Structure, pug-mill, molasses gutters and all other accessories suitable for installation of one no. Similar machines shall be provided for ultimate capacity.

'Auto – manual' switch shall be provided for manual operation in case of failure of control system. Necessary manual controls shall be provided.

Manually operated power actuated brakes shall also be provided for emergency.

Necessary arrangement in the panel shall be provided for tripping of the machine in case of high temperature on sensing through ETD, of the motors and excessive vibrations / wobbling.

Suitable interlocking arrangement shall be provided in panels so that not more than one machine start at a time.

Provision shall be made in lay out suitable for ultimate capacity of 7500 TCD

Molasses Run-off Tanks

Two (2) sets of vertical cylindrical, 8mm thick of Mild Steel IS 2062 construction molasses run-off tanks each of 3 m³ capacity, one for AH molasses and one for AL molasses shall be supplied.

Molasses Pumps

Two (2) sets of molasses run-off pumps of suitable capacity and head for each duty, one operating and one standby, complete in all respect with AC motor shall be provided.

Pug Mill

The pug-mill shall be made out of 8 mm thick mild steel plate and provided having paddle type stirring arrangement, driven by Ac electric motors through shaft mounted planetary gearbox.

10. Injection water pumps Header Replacement & Modification and new Injection waterpump:

Injection pumps of different characteristics for eg, different Heads are being run together which will deteriorate the performance of low head Injection pumps. Due to this more Injection pumps are being operated continuously to achieve the required vacuum in Evaporators & Pans. Batch Pans restarting after the dropping of pans is around 45 minutes which will reduce the capacity of the pans.

For vacuum creation in vacuum pans & evaporators, one vertical mixed flow type pump 3000 m³/hr with 22 mtrs head, one pump of 2500 m³/hr with 15 mtrshead& one separate pump for Evaporator (i.e) 1000 m³/hr with 22 mtrs head are in operation.

To rectify all these issues in the injection water station, the following recommendations are suggested

1. All the pumps Head should be made equal and for that the pump supplier to be called and 15mtrs head pump should be raised to 22 mtrs head so that pump pressure will improve and this will ultimately improve the performance of the panstation.
2. The MS injection water header of lower dimension should be replaced with higher sizing of minimum of 1200 mm dia with 12 mm thickness to maintain the required pressure.
3. Both the Injection water headers should be in the same level and also all the condensers should

be in the equal level.

The header pressure should be around 1 Kg/sqcm and around 0.4 Kg/sq cm at the inlet of condenser for efficient pan boiling.

11. One New vertical mixed flow type pump 3000 m³/hr with 22 mtrs head with motor shall be provided.

However new vertical injection pump which is to be run continuously for reducing water consumption and for automation.

The delivery pipeline of each pump shall be individually connected to the respective headers with tangential connection.

The pumps shall have CI casting, SS impeller and SS-410 shaft & sleeves.

Suction strainer of stainless steel construction 304 grade, NRV and isolation valves in the delivery lines shall be provided.

Thickness of injection headers M.S. fabricated pipeline shall be of 12mm.

12. Spray pump.

One MF 40 x 45 spray pump with motor of capacity 3000 cum/hr capacity with 18 mtrs Head to be provided as a replacement of old obsolete spray pump. The new pump shall have CI casting, SS impeller and SS-410 shaft & sleeves. Modification in spray condensate & cooling system to reduce power & water consumption.

13. Centralized PLC System for Boiling House-

Centralized PLC system for Pressure & Temperature of juice, Live steam, Exhaust steam, Vapour etc indication, monitoring and control systems to be hooked on distributed control system (DCS). All control monitoring and interlock function will be provided for smooth functioning of the Boiling House equipment. Comprehensive instrumentation and control equipment shall be provided for each section of boiling house. The controls will be located in the central control room. Instrumentation will broadly cover the following functions:

- Local indication by gauges
- Remote indications through transmitters
- Interlocks for safety of personnel / equipment
- Closed loop control system using single loop controller / DCS
- Status indicators
- Alarm annunciation

Controls and interlocking will be through microprocessor based hardware. Actuation will be done generally through pneumatic actuators.

The DCS shall be provided keeping in view the safety, reliability and availability for comprehensive presentation of plant operation status, trends and essential operation interacting facility.

Transmitters for the measurement and control will be of electronic type using solid state hardware. Field signal transmission will be 4-20 mA, two wire system suitable for long distance transmission and compatibility with computer interface and ease conversion into voltage signals using simple resistor.

The control system will be designed to facilitate manual operation of the plant from the control panel. Necessary hardware indicators and recorders will be provided on the control panel located in the control room.

Closed loop control system will be provided for Boiling house equipments with processor and sensor level redundancy.

All control valves will be of pneumatic type with fast response and have ease of maintenance and should be remote controlled room control desk.

All operations of the Boiling House equipments should be indicated on computer screen for different sections indicating all the operating parameters on MIMIC diagram. Control room should be provided with water cooled air conditioning system.

14. Insulation & Lagging

Insulation and lagging of all new equipment, pipes and fittings etc. of the sugar plant shall be supplied.

All the new equipment and pipelines surfaces in the sugar plant above 55 deg. C temperature shall be effectively lagged.

Lagging of boiling house equipment & piping shall be from factory made mattresses of Bonded Mineral wool of readymade mattresses specifications. All lagging shall be cladded with minimum 22 gauge aluminium sheet cladding.

Glass wool/Mineral wool for vessels and piping shall be provided. The thickness shall be to suit the temperature and diameter of pipe. Lagging of all the heat exchange equipment, steam and condensate pipes, valves having high temperature fluids such as juice, condensate, vapour etc., pipes, flanges and fittings for new equipment shall be provided.

15. Staging & Structures

The necessary staging & structure for various new equipment in boiling house to be provided.

Extension of Technical and Financial Bid Opening:

Technical Bid Date: 31-10-2022 Time- 11:00 AM

Financial Bid Date: 01-11-2022 Time- 11:00 AM