SAHAKAR MAHARSHI BHAUSAHEB THORAT S.S.K. LTD.

TECHNICAL SPECIFICATION FOR EXPANSION TO 9000 TCD SUGAR PLANT

CONTENTS

ANNEXURE-I

TECHNICAL SPECIFICATION OF BOILING HOUSE

TECHNICAL SPECIFICATION FOR 375 TCH PROCESS HOUSE EXPANSION DOUBLE SULPHITATION SUGAR

Performance Parameter

1) Process house Steam Consumption 32 % on Cane (on Return Condensate).
2) Crushing Capacity 9000 TCD C Heavy (A, B & C Massecuite)

1. Mass Flow Meter for Raw Juice: 01 No.

Existing:
Bent tube Coriolis principal based. Range: 0 to 400 M^3/hr. Size: 150 mm.

Proposed:
Use Existing.

Raw Juice, Sulphited juice & Clear juice MS pipe line replaced with 300NB.

JUICE HEATERS:

2. RJ-1 Vapour Line Juice Heater:

Existing:
02 Nos of 600 m2. Vapour line juice heater for RJ-1 Heating

Proposed:
Additional one new vapour line juice heater of 600m2 for RJ-1 Heating

600 m2 Vapour Line Juice Heater: 01 No.

Vertical tubular 600m2 juice heaters shall be of multiple circulation type designed to have juice velocity of 1.5-1.6 m/sec. At 110% juice on cane at crushing rates of 375 TCH.

The body shall be constructed from 14 mm thick, 32 mm top & bottom tube plates and cover plates from 36 mm thick & partition plate MOC of MS. The cover plates shall be provided with suitable stiffeners.

Each vertical tubular juice heater shall be provided with easy opening device for cover plates, double beat valves as required, vapour bleeding connections with valves and top and bottom venting control by separate valve to atmosphere and vacuum arrangement

600m2 juice heater shall be of mild steel construction complete with ERW stainless steel tubes as per IS 13316:1992, grade 04 Cr.18 Ni.10 (Equivalent AISI -304) of 45 mm O/D x 1.6mm thick x 5 M length, drain cocks, gauges, air cocks, double beat valves, bled vapour and exhaust steam valves etc.

Construction of vapour line juice heater shall be to suite installation in the vapour piping to condensers. All tubular juice heaters except VLJH should be taken to common condensate flash

vessel system.

Online Caustic Soda Circulation shall be provided FOR VLJH

VLJH Condensate Receiver: 01 No.

VLJH condensate Receiver to collect condensate from VLJH MOC of MS.

VLJH Condensate Pump:

Two no. pumps (1W+1S) of 15 m3/ hr. capacity at 30 M head. The CI casing & impeller shall be of SS CF-8 and shaft shall be of SS 410.

3. RJ-2 Condensate Juice Heater:

Existing:
450 m2 Tubular juice heater for RJ-2 Heating.

Proposed:
03 Nos (2W+1S) new condensate tubular juice heater battery type of 250m2 shall be used.

Condensate juice heater shall be of mild steel construction complete with ERW stainless Steel tubes as per IS 13316:1992, grade 04 Cr.18 Ni.10 (Equivalent AISI -304) of 45 mm O/D x 1.2 mm thick x 5 M length. The body shall be constructed from 8 mm thick, 25 mm top & bottom tube plates and cover plates from 25mm thick & partition plate 8 mm thick mild steel plate. The cover plates shall be provided with suitable stiffeners, drain cocks, gauges, air cocks, and valves

4. RJ-3 Juice Heater:

Existing:
400 m2 Tubular juice heater for RJ-3Heating.

Proposed:
No change

5. Tubular Juice Heater:

Existing:
Total 09 Nos.
02 Nos. for Dynamic
05 Nos. for RJ, SJ and CJ
02 Nos. VLJH.
H.S.A. – 400 M^2 and 350 M^2

Proposed:
Existing 05 Nos. of 400 m2 shall be used for SJ-1 & SJ-2 Heating.
38 tubes/ passes modification
Existing DCH Type Heater shall be used for SJ-3 Heating.

6. Direct Contact Type Heater:

Existing:
Total 02Nos.
01 No. for Clear juice heating for 340 TCH.
01 No. for SJ3 on 2nd /1st stage vapour for 340 TCH.

Proposed:

Add Two new direct contact juice heater Clear juice first and clear juice second heating shall be provided. The direct contact type juice heaters shall be designed for juice heating considering 500m3/hr. crush rate. The approach shall be less than 4°C. Appropriate digital temperature indicators for vapour inlet, juice inlet and juice outlet let shall be provided. The heating station shall be complete with support structures with stairs and access platforms, non-condensable gas outlets and sight glasses.

The direct contact heater shall be shall be fabricated from SS 409, appropriate ceiling height, digital temperature indicators, Suitable Entrainment catcher, staging & structure.

7. Juice Sulphiter:

Existing:
Capacity of 450 HL (45 M^3). Ø 5125 mm X 4400 mm
Capacity – 550 HL Ø 5650 mm X 5744 mm height

Proposed:
Existing Sulphitor shall be used. 450 HL Overflow Height Modification

7.2 Sulphiter Juice Receiving Tank:

Existing:
1nos 450 HL juice receiving tank

Proposed:
Existing shall be used.

7.3 Sulphited Juice Pump:

Existing:
01 No. of 350 M3/hr. with 60 M Head & drive 110 KW, 1450 RPM.
01 No. of 500 M3/hr. with 80 M Head & drive 180 KW, 1450 RPM.

Proposed:
Add 1no new Sulphited juice pump capacity 500M3/hr. with 80 M Head. The CI casing & impeller shall be of SS CF-8 and shaft shall be of SS 410.
New pump shall be Erected by discarding existing 350 M3/hr . pump.

8. Sulphur Gas Plant:

8.1 Sulphur Burners:

Existing:
4 Nos. continuous type.
1 x 300 Kg/Hr. 02 x 200 Kg/Hr. & 01 X 100 kg. /hr.

Proposed:
Add 1no New 300kg/hr. Sulphur Burners with all accessories & waste heat recovery system.

one no Sulphur furnace with vapcon system for shall be of continuous type, suitable for burning 300 Kg/Hr. of standard quality sulphur. burner to have suitable burning area. All Sulphur feeding valve spindles and seat shall be of stainless steel. The melting chamber for Sulphur should be made out of 12 mm thick mild steel plates. The combustion chamber should be 16mm thick mild steel with refractory lining.

Water jacked counter current cooling arrangement for the vertical gas pipe, mild steel water jacketed and cast iron scrubbers, etc. Sulphur pipe line from all the furnaces to be so designed that both juice and syrup could be Sulphited from any of the furnaces either singly or jointly. Sulphur pipe line shall be of heavy duty M.S. Pipe. Suitable glass lined rubber diaphragm valves shall also be provided. Temperature indicators for indicating temperature of molten Sulphur and SO2 gas shall be provided. Suitable staging & structure.

It shall be erected by discarding existing 100kg/ hr burner.

8.2 Air Blowers:

Existing:
4 Nos. Air Blower.
2 x 1200 M^3/hr., 1 x 600 M^3 / hr. & 2 x 1800 M^3/ hr. Working Pressure – 1 to 1.25 kg / cm^2, Motor – 55 KW/ 37 KW, 1480 RPM

Proposed:
Add 1No new 2000 M3/ hr. air blowers.

one air Blowers 1 x capable of supplying 2000m3 free air delivery per hour free air delivery per hour at 1kg/cm2 g pressure.

air blower shall be provided with necessary pipe line, gauges, valves, etc., arrangement to supply moisture free air with suitable filter of adequate capacity, air receiver with suitable relief valve.
It shall be erected by discarding existing 600m3/ hr blower.

9. Milk of Lime Station

9.1 Vibro Screen:

Existing:

Capacity – 1200 kg / hr. & drive 5.6 kW 1440 Rpm.

Proposed:

Existing shall be used.

9.2 Lime Classifier:

Existing:

Lime grit classifier unit with Technocyclon & Microcyclon to handle 340 TCH capacity milk of lime solution. One screen added.

Proposed:

Existing shall be used.

9.3 Lime and Juice Mixer:

Existing:

Top mounted, Motor – 1.5 Kw.

Proposed:

Existing shall be used.

9.4 Milk of Lime Tank:

Existing:

03 Nos tank stirrer type vertical – 3340. Motor 9.33 Kw - 1440 Rpm & Ratio – 24:1

Proposed:

Add 1No new 40m3 MOL Storage tank.

400 HL capacity fabricated from Shell 6 mm thick & bottom plate 8 mm thick M.S. Plates, complete with electric motor drive to give final stirrer speed of 16 RPM approx.

9.5 Milk of Lime Pump:

Existing:

02 No. of 15 M3/hr. with 20 M Head & drive 5.5 KW, 1450 RPM.

Proposed:

Existing shall be used

10. Juice Clarifier:

Existing:

02 nos of 500 M^3 /hr. Capacity

555 type clarifier of 30 feet (dia. 9144 mm) x 7.5 m height

Proposed:

Addition of one new 4 compartment Clarifier of mild steel construction of 9122 mm (30 ft.) dia. The clarifier shall be of Four compartments with separate juice inlet and separate mud outlet from each compartment. There should be two juice withdrawal points preferably diametrically opposite in each compartment to minimize turbulence.

The flocculating compartment complete with skimmer and feed well shall be installed separately.

The specifications & scope of supply of Juice clarifier shall be as follows:

i)	Type	:	Continuous, multi tray 4 compartments
ii)	Diameter	:	30 Feet
iii)	Total holding capacity	:	3984 HL
iv)	Number of Compartments	:	Four
v)	Height of each compartment	:	1524 mm
vi)	Total Height	:	6096 (20 feet)
vii)	Material of each Compartment	:	Mild steel
viii)	Bottom Cone	:	10 mm Mild steel
ix)	Shell	:	8 mm Mild steel with stiffeners
x)	Tray (Intermediate)	:	10 mm Mild steel
xi)	Tray (Top)	:	8 mm Mild steel
xii)	Top Cover	:	8 mm Mild steel with stiffeners
xiii)	Flocculating Compartment	:	8 mm Mild steel
xiv)	Drive Head	:	Worm (EN8), cast iron worm wheel, Drive, 1440 RPM TEFC sq. cage motor with gearbox through chain and sprocket.
xv)	Juice & Mud Outlet connection	:	Standard.
xvi)	Juice Inlet Line Size	:	Standard.
xvii)	Flash Tank	:	Suitable mild steel with vent outlet chimney with siphon of suitable size.
xviii)	Clear juice withdrawal box	:	2 Nos.
xix)	Clear juice column for outlet	:	Made of 8 mm thick MS plate complete with juice inlet, juice outlet, drain connection of 50 NB, sight and light glasses.
xx)	Feed Entry	:	Tangential type
xxi)	Centre shaft	:	Two pieces duly machined
xxii)	Operating platform level for the clarifier	:	Suitable

Clear Juice Pump:

Existing:
01 No. of 350 M3/hr. with 30 M Head & drive 110 KW, 1450 RPM.
01 No. of 400 M3/hr. with 80 M Head & drive 180 KW, 1455 RPM.

Proposed:
Add 1no new Clear juice pump capacity 400M3/hr. with **60M Head**. The CI casing & impeller shall be of CF-8 and shaft shall be of SS 410.

It shall be erected by discarding existing 350m3/ hr. pump.

Mud Liquidation Pump:

Existing:
02 No. Mud liquidation pump of 30 M3/hr. with 20 M Head & drive 7.5 KW, 1440 RPM.

Proposed:
Add 2no new Mud Liquidation pump capacity 100M3/hr. with 20 M Head. The CI casing & impeller shall be of CF-8 and shaft shall be of SS 410.

11. Rotary Vacuum Filter:

Existing:
5 Nos. Decanter PLC based fully automatic,
2 nos' for primary and 2 nos for secondary with suitable tanks, pumps, chemical feeding arrangement and press mud conveying system. Capacity – 20 TPH each.

Existing 01 No. Primary Filtrate of pump 30 M3/hr. with 20 M Head & drive 7.5 KW, 1480 RPM.
Existing 01 No. Decanter Chemical pump of 2.5 M3/hr. with 20 M Head & drive 1.5 KW, 1420 RPM.

Proposed:
Three Nos new 14 ft. x 28 ft. vacuum filter with all accessorize shall be provided.

One rotary vacuum filters of 14 ft. x 28 ft. size shall be complete with SS drumheads, carbon steel fly rims, C.I. trunnions, Suitable decking & SS internal drum piping, SS Screens, forced feed auto lubricators, drum drive and agitator drive.

The brief specifications shall be as follows:

Sr. No.	Description	Technical Details
1.	Type	Rotary drum vacuum filter
2.	Size	14 ft. x 28 ft.
3.	Filtration Area	114m2

Sr. No.	Description	Technical Details
4.	Operating platform level	+8.0 meters
5.	Drum Shell	5 mm thick stainless steel AISI 304 grade
6.	Drum Head	5 mm thick stainless steel AISI 304 grade
7.	Reinforcement	Mild steel structural
8.	Trunions	Cast iron with Gun metal liners. & Forced feed lubrication system.
9.	Screen	Stainless steel having 625 holes/sq. inch & 30SWG
10.	Body Wear Plates	Gun metal
11.	Juice Withdrawal	At both ends
12.	Spray & drip pipe	G.I. heavy duty (Class 'C')
13.	Cover, cleaning header	Mild Steel
14.	Trough	Mild steel
15.	Decking	PP
16.	Lubricator	Multi point forced type (8 points)
17.	Mud discharge scrapper	With rubber
Accessories of Vacuum Filter:		
1.	Vacuum Filtrate receivers	Two Nos. mild steel, construction 6 mm thick, filtrate receiver for light and heavy filtrate Each for vacuum filter.
2.	Filtrate Collection Tank	One No. cylindrical / rectangular vertical tank
3.	Filter Condenser	Mild steel, of suitable size each
4.	Entrainment Separator	Mild steel construction of suitable size
5.	Vacuum Pumps	One No Vacuum pump of suitable capacity for Each filter total three.
6.	Mud recirculation tank	Mild steel with steam coil and steam trap.
7.	Wash Water	Mild steel construction
8.	Feed Mixer	Total Two nos Mild steel for three vacuum filter, suitable size complete with stirrer, motor and reduction gearbox
9.	Bagacillo Blower	Type **– Three nos** Centrifugal Type. Capacity – Suitable PVC Pipe –from mill house to bagacillo separator
10.	Bagacillo Piping	PVC 02 Set

Sr. No.	Description	Technical Details
11.	Cyclone Separator	**2Nos**. G.I. construction for separating bagacillo
12.	Mud Belt Conveyor and Mud bin	Quantity – **1 Lot** Length – Suitable for layout Drive – Suitable HP TEFC Sq. cage with reduction gearbox.
13.	Vacuum regulating valve and flat	C.I. body with gun metal working parts
14.	Inter connecting pipes for filtrate	M.S, 'C' class, rest mud piping etc. of M.S. 'C' class
15.	Drum drive	Suitable kW TEFC motor with VFD & enclosed worm gear box to vary drum speed from 36 to 10 RPH.
16.	Agitator type	suitable kW TEFC Sq. cage motor with enclosed worm gear box
17.	Cake wash pump	Quantity - **Two Nos.** Type - Centrifugal Capacity - 30 m^3/Hr. Head - 30 meter
18.	Mud Recirculation Pump	Quantity – Two Nos. Type – Centrifugal. Capacity - 100m^3/Hr. Head - 20meter
19.	Filtrate Pump	Quantity – Two Nos. Type – Centrifugal. Capacity - 100 m^3/Hr. Head - 20 meter

EVAPORATION SECTION

1. Quintuple effect evaporator set.

Existing:

1st effect	SK- 5000 m2 heating surface area Tube Size: 45 x 1.225 thk. x 5000 mm Length
2nd effect	RB- 5500 m2 heating surface area Tube Size: 45 x 1.225 thk. x 3000 mm Length
3rd effect	RB- 1500 m2 heating surface area Tube Size: 45 x 1.225 thk. x 2000 mm Length
4th effect	RB- 1200 m2 heating surface area Tube Size: 45 x 1.225 thk. x 2000 mm Length
5th effect	RB- 600 m2 heating surface area Tube Size: 45 x 1.225 thk. x 2000 mm Length

Proposed: -
Additional 3 nos New FFE 6500 m2 H.S.A. for 2nd & 3rd & EFFECT
Existing body Re-arrangement.

2. Quintuple / Sextuple effect evaporator set.

Vessel	H.S.A. M2
1st effect	Existing SK 5000m2 /SB 5500 m2
2nd effect	Existing ERB 5500m2
2nd effect	**1no New FFE 6500m2 Working**
3rd effect	**2nos New FFE 6500m2 (1w+1sb)**
4th effect	Existing 02 Nos. Robert Body of 1500m2 (1w+1sb)
5th effect	Existing 02 Nos. (1w+1sb) Robert Body of 1200m2
6th effect	Existing 02 Nos. (1w+1sb) Robert Body of 600m2

New Three Nos. 6500m2 for 2nd & 3rd effect
New FFE with inbuilt Catcher shall be provided. Juice distribution for falling film shall be in SS 304 construction.

FFE (6500 m2 heating surface):
OD (mm) - 45
Length (mm) - 12000
Thickness - **(16 SWG) 1.6**
MOC - IS 13316: 1992 grade 04 Cr. 18 Ni. 10 (AISI 304 grade).

FFE shall have adequate nos. of sight glasses and light glass each of 200 mm diameter x 16 mm thick glass complete with carbon steel frames.
FFE shall be complete with continuous syrup sampler, mild steel fabricated quick opening manholes, temperature and pressure gauges, internal noxious gas piping, external noxious piping of mild steel. Each vessel shall be provided with necessary connection and valves.

Plate Thickness: -

Tube Plate	-	36 mm
Calandria Shell	-	16 mm
Body Shell	-	16 mm
Top cone	-	12 mm
Base plate	-	22 mm
Steam Jacket	-	12 mm
Catchall shell plate	-	12 mm
Top Flange	-	36 mm
Distributor (SS 304)	-	4 mm

Recirculation Pumps for FFE: -
Three Nos. 550 M3/hr. capacity with 30 mtr head (2W+1S) with 3 Nos motors for each FFE. The CI casing & impeller shall be of CF-8 and shaft shall be of SS 410.

Transfer Pumps:
Two Transfer pumps for (1W+1S) of 150 M3/Hr. & 12 m head shall be provided. The CI casing & impeller shall be of CF-8 and shaft shall be of SS 410.

3. Exhaust Condensate tank

Existing:
One Exhaust condensate tank MS Constructed

Proposed:
Existing shall be used.

4. Exhaust /SK Condensate pumps

Existing:
02 No. SK condensate pump of 150 M3/hr. with 35 M Head & drive 30 KW, 1450 RPM.
01 No. SK condensate pump of 150 M3/hr. with 70 M Head & drive 55 KW, 1450 RPM.

Proposed:
Existing shall be used.

5. Evaporator No 5 Condensate pumps

Existing:
02 No. last body condensate pump of 15 M3/hr. with 30 M Head & drive 5.5 KW, 1450 RPM.

Proposed:

Existing shall be used.

6. Cigar System

Existing:
Condensate collection / Distribution
Tank size – Ø2000 mm X 5000 mm long.
Tank length for body no 1 – 2000 mm,
Tank length for body no 2 / 3 – 1500 mm,
Tank length for pan – 900 mm,
Condensate pipe for body no 1, 2 & 3 – 400 mm,
Condensate pipe for pan – 400 mm

Proposed:
Existing cigar system shall be modified.

Add one new Exhaust Condensate PHE 375 TCH suitable capacity shall provide.

7. Cigar Condensate pumps

Existing:
02 No. cigar condensate pump of 200 M3/hr. with 30 M Head & drive 30 KW, 1480 RPM.

Proposed:
Add 1no new Cigar condensate transfer pump capacity 200M3/hr. with 30 M Head. The CI casing & impeller shall be of SS CF-8 and shaft shall be of SS 410.

8. Caustic Soda / Acid Tank with Pumps

Existing:
02 No. caustic soda pump of 15 M3/hr. with 20 M Head & drive 5.5 KW, 1480 RPM

Proposed:

SS 304 fabricated tank with Stirrer for Caustic soda /acid and pumps for pumping the same to evaporator bodies with recirculation arrangement shall be provided. Capacity of the tank shall be 250 HL and 2nos pump capacity 70 m3/h with 30 m head.

9. Unsulphited Syrup pumps:

Existing:
02 No. unsulphited syrup pump of 75 M3/hr. with 30 M Head & drive 18.5 KW, 1450 RPM.

Proposed:
Add 1no New 100 M3/Hr. & 30 m head shall be provided. The CI casing & impeller shall be of CF-8 and shaft shall be of SS 410.

10. Syrup Sulphitor:

Existing:
1 No of 120 HL, Tank size – Ø3100 mm X 4000 mm,
1 No of 200 HL Tank size – Ø3570 mm X 5128 mm,

Proposed:
Existing shall be used.

11. Sulphited Syrup pumps:

Existing:
02 No. sulphited syrup pump of 75 M3/hr. with 30 M Head & drive 18.5 KW, 1450 RPM.

12. Syrup Clarification system:

Existing:
With PLC based Automation, Suitable tanks with stirring arrangement, pumps and chemical feeding system. 1 + 1 standby unit.

Proposed:
Existing shall be used.

13. Clarified Syrup pumps:

Existing:
01 No. unsulphited syrup pump of 100 M3/hr. with 30 M Head & drive 18.5 KW, 1450 RPM.
01 No. unsulphited syrup pump of 100 M3/hr. with 30 M Head & drive 18.5 KW, 1450 RPM

Proposed:
Existing shall be used.

14. Syrup pumps

Existing:
01 No. syrup pump of 100 M3/hr. with 30 M Head & drive 22 KW, 1440 RPM.

Proposed:
Add 1no new Syrup pump capacity 100M3/hr. with 30 M Head. The CI casing & impeller shall be of SS CF-8 and shaft shall be of SS 410.

PAN STATION & CRYSTALLIZERS

1. Syrup Storage Tank

Existing:
14 nos. Storage tanks
05 x 150 m3 for Syrup

01 x 30 m3 for Melt
01 x 30 m3 for AL Molasses
03 x 90 m3 for AH Molasses
02 x 60 m3 for BH Molasses
02x 60 m3 for CL Molasses

Proposed:
Existing AH Molasses Tank shall be reused. **(If Required shall be Modifition to suit layout**)

2. AH molasses Storage Tank near VCP: 01 Nos.

Tank shall be of 800 HL capacity to store AH Molasses, at the Ground floor near VCP. The tanks shall be made of 10 mm thick mild steel plate.

3. Molasses Conditioner

Existing:
3 Nos. All control from pan for AH, BH & CL Molasses

Proposed:
Existing shall be used.

4. Batch Type Vacuum Pans:

Existing:
5 Nos x 80 MT, Heating Surface – 370 m^2
Tube size – ID 99 mm X OD 102 mm X 750 mm lg.

1 No. x 60 MT. Heating Surface – 278 m^2
Tube size-OD 102 mm X 1.6 mm thk. X 850 mm lg.

1 No. x 100 MT. Heating Surface – 462 m^2
Tube size – ID 99 mm X OD 102 mm X 860 mm lg.

Proposed:

Add New 100 MT Batch Pan with mechanical circulator.
Use existing batch pan for A Massecuite.
100 Ton – 2no.
80 Ton – 4nos.

Existing 1no 80 Ton batch pan Mechanical Circulator with VFD shall be provided.

100 Ton batch Vacuum Pan: 01 No.

Add 1nos new 100 Ton Capacity of batch pan mechanical Circulator with VFD for A Masecuite.

The vacuum pans shall be low head rapid boiling calandria type each having normal strike capacity of 100 tones Masecuite.

The length of the tube shall not exceed 900 mm. The tubes shall be SS 304 quality 102 mm outside dia. 1.6 mm thickness The pitch of the tubes shall be such that ligament is not less than 16 mm. All Pan is fabricated from Mild steel tube plate. The 'W' shape bottom saucer shall be welded to the calandria in which case suitable arrangement for expansion of tubes in the bottom tube plate should be provided.

A vapour space of 2 m should be provided in the cylindrical portion above the strike level. The pan shall have internal save all of efficient design. The vapour pipe dia. going to be condenser shall be 1400. With 12 mm thick. the pan shall have feed-check valve after the feed manifold. Pans shall have sight and light glasses, light and reflection to illuminate the whole tube plate and to have calibration scale, vacuum gauge and thermometer in vapour space and a compound gauge and thermometer in the calandria.

Pan shall be completed in every respect with necessary fittings for satisfactory operation including the Hydraulic type discharge valve of ample capacity, various pipe lines (vapour, syrup, high and low grade molasses, movement water, inter connecting cut over pipe lines, etc.) key sampler, vacuum atmosphere venting. The condensate shall be given to common flash vessel or separate receiver. The pan shall have double tangential steam entry.

Technical Specification		
Quantity	:	1 no.
Type	:	Batch pan
Material	:	A-Massecuite
Capacity	:	100 Ton
Material of Construction		
Body/Shell	:	Carbon Steel
Tube plate	:	Carbon Steel
Bottom Cone	:	Carbon Steel
Top Cone	:	Carbon Steel
Catch all	:	Carbon Steel
Vapour Pipe	:	Carbon Steel
Thickness		
Bottom Cone	:	22 mm
Tube Plate Top & Bottom	:	36 mm
Catchall shell	:	12 mm
Calandria Shell, Body Shell	:	16 mm

5. Seed Crystallizer:

Existing:
1No. Capacity – 80 MT Seed crystallizer for B/Dry seed crystallizer

Proposed:
Existing shall be used.

6. Vacuum Crystallizer:

Existing:

1 x 80 MT Vacuum Crystallizer for A Masecuite.
1 x 80 MT Vacuum Crystallizer for B Masecuite.
1 x 80 MT Vacuum Crystallizer for C Masecuite.

Proposed:
Existing shall be used.

7. A-Massecuite Crystallizer:

Existing:
Total 06 nos. Air cooled crystallizer
5 Nos. x 90 MT. Motor – 5.5 KW / 1440 Rpm, Ratio – 1460.63.
1 No x 120 MT. Motor – 5.5 KW / 1440 Rpm, Ratio – 1460.63.
Rpm final Rpm – 1.

Proposed:
Add 1No new 110 Ton air cooled crystallizer.

Mild steel fabricated horizontal air-cooled type receivers each of 110 tones holding capacity shall be provided.

The crystallizers shall be complete with efficient stirring arrangement of sturdy construction for air-cooled and sturdy heat exchange unit of water cooled, driven by electric motor of suitable for continuous working and complete with suitable Planetary type reduction gear unit designed to give a stirrer speed of not more than 60 RPH.

The shell of the horizontal crystallizers shall be made of minimum 12 mm thick mild steel plate and end plates 18mm thick mild steel plate.

The system of crystallizers shall be arranged in such a way that high grade Masecuite flow to centrifugal machine by gravity without any pumping and fed to pug-mills by gravity from these crystallizers.

8. Continuous Pan for B-Massecuite

Existing:
Capacity – 40 TPH. Heating Surface – 801 m^3
Tube size – OD 102 X 1.6 mm thk. X 900 mm ht.
Total Tube – 3078.Compartment – 11
S/v ratio – 10 to 10.5 Massecuite value – 76 m^3,

Proposed:

Existing 60 Ton Batch pan shall be used for B/ C Graining.

One new 60 TPH Vertical Continuous Pan for B-Massecuite

60 TPH Vertical Continuous Vacuum Pan: 01 No.

60 TPH Vertical continuous pan for B-Massecuite boiling with all accessories shall be provided. Continuous pan shall be Vertical construction with vertical tubes with PLC based auto feed control system, suitable to be hooked with DCS system.

The calandria and vapor space shall be fabricated from mild steel plates. Pan body shall be divided into multiple Chembers.

Stainless steel welded quality tubes, temper annealed, and ends suitable for expansion in tube plates, shall be provided.

Sight and light glasses shall be provided in each compartment with suitable cleaning pipes, with low-pressure steam.

Heating vapor shall be admitted at the calandria with minimum pressure drop across the tubes to ensure that the vapor reaches the other end of calandria. The condensate shall be removed at the bottom tube plate to ensure quick removal of condensate.
Non-condensable gas connections shall be provided at the end for efficient and complete removal.

Seed inlet is given to first and second compartment from Top side and massecuite flow from top to bottom. There are five chambers (4W+1S). One AH tank shall be provided. Outlet connection from last two compartment is given to sealing crystallizer.

Suitable platform shall be given for VCP.

Various vertical headers of Vapour inlet, Vapors outlet, Condensate, Hot and Cold water header, Overflow, Bypass pipeline shall be provided.

One suitable single entry condenser shall be provided.

Each chambers shall be with TOP mounted Mechanical Circulator and mechanical seal along

with VFD & Drive Motor, Planetary Gear Box etc.

Technical Specification		
Quantity	:	1 no.
Type	:	Vertical Continuous Pan
Material	:	B-Massecuite
Capacity	:	60 TPH
No of Chamber(Working)	:	4
No of Chamber(Grain/Standby)	:	1
S/V Ratio	:	10 to 10.5 m2/m3
Tube Details		
Outside diameter	:	102 mm
Thickness	:	1.5 mm
Tube Length	:	1000 mm
Material	:	Stainless steel ERW quality tubes as per IS 13316: 1992, grade 04 Cr.18 Ni. 10 (Equivalent AISI -304), temper annealed and ends suitable for expansion in tube plates
Ligament of the tubes	:	Not less than 16 mm
Material of Construction		
Body/Shell	:	Carbon Steel
Tube plate	:	Carbon Steel
Bottom Cone	:	Carbon Steel
Top Cone	:	Carbon Steel
Catch all	:	Carbon Steel
Vapour Pipe	:	Carbon Steel
Thickness		
Bottom Skirt	:	20 mm
Tube Plate	:	32 mm
Bottom Cone	:	20 mm
Calandria Shell, Body Shell	:	20,18,16,16 mm

9. AH-Molasses Pump: 02 Nos. (1W+1S)

Two AH molasses pumps of 65 M3/hr. capacity 60 Mtr head with ACVFD shall be provided.

10. Grain pumps for B Vertical Pan: 02 Nos. (1W+1S)

Screw/High, flow Grain pumps of 25 M3/hr. capacity with 60 Mtr head with ACVFD shall be provided.

11. B Massecuite lifting Pumps: 02 Nos. (1W+1S)

Two Massecuite lifting pumps of 65 TPH capacity, 30-meter head with ACVFD shall be provided

12. Hot water/ Cold water Tank with Pumps for VCP

One suitable capacity hot/ cold water tank. The tanks shall be made of 8 mm thick mild steel plate.

Two Hot / Cold water pumps of 30m3/hr. capacity, 60-meter head shall be provided.

13. B-Massecuite Crystallizer:

Existing:
1 No x 90 MT. Motor – 5.5 kW / 1440 Rpm, Ratio – 1460.63.

Proposed:
Existing shall be used.

14. B/C Sealing crystallizer

Existing:
2 Nos. Capacity – 55 MT.
Drive – Planetary Motor – 3.7 KW / 1440 Rpm.

Proposed

Add one new 65 ton sealing crystallizer for new VCP for B-Massecuite

One MS Fabricated Sealing crystallizers of 65 tones working capacity each up to the top sight glass center each shall be provided for storing grain.

The shell of the horizontal crystallizers shall be made of minimum 10 mm thick mild steel plate and end plates 16mm thick mild steel plate.

Sealing crystallizers shall have four sight glasses on the side and one sight glass with light at top. Two manholes each of 500 mm dia. and arrangement for sight glass washing shall be provided. A ladder is provided on each seed and vacuum crystallizer. The crystallizers shall be horizontal design fitted with stirrer driven by suitable planetary drive.

15. Vertical Crystallizer for B-Massecuite

Existing:
1 Nos. Capacity – 550 MT.
Motor – 7.5 kW / 960 Rpm. Additional arm fitted at bottom. Ratio – 2756.97 Final Speed – 0.34 rpm.

Proposed:
Existing shall be used.

16. Continuous Pan for C-Massecuite

Existing:
Capacity – 30 TPH. Heating Surface – 904 m^3 Total Tube – 3560.
Tube size – OD 102 X 1.6 mm thk. X 900 mm ht. Tube size – OD 102 X 1.6 mm thk. X 800 mm ht. Compartment – 11
S/v ratio – 10 to 10.5 Massecuite value – 86 m^3, Vapor outlet pipe – 1200 mm.
Vapor pipe with external catcher. /v ratio – 10 to 10.5 Massecuite value – 76 m^3, Vapor outlet pipe – 1200 mm.
Vapor pipe with external catcher

Proposed:
Existing 2nos horizontal CVP 30 TPH shall be used for C Massecuite.

Existing 1no Batch pan 80 Ton shall be used for B/ C Massecuite grain.

17. C-Massecuite Crystallizer:

Existing:
1 No x 65 MT. Motor – 3.5.5 kW / 1440 Rpm.

Proposed:
Existing shall be used.

18. Vertical Crystallizer for C-Massecuite

Existing:
1 Nos. Capacity – 550 MT.
Motor – 15 kW / 960 Rpm. Additional arm fitted at bottom. Ratio – 2756.97 Final Speed – 0.33 rpm.

Proposed:
Existing shall be used.

19. Sweet Water Tank & Pump: 02 Nos.

One 50 m3 capacity sweet water tank of mild steel construction shall be provided.

Thickness:

Shell	:	8 mm with stiffeners
Bottom	:	10 mm

02 nos. (1W+1S) sweet water pumps each of 20 m3/hr., 30 M head of C.I body & stainless steel impeller with TEFC sq. cage drive motors shall be provided.

20. Condensers:

Existing:
11 Nos.
Ø1300 mm X 5 Nos. for 80 MT pan
Ø1200 mm x 2 nos for Cont. Pan, Capacity – 16 MT
Ø1100 mm x 3 nos, Evaporators and 60 T pan.
Spray and jet nozzle water control based on vapour load and vacuum

Proposed:
Add Two nos new single Entry type condenser for new VCP & batch pan Suitable capacity.

Each condenser body and bottom cone shall be made of SS 304 material with tail pipe and suitable platform with railings, access staircase for inspection, repairs, etc., of the condensers shall be provided. All nozzles shall be of PVC/SS 304 quality.

Automation for Condenser
Vacuum control will be provided for condenser automation. According to equipment vacuum on/Off valve will be operated to maintain the vacuum as per process requirement. Vacuum, tail pipe temperature shall be monitored to PLC. Pressure and temperature gauges shall be provided as per standard practice.

21. Vacuum Ejector:

Existing:
Vacuum ejector of suitable capacity to create vacuum for B & C Vacuum Crystallizer.

Proposed:
Add one new air ejector for suitable capacity.

22. Injection Pumps:

Existing:
04 No. injection pump of 3000 M3/hr. with 32 M Head & drive 350 KW, 980 RPM

Proposed:
Existing shall be used.

23. Injection Priming Pumps:

Existing:
03 No. injection priming pump of 60 M3/hr. with 600 M Head & drive 3.7 KW, 1450 RPM

24. Spray Pond:

Existing:
Gravity flow arrangement. Size – 40-meter X 85 Meter Nos of nozzles – 625 nos

Proposed:

Add new 90 Nozzles. Separate line for additional condenser to spray pond shall be provided.

NOTE-; old injection & spray water Header damaged piping shall be replace with new one & discarded scrap piping is property of supplier.

CENTRIFUGAL STATION

1. Pug Mill:

Existing:
3 Nos. of Size – 1000 mm X 8760 mm.
Motor – 5.5 kW / 1440 rpm.

Proposed:
In Existing Modification shall be 6 Nos suitable machine.

2. Batch Centrifugal Machine:

Existing:
05 Nos. For "A" Massecuite
4 Nos. of 1750 Kg/cycle, No of cycle/hr. - 18 – 20.
1 No. of 1750 kg / charge (with hopper / pug mill)

Proposed:
Existing shall be used.

One new 1750 kg/ Charge batch centrifugal machine shall be provided.

AC motor & AC VFD of ABB latest version make shall be provided.

Fully automatic recycling type centrifugal machine consisting of:

CENTRIFUGAL BASKET

The basket is of welded construction and fabricated from stainless steel plates with welded joints radio graphed in accordance with ASME code. The thickness of the shell plate of the basket designed to withstand the working stress induced. The basket is reinforced by stainless steel hoop rings equally spaced fitted on basket shell whenever necessary. A cast steel spider hub of ample proportion is bolted to the basket. The basket is provided with a bottom-closing valve.

Complete Basket to be manufactured used in Stainless Steel & Separate spider hub to be provided with special oval shape of ribs due to this No sugar drops stored/stop on Ribs.

Basket Size: 1600 mm diameter x 1100 mm deep.

MONITOR CASING

Monitor casing is fabricated from mild steel plates is provided with molasses outlet pipe and top sliding cover. A water spray manifold will be fitted to the monitor casing such that nozzles are located inside the basket for efficient washing with superheated wash water. The machine will be equipped with syrup separators (Molasses classifiers). Curb wash coil to be provided inside the casing to clean the molasses chamber.

Large size man hole (Covered by aluminum cover) to be provided on the top of the cover to cleaning purpose and necessary checking and maintenance. Top cover in two pieces.

SUSPENSION

The suspension system of the centrifugal comprises a fabricated main bracket having a CS seat fitted with PTFE sheet segment into which the heavy duty C.I/C. S suspension assembly is located. Roller bearings of ample proportions housed inside the suspension assembly is designed to take the necessary radial and thrust loads.

The centrifugal shaft is to high tensile forged steel and is designed for good dynamic stability under loads. The lower end of the shaft is bolted to the basket spider hub having large opening area. The shaft of the centrifugal machine and the electric motor is coupled by means of a special flexible star type coupling.
Special type Locking and adjusting arrangement to be provided in suspension assembly for self-setting of suspension bowl.

Proper location of Buffer supporting Ring to get the less vibration and increase the life of rotating part.

Special Sleeve to be provided for bearing mounting used/increase the life of shaft.

We provided proper & easy location of grease nipple for greasing which result to minimize the quantity of grease.

The proper & correct design of bearing housing is easy for maintenance, Increase the life of rotating part, rubber part etc.

MECHANICAL BRAKE

An air cooled brake disk of ample proportion is fitted to the shaft for applying mechanical breaks. The breaks can be operated either manually or automatically by an electro pneumatic cylinder. Break disc used to generate the minimum heat at the time of breaking

LUBRICATION

Grease lubrication to machine bearing will be by grease pump, ensuring low bearing temperature rise and longer life of bearing.

PNEUMATICALLY OPERATED DISCHARGER:

The Pneumatically operated discharger is provided for discharging sugar the solenoid valves will be actuated in automated sequence by process control timers. An overriding control for manual operation of the discharger will be provided. An inter-locking id provided such that speeds above 50 RPM will not be picked when the discharger in operation.

Plough blade with air assisted (Air System) to be provided to control the less quantity of remaining sugar in the basket.

BOTTOM VALVE

Positive Sealing type conical shaped bottom opening leak proof bottom valve is provided in machine. In case failure of cycle, massecuite does not leak through bottom valve, it remains in basket which can be processed afterwards.

Bottom Opening valve which is give the guide to sugar discharge on hopper & remaining sugar is less than others Basket.

Proper massecuite distributions through distribution cone/plate which protect/prevent the basket oscillation & get less Vibration.

Special design of centering device with G.M Bush, to hold the shaft at the time of ploughing and control the vibration.
Special hood actuating device is provided for smooth & leak proof operation of closing hood.

Feeding System – System to be consisting of feed pipe with washing coil, 2 Nos Butterfly Valve to be provided. Massecuite to be feed through massecuite distribution gutter to centrally fitted distribution cone.

Charging Sensor – Electro pneumatically operated massecuite thickness controller to be provided to control the feeding.

Washing System – **SHW** water to be provided through water nozzle assembly. SHW water to be control by Globe valve and pneumatically operated control valve.

Syrup Separator – System to be consisting of outlet pipe and 2 nos. butterfly valve.

IGBT CONTROL AC DRIVE SYSTEM
FOR 1750 KG/CHARGE CENTRIFUGAL MACHINE

1. AC VFD system along with ac inverter duty motor should be supplied based upon given load details and as per below mention specification load derail:

Application	: Batch type centrifugal Machine
Capacity	: 1750 kg A massecuite
GD sq. values (kg m sq.)	: Empty-2500, Charged-5150
	Spunout – 4255
Timings	: Process time -80 sec
	: Acceleration & Deceleration time-80 sec
	: Total cycle time – 160 sec

2. The panel shall be constructed with CRCA sheet with load bearing members of 2 mm and other panel section of 1.6 mm free standing with IP41 degree of portion. The suitable capacity AI. Bus bar shall be provided with PVC sleeves and current density of bus bar shall be more than 0.8 A/sq.mm. Also the provision shall be made to take outgoing power and control cable from bottom. The earth bus bar shall run throughout the length of panel. The panel shall be finished with power coated paint.

The line volt meter and RYB mimic indication shall be provided on the incomer panel door. Reset of the specs shall be as indicated in the specs.

Man machine interface shall be provided on the panel / PB Stn, which shall display the process parameters and speed, current. The provision of auto / manual mode selection shall be provided.

3. The panel shall comprise of required switch gear, metering annunciation and Alpha numeric display, MMI along with LCL filter and active front end type AC drive with PLC control. The ABB make digital four quadrant type AC drive module of ACS 880 series/of suitable series comprises of IGBT based converter, DC link, IGBT based inverter as per following technical specifications.

Type of control	:	Frequency control (v/f) / Direct torque control technology.
Main input supply	:	380-415 + 10%, 50 Hz ± 5%
Power Factor	:	0.93 – 0.95 total
Efficiency at nominal power	:	98%
I Cont.	:	505 A / supplier to confirm
I max	:	supplier to confirm
Ambient temp.	:	40 Deg. C.
Input supply	:	3 phase, 415 V + 10%, 50 Hz + 3%

4. Display unit – Alphanumeric display (4-line x 20 character) plain text. It can display three separate actual values simultaneously from following –

Motor speed	:	DC Bus voltage
Frequency	:	Output voltage
Current	:	Heat sink temp.
Torque	:	Operating hours
Power	:	Kilowatt hours

5. **Protections:** - Over temp, overload, over speed, over current, short circuit., earth fault, motor blower fan failure, drive module fan failure, motor stall & unbalance, short circuit, along with process and system protection.

6. The logic operation controlled thro' PLC as per following: -

Make	:	MESSUNG / MITSUBISHI /SIEMENS
Type	:	STANDARD
Power supply	:	200 V AC + 15%, 50 Hz + 6% 100 VA
Protection	:	a) 3A 20 mm glass fuses b) MOV protection for over voltage c) Output short ckt. Protection.
Features	:	a) Alpha numeric display & 6 user configurable keys in CPU of PLC b) LED indicating CPU status c) Key board with 6 keys d) 3 port:

1) Programming port
2) Open port for MMI
3) Open port for DC drive

Communication

7. Operator Control Consol (Sr. Man Machine Interface unite)- A touch screen type panel electronic controls and a separate emergency push button, motor OFF push button, Auto/ Manual, Manual selector switch shall be housed in a separate enclosure of IP 55 type.

Make	:	VFD panel builder
Type	:	soft line senior
Display	:	7”

The 50 mtr communication cable between PLC & MMI also shall be provided.

8. System interlocks or system protections for high speed ploughing, wobbling, high motor winding temp., high bearing temp., monitoring timer time out alarms along with interlocking like blower fan motors lock, AC drive module fan motor’s interlock, acceleration mode interlocks shall be incorporated so as to make the system fool proof.

9. AC motor specifications: -

Make	:	Siemens
Main input supply	:	380-415 V + 10%, 50 Hz + 5%
Rating in KW	:	250 KW
Duty	:	S1
Synchronous Speed.	:	740rpm
Top speed	:	1100 rpm
Full load current	:	Suppler to specify
Full load torque	:	Supplier to specify
Full load efficiency	:	93.5% or better
Full load power factor	:	Supplier to specify
Insulation class	:	F
Temperature rise limited up to class	:	F
Ambient Temp	:	0 – 50 Deg. C
Degree of protection	:	IP 55
Type of cooling	:	Force cooling
Applicable std.	:	IS 325 – 1996
Operating speeds	:	150 – 200 rpm – charging
	:	1050 – 1100 rpm max. spinning
	:	50 – 70 rpm ploughing
Features	:	VPI treatment - Insulated bearings - 3 Nos. RTD for winding protection - 2 Nos. BTD for bearing protection - Space heater

10. Mean Sea Level : Less than 1000 Meters for Motor and Drive System.

3. B Pug Mill

Existing:
3 Nos. of Size – 1000 mm X 8760 mm.
Motor – 5.5 kW / 1440 rpm.

Proposed:
Use Existing Modification

4. Continuous Centrifugal Machine for B-Massecuite:

Existing:
03 Nos. for "B" Massecuite
Type – WK 1500, Capacity – 22 MT / hr.
Motor – 110 kW 1480 rpm,

Proposed:
Use Existing 3 x 1500 mm continuous machine for B massecuite

One new 1500 mm Continuous machine for B Massecuite

Continuous centrifugal machine of 1500 mm Diameter.

BASKET	The cone shaped centrifugal basket is made out of special chloride resistant anti corrosive stainless steel, with a diameter 1500 mm. The basket is accurately balanced and with optimum thickness - calculated for allowable stress due to centrifugal force and is provided with a stainless steel high draining backing screen of dovex type which supports a pure nickel working screen. The high drainage area gives the best performance of machine & get dry (less moisture % as compared to other) & bright white sugar. The bottom part of the basket contains a special accelerating cup, the 30 degree basket handles both low grade massecuite with fine crystals and intermediate products and affination magma, only with the replacement of suitable working screen and driving pulley.
OUTER CASING	A mild steel sheet casing of welded construction to receive the centrifugal basket and driving gear assembly is provided. The casing is subdivided in to sugar and molasses compartment, both compartments being separated and sealed by aero dynamic device with rubber sealing.
DRIVE UNIT	The driving gear assembly is located beneath the basket. The drive unit is provided with amply dimensioned antifriction bearings in driving gear assembly and adequately proportioned

	shaft of non-vibrating design so that the operating speed is far below the critical speed. Speed of rotation - 1550 to 1750 RPM Selection speeds for "CF" CA, B applications are provided.
LUBRICATION STATION	The grease lubrication system shall be provided.
WASHING **FEEDING SYSTEM**	Comprising of manifold, strainer, spray nozzles, globe valves, main stop valve, steel pipes etc. Feed system consisting of manually operated Pulp valve of suitable size & fabricated strainer, double wall S.S. Feed tube with provision For admitting steam in annular space of the tube and water to the center care of the incoming massecuite.
SCREEN **BACKING SCRREN**	Dovex R type S.S. wire woven backing screen fixed in the basket to support the working screen
WORKING SCREEN	One set of pure nickel with hard chromium plated working screen Perforation - Slot 0.06 mm / 0.09 X 2.8 mm fitted to the basket.
DRIVING MOTOR	150 HP, 50 Hz, 1500 RPM, 3 phase, TEFC Induction motor of IEC/SIEMENS make. The motor is complete with V belt pulley mounted on the driving shaft of the motor.
CONTROL EQUIPMENT	The main Control panel shall be of a sheet metal cabinet design for main 150 HP motor with Star / Delta starter, interlocked with ammeter, voltmeter, indicating lamps, control transformer & over load protection & with flasher unit. Push button panel for above.

5. C Pug Mill

Existing:
Pipe type closed.

Proposed:
Use Existing / Modification

6. CFW Massecuite Header & Transient Heater

Existing:
Suitable for machine

Proposed:
No Change
One new transient Heater suitable capacity.

7. CFW Massecuite Continuous machine

Existing:
05 Nos. for "C" fore worker massecuite.
Type – WK 1150, Capacity – 6 MT / hr.
Motor – 55 kW 1440 rpm,

Proposed:
Use Existing 5 x 1150 mm continuous machine for CFW massecuite

One new 1500 mm Continuous machine for CFW Massecuite

Continuous centrifugal machine of 1500 mm Diameter.

BASKET	The cone shaped centrifugal basket is made out of special chloride resistant anti corrosive stainless steel, with a diameter 1500 mm. The basket is accurately balanced and with optimum thickness - calculated for allowable stress due to centrifugal force and is provided with a stainless steel high draining backing screen of dovex type which supports a pure nickel working screen. The high drainage area gives the best performance of machine & get dry (less moisture % as compared to other) & bright white sugar. The bottom part of the basket contains a special accelerating cup, the 30 degree basket handles both low grade massecuite with fine crystals and intermediate products and affination magma, only with the replacement of suitable working screen and driving pulley.
OUTER CASING	A mild steel sheet casing of welded construction to receive the centrifugal basket and driving gear assembly is provided. The casing is subdivided in to sugar and molasses compartment, both compartments being separated and sealed by aero dynamic device with rubber sealing.
DRIVE UNIT	The driving gear assembly is located beneath the basket. The drive unit is provided with amply dimensioned antifriction bearings in driving gear assembly and adequately proportioned shaft of non-vibrating design so that the operating speed is far below the critical speed. Speed of rotation - 1550 to 1750 RPM Selection speeds for "CF" CA, B applications are provided.
LUBRICATION STATION	The grease lubrication system shall be provided.
WASHING **FEEDING SYSTEM**	Comprising of manifold, strainer, spray nozzles, globe valves, main stop valve, steel pipes etc.

	Feed system consisting of manually operated Pulp valve of suitable size & fabricated strainer, double wall S.S. Feed tube with provision For admitting steam in annular space of the tube and water to the center care of the incoming massecuite.
SCREEN **BACKING SCRREN**	Dovex R type S.S. wire woven backing screen fixed in the basket to support the working screen
WORKING SCREEN	One set of pure nickel with hard chromium plated working screen Perforation - Slot 0.06 mm / 0.09 X 2.8 mm fitted to the basket.
DRIVING MOTOR	150 HP, 50 Hz, 1500 RPM, 3 phase, TEFC Induction motor of IEC/SIEMENS make. The motor is complete with V belt pulley mounted on the driving shaft of the motor.
CONTROL EQUIPMENT	The main Control panel shall be of a sheet metal cabinet design for main 150 HP motor with Star / Delta starter, interlocked with ammeter, voltmeter, indicating lamps, control transformer & over load protection & with flasher unit. Push button panel for above.

8. CAW Massecuite Continuous Machine

Existing:
02 Nos. for "C" After worker massecuite.
Type – WK 1100, Capacity – 8-10 MT / hr.
Motor – 55 kW 1440 rpm,

Proposed:
Use Existing 2 x 1150 mm continuous machine for CFW massecuite

One new 1500 mm Continuous machine for CAW Massecuite

continuous centrifugal machine of 1500 mm Diameter.

BASKET	The cone shaped centrifugal basket is made out of special chloride resistant anti corrosive stainless steel, with a diameter 1500 mm. The basket is accurately balanced and with optimum thickness - calculated for allowable stress due to centrifugal force and is provided with a stainless steel high draining backing screen of dovex type which supports a pure nickel working screen. The high drainage area gives the best performance of machine & get dry (less moisture % as compared to other) & bright white sugar. The bottom part of the basket contains a special accelerating cup, the 30 degree basket handles both low grade massecuite with

	fine crystals and intermediate products and affination magma, only with the replacement of suitable working screen and driving pulley.
OUTER CASING	A mild steel sheet casing of welded construction to receive the centrifugal basket and driving gear assembly is provided. The casing is subdivided in to sugar and molasses compartment, both compartments being separated and sealed by aero dynamic device with rubber sealing.
DRIVE UNIT	The driving gear assembly is located beneath the basket. The drive unit is provided with amply dimensioned antifriction bearings in driving gear assembly and adequately proportioned shaft of non-vibrating design so that the operating speed is far below the critical speed. Speed of rotation - 1550 to 1750 RPM Selection speeds for "CF" CA, B applications are provided.
LUBRICATION STATION	The grease lubrication system shall be provided.
WASHING **FEEDING SYSTEM**	Comprising of manifold, strainer, spray nozzles, globe valves, main stop valve, steel pipes etc. Feed system consisting of manually operated Pulp valve of suitable size & fabricated strainer, double wall S.S. Feed tube with provision For admitting steam in annular space of the tube and water to the center care of the incoming massecuite.
SCREEN **BACKING SCRREN**	Dovex R type S.S. wire woven backing screen fixed in the basket to support the working screen
WORKING SCREEN	One set of pure nickel with hard chromium plated working screen Perforation - Slot 0.06 mm / 0.09 X 2.8 mm fitted to the basket.
DRIVING MOTOR	150 HP, 50 Hz, 1500 RPM, 3 phase, TEFC Induction motor of IEC/SIEMENS make. The motor is complete with V belt pulley mounted on the driving shaft of the motor.
CONTROL EQUIPMENT	The main Control panel shall be of a sheet metal cabinet design for main 150 HP motor with Star / Delta starter, interlocked with ammeter, voltmeter, indicating lamps, control transformer & over load protection & with flasher unit. Push button panel for above.

9. Magma Mixer:

Existing:
3 Nos. for B. CAW & CFW
Motor – 5.5 KW / 1440 rpm. Final Rpm – 37.85.

Proposed:
Use Existing by modification.

10. Magma Pumps:

Existing:

Pump Station	Qty.	Capacity	Head	Motor Kw	Speed
B Magma	01 No.	25	20	11	1440
B Magma	01 No.	30	30	11	1440
C Fore Magma	01 No.	25	20	11	1440
C After Magma	01 No.	25	20	11	1440
C After Magma	01 No.	25	30	7.5	1440

Proposed:
Add 1no B Magma pump Capacity 30 TPH with 30 MLC Head.

Add 1no CFW Magma pump Capacity 30 TPH with 30 MLC Head.

11. Molasses Run Off Tanks:

Existing:
Suitable capacity

Proposed:
Existing shall be used.

12. Molasses Runoff ump:

Existing:

Pump Station	Qty.	Capacity	Head	Motor Kw	Speed
A Heavy	01 No.	40	30	11	1440
A Heavy	01 No.	65	30	11	1440
A Heavy	01 No.	40	30	11	1440
A Light	01 No.	40	30	11	1440
A Light	01 No.	65	30	7.5	1440
A Light	01 No.	40	30	11	1440
B Heavy	01 No.	25	30	11	1440
B Heavy	01 No.	65	30	11	1440
C Light	01 No.	20	30	11	1440
C Light	01 No.	65	30	7.5	1440

Proposed:
Existing shall be used.

13. Sugar Melter

Existing:
03 Nos. for B-Seed. C-Seed & Dry Seed. Motor - 7.5 kW / 1440 rpm.

Proposed:

Add one nos new 35 T/HR B & C Sugar melter.
One vertical Continuous sugar melter of 35T/hour capacities for capacity complete with stirrer, drive and necessary steam, water connection for melting B-Seed & C-Seed Melting sugar.
A platform with staircases in the melter shall be provided for feeding of sugar into the melter.
Temp control system for vertical sugar melter shall be provided,

14. B-Seed Melting Pump

Existing:
03 No. melting pump of 29.98 M3/hr. with 33 M Head & drive 11 KW, 1440 RPM

Proposed:
Existing shall be used.

SUGAR HANDLING SYSTEM

1. Sugar Hopper

Existing:
03 Nos. Make – Electromag – Joest Vibration Pvt. Ltd. Type – FSM, 2500 X 17300 for receiving, Material Handled – sugar crystals. Conveying Performance – 90 TPH. Inclination for conveyor – Horizontal. Opening Frequency dimension - 480 - 530 RPM, Upper trough width – 2500 mm Trough height material – 300 mm, Machine body – MS, Trough material / thk. - IS 2062 Gr. B. / 8 mm Drive – Crank drive unit. Motor – 11 kW, Ca. 1000 RPM 6 Pole IP 55, class F. Voltage - 415 V 3 ph. 50 Hz

Proposed:
Existing shall be used.

2. Hot Air Blower for Hopper

Existing:
3 Loop control system. Hot and Cold air fan capacity – 7500 CFM. Motor – 7.5 kW / 1440 Rpm

Proposed:
Existing shall be used.

3. Sugar Elevator:

Existing:
2 Nos. of 60 TPH each. Belt size – 500 mm X 71800 mm. Motor 15HP/1440 RPM, G B Ratio – 72.5:1 Belt Surface speed – 37.42 mtr. /min.

Proposed:
Existing shall be used.

4. Sugar Grader:

Existing:
2 Nos. of 30 TPH each. 6 Decks. Drive: 15 KW, 750 RPM

Proposed:
Existing shall be used.

5. Sugar Silo:

Existing:
4 Nos.
2 x 150 MT., 1 x 100 MT & 1 x 25 MT.

Proposed:
Existing shall be used.

6. Dry Seed Belt Conveyor and Vibro Screen with Mixer:

Existing:
2 Nos. Belt Size – 600 mm X 24 meter. Vibro Screen size – 72" = 1 no
Seed mixer – 1 no.

Proposed:
Existing shall be used.

7. Sugar Dust Catcher:

Existing:
Capacity – 60000 M^3 / hr., No of points – 50.

Proposed:
Existing shall be used.

15. Dust Catcher Pump:

Existing:
01 No. dust catcher pump of 25 M3/hr. with 22 M Head & drive 7.5 KW, 1440 RPM

Proposed:
Existing shall be used.

8. Sugar Bag Weighing Machine:

Existing:
04 Nos.

Proposed:
Existing shall be used.

9. Bag Stitching machine:

Existing:
No details.

Proposed:
Existing shall be used.

10. Hot & Cold Water Overhead Tank:

Existing:
3 Nos. Storage tank (Pan Floor) of 60 m3 each.
02 for cold water & 01 for hot water.

Proposed:
Existing shall be used.

16. Service Water Pump

Existing:
02 No. service water pump of 450 M3/hr. with 30 M Head & drive 55 KW, 1450 RPM

Proposed:
Existing shall be used.

11. Excess Condensate Cooling Tower:

Existing:
Capacity – 200 M^3 / Hr. Temp. Range - 95° / 35°.

Proposed:
Existing shall be used.

ANNEXURE-II
INSTRUMETATION

TECHNICAL SPECIFICATION OF INSTRUMENTATION

1. Automation at FFE

One set of automation for FFE station to control level of FFE. The FFE level control shall be PLC based with temperature, pressure and level monitoring. Hot water on/off valve shall be provided to control emergency FFE level.

2. VCP Automation

Instrumentation & Automation with standalone PLC with SCADA control system.

Pan feed control	:	As per consistency/calculative brix of chamber
Pan steam control	:	As per consistency/brix of chamber
Pan vacuum control	:	At every chamber Steam pressure and temperature control
For each chamber Level based automation	:	For each chamber
Control valve	:	For steam, main feed, seed etc.
Flow meter	:	For seed, feed and massecuite
Pan Brix control	:	On mechanical circulator load basis
Flow meter	:	4 Nos. (For AH, CL, Condensate, HW)

Note – VCP Automation shall be provided as per Supplier Proven design.

Other Accessories of Vertical Continuous Pan

Each chamber pressure & temperature monitor with necessary instrumentation. Diff. pressure type level transmitter considered for each chamber. chamber bypass control valve considered when VCP in cleaning mode. Steam header pressure & temperature sensors & transmitter provided to monitor the same. Vacuum transmitter installed at vacuum header. All pneumatic valves shall be butterfly type with electro pneumatic positioner for control type & SOV with limit switches for on/off type valves.

Instrument air is in customer scope same is required at one point at VCP section. Air conditioner system with dustproof control room shall be provided by customer for heathy ness of PLC system. Earthing below ground in customer scope.

Batch Pan Automation

Batch pan automation shall be provided Consistency based. With pressure gauges & temperature gauges for local monitoring. Brix sensor shall be constancy based instead of mechanical circulator load.

Melter Automation –

Temperature control system shall be provided for sugar melter .

Overall Automation points

- **Pressure, Level, vacuum, DP transmitter shall be smart**
- **Control valve class will be 150**
- **PLC control system shall be redundant for Controller, power & communication.**
- **20% spare IO shall be provided for each type IO.**

ANNEXURE III
ELECTRICAL

ELECTRICAL DISTRIBUTION FOR BOILING HOUSE

1. 11KV MV Panels	
Indoor, 11kV ± 10%, 50Hz ± 5%, Al, 40kA for 3sec. metal Clad, Indoor, draw out truck type with vacuum circuit breakers Having Suitable CT'S, for Metering and Protective relays etc. Enclosure protection of MV panel shall be IP 4X All main protection relay shall be numerical type and auxiliary relay shall be electromechanical type. **Feeder protection relay shall be Siemens 7SR series** **11kV,1250A, MV panels consisting of following feeders** 1. For Distribution Transformer feeders (1250A, VCB): Qty. - 1 No 2. Adaptor Panel to suit the existing bus bar of the 11kV panel	1No
2.DISTRIBUTION TRANSFORMER	
3 MVA, 2 Winding Distribution Transformers shall be outdoor type, oil cooled and 0.8 power factor continuous duty for LT Auxiliary load for **Boiling House** with rating of 11 KV/0.433 KV, ONAN, Solid earthing, Dyn-11, OCTC ±7.5% in step of 2.5% taps having all Standard accessories. Z = 8% (+ IS tol.), Temperature rise over ambient 50 Deg Oil/winding - 50/55 Deg. No Load Losses- 3kW & Load Losses-33kW	1 No.
3. 415V LV Bus duct Sugar	
5000A, 415V ± 10%, 50Hz, TPN, Non-segregated phase AL bus bar, epoxy insulator, with MS enclosure Bus duct shall be provided between 3 MVA Distribution transformers to Sugar LT PCC. Aluminum bus bar	1 Set.
4. BOILING HOUSE PCC	
5000A, 415V ± 10%, 50Hz, PCC Incomer shall have 5000A ACB Breakers for Transformer Incomer. PCC shall be non-draw-out type (except PCC Incomers ACB's which are draw out). PCC panel shall be fabricated from 2 mm thick CRCA sheet steel and powder coated as per shade RAL 7032, with necessary feeder ratings. All LT switch gear are of panel construction sheet steel thickness shall be 2 mm for load bearing no. and 1.6 mm for non-loading bearing members. Fault Level Shall be 50KA, 1 sec. All LT switch gear panel shall be of single front only. Protection shall be IP 52. Incomer and outgoing of PCC up to 630 amps **MCCB with LSIG** and above 630apms shall be manual draw out type ACB. Temperature rise of bus bar shall be as per IS / IEC standard. Following breakers shall be considered. 1. PCC Transformer Incomer - 5000A, 4P, EDO ACB - 1 No. 2. Out Going Feeders for Boiling House - MDO ACB / SFU Required Rating shall be provided. 3. **03 Nos Spare Feeder shall be provided for Higher/Middle/Lower rating.**	1 Set.
5. MCC PANELS	

MCC Panel shall be 415V, 50Hz, 50 kA / 1 Sec, for TPN, non-draw-out type, floor mounted and TPN, Non-draw out, Single front type MCC's and rating shall be suitable for Working load excluding spare and standby feeder. The power Bus bars shall have a short circuit withstanding capacity of 50kA for 1sec. Bus bars shall be rated for 35Deg.C temperature rise over an ambient of 50 Deg. C • Incomer of MCC: Up to 630A **MCCB** & above 630A MDO ACB. • For all outgoing motor feeders of MCC: fixed SFU + contactor + O/L relay • For all outgoing non-motor feeder: fixed SFU All switch gear components shall be selected based on type II co-ordination which shall be as per IS / IEC standard. Bimetallic thermal overload relay for motor rating below 132kw and electronic overload relay for motor 132kw and above. 160kw Above motors provided with soft starter feeder. **All motor feeder shall be provided with remote/DCS provision.** Boiling MCC Panels: 1. CLARIFICATION MCC -1 2. CLARIFICATION MCC -2 3. CRYSTALLIZER MCC 4. JCP EVAPORATION MCC 5. BAGACILLO BLOWER MCC 6. CENTRIFUGAL MCC 7. CONTINUOUS C/F MACHINE	1 Lot
6. APFC PANEL:	
Automatic Power Factor Control Panel with Suitable rating, Incomer TPN ACB, and required Outgoing feeders with SDF, Capacitor Duty Contactor for KVAR with 7 % Detuned AL filter, Capacitor Bank, Push Buttons, timer, aux. contactor, and microprocessor based APFC Relay, wiring etc. ➢ Sugar APFC Panel (500 KVAR): 1No	1 Set
7. VFD PANEL	
The drives shall be suitable for 45 °C temperature and voltage variation of ±10% and frequency variation of ±5%. The drives shall be properly selected for the specified duty of the driven equipment. VFD panels shall be of dust, damp and vermin proof construction, sheet steel clad, totally enclosed, compartmentalized, floor mounted and self-standing type with access from front and back by means of hinged doors **All VFD motor shall be provided with remote/DCS provision.** The Switchboards shall be suitable for the following operating system. ➢ Rated Voltage : 415V ±10%, 3 Ph, 3 Wire ➢ Rated Frequency : 50 Hz ±5%	1 Set

➢ Fault Level : 50kA for 1 Sec for AC. ➢ Enclosure : IP 42 **BOILING HOUSE** 1. VFD LINE UP PANEL -1 2. VFD LINE UP PANEL -2 3. VFD LINE UP PANEL -3 4. VFD LINE UP PANEL -4 5. BATCH TYPE CENTRIFUGAL MACHINE (1750KG/CHARGE)	
8. STANDARD MOTOR (IE3)	
All motors design ambient temperature shall be 50 Dec. All motors enclosure protection shall be IP55 construction. The insulation of motor shall be class F with temperature rise limited to that of class B. Anti-condensation heaters above 90kw and Thermistors above 110kw has been considered. RTD Shall be considered frame size above 355. Motors driven VFD shall be of VPI & Double Enamel coating. All motors shall be efficiency level IE3 type.	1 Lot
9. MV Cables	
MV cables shall be 11kv (UE), XLPE ST2 insulation, PVC outer sheath, armored AL conductor. 11Kv (UE), 3C x 300Sq.MM Al Arm XLPE 11Kv Transformer VCB to 3MVA Transformer	1 Lot
10. LT Cables	
All LV power cable shall be rated voltage 1100V (E), XLPE ST2 insulated Wrapped tape PVC inner sheath, extruded PVC outer sheath, armored cables. All power cable shall be of AL conductors. Al control cables shall be voltage 690V (E) XLPE insulated, wrapped tape PVC inner sheath, extruded PVC outer sheath, armored cables, armored copper conductor with size of 1.5sqmm. De-rating factor for the cable shall be 0.7 The cable voltage drop shall be 5% for running and 15% for starting. FRLS cable shall be provided in Boiling section as applicable. 1. Boiling PCC Panel to Boiling House MCC/VFD. 3. Boiling House MCC Panels to motors. 4. Boiling House VFD panels to motors. 5. Control cables for all MCC & VFD Panel to motors. 6. Control cables for HT Panel to transformer's	1 Lot
11. Cable trays	
All cable trays will be ladder type. The Cable trays shall be Prefabricated GI type & 2mm/1.6mm Thick. MS supports at every 1.5m interval shall be provided for our supplied cable.	1 Lot
12. Push button & Termination	

All motors provided with local push button station for start & stop purpose. Double compression cable gland shall be provided for power & control cable. Al type lugs shall be provided for Power cable & copper type lug for control cable.	1 Lot
13. EARTHING	
Above ground Earthing for Electrical of the Boiling House Plant shall be considered as per IS 3043 Specifications. Earth strip GI shall be provided with required earth pits	1 Lot

ANNEXURE IV
SCOPE CHART

SR NO	ITEMS	ENGG	SUPPLY	E & C
1.	GA drawing	**Supplier**	-	-
2.	Civil loading drawing	**Supplier**	-	-
3.	Civil foundation drawing.	Client	Client	Client
4.	Civil Foundation, Cabin, Air conditioning, Factory Building Modification	Client	Client	Client
5.	Equipment as per technical Specification	**Supplier**	**Supplier**	**Supplier**
6.	SS tubes	**Supplier**	**Supplier**	**Supplier**
7.	Electrical, Cable, starter for New Equipment	**Supplier**	**Supplier**	**Supplier**
8.	Connection From PCC to Supplier MCC	**Supplier**	**Supplier**	**Supplier**
9.	**Instrumentation**			
10.	Instrumentation as per technical specification	**Supplier**	**Supplier**	**Supplier**
11.	**Air Existing Compressor**	Client	Client	Client
12.	**General**			
13.	Painting and Packing	**Supplier**	**Supplier**	
14.	Primer painting for protection	**Supplier**	**Supplier**	
15.	Erection & commissioning			**Supplier**
16.	Lodging & boarding for Supervision engineer			Client

ANNEXURE V
EXCLUSIONS, GENERAL & MAKE LIST

EXCLUSIONS

- All statutory approvals from the local authorities, government approvals, pollution approval and all statutory fees.
- All Civil work including factory building, control room including Cut out, false flooring etc.
- Existing equipment Maintenance work.
- Building modification, strengthening & extension if required.
- Earthing below ground
- Control room
- UPS incoming power
- CCTV, Plant communication system, walky talky
- Air conditioning system
- Existing Equipment instrumentation & Automation
- Existing automation PLC/DCS IO requirement
- Plant communication
- HART Communicator
- Any other Equipment not mentioned in technical offer.
- **Air Compressor**

GENERAL

- Equipment inspection shall be in client scope.
- Free lodging, boarding facilities for our Engineering team along with site engineer & service engineer.
- We will take back our extra supplied material, used/unused, wrongly dispatched material & scrap etc.
- Free lodging for erection contractor labour shall be provided.

MAKES OF MAIN UNITS

Sr. No.	EQUIPMENT / ITEMS	MAKE
1.	CENTRIFUGAL PUMPS	KIRLOSKAR/ PSP/ **SINTECH**
2.	MAGMA/MOLASSES	PSP/ **RISANSI**
3.	ELECTRIC DRIVE MOTORS	**ABB / SIEMENS** / KIRLOSKAR / CG/
4.	VARIABLE FREQUENCY DRIVES	**ABB**/ SIEMENS /DANFOSS
5.	FABRICATED & C.I. VALVES	PURI/ **THORAT**
6.	BUTTERFLLY VALVE	**CRANE**/DELVAL
7.	CLARIFIER/ **VACUUM FILTER**	UNIVERSAL / SIMPLEX / **HI-TECH**
8.	AIR BLOWER	**KPT**
9.	CENTRIFUGAL MACHINE	**WALCHAND /OEM**
10.	CONDENSOR	SPRAY/SHAMRAJ
11.	SULPHER BURNER	VISHWA/**SAI SYSTEM**
12.	PRESSURE & TEMPERATURE GAUGES	GIC/WIKA/WAREE/ **BOUMER**
13.	GLOBE CONTROL VALVE	MIL/**PNEUCON**/DEMBLA
14.	MAGNETIC FLOW METER	EMERSON/FORBESH MARSHALL/E&H /**ABB/ MANAS**
15.	FLOW ELEMENT	**DELTA**/ FABRI-TECH/RAHUL ENG.
16.	INSTRUMENT CABLES	**KABKONNECT CABLE/** THERMOCABLES/ TECHNOCAB/**POLYCAB**
17.	PLC	HONEYWELL/ **ABB**/SIEMENS/SUPCON/A&B/SCHNEIDER
18.	CONTROL VALVE	**CRANE**/DEMBLA/DELVALVE/PNEUCONs
19.	STAINLESS STEEL TUBES	SCRODOLITE / **DEVINE** / ADITYA/PARSHWA /JINDAL
20.	TRASNFORMER	KIRLOSKAR/**VOLTAMP**/TELAWNE
21.	POWER & CONTROL CABLE	**PLOYCAB** / KEI / POLYCARE/

Sr. No.	EQUIPMENT / ITEMS	MAKE
22.	HT PANEL	ABB /SIEMENS**/CGL**/ SCHNEIDER
23.	SWITCHGEAR	L&T / **ABB** / **SCHNEIDER** /L&T/ **SIEMENS**
24.	MECHANICAL CIRCULATOR	**GALAXY- PREMIUM GEAR BOX**
25.	PLANETARY GEAR BOX	**TOP GEAR**
26.	PAN HYDRALIC DISCHARGE VALVE	**KAMAKSHI**
27.	PAN AUTOMATION	YUTECH / **VERSATILE**
28.	SWITCHGEAR PANEL	ANY APPROVED CPRI VENDOR
29.	BUSDUCT	ANY APPROVED CPRI VENDOR