हिन्दुस्तान पेट्रोलियम HP / इंजीनियर्स इंडिया लिमिटेड ENGINEERS INDIA LIMITED (A Govt. of India Undertaking)	Residue Upgradation Facility (RUF) EPCC-3 Package for Visakh Refinery Modernization Project (VRMP)	L&T Hydrocarbon Engineering L&T- CHIYODA LIMITED
Title: Process Datasheet for CLOSED BLOWDOWN DRUM 1 (504-V-803) Doc. No.: B016-RUF-LT-504-PC-DS-0284		Rev. No.: 0 Page No: 1 of 2

OWNER : HINDUSTAN PETROLEUM CORPORATION LIMITED (HPCL)

PMC : ENGINEERS INDIA LIMITED, NEW DELHI (EIL)

UNIT : 504

PMC JOB NO. : B016

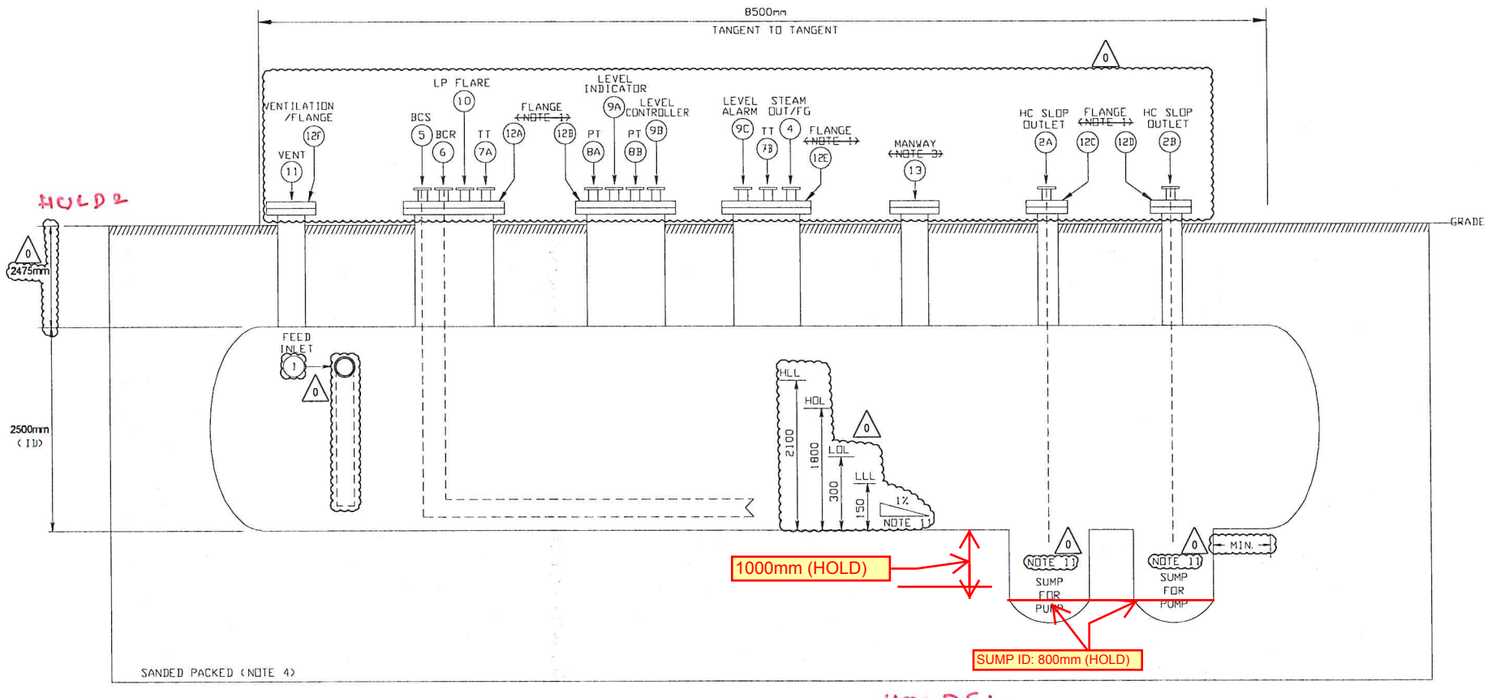
DOCUMENT SUBMISSION STATUS - LTHE	REVIEW STATUS - EIL
DOC. CATEGORY: (USE TICK MARK) ☑ R ☐ I	☐ CODE 1 – NO COMMENTS. PROCEED WITH MANUFACTURE / FABRICATION / CONSTRUCTION AS PER THE DOCUMENT.
ISSUED FOR	☐ CODE 2 – PROCEED WITH MANUFACTURE/FABRICATION/CONSTRUCTION AS PER COMMENTED DOCUMENT. REVISED DOCUMENT REQUIRED.
☐ INFORMATION ☑ REVIEW ☐ CONSTRUCTION ☐ INQUIRY ☐ PROCUREMENT ☐ AS BUILT	☐ REVIEW CODE 3 – DOCUMENT DOES NOT CONFORM TO BASIC REQUIREMENTS AS MARKED. RESUBMIT FOR REVIEW ☐ Code R – DOCUMENT IS RETAINED FOR RECORDS. PROCEED WITH MANUFACTURE / FABRICATION ☐ Code V - VOID

NAME	DISCIPLINE	SIGN.	DATE

Revision No.	Description	Prepared by	Reviewed by	Approved by	Reviewed by	Approved by	Approved Date
0	Issued for Review	JGT	MSK	SSR	KDS	BDT	27/1/20

Shell- 26 Thk
Typical- Head : 2:1 Ellipsoidal Head Thickness : 22 mm Min.
ALL TOP NOZZLES TYP. PROJECTION FROM VESSEL TOP = 3000 mm (hold)
Steam Coil- 3 inch Sch160, 22 mtr (Hold)
FABRICATED WEIGHT = 34000 kg
PWHT & Impact test requirement : As per code/specification/data sheet
Note: Above Indicated Weights and Thicknesses for pressure parts and non-pressure parts are minimum to be followed and shall not form the basis for quotation. supplier shall check the thickness to satisfy the requirement of codes ,standards and requisition and guarantee them on strength.

VENDOR TO CONSIDER 5TONS(HOLD) LOAD FOR PUMP FOR PUMP HOSHING NOZZLE, THE FINAL LOAD TO BE INFORMED DURING DETAILS ENGINEERING.



NOTES

1. BBE MECHANICAL TO DESIGN ALL FLANGES.
2. VENT & STEAM OUT NOZZLE SIZES SHOWN ARE BASED ON ~~PROJECT SPECIFICATION C1L_BEDB PART B~~ 0
3. ~~MANWAY SIZE IS RECOMMENDED MINIMUM. LOCATION TO BE DETERMINED BY BBE DELETED~~
4. THIS DRUM TO BE LOCATED INSIDE RCC WITH SAND PACKED BY VIBRO COMPRESSION WITH LEAN CONCRETE ON TOP. 0 ~~RELATIVE LOCATION OF DRUM W.R.T GROUND LEVEL ETC. TO BE FINALISED BY GENERAL CIVIL DURING DETAIL ENGINEERING.~~
5. ~~CWS AND CWR~~ BCS AND BCR COIL TO BE BELOW THE LOW LIQUID LEVEL. 0
6. STEAM OUT CONDITIONS ARE 0.5 kg/cm2g AND 170°C.
7. DRUM TO HAVE CATHODIC PROTECTION.
8. VENTILATION NOZZLE IS TO BE LOCATED TOWARDS THE END OPPOSITE TO THE MANWAY. VENT NOZZLE SHALL BE WELDED TO THE VENTILATION NOZZLE BLIND FLANGE.
9. TRIM B1A
10. MDMT: 12.5°C 0
11. VESSEL SHALL BE SLOPED TOWARDS THE SUMP. SUMP SHALL BE LOCATED TOWARDS SLOPING END OF VESSEL.

EQUIPMENT NUMBER:	504-V-803
EQUIPMENT NAME:	CLOSED BLOWDOWN DRUM 1
PROCESS DATA	
OPERATING TEMPERATURE, °C	56
OPERATING PRESSURE, kg/cm2g	1.5
PRELIMINARY MECHANICAL DESIGN DATA	
DESIGN TEMPERATURE, °C	260
DESIGN PRESSURE, kg/cm2g	5.0
ASME CODE SECTION VIII:	DIV. 1
INSULATION REQUIRED:	NO
POST-WELD HEAT TREATMENT:	YES

MATERIALS OF CONSTRUCTION

	CORROSION ALLOWANCE (mm)	MATERIAL
SHELL & HEADS:	3	SA516-70 (CS)
PERMANENT INTERNALS:	6	SA516-70 (CS)
REMOVABLE INTERNALS:	3	SA516-70 (CS)

0

NOZZLE NO. :	NOZZLE TYPES	NUMBER	SIZE(S) (IN)	FLANGE
13	MANWAY HOLD 3	1	24	300#RF
	PROCESS NOZZLES:			
1	FEED INLET 0	1	0 10 0	300#RF
12(A/B)	FLANGES	2	24 ~~BY BBE~~	300#RF
12(C/D)	FLANGES	2	32	300#RF
12E	FLANGES	1	20	300#RF
2(A/B)	HC SLOP OUTLET	2	4	300#RF
7(A/B)	TEMPERATURE TAP	2	2	300#RF
8(A/B)	PRESSURE TAP	2	2	300#RF
4	STEAM OUT/FG	1	2	300#RF
9(A-C)	LEVEL TAPS	3	4 ~~BY BBE~~	300#RF
12F	VENTILATION/~~VENT~~ FLANGE (NOTE 8) 0	1	8	300#RF
11	VENT (NOTE 8)	1	2	300#RF
5	BEARING COOLING WATER SUPPLY	1	3	300#RF
6	BEARING COOLING WATER RETURN	1	3	300#RF
10	LP FLARE	1	4	300#RF

HOLD 1

HOLD 1 Σ

For Buried vessels (Underground Vessel): Nozzle of size 4" and below shall not be directly mounted on vessels and shall be mounted on a housing nozzle of atleast 8"NB and above. 2 to 4 nos of Nozzles can be combined in a single housing nozzle based on their sizes. External corrosion allowance of minimum 3mm shall be considered in addition to internal corrosion allowance specified in PDS. External stiffeners shall to be provided on all nozzles. All underground vessels shall be anchored with pedestal to resist Buoyancy and anchorage shall be checked against buoyancy. All UG vessels shall be designed for external pressure also considering buried height.

HOLDS:-
1. FLANGES NUMBERS AND SIZE, MECHANICAL TO CONFIRM.
2. DRUM LOCATION W.T.E. GROUND LEVEL.
3. MANWAY LOCATION.

REVISIONS								
0 ISSUED FOR EDP	07-13-18	JD	ALD	CLD	2 REVISED AS NOTED	10-22-18	JD	ALD	CLD
1 REVISED AS NOTED	08-24-18	JD	ALD	CLD					

Chevron Lummus Global

SCALE _____ DATE _____
DR. _____ CH. _____ DR. APP. _____ ENGR. _____
APPROVED

ENGINEERS INDIA LIMITED (A Govt. of India Undertaking)
हिंदुस्तान पेट्रोलियम कॉरपोरेशन लिमिटेड
HINDUSTAN PETROLEUM CORPORATION LTD
VISAKH REFINERY
VISAKH REFINERY MODERNIZATION PROJECT
CLG LC-MAX TECHNOLOGY & ISOTREATING TECHNOLOGY
CLOSED BLOWDOWN DRUM 1, 504-V-803
RESIDUE UPGRADATION FACILITY (RUF)
VISAKH REFINERY MODERNIZATION PROJECT (VRMP)
HINDUSTAN PETROLEUM CORPORATION LIMITED
VISAKHAPATNAM, ANDHRA PRADESH, INDIA

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ANNEXURE – 1

CHANGE LIST

General: This document is based on Licensor datasheet for CLOSED BLOWDOWN DRUM 1 (504-V-803) issued with bid. Document is further updated based detail engineering requirements (refer Change List below for details).

Category (C1): No Change.

Category (C2):

Sr. No.	Page No.	Description of change	Reference / Remarks
1.	2	Flanges numbers revised & sizes are defined in nozzle details & corresponding Note 1 is updated.	As per flange design input by Mechanical department. For detail refer mechanical engineering drawing. Number of flanges and detail will be updated in Rev 1 of P&ID: B016-RUF-LT-PID-504-11812.
2.	2	Vent (#11) & steam out nozzles (#4) sizes are confirmed as 2" each as vessel is non-cladded, in nozzle details & corresponding Note 2 is updated.	As per EIL guidelines in BEDB (Part-B) clause 8.5.3.3 doc. no.: A758-999-02-41-ODB-1001 pg. 73 of 115.
3.	2	Manway nozzle (#13) size (24") and location is confirmed and Note 3 deleted accordingly.	1. Location is at top shell of horizontal vessel. Final location will be decided by Mechanical engineering based on piping. There is no other Process engineering input required. 2. Manway size is based on EIL BEDB (Part-B) clause 8.5.3.3 A758-999-02-41-ODB-1001 pg. 73 of 115.
4.	2	Drum location w.r.t ground level is defined on vessel sketch and corresponding Note 4 is modified.	Relative elevation of drum is provided as per piping input considering slope of feed inlet header to the vessel.
5.	2	Nozzle numbering is added to nozzle details and on vessel sketch.	For better clarity on nozzle identification.

Sr. No.	Page No.	Description of change	Reference / Remarks
6.	2	Feed nozzle (#1) size changed from 6" to 10" and update the nozzle location.	As per clause C-123 of Annexure A of "C-1.3B016-79-41-EPC-107 Rev-4" page 61 of 66 and consistent with P&ID: B016-RUF-LT-PID-504-11812 (Rev 0). The feed nozzle was fouling with knuckle of vessels while placing it above HLL. Hence, the feed nozzle was shifted to shell as marked based on input by Mechanical department.
7.	2	Ventilation/Vent nozzle (#12F) updated to Ventilation/Flange nozzle and Vent nozzle #11 defined separately.	As per mechanical department input, Ventilation nozzle is considered as flange. For further details, please refer Mechanical Engineering Drawing.
8.	2	Cooling water supply and cooling water return word is changed to Bearing cooling water supply (#5) and Bearing cooling water return (#6) respectively in nozzle detail table. Also corresponding changes made in sketch and note 5 i.e. CWS and CWR changed to BCS and BCR.	To keep it in-line with P&ID: B016-RUF-LT-PID-504-11812 (Rev 0).
9.	2	Level taps nozzle (#9) sizes are defined as 4".	As per Instrument design basis & EIL guidelines in doc. no. B016-504-16-EDB-95097-52-0001.
10.	2	Liquid level nomenclature is modified on vessel sketch for better clarity on level identification.	As per EIL guidelines in BEDB (Part-B) Abbreviations on pg. 11 of 115 A758-999-02-41-ODB-1001.
11.	2	High Liquid Level (HLL) is revised from 2200mm to 2100mm. Low liquid level (LLL) is defined as 150 mm.	To place the Feed nozzle above HLL, the HLL was reduced. The total pumpable volume between HLL and LLL is ensured as 40 m^3 as specified in EIL BEDB (Part-B) clause 6.8.2 pg. 44 of 115 A758-999-02-41-ODB-1001. For detail calculations, please refer Annexure 2.

Sr. No.	Page No.	Description of change	Reference / Remarks
12.	2	Slope is defined as 1% inside vessel and corresponding Note 11 is added.	To drain towards sumps as per good engineering practice. It will be updated in Rev 1 of P&ID: B016-RUF-LT-PID-504-11812.
13.	2	Sump and pump discharge nozzle location is changed in vessel sketch and corresponding Note 11 is added.	Location of sumps is towards sloping end of vessel and minimum from TL. Location is changed in order to ensure complete draining of vessel due to slope.
14.	2	Trim added as Note 9.	As per PMS of inlet and outlet lines indicated in P&ID: B016-RUF-LT-PID-504-11812 (Rev 0).
15.	2	MDMT added in Note 9.	As per EIL guidelines in BEDB (Part-B) clause 4.2 pg. 22 of 115 A758-999-02-41-ODB-1001.

Liquid level calculations:

Basis and assumptions:

As per EIL guidelines in BEDB (Part-B) clause 6.8.2 pg. 44 of 115 A758-999-02-41-ODB-1001, for closed blow-down drum in RUF:

a) Pump-able volume of vessel = 40 m^3.

b) Pump out flow = 40 m^3/hr.

As per datasheet,

c) Vessel diameter = 2.5 m

d) Cylindrical length = 8.5 m

Conclusions:

1) Volume between LOL & HOL is 32 m^3.
2) Volume between LLL & HLL is 40 m^3.

For detail calculations, please refer Annexure 2.

Project: Residue Upgradation Facility (RUF) EPCC-3 Package for Visakh Refinery Modernization Project (VRMP). **ANNEXURE 2**

Job No.: B016

Unit.: 504

CHECK FOR LIQUID HOLDUP TIME

Vessel Tag No. 504-V-803

Fluid Flow rate		
Vol. Flow rate	**40.0**	**m3/h**

Vessel ID	2.5	m
Cylindrical Length	8.5	m

L/D	3.4

Volumes, m3			
Head Volume	4.1	Total	45.8
Cylinder Volume	41.7		

Level	h	h/d	Cyl. Fraction	angle	cyl vol	Cyl Vol	Head Fraction	Head Vol	Head Vol	Total Vol	Res Time (mins)
LLL	150	0.06	0.349	28.358	1.0	14.55	0.323	0.04	1.321	1.1	2
LOL	300	0.12	0.349	40.536	2.8	14.55	0.323	0.16	1.321	3.0	4
NOL		0	0.500	0.000	0.0	20.86	0.5	0.00	2.045	0.0	-
HOL	1800	0.72	0.349	116.104	32.2	14.55	0.323	3.31	1.321	35.5	53
HLL	2100	0.84	0.651	132.844	37.4	27.18	0.677	3.81	2.769	41.2	62

OPERATING VOL.	**32.5**	BETWEEN HOL & LOL
OPERATING VOL.	**40.2**	BETWEEN HLL & LLL