JDW SUGAR MILLS LTD. UNIT-III GHOTKI.

ACHIEVEMENT OF EXCELLENT PERFORMANCE OF FFE

BY REPLACEMENT OF ENTRAINMENT SEPARATOR AT

JDW-III GHOTKI.

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ACHIEVEMENT OF EXCELLENT PERFORMANCE OF FFEs BY REPLACEMENT OF ENTRAINMENT SEPARATOR

ABSTRACT:

We installed two FFEs supplied by famous Indian company in 2012. During FFEs trial season; we faced heavy entrainment of sugar traces through entrainment separators. Through vapour drain lines we collected the juice approximately 1.72 liter / minutes (2477 liter/day) of Brix 13 having a cost of more than 1.3 million. We lost heavy amount of sugar in 1st vapour condensate and due to high traces of sugar, this condensate could not be used as make up for Boilers feed water. To overcome the shortage of makeup feed water, we had to use poor quality and low temperature. 2nd vapour condensate from Pans. To overcome these problems we replaced the their Entrainment Separators with Entrainment Separator designed on low vapour velocity instead of high vapour velocity as designed by Indian company. Both drawing of entrainment separator are given in Drawing # 1 & 3 for proper study and installation of excellent designed entrainment separator in Pakistan in future.

INTRODUCTION:

Sugar free condensate water achievements are essential task of Chemical Department. For achievement of this objective many major modifications are done in Entrainment Separator supplied by Indian company with FFEs. Separator diameter and height are designed on low velocity parameters, another modification in vapour outlet line Ø900mm (Two lines) are changed in one pipe line Ø1500mm. Also sudden drop of vapour velocity & pressure play a vital role in sugar separation, due to this phenomena excellent quality of vapours are recovered from entrainment separator instead of Indian company design which based on high velocity and high vapour pressure, with multi direction change in smaller vessel Dia which causing a huge amount of sugar entrainment in vapour and contaminated condensate production in bottom of separator. A lost of 2477 liter/ day juice of brix13° of cost more than 1.3 million in season 2012-2013 was observed. By installation of entrainment separator of given design, we achieve excellent results. This paper will be helpful for future designing of Entrainment Separator and all existing Indian company's Entrainment Separators which may be redesigned as per given new design are shown in drawing 1 & 3.

OBJECTIVE:

1. To achieve sugar free water
2. Control the sugar losses

OPERATING CONDITIONS:

Season	2012-13	2013-14
Total Days	115	139
Cane Crushed (Tons)	1,200,650	1,504,768
Sugar Production (Tons)	134,718	162,667.5
Recovery %	11.22	10.81
Av. Cane TCD	10440.43	10825.671
Mill Extraction	95.97	95.95
Primary Juice Purity	82.85	81.91
Pol % Cane	13.046	12.598
Av. Added water %Cane	44.743	42.83
Pol% Bagasse	1.662	1.647
Fiber % cane	14.161	14.055
Steam % Cane	52.60	50.10
Pol % Mud	2.63	3.22
Pty. Final Molasses	33.23	30.814
Molasses % Cane	4.011	4.029
Sugar Lost in F.M% cane	1.2113	1.1697
Total Losses	1.8252	1.7887

SPECIFICATION:

Falling Film Evaporator H.S 3500m²

1. Heating Surface Area : 3500m²
2. No. of Tubes : 3320 Nos.
3. Tube ID (Inner Dia) : 32.6mm
4. Tube OD (Outer Dia) : 35.0mm
5. Tube Thickness : 1.2 mm
6. Tube Length : 10,000 mm
7. Steam Valve : Ø 1200mm
8. Vapour Valve : Ø1300 mm
9. Shell Dia : 3020 mm
10. Re- circulation Pump : 600m³/hr
11. Head : 20Meter
12. Quantity : 04 Nos.
13. FFE-I Juice Inlet : Ø 400mm

14. FFE-I Juice Outlet : Ø 450mm
15. FFE-II Juice Inlet : Ø 450mm
16. FFE-II Juice Outlet : Ø 450mm
17. Juice Bypass line : Ø 400mm
18. Condensate line : Ø 250mm
19. Acid line Connection : Ø 100mm
20. Calandria Cold water connection : Ø 150mm
21. Emergency Hot water connection : Ø 150mm
22. Shell Cold water, Hot water, Soda connection : Ø 150mm

DESIGNING PARAMETERS:

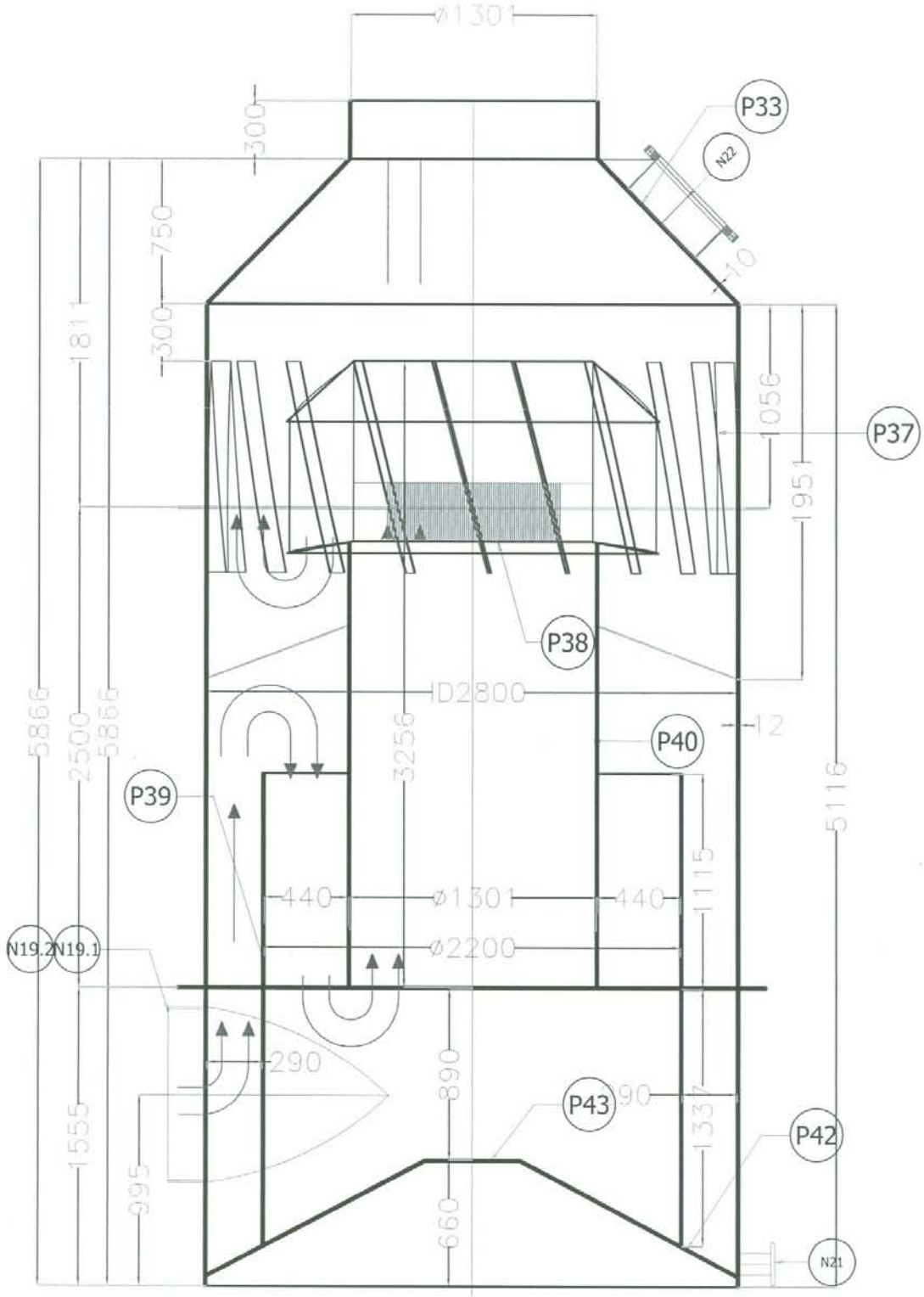
Designing Parameters of Indian Company Entrainment Separator:

Indian company maintained the high velocity of vapour at entrance of entrainment separator with multi-direction (Change in direction), due to this, vapour will hit to the deflection plate and juice return back & collected at bottom of entrainment separator. Velocity in shell remained 21m/sec (approx.) due to less shell dia i.e. (2800mm-1500mm). Original drawing of Entrainment Separator is shown in drawing # 01 and location in drawing # 2.

Designing Parameter of JDW Entrainment Separator:

JDW maintained the low velocity of vapour at entrance of entrainment separator and keep the uni-direction of vapour with slightly reduction in temperature and pressure of vapour. Juice will also return back at the bottom of entrainment separator. Velocity in shell remained 2.2m/sec (Approx.) due to high shell dia i.e. 4500mm. Modified drawing of Entrainment Separator is shown in drawing # 03 and location in drawing # 4.

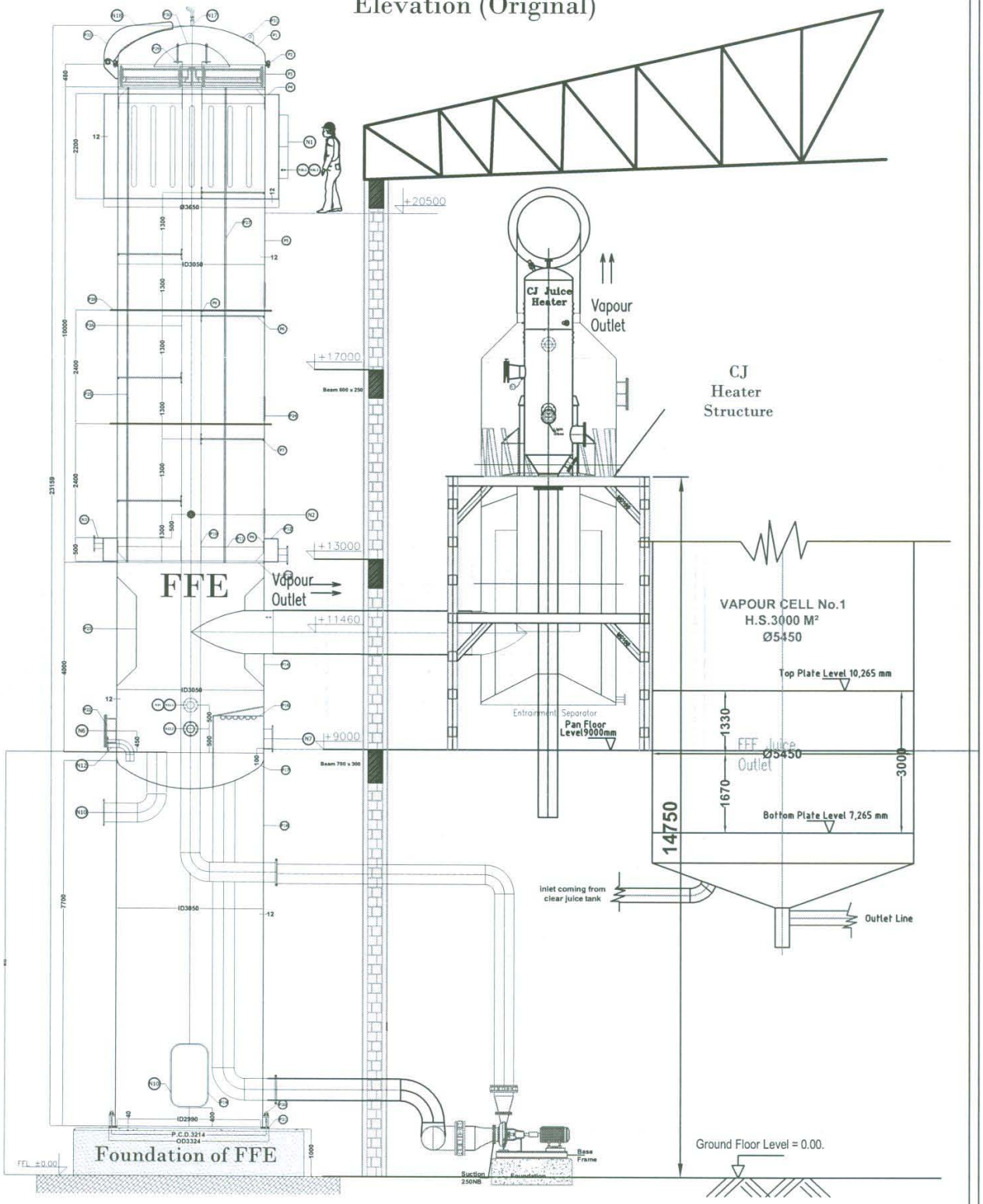
Basic difference between Indian Company and JDW-III Entrainment Separator are given below		
Sr. #	**Indian Company Entrainment Separator**	**JDW-III Entrainment Separator**
1	Vapour pipe Ø900mm (02 Nos.)	Vapour pipe Ø1500mm (01 No.)
2	Dia of Entrainment Separator 2800mm	Dia of Entrainment Separator 4500mm
3	Height of Entrainment separator 6166mm	Height of Entrainment separator 10158mm
4	Vapour Outlet Ø1300mm	Vapour Outlet Ø1300mm
5	Velocity in Shell ($D_2 - D_1$) 21.0 m/sec.	Velocity in Shell 2.2 m/sec.
6	Pressure 0.7 Kg/cm	Pressure 0.6 Kg/cm
7	Temperature 111°C	Temperature 110°C



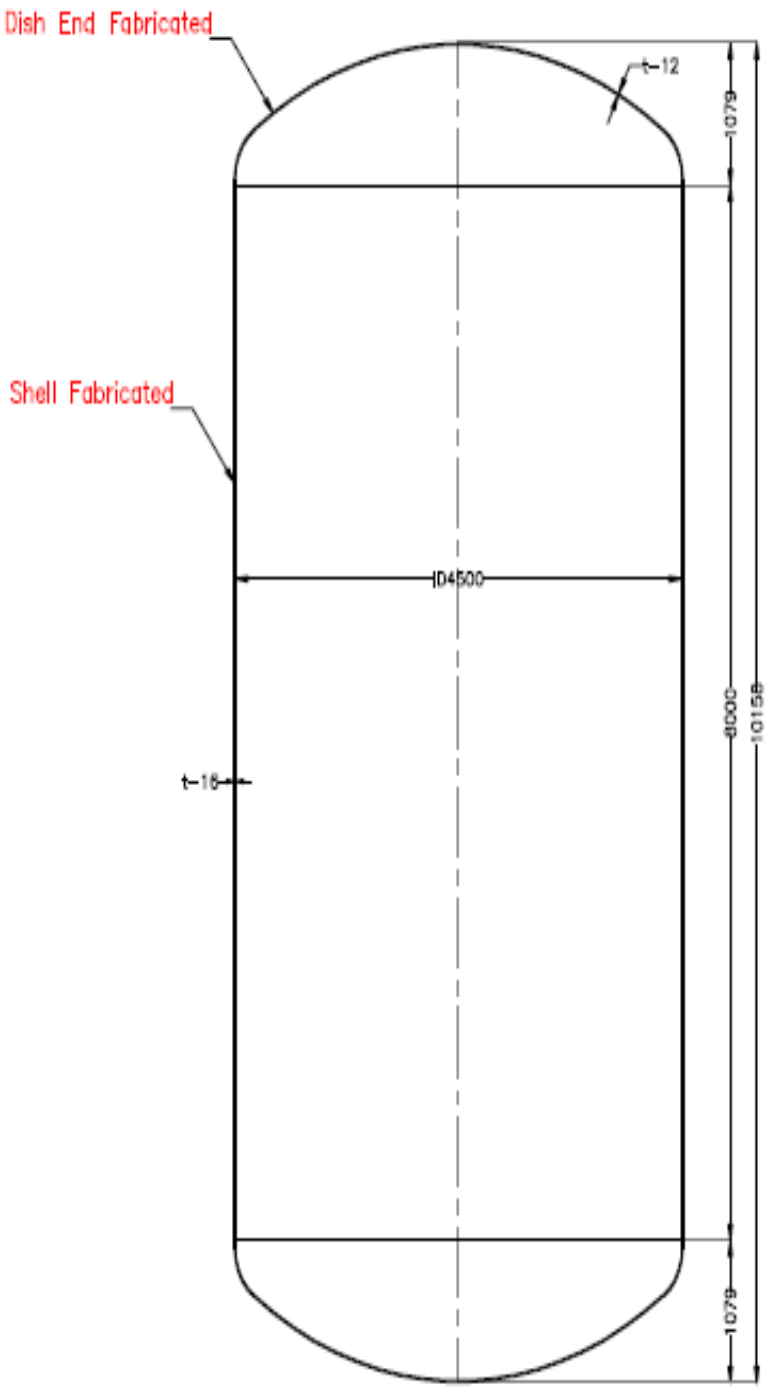
Entrainment Separator

Drawing.# 01

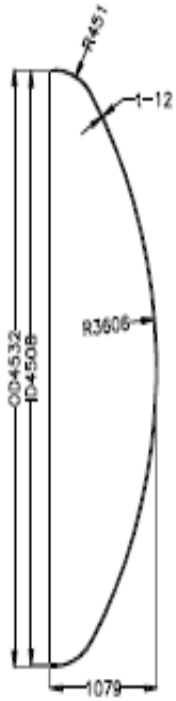
FFE, Entrainment Catcher & Pumps
Elevation (Original)



Drawing. # 2



Entrainment Separator



Detail of Dish End: 2Nos.

Drawing # 3

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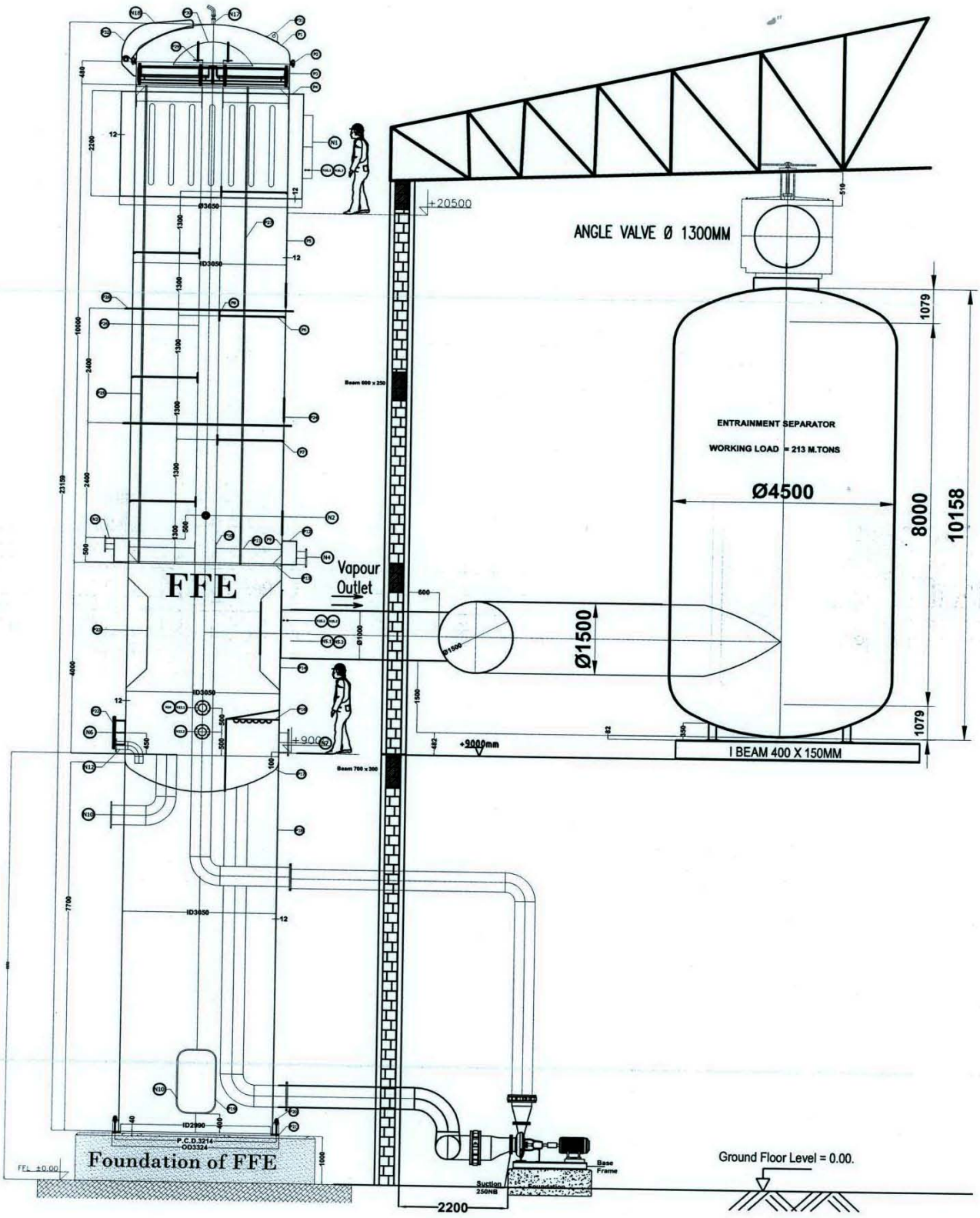
FFE, Entrainment Separator & Pumps Elevation



Drawing # 4

RESULTS:

1. Juice lost per day : 2477 liters
2. Cost of Juice lost in season (2012-2013) : Rs. 1.3 Millions
3. Achievement of high temperature condensate of 1st vapours.

CONCLUSION:

By installation of new JDW-III designed Entrainment Separators Approximately cost Rs. 6.0 million and we saved the juice lost of cost Rs. 1.3 million/Season. Also achieve the high temperature condensate of 1st vapours free from sugar contamination.

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