`TECHNICAL DOCUMENTATION FRONT SHEET

Total Pages: 11

NUMALIGARH REFINERY LIMITED

NRL EXPANSION PROJECT

DOCUMENT DESCRIPTION

Vendor Name: Fabtech Project and Engineers Ltd
Tag / Item No.: 1P22-VV-7732
Tag / Item Description: Hot Oil Drain Drum

tkIS India / Vendor

Category Codes (Submission Purpose)
- ☐ 1 For Approval
- ☐ 2 For Review / Comments
- ☐ 3 For Information
- ☐ 4 For Engineering
- ☐ 5 For Enquiry
- ☐ 6 For Order Placement
- ☐ 7 Final & Approved
- ☐ 8 Released for Construction

Acceptance Codes (Approval Codes)
- ☐ 1 Approved
- ☐ 2 Approved for Manufacturing / Fabrication with Comments as marked
- ☐ 3 Not Approved / Resubmit
- ☐ 4 Retained for Information / Records
- ☐ 5 Reviewed
- ☐ 6 Reviewed as Noted / Resubmit

Remarks for AC2 : This marked-up drawings is hereby approved for fabrication / manufacturing and shall be re-sbumitted after revision. This drawing should be revised only to the extent of tkIS India / Owner / Client comments. Any other changes made by you will not be considered unless clearly highlighted in covering letter asking for approval.

This approval / review does not absolve the supplier from the full responsibility for design and fabrication.

Date : ___/___/_____ Name : _____

tkIS India / Owner / Client

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Date : ___/___/_____ Name : _____

Rev	Date	Reason for Issue	Prepared (Disc. Eng.)	Checked (Disc. Lead)	Approved (Contr. Rep)	Prepared (Disc. Eng.)	Review (Proj. Eng.)	Review (Com.Rep. Dept. Head)
01	21.06.2023	Review	AB	AB	HT			
00	23.02.2023	Review	AB	AB	HT			

Vendor / Contractor		NRL / tkIS / Consultant
Category	**Code**	**Description**
Facility Area Code	**1Z**	**Numaligarh Refinery Common Document**
Document Type	**ITP**	**Inspection and Test Plan (ITP)**
System Number	**00**	**General**
Life Cycle		Disk Ref.:

NRL's PO No. to tkIS:
NRL's PO No. to Vendor / Contractor: 4500025832 dt 22.12.2022
Vendor / Contractor Document N0.: FSHO-514-ITP-1P22-VV-7732-001

tkIS Contract No.: **66-6733**
tkIS Engineering Status Code:
tkIS Document Category Code:

Originator/ Contractor	Asset Code	Disc	RFP NO	Document Type	Sequence Number	Revision
TK	**1P22A**	**ME**	**7732**	**ITP**	**0001**	**01**

INSPECTION AND TEST PLAN

PROJECT	NUMALIGARH REFINERY EXPANSION PROJECT

TAG NO:- 1P22-VV-7732	**Equipment Name:-** Hot Oil Drain Drum	**DOC NO:- FSHO-514-QAP-1P22-VV-7732 , Rev.01 DATE-16/06/2023**
CLIENT:- M/S NUMALIGARH REFINERY LIMITED		**Design and Fabrication code:** ASME SEC. VIII DIV-1 ED 2021
EPC CONTRACTOR: ThyssenKrupp Industrial Solutions (India) Private Limited.		**PO NO:-**PUR-PRJNUM-1004763/LOA/Fabtech
MANUFACTURER:- FABTECH PROJECTS & ENGINEERS LTD		**INSPECTION AGENCY:-** TPIA **GROUP:-** 4

LEGEND:-

CE	Carbon Equivalent	DFT	Dry Film Thickness
DPT / PT	Dye Penetrant Testing / Penetrant Testing	HT	Heat Treatment
HIC	Hydrogen Induced Cracking	ITP	Inspection & Test Plan
IP	Ingress Protection	IGC	Inter-Granular Corrosion
IC	Inspection Certificate	MPT/MT	Magnetic Particle Testing
MR	Material Requisition	MRT	Mechanical Run Test
MTC/TC	Material Test Certificate / Test Certificate	PO	Purchase Order
NDT	Non-Destructive Testing	PR	Purchase Requisition
PQR	Procedure Qualification Record	PMI	Positive Material Identification
RT	Radiography Testing	SSCC	Sulphide Stress Corrosion Cracking
SCC	Stress Corrosion Cracking	TPI/TPIA	Third Party Inspection Agency
UT	Ultrasonic Testing	VDR	Vendor Data Requirement
I	Information	WPQ	Welder Performance Qualification
R	Review	WPS	Weld Procedure Specification
H	Hold Point	R/W	Review or Witness
W	Witness Point	UID	Unique Identification Marking
RW	Random Witness	PTC	Production Test Coupon
R/W	Review or witness	I	Information

Representative	Prepared by QA/QC Engineer	Approved by QA /QC Manager	Accepted by TPIA	tkIS	OWNER
Name	Abhinandan Dhamane	Harish Talele			
Signature			☐ WITNESSED ☑ REVIEWED		
Date	16/06/2023	16/06/2023	Amol Patil 17/06/2023 Date & Signature SGS INDIA PVT. LTD. PUNE		

FABTECH PROJECTS & ENGINEERS LTD. QC MANAGER

The SGS stamp & signature is for witnessing/observation purposes only and is subject to the provisions of the SGS General Conditions of Services, Particularly article 2(d), available at http://www.sgs.com/terms_and_conditions.htm

FABTECH — PROJECTS & ENGINEERS —	thyssenkrupp	**INSPECTION AND TEST PLAN**		NRL
		PROJECT	NUMALIGARH REFINERY EXPANSION PROJECT	

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MANUFACTURER:- FABTECH PROJECTS & ENGINEERS LTD		**INSPECTION AGENCY:-** TPIA **GROUP:-** 4

SR. No.	INSPECTION ACTIVITY	CHARACTERISTICS TO BE CHECKED	EXTENT OF CHECK	REFERENCE DOCUMENTS & PROJECT SPEC.	ACCEPTANCE STANDARD & PROJECT SPEC.	RECORDING FORMAT	Extent of Inspection				REMARKS
							Vendor	TPIA	tkIS	Owner	
1	QAP	Review of H, W, R stages, Documentation	100%	Approved Drawing, MDS , PR & Project Spec.	Approved Drawing, MDS , PR & & Project Spec.	QAP	H	A	A		
2	Approval of Drawing	Drawing parameters	100%	Design Data/code, PR	Design Data/code, PR	Drawing	H	R	A		
3	Review of WPS, WPQ along with weld map/Weld test plan	Essential variables as per Project Spec. & AXENS	100%	ASME SEC. IX., Approved Drawings	ASME SEC. IX.	WPS & WPQ	H	R/W			For Old-R & New –W (Qualified under NRL Project approved TPIA)
4	Review of welding consumable TC's	Documentation	100%	Approved Drawing. & ASME Sec. II C & Sec IX.	Approved Drawing. & ASME Sec. II C & Sec IX.	Weld map, MTC	H	R			
5	Review of all the procedures for NDE, Hydro, Pneumatic, PMI, Blasting & Painting etc.	Documented Procedure	100%	Documents Review.	Documents Review.	Docs. Review.	H	R			
6	Raw Material Identification for Pressure Parts including gasket & fastener	Visual, Dimension, Co-relation with MTC, Review of MTC	100 %	Approved Drawing, ASME SEC. II A,	Approved Drawing, ASME SEC. II A,	Material Ident. Report	H	H			3.1 Certificate is required (Refer Note 5)
7	Raw Material Identification for Non-Pressure Parts	Visual, Dimension; review of Chem. & Mech. properties of MTC	100 %	Approved Drawing., ASME SEC. II A	Approved Drawing., ASME SEC. II A	Mat. History Chart	H	R			Non Pr. Part welded to Pr. Part shall be same as Pr. Part material.
8	Heat treatment (Normalizing) After forming of Dish end petal & Crown.	Review of HT chart & Review of calibration Record for Thermocouple & Temp. Recorder.	100 %	Approved Drg., & ASME Sec VIII Div. 1	Approved Drg., & ASME Sec VIII Div. 1	HT Cycle Chart	H	R			Mat. Test Coupon to be provided. (Test reports review by TPI)

17/06/2023
For SCIS

FABTECH — PROJECTS & ENGINEERS —	thyssenkrupp	**INSPECTION AND TEST PLAN**		NRL
		PROJECT	NUMALIGARH REFINERY EXPANSION PROJECT	

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MANUFACTURER:- FABTECH PROJECTS & ENGINEERS LTD		**INSPECTION AGENCY:-** TPIA **GROUP:-** 4

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							Vendor	TPIA	tkIS	Owner	
9	D/E Petal & Crown Long Seam set up & welding – after pressing.	Identification Stamping , Alignment, Geometry of Groove, Profile, Dimensions, PT/MT of WEP.	100 %	Approved. Drawing& ASME Section VIII. Div.1	Approved. Drawing& ASME Section VIII. Div.1	Stage IR	H	W			Refer note 9 (PTC to be attached)
10	Back chip & PT of Petal & Crown LS of Dish end	Weld surface defect check	100%	Approved. Drawing& ASME Section VIII. Div.1 & ASME Section V&PT procedure	Approved. Drawing& ASME Section VIII. Div.1 & ASME Section V&PT procedure	IR	H	R			
11	NDE- Radiography of Petal & Crown L-Seam of Dish end.	Soundness of weld	100 %	NDE Procedure, ASME Sec. V/ VIII Div. 1	NDE Procedure, ASME Sec. V/ VIII Div. 1	RT Report	P	R			RT Film review by TPI
12	Heat treatment Boot dish ends(Normalizing)	Review of HT chart & Review of calibration Record for Thermocouple & Temp. Recorder.	100 %	Approved Drg., & ASME Sec VIII Div. 1	Approved Drg., & ASME Sec VIII Div. 1	HT Cycle Chart	H	R			Mat. Test Coupon to be provided. (Test reports review by TPI)
13	Dished End Inspection (Main Dish end & Boot Dish end)	Identification Stamping, Verification of Template, Visual Inspection; Profile, Dim, Thickness, PT of Knuckle / SF / WEP.	100 %	Approved Drawing. & ASME Sec VIII Div-1	Approved Drawing. & ASME Sec VIII Div-1	D'end IR	H	W			
14	Long Seam shell / Nozzle Neck fit up & welding	Identification Stamping, Geometry of Groove, Dimension, PT at WEP	100 %	Approved Drawing & ASME Sec VIII Div-1	Approved Drawing. & ASME Sec VIII Div-1	Stage IR	H	RW			

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FABTECH — PROJECTS & ENGINEERS —	thyssenkrupp	**INSPECTION AND TEST PLAN**		NRL
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MANUFACTURER:- FABTECH PROJECTS & ENGINEERS LTD		**INSPECTION AGENCY:-** TPIA **GROUP:-** 4

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							Vendor	TPIA	tkIS	Owner	
15	Back chip DP & welding of Long seam	Surface Defect	100 %	Approved Drawing. & NDE Procedure, ASME Sec. V/ Sec. VIII Div-1	Approved Drawing. & NDE Procedure, ASME Sec. V/ Sec. VIII Div-1	LPT Report	H	R			
16	NDE- Radiography of L-Seam of shell, nozzle neck.	Soundness of weld	100 %	NDE Procedure, ASME Sec. V/ VIII Div. 1	NDE Procedure, ASME Sec. V/ VIII Div. 1	RT Report	P	R			RT Film review by TPI
17	Cir. seam fit up & welding of shell to shell/Dish end	Identification Stamping, Geometry of Groove, DP of WEP, Alignment, Mismatch, Dimension, 'L' Seam orientation.	100 %	Approved Drg. & ASME SEC VIII Div.1	Approved Drg. & ASME SEC VIII Div.1	Stage IR	H	RW			
18	Back chip PT & welding of 'C' seam	Surface defects	100 %	Approved Drg. & NDE Procedure, ASME Sec. V/ Sec. VIII Div-1	Approved Drg. & NDE Procedure, ASME Sec. V/ Sec. VIII Div-1	LPT Report	H	R			
19	NDE- Radiography of C-Seam	Soundness of weld	100 %	NDE Procedure, ASME Sec. V/ VIII Div. 1	NDE Procedure, ASME Sec. V/ VIII Div. 1	RT Report	P	R			RT Film review by TPI
20	Nozzle neck to flange, pipe to pipe, pipe to fitting fit up & welding	Identification Stamping, Mismatch, PT of Bevel Edge, Geometry of Groove, Dimension etc.	100 %	Approved Drawing. & ASME Sec. VIII Div. 1	Approved Drawing. & ASME Sec. VIII Div. 1	Stage IR	H	R			
21	Back chip & PT of Neck to Flange , pipe to pipe, pipe to fitting seam if accessible from second side	Surface defects	100 %	Approved Drg. & ASME Sec. V/ Sec. VIII Div-1	Approved Drg. & ASME Sec. V/ Sec. VIII Div-1	LPT Report	H	R			For Single Side FPW - Root Pass PT

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FABTECH — PROJECTS & ENGINEERS —	thyssenkrupp	**INSPECTION AND TEST PLAN**		NRL
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							Vendor	TPIA	tkIS	Owner	
22	NDE- Radiography of C-Seam for nozzle to flange, pipe to pipe, pipe to fitting seam	Soundness of weld	100 %	Approved Drg., NDE Procedure, ASME Sec. V/ VIII Div. 1	Approved Drg., NDE Procedure, ASME Sec. V/ VIII Div. 1	RT Report	P	R			RT Film review by TPI
23	Nozzle marking & opening inspection	Elevation, Orientation, Size of nozzle opening.	100 %	Approved Drg. & ASME Sec VIII Div.1	Approved Drg. & ASME Sec VIII Div.1	Stage IR	H	R			
24	Nozzle to shell / dish ends fit up & Welding	Geometry of groove, DP of Tack weld & Bevel Edge, Orientation, location (Elevation)	100 %	Approved Drg. & ASME Sec VIII Div.1	Approved Drg. & ASME Sec VIII Div.1	Stage IR	H	W			
25	Root & Final run PT of Nozzle to shell / dish ends	Surface defects	100 %	Approved Drg. & ASME Sec. V/ Sec.VIII Div-1	Approved Drg. & ASME Sec. V/ Sec.VIII Div-1	LPT Report	H	R			
26	Saddle support assembly	Visual & dimension	100 %	Approved Drg. & ASME Sec VIII Div.1	Approved Drg. & ASME Sec VIII Div.1	Stage IR	H	R			
27	PT check at internal , External attachment's & Temporary attachment areas	Internal attachments of full penetration weld joints	100 %	Approved NDT procedure, ASME Sec VIII Div. 1	Approved NDT procedure, ASME Sec VIII Div. 1	PT report	H	R			UT & MT at Lifting Lugs welding
28	Final Visual, Dimensional Inspection of complete vessel	orientation, dimensional checking of various external as well as internal attachment & completeness check & ncr (if any) closures	100 %	Approved Drg. & ASME Sec VIII Div.1	Approved Drg. & ASME Sec VIII Div.1	Visual & Dim. Report	H	H			

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FABTECH — PROJECTS & ENGINEERS —	thyssenkrupp	**INSPECTION AND TEST PLAN**	NRL
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29	PMI check (only for SS, Alloy steel)	Material composition & components	100 %	As per ASME sec IIA Ed 2019	As per ASME sec IIA Ed 2019	PMI Report	H	W			
30	Mandatory & Commissioning Spare Verification (As applicable)	Visual & Dimensional check	100 %	Approved drawing.	Approved drawing.	Stage Inspection Report	H	W			
31	RF Pad pneumatic test check	Leak check	100 %	Approved Drg. & ASME Sec VIII Div-1, Pneumatic Test Procedure	Approved Drg. & ASME Sec VIII Div-1, Pneumatic Test Procedure	Pneumatic test report.	H	W			
32	Hydrostatic Test of complete Vessel	Check for Leakage, seepage, Pressure drop	100 %	Approved Drg. & ASME Sec VIII Div-1, Hydrostatic Test Procedure and water test report.	Approved Drg. & ASME Sec VIII Div-1, Hydrostatic Test Procedure and water test report.	Hydrostatic Test Report	H	H			1 Hr. holding Time. (Refer Note 8)
33	Drying & inside cleaning of equipment after Hydro test	Visual checking	100 %	Approved Drg. & Approved Procedure	Approved Drg. & Approved Procedure	Inspection Report	H	R			
34	Surface Preparation	Outside blasting	100%	Approved Drg, Aprroved procedure	Approved Drg, Aprroved procedure	Inspection Report	H	RW			
35	Painting inspection	DFT of finish paint.	100%	Approved Drg, Painting procedure.	Approved Drg, Painting procedure.	Inspection Report	H	W			Testing as per Project Spec. (Protection of machined surface, Marking)

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							Vendor	TPIA	tkIS	Owner	
36	Nitrogen Purging at 0.5 Kg/cm2 (As applicable)	Pressure checked	100%	Approved Drawing	Approved Drawing	Stage IR	H	R			
37	Final stamping , Verification of Name Plate as per Drawing & Release Note	Document Review, As-Built drawing .	100 %	Approved Drg. & ASME Sec VIII Div-1	Approved Drg. & ASME Sec VIII Div-1	Release Note	H	H			
38	Final documentation as per PR	Verification & completion of inspection & test records for submission to costumer	100 %	PR	PR	QC Dossier	H	R			R of Document & H for issuing Despatch clearance

General Notes:-

1. All bolt holes shall be straddle the main axis centre lines.
2. Peening is not permitted.
3. Non pressure part welded to pressure part shall be same as pressure part material.
4. All carbon steel material shall be provided in killed condition. Carbon steel plates shall be normalized.
5. Material Procurement as per project Spec, & applicable codes, all requirements of material also meet as per Axens IN-042.0-EN - for chemical, mechanical tests including heat treatments simulating those anticipated along the fabrication that is PFHT, Intermediate HT if any, "Z'" quality for Plates- Through thickness ductility as per ASTM A 770, NDE etc. to be met.
6. Weld seams of formed ends shall be 100 % Radio graphed after forming & Heat Treatment as applicable.

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7. Plates shall be examined before forming in accordance with ASME SA-578-B & Forgings shall be examined in accordance with ASME SA-388 and ASME Section VIII, Division 1.
8. The gaskets included in the scope of the supply shall not be utilized for performing the test. However, the test shall be conducted with gaskets of the same type and material of the installed ones during operation for body flanges and blind nozzles. After hydro test when a flanged assembly with a gasket is opened, the gasket must be replaced with a new service gasket prior to reassembly.
9. Project specifications and Standards -

AXENS IN-42.0-EN
TP-1ZZZA-ME-BOD-0001: Project specifications and Standards
TP-1ZZZA-ME-SPE-0001: Job Specification for Supply of Pressure Equipment
NR-0ZZZZ-ME-SPE-0026 : Specification Supplement for Carbon Steel Vessels
NR-0ZZZZ-ME-SPE-0031 : Specification for Boiler Quality Carbon Steel Plates
TP-1ZZZA-IP-SPE-0001: General Specification for Welding and NDE of Pressure Vessels and Heat Exchangers
TP-1ZZZA-PI-SPE-0003 : Specification for Painting
NR-0ZZZZ-PI-SPE-0032: Specification for Positive Material Identification

17/06/2023
FOR SGS

FABTECH — PROJECTS & ENGINEERS —	DOCUMENT TITLE : COMMENT RESOLUTION SHEET (SHOP QAP)	DATE-16/06/2023
	PROJECT TITLE: NRL	

CLICENT: ThyssenKrupp Industrial Solutions (India) Private Limited.

DOCUMENT NO:- **FSHO-514-QAP-1P22-VV-7732 , Rev.01 DATE-16/06/2023**

SL. NO.	COMMENT FROM CLIENT	RESPONSE FROM FABTECH PROJECTS & ENGINEERS LTD.	REMARK
1	As per GA Drawing - Vessel is not under H2S Service. AS per Note 38 of Gen. Notes Drawing it is mentioned as Vessel under H2S Service - Necessary correction to be done.	Noted & corrected In Revised QAP	
2	Include Project Spec.	Noted & Incorporated In Revised QAP	
3	Non Pr. Part welded to Pr. Part shall be same as Pr. Part Material	Noted & Incorporated In Revised QAP	
4	Material Procurement as per Project Spec, & applicable Codes, All Requirements of material also meet as per Axens IN-042.0-EN - for Chemical, Mechanical tests including heat treatments simulating those anticipated along the fabrication that is PFHT, Intermediate HT if any, , "Z'" quality for Plates- Through thickness ductility as per ASTM A 770, NDE etc. to be met	Noted & Incorporated In Revised QAP	
5	With PTC & tested for Tensile & Impact on HAZ. for each Process of Weld as per Cl. 4.1.3 of AXENS) if PWHT is applicable as mentioned in Line 28 of this Document Material Procurement shall also be as per Cl. 4 of AXENS & with simulation , 1+2 PWHT	Not Applicable.	
6	Review of all Procedures - NDE with summary & Vessel sketch with seam Nos., Hydro, PMI, Blasting & Painting, etc. - R for TPIA	Noted & Incorporated In Revised QAP	
7	PT of Knuckle / SF / WEP, 100% RT of seams	Noted & Incorporated In Revised QAP	
8	Testing of Mat. Test Coupon of Main & Boot DE - R for TPIA	Noted & Incorporated In Revised QAP	
9	Clarify - as per Submitted Drawing PWHT is not applicable. Refer line 7 & 10 for DE Normalising	Same to be removed in revised QAP	

10	NDT of Lifting Lug - PT / MT PT of Temp. attachment areas R by TPIA	Noted & Incorporated In Revised QAP	
11	Include Nozzle RF pad Pneumatic Test before & after PWHT (if PWHT is applicable)	Noted & Incorporated In Revised QAP	
12	Include NDE including for Lifting Lugs , Visual, Dimension after PWHT - if applicable - W by TPIA	Not applicable.	
13	Hydro Test of Thermowell Pipe if open end of pipe is plugged.	Not Applicable	
14	The gaskets included in the scope of the supply shall not be utilized for performing the test. However, the test shall be conducted with gaskets of the same type and material of the installed ones during operation for body flanges and blind nozzles. After hydro test when a flanged assembly with a gasket is opened, the gasket must be replaced with a new service gasket prior to reassembly	Noted & Incorporated In Revised QAP	
15	While painting Protection of machined surface, Marking, etc.	Noted & Incorporated In Revised QAP	
16	Verification of Name Plate as per Drawing	Noted & Incorporated In Revised QAP	
17	H2 service & H2S service is not applicable for this vessel (Refer Drawing)	Noted and correction done In revised QAP	

FABTECH PROJECTS & ENGINEERS LTD
QC MANAGER

General Notes:

01. ALL DIMENSION SHOWN ARE IN MM UNLESS OTHERWISE NOTED .
02. ALL WELDS SHALL BE CONTINUOUS EXCEPT AS NOTED.
03. ALL BOLT HOLE TO STRADDLE THE NORTH / SOUTH AND VERTICAL CENTER LINES.
04. a) FOR NOZZLES ON SHELL PROJECTIONS ARE REFERRED TO FROM TRUE HORIZONTAL LINE TO FLANGE CONTACT FACE.
    b) FOR NOZZLES ON HEAD PROJECTIONS ARE REFERRED TO FROM HEAD T.L. TO FLANGE CONTACT FACE.(AND SHALL BE PERPENDICULAR TO TRUE HORIZ C.L.)
05. UNLESS OTHERWISE SPECIFIED, NOZZLE GASKET SURFACE SHALL BE SERRATED CONCENTRIC OR SERRATED SPIRAL FINISH HAVING A RESULTANT SURFACE FINISH 3.2 TO 6.3 MICRON AVERAGE ROUGHNESS.
06. GASKET MATERIAL : SPIRAL WOUND (4.5t) ANSI 16.20, FILLER : FLEXIBLE GRAPHITE , WINDING: 316 SS, INNER RING : 316 SS, OUTER RING : CS
07. ALL REMOVABLE INTERNAL SHALL PASS THROUGH MANHOLE ID OF 580 MM.
08. THIS COLUMN SHALL BE VERIFIED FOR STEAMOUT CONDITION OF 0.5 Kg/cm² (a) (VACUUM) AND 0.5 Kg/cm² g AT 170°C.
09. ALL LEVEL GUAGE NOZZLES TOLERANCE : ±2.0MM.
10. SPARE PART LIST :

	MANDATORY SPARE	COMMISSIONING SPARE
GASKET FOR NOZZLE	2 SET FOR EACH INSTALLED GASKET	2 SET FOR EACH INSTALLED GASKET
BOLTS & NUTS FOR NOZZLE	20% (MIN. 2 SETS)	10% (MIN. 2 SETS)
GASKET FOR INTERNALS	2 SET FOR EACH INSTALLED GASKET	
BOLTS & NUTS FOR INTERNALS	20% (MIN. 2 SETS)	

11. PAINTING SCHEME :

NO	PART NAME TO BE PAINTING	OPERATING TEMP. °C	SURFACE PREPARATION	COATING SYSTEM	PAINT SECTION	PAINT TYPE	PAINT NAME	PAINT COLOR	MIN D.F.T.	PAINT COATS	TOTAL D.F.T.
2.1.1	FOR COMPLETE VESSEL	-14 to 80	SSPC-SP-10	AS PER TABLE-2	PRIMER	-	Inorganic Zinc Silicate (FP-6)	-	65-75	1	75
					FINISH	-	High Glass Flake Epoxy	-	200	2	400

⚠ ( )

12. A) PWHT CYCLE :(NOT APPLICABLE) ⚠
    B) NORMALIZING CYCLE FOR MAIN DISH ENDS & BOOT DISH ENDS:
    LOADING TEMP. : 300 °C (MAX.)
    HEATING RATE ABOVE 300°C : 150°C/HR.(MAX.)
    SOAKING TEMP. : 924±14 °C
    SOAKING TIME : 2.4 MIN PER MM
    COOLING IN STILL AIR
13. UNLESS OTHERWISE SPECIFIED, TOLERANCE FOR PRESSURE VESSEL SHALL BE IN ACCORDANCE WITH APPLICABLE PROJECT SPECIFICATION STC-0490-0009
14. A. CHLORIDE CONTENT IN WATER USED FOR HYDRO TEST SHALL BE LESS THAN 100 PPM FOR CARBON STEEL EQUIPMENT.A SUFFICIENT QUANTITY OF SODIUM-NITRATE SHALL BE ADDED TO PROVIDE A TEST MEDIUM OF 0.5% BY WEIGHT SODIUM-NITRATE SOLUTION.& LESS THAN 25 PPM FOR STAINLESS STEEL EQUIPMENT. ⚠ ⚠
    B. THE VESSEL SHALL BE FREE OF DEBRIES, DIRT & FOREIGN MATTER AND AFTER HYDROTEST THE EQUIPMENT SHALL BE DRIED THOROUGHLY & CLEANED FROM INSIDE WHEREVER ACCESSIBLE & FROM OUTSIDE.
15. LOW STRESS STAMPING TO BE FOLLOWED ON PRESSURE PARTS.
16. CORROSION ALLOWANCE SHALL BE AS FOLLOW:
    A. MAIN BODY: 3mm / BOOT: 3mm (1.5 mm EXTERNAL)
    B. SUPPORT: 0
    C. WELDED INTERNALS: 6mm (Total)
17. ALL WELDS ACCESSIBLE FROM SECOND SIDE SHALL BE BACK CHIPPED / GAUGED BACK TO SOUND METAL BEFORE WELDING FROM SECOND SIDE. WELDS NOT ACCESSIBLE FROM SECOND SIDE SHALL HAVE ROOT RUN DONE BY TIG WELDING WITH ARGON PURGING.
18. ALL WELDS SHALL BE FULL PENETRATION WELDS, INCLUDING THE WELD BETWEEN INTERNAL RINGS, BAFFLES, PASS PARTITION PLATES AND SHELL. THERE SHALL BE NO CREVICE AND ENCLOSED FREE SPACE.
19. I.D. OF WELD NECK FLANGES SHALL MATCH WITH CORRESPONDING I.D. OF NOZZLE PIPE / SHELL.
20. ALL NDE SHALL BE AS PER APPROVED NDE PROCEDURE.
21. LIFTING ACCESSORIES AS TAILING LUGS, TRUNNIONS AND LIFTING LUGS SHALL BE DESIGNED TO WITHSTAND THE EQUIPMENT LIFTING WEIGHT CONSIDERING AN IMPACT FACTOR OF 2.
22. OUT OF ROUNDNESS SHALL BE AS PER UG80 & UG81 OF ASME SEC VIII DIV 1.
23. ALL MATERIAL USED IN THE VESSEL(S) SHALL BE NEW.
24. PLATES, 1⁄2 IN.[12.5 MM] AND OVER AND LESS THAN 50 MM IN THICKNESS SHALL BE SUBJECTED TO ULTRASONIC TEST AS PER SA/A435 OR A578 LEVEL B.
25. ORDERED THICKNESS IS THE MINIMUM THICKNESS, THERE IS NO NEGATIVE TOLERANCE, ONLY +VE TOLERANCE.
26. ALL NOZZLES AND MANWAYS, EXCEPT NOZZLES WITH ATTACHED INTERNAL PIPING, SHALL BE SET FLUSH WITH THE INSIDE OF THE VESSEL. THE INSIDE CORNER OF NOZZLE AND MANWAY NECKS SHALL BE ROUNDED TO ELIMINATE ALL SHARP CORNERS.
27. ALL BOLTS / STUDS FOR STANDARD & NON-STANDARD FLANGES SHALL HAVE UNC STANDARD THREAD UP TO 1" AND LARGER SIZES SHALL HAVE UN THREADING (8-THREAD SERIES) AS PER ASME B1.1 UNLESS OTHERWISE SPECIFIED.
28. STUDS SHALL EXTEND BEYOND NUTS AT LEAST BY 2 THREADS & STUDS SHALL BE THREADED TO FULL LENGTH.
29. STUD BOLTS SHALL BE PROVIDED WITH TWO HEAVY SERIES HEXAGONAL NUTS.
30. ALL MAIN WELD SEAMS SHALL BE CLEAR OF NOZZLES, REINFORCEMENT PADS, INTERNALS, TRAY SUPPORT RINGS, CLEATS AND STIFFENING RINGS BY HIGHER OF TWO TIMES SHELL THICKNESS OR 50 MM (WELD EDGE TO WELD EDGE). IN CASE THE SAME IS UNAVOIDABLE FOLLOWING REQUIREMENT SHALL APPLY:
    A) NOZZLES WITHOUT REINFORCING PAD
    ANY WELD SEAM HAVING DISTANCE (WELD EDGE TO WELD EDGE) TO NOZZLE WITHIN 50MM (BUT NOT FOULING WITH WELD SEAM) SHALL BE FULLY RADIOGRAPHED AND DYE PENETRANT EXAMINED TO A LENGTH EQUAL TO 100MM ON EACH SIDE MEASURED FROM NEAREST POINT TO NOZZLE EDGE.
    ANY WELD SEAM FOULING WITH NOZZLE OPENING SHALL BE FULLY RADIOGRAPHED AND DYE PENETRANT EXAMINED TO A LENGTH EQUAL TO 3 TIMES OF OUTSIDE DIAMETER OF NOZZLE I.E. 1.5 TIMES OF OUTSIDE DIAMETER OF NOZZLE ON EACH SIDE AFTER INSTALLATION OF NOZZLES. NOZZLE TO VESSEL FILLET WELD SHALL BE PROVIDED WITH SMOOTH CONCAVE RADIUS.
    B) IN CASE OF OTHER ATTACHMENTS LIKE INTERNALS, SUPPORT RINGS, CLEATS ETC. IS FOULING WITH WELD SEAM, THE WELD SEAM PORTION COMING UNDER THE ATTACHMENT PLUS 100 MM LENGTH ON EACH SIDE SHALL BE GROUND FLUSH, FULLY RADIOGRAPHED AND DYE PENETRANT EXAMINED BEFORE WELDING OF ANY SUCH ATTACHMENT.
31. ALL NOZZLES FABRICATED FROM PLATE, IRRESPECTIVE OF THICKNESS OF PLATE, SHALL BE 100% RADIO GRAPHED.
32. ALL NOZZLE TO SHELL WELDS (ROOT AND FINAL RUN) SHALL BE EXAMINED BY MAGNETIC PARTICLE/ DYE PENETRANT EXAMINATION
33. ALL COMPLETED EQUIPMENT SHALL BE CLEANED INTERNALLY AND EXTERNALLY TO REMOVE SCALE, DIRT, SAND, WATER AND FOREIGN MATTER.
34. CENTER OF GRAVITY IN THE SHOP FABRICATED CONDITION SHALL BE MARKED CLEARLY ON OPPOSITE SIDES OF THE VESSEL.
35. THE NOZZLE FLANGES UP TO 24" NPS SHALL CONFIRM TO ASME B16.5 FLANGES ABOVE 24" NPS SHALL BEAS PER ASME B16.47 SERIES A.
36. ALL ATTACHMENTS WELDED TO VESSEL SHALL BE OF SAME MATERIAL AND GRADE OF THE SECTION TO WHICH IT IS ATTACHED AND TO BE SUPPLIED BY THE VESSEL VENDOR.
37. ALL CARBON STEEL MATERIAL SHALL BE KILLED QUALITY.
38. DELETED
39. DELETED ⚠
40. DELETED
41. MATERIAL CERTIFICATION FOR PLATES SHALL BE EN 10204 3.1.
    FOR ALL OTHER PARTS, MATERIAL CERTIFICATION AS PER CLAUSE 9.2.4 OF DOC. NO.: TP-1ZZZA-ME-SPE-0001
    i.e. EN10204 3.1/2.2 (AS APPLICABLE) CERTIFICATE SHALL BE CONSIDERED.

–	–	–	–
Part	Heat treatment type	Holding time min	Holding temperature °C

Heat treatment (Details as per document ID :

Fabricated nozzle neck	1	100%	As per Approved Inspection and Testing Plan Document ID: –					
Dish Ends	1	100%						
Shell	1	100%						
Part	Joint eff.	Radiography %	Ultra-sonic %	Magnetic particle %	Dye pe-netrant %	Tests specimens	Others	

Tests (Test reports incl. appraisals are required in all cases)

As per Job specification for painting (TP-1ZZZA-PI-SPE-0003)

Insulated CS surfaces	–
Part	System no.

Surface treatment

Nozzle O2	1+7/8" 8UN	MIN: 451.7 kN/ MAX: 790.5 kN
Nozzle M1/M2	1+1/4" 8UN	MIN: 187.1 kN/ MAX: 327.4 kN
Nozzle/Flange	Bolt Size	BOLT TIGHTENING LOAD

Bolts tightening moments(As Per ASME PCC Ed. 2019)

Part	Materials	Remarks
Shell	SA-516 GR. 70N	
Heads	SA-516 GR. 70N	
Shell Flange	–	
Supports/ Saddle	CS/ SA-516 GR. 70	
Clips	CS/ SA-516 GR. 70	
Nozzle pipes	SA-106 GR. B	
Nozzle Flange	SA-105	
Internals Welded	SA-516 GR. 70N/ SA 106 GR. B	
Internals Removable	CS	
Bolts/ Nuts Inside	–	
Bolts/ Nuts Outside	SA 193 Gr. B7 / SA 194 Gr. 2H ⚠	
Gaskets Inside	SS 316 Spiral Wound gaskets+Graphite filler along with SS 316 Inner rings & Outer rings	
Gaskets Outside		
Gaskets Shell flange	–	
Davit	CS/ SA-516 GR. 70	
Name Plate/ Brackets	SS 304/CS	
Lifting Lugs	CS	
Anchor Bolts	IS 2062:E250 BR OR 8.8 equivalent	(BY OTHER)
Shear key	CS	
Sliding plate/ Teflon Plate	SS/ PTFE	
Earthing lugs	SS	

Project Engineering Specifications & Standards

Description	Document ID
Engineering Design Basis for Static Equipment	TP-1ZZZA-ME-BOD-0001
Site Specific Seismic Spectra	TP-1ZZZA-CV-BOD-0002
Job Specification for Supply of Pressure Equipment	TP-1ZZZA-ME-SPE-0001
General Specification for Welding and NDE for Pressure Vessels and Heat Exchangers	TP-1ZZZA-IP-SPE-0001
Job Specification for Painting	TP-1ZZZA-PI-SPE-0003
Specification for Identification of Piping and Equipment	NR-0ZZZZ-CV-SPE-0021
Spare Parts, Special Tools and Consumable philosophy	TP-1ZZZA-PQ-PRC-0005
Standard Construction Drawings for Pressure Equipment	TP-1ZZZA-ME-STD-0001
Specification For CS Components Used in Sour Service in Petroleum Refinery	NR-0ZZZZ-PI-SPE-0025
Packing Marking and Shipping Specification	TP-1ZZZA-PQ-SPE-0003
Specification Supplement for Carbon Steel Vessels	NR-0ZZZZ-ME-SPE-0026
Specification for Boiler Quality Carbon Steel Plates	NR-0ZZZZ-ME-SPE-0031
Vendor/Contractor Documentation Procedure	TK-1ZZZA-DC-PCP-0001
Project Data and Information Handover Specification	NR-0ZZZZ-IF-SPE-0001
Technical Document Numbering Specification	NR-0ZZZZ-GE-SPE-0001
Specification for Identification of Piping & Equipment	NR-0ZZZ-CV-SPE-0021
Standard ITP For Site Fabricated Equipment	–

Spares

Mandatory spare parts	Gaskets : 200% (2 sets of each installed gasket) Bolts : 20%(min.2)(for each gasketed joint)
Commissioning spare parts	Gaskets : 200% (2 sets of each installed gasket) Bolts : 20%(min.2)(for each gasketed joint)

Rev.	Date	Reason for Issue	Prepared	Checked	Approved	Owner Approved
01	10/05/2023	REVISED AS PER COMMENTS	SAGAR P.	LALIT W.	VITTHAL N.	D.P.THORAT
00	24/02/2023	ISSUED FOR APPROVAL	PRAMOD B.	LALIT W.	VITTHAL N.	D.P.THORAT

Document belonging to drawing

tkIS India / Vendor — Category Codes (Submission purpose)
- ☐ 1 For Approval
- ☐ 2 For Review / Comments
- ☐ 3 For Information
- ☐ 4 For Engineering
- ☐ 5 For Enquiry
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- ☐ 7 Final & Approved
- ☐ 8 Released for Construction

tkIS India / Vendor — Acceptance Codes (Approval Codes)
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- ☐ 3 Not Approved/Resubmit
- ☐ 4 Retained for Information/Records
- ☐ 5 Reviewed
- ☐ 6 Reviewed as Noted/Resubmit

Date : __ /__ /____ Name : _____

MGF. BY
FABTECH — PROJECTS & ENGINEERS
FABTECH PROJECTS & ENGINEERS LTD.
CORPORATE OFFICE:- LEVEL-7, M-AGILE, NEAR PAN CARD CLUB ROAD, BANER, PUNE - 411045

thyssenkrupp

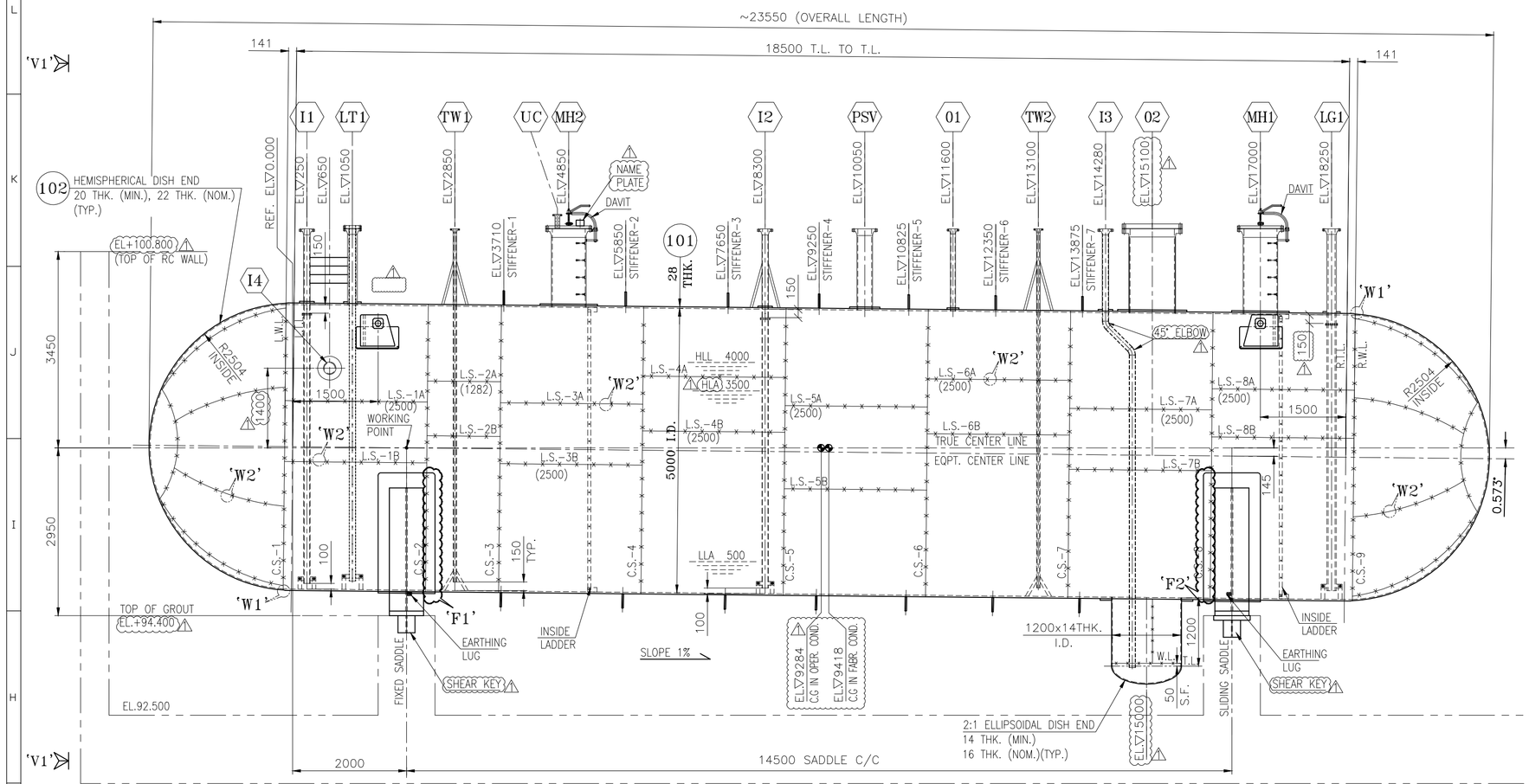
NRL's PO No.:	4500025832-/22.12.2022
Vendor's PO No.:	PUR-PRJNUM-1004763/LOA/FABTECH
Vendor's Document No.:	FSH0-514-DR-1P22-VV-7732-001

Contract No.	Document ID				Part	
⚠66-6733	TK-1P22-VW-7732-0001-001				–	
Store Location: Server/Share	BAR-Code					
–						
Store Location: Folder						
–						
Store Name						
–						
Pro. Unit	Con. Unit	ITEM No.	Group	Order No.	Cat. Code	Acc. Code	Status
–	–	1P22-W-7732	4	⚠ –	5	1P22A	01 ⚠

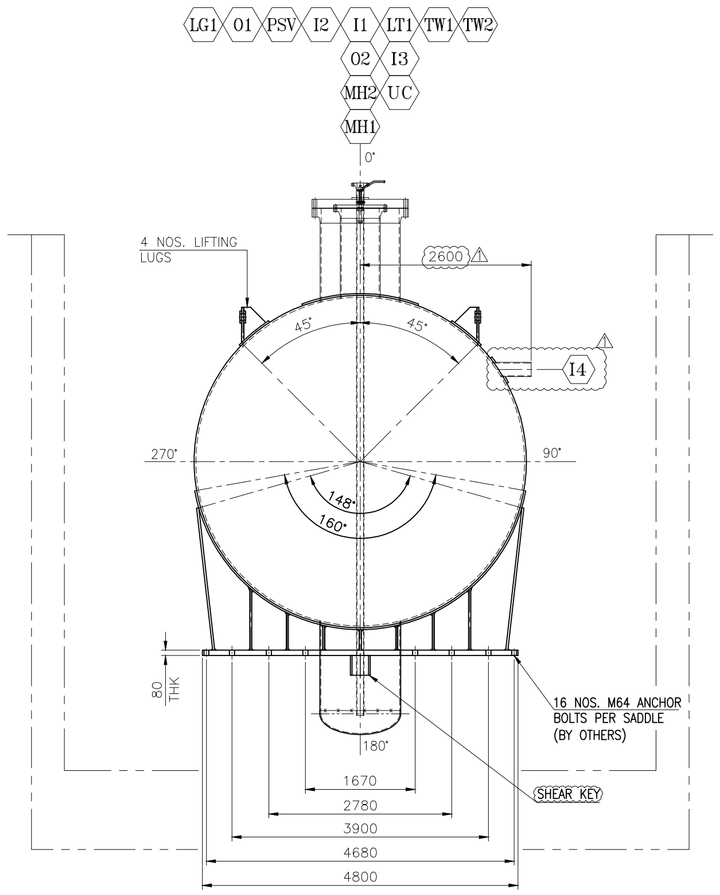
NRL NUMALIGARH REFINERY LIMITED

PROJECT: NUMALIGARH REFINERY EXPANSION PROJECT
UNIT/FACILITY: NAPHTHA HYDROTREATER UNIT (NHTU)
DRAWING TITLE : GENERAL NOTES DRAWING FOR SYSTEM DESCRIPTION : HOT OIL DRAIN DRUM (1P22-VV-7732)
Scale: 1:1 Drg.Size: A1

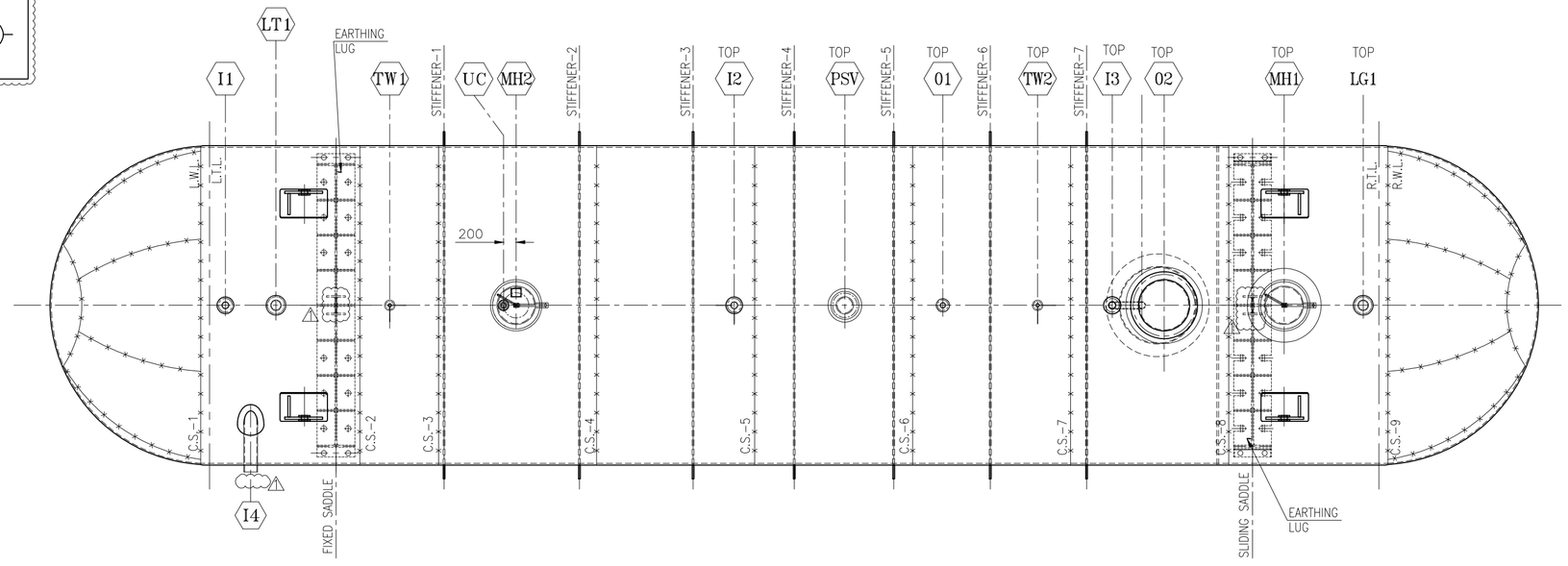
Originator/ Contractor	Asset Code	Disc	RFP No.	Drawing Type	Sequence Number	Rev.	Sheet
TK	1P22A	ME	7732	GAS	0001	01	1 OF 1



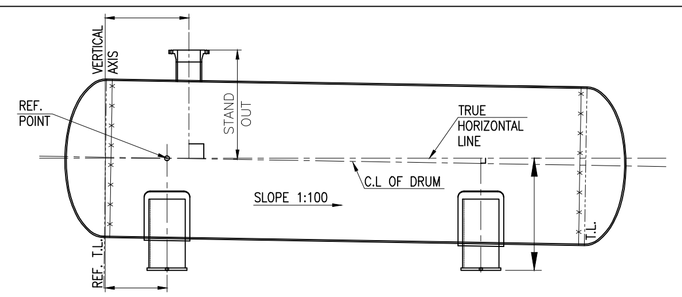
ELEVATION VIEW



VIEW–'V1–V1'

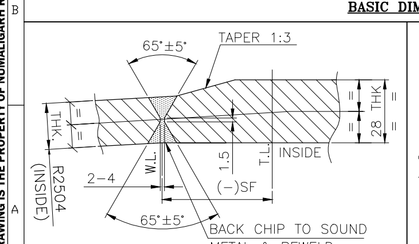


PLAN VIEW

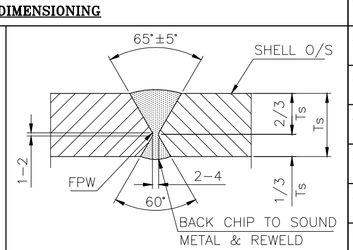


1. ALL NOZZLES NECKS, NOZZLE FLANGE FACES, SADDLE SUPPORT, AND SADDLE BASE CONNECTION SHALL BE IN TRUE HORIZONTAL & VERTICAL PLANES.

BASIC DIMENSIONING



WELD DETAIL 'W1'



WELD DETAIL 'W2'

HOLD POINTS :– ⚠

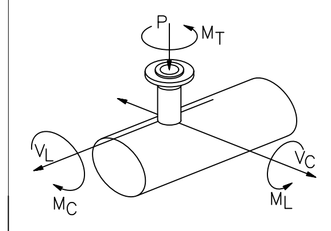
1. NOZZLE I3, I4 & UC ORIENTATION
2. NOZZLE I2 SIZE
3. NOZZLE 02 COVER/BLIND FLANGE + NOZZLE I3 SCOPE OF SUPPLY

FOULING POINTS :–

F1. FIXED SADDLE FOULING WITH C.S.–2
F2. SLIDING SADDLE FOULING WITH C.S.–8

TKIS DOCUMENT ID.	NRL DOCUMENT ID.	FABTECH DOCUMENT I.D.	DESCRIPTION
TK–1P22–VV–7732–0001–007	TK–1P22A–ME–7732–DTL–0004	FSHO–514–DR–1P22–VV–7732–006	NAME PLATE DETAIL DRAWING FOR HOT OIL DRAIN DRUM
TK–1P22–VV–7732–0001–006	TK–1P22A–ME–7732–DTL–0003	FSHO–514–DR–1P22–VV–7732–005	MANHOLE DEVIT DETAIL DRAWING FOR HOT OIL DRAIN DRUM
TK–1P22–VV–7732–0001–005	TK–1P22A–ME–7732–DTL–0002	FSHO–514–DR–1P22–VV–7732–004	SADDLE AND OTHER DETAILS DRAWING FOR HOT OIL DRAIN DRUM
TK–1P22–VV–7732–0001–004	TK–1P22A–ME–7732–DTL–0001	FSHO–514–DR–1P22–VV–7732–003	NOZZLE DETAIL DRAWING FOR HOT OIL DRAIN DRUM
TK–1P22–VV–7732–0001–003	TK–1P22A–ME–7732–CAL–0001	FSHO–514–DC–1P22–VV–7732–001	MECHANICAL DESIGN CALCULATION FOR HOT OIL DRAIN DRUM
TK–1P22–VV–7732–0001–002	TK–1P22A–ME–7732–GAS–0002	FSHO–514–DR–1P22–VV–7732–002	GENERAL ARRANGEMENT DRAWING FOR HOT OIL DRAIN DRUM
TK–1P22–VV–7732–0001–001	TK–1P22A–ME–7732–GAS–0001	FSHO–514–DR–1P22–VV–7732–001	GENERAL NOTES FOR HOT OIL DRAIN DRUM

MAX. NOZZLE LOAD



NOZZLE	NPS	FORCES [N]			MOMENTS [N–m]		
		VL	P	VC	MT	ML	MC
I1	4	9360	9360	7020	3120	2730	2080
I2	4	9360	9360	7020	3120	2730	2080
I3	4	9360	9360	7020	3120	2730	2080
01	3	7280	7280	5460	1950	1690	1300
PSV	10	19630	19630	14690	15730	13650	10530
I4	8	15730	15730	11830	10140	8840	6760

NOTE d: WITH ANTI–SYPHON HOLES) ⚠
NOTE c: WITH DIP PIPE
NOTE b: LOCATED ON MANHOLE NOZZLES MH2
NOTE a: WITH COVER FLANGE & DAVIT

NOZZLE SYMBOL	DESCRIPTION	QTY.	NPS IN	CLASS	ASME	FLANGE TYPE	FLANGE FACING	PIPE SCHEDULE	REINFORCING PLATE (WxT)	PROJECTION	REMARKS
BOOT	BOOT	1	1200 I.D.	–	–	–	–	14 THK.	200Wx28	SEE DWG	–
I4	HTO DRAIN FROM MSP	1	8	–	–	BW	–	SCH.100	100Wx28	SEE DWG	–
PSV	PRESSURE SAFETY VALVE	1	10	300	B16.5	WN	RF	SCH.100	130Wx28	3850	–
LT1	LT FOR CONTROL COMMAND	1	6	300	B16.5	WN	RF ⚠	SCH.120	70Wx28	3850	NOTE–c
LG1	LEVEL GAUGE	1	6	300	B16.5	WN	RF	SCH.120	70Wx28	3850	NOTE–c
TW1,2	THERMOWELL	2	2	300	B16.5	WN	RF	SCH.XXS	–	3850	NOTE–c
UC	UTILITY CONNECTION	1	2	300	B16.5	LWN	RF	16.6 THK.	– ⚠	4052	NOTE–b
MH1,2	MANHOLE	2	24	150	B16.5	WN	RF	16 THK.	200Wx28	3850	NOTE–a
O2	HOT OIL PUMP CONNECTION	1	32	150	B16.47A	WN	RF	16 THK.	200Wx28	3850	–
O1	VAPOR OUTLET/ BLANKETING	1	3	600	B16.5	WN	RF	SCH.XXS	60Wx28	3850	–
I3	TEMPORARY CONNECTION	1	4	600	B16.5	WN	RF	SCH.160	70Wx28	⚠4238	NOTE–c
I2	HOT OIL DRAIN PUMP MIN. FLOW INLET	1	4	600	B16.5	WN	RF	SCH.160	70Wx28	3850 ⚠	NOTE–c,d
I1	HOT OIL INLET	1	4	600	B16.5	WN	RF	SCH.160	70Wx28	3850	NOTE–c

Nozzle table

TOTAL WEIGHT IN KG 80998.6

ITEM NO.	DESCRIPTION	QTY	MATERIAL	SIZE	WEIGHT	REMARKS
102	HEMISPHERICAL DISH ENDS	2	SA–516 Gr. 70N	5044 O.D. x 22 THK.(NOM.)	15892	20 THK (MIN.)
101	SHELL	1	SA–516 Gr. 70N	Circ. 15802 x 18782 LG. x 28 THK.	65106.6	–

BILL OF MATERIAL (ONLY FOR 1 EQUIPMENT)

Design codes: ASME Sec. VIII Div. 1, Edition 2021

Pressure chamber		SHELL	Inspection by: TPIA
Design pressure (INT/EXT)	kg/cm²(g)	3.5 / F.V. (Npte–a)	Supervision of manuf. by: FPEL
Design temperature (INT/EXT)	°C	210 / 210	Shipping weight: ⚠~110500 kg
Corrosion allowance (INT/EXT)	mm	3.0 / 1.5 (Note–b)	Empty weight: ~110500 kg
Other additional allowances	mm	0	Operating weight: ~861500 kg
Joint efficiency (SHELL / HEAD)		1.0 / 1.0	Weight at retest: ~540000 kg
Radiography (RT1/RT2/RT3/RT4)		RT–1	Mfr's Serial No.: FT–4984
Material		C.S.	Year of manufacture: 2023
Initial test pressure at top with water/air Position: Horizontal	kg/cm²(g)	4.55 (As per UG–99 Note 35)	Wind shear: NA N
			Wind moment: NA N–m
Operating pressure	kg/cm²(g)	1.5	Seismic shear: ⚠2638375 N
Operating temperature	°C	AMB	Seismic moment: 7783207 N–m
Retest pressure at top with water/air Position: Horizontal	kg/cm²(g)	4.55 (As per UG–99 Note 35)	MDMT: 5 °C
			Insulation Thickness: N/A mm
Process fluid		–	Insulation type: N/A
Density	kg/m³	891.2	Fireproofing: N.A mm
H_2 partial pressure	kg/cm² abs.	N.A.	PWHT (Stress Relieving) : NO
H_2S partial pressure	kg/cm² abs.	N.A.	Leakage Class: N.A.
Nominal volume	m³	462	Classification Group: 4
MAWP	kg/cm²(g)	3.5	
MAP	kg/cm²(g)	–	IBR Service : No
Toxic/Lethal service	(Yes/No)	No / No	Wind Design: Not Applicable
Flammable service	(Yes/No)	No	
H2 service	(Yes/No)	No	Seismic Design:–IS 1893 (Part 4)
H2S service	(Yes/No)	No	: 2018+Amend 1 & 2 + site spectra
Cyclic service	(Yes/No)	No	
Wet H2S Service	(Yes/No)	No	
Impact testing	(Yes/No)	Note–c ⚠	

Note–a Total External Pressure on Bullet is FV + 0.52 (External pressure due to sand) i.e. 1.055 + 0.52 = 1.575 = ~1.6 kg/cm^2(g) ⚠
Note–b Corrosion allowance for anchor bolt 6 mm.
Note–c All material shall comply the requirements of IN–042.0 and shall be supplied in impact tested condition at MDMT as per licensor specification IN–042.0.

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☐ 2 For Review / Comments
☐ 3 For Information
☐ 4 For Engineering
☐ 5 For Enquiry
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☐ 5 Reviewed
☐ 6 Reviewed as Noted/Resubmit
Date : __ /__ /____ Name : _____

Contract No.	Document ID	Part
66–6733	TK–1P22–VV–7732–0001–002	–

Store Location: Server/Share	BAR–Code
–	
Store Location: Folder	
–	
Store Name	
–	

–	Con. Unit	ITEM No.	Group	Order No.	Cat. Code	Acc. Code	Status
–	–	1P22–VV–7732	4	–	5	1P22A	01

Rev.	Date	Reason for Issue	Prepared	Checked	Approved	Owner Approved
01	10/05/2023	REVISED AS PER COMMENTS	SAGAR P.	LALIT W.	VITTHAL N.	D.P.THORAT
00	24/02/2023	ISSUED FOR APPROVAL	PRAMOD B.	LALIT W.	VITTHAL N.	D.P.THORAT

MGF. BY
FABTECH PROJECTS & ENGINEERS
FABTECH PROJECTS & ENGINEERS LTD. CORPORATE OFFICE:- LEVEL-7, M-AGILE, NEAR PAN CARD CLUB ROAD, BANER, PUNE - 411045

thyssenkrupp

NRL's PO No.:	4500025832–/22.12.2022
Vendor's PO No.:	PUR–PRJNUM–1004763/LOA/FABTECH
Vendor's Document No.:	FSHO–514–DR–1P22–VV–7732–002

NUMALIGARH REFINERY LIMITED

PROJECT: NUMALIGARH REFINERY EXPANSION PROJECT
UNIT/FACILITY: NAPHTHA HYDROTREATER UNIT (NHTU)
DRAWING TITLE : GENERAL ARRANGEMENT DRAWING FOR
SYSTEM DESCRIPTION : HOT OIL DRAIN DRUM (1P22–VV–7732)
Scale: 1:62
Drg.Size: A1

Originator/ Contractor	Asset Code	Disc	RFP No.	Drawing Type	Sequence Number	Rev.	Sheet
TK	1P22A	ME	7732	GAS	0002	01	1 OF 1

`TECHNICAL DOCUMENTATION FRONT SHEET

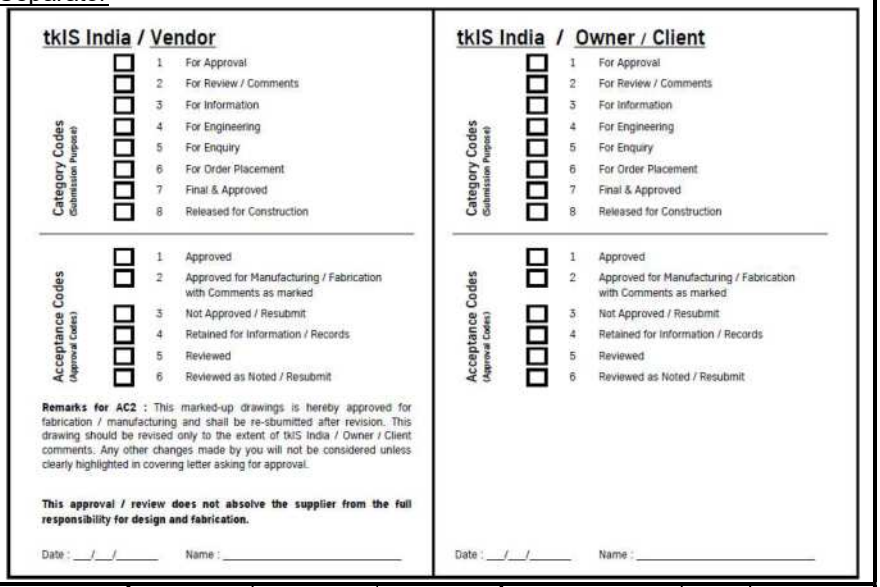
Total Pages: 13

NUMALIGARH REFINERY LIMITED

NRL EXPANSION PROJECT

DOCUMENT DESCRIPTION

Vendor Name: Fabtech Project and Engineers Ltd
Tag / Item No.: 1P25-VV-3034
Tag / Item Description: High Pressure Separator



tkIS India / Vendor

Category Codes (Submission Purpose)
- ☐ 1 For Approval
- ☐ 2 For Review / Comments
- ☐ 3 For Information
- ☐ 4 For Engineering
- ☐ 5 For Enquiry
- ☐ 6 For Order Placement
- ☐ 7 Final & Approved
- ☐ 8 Released for Construction

Acceptance Codes (Approval Codes)
- ☐ 1 Approved
- ☐ 2 Approved for Manufacturing / Fabrication with Comments as marked
- ☐ 3 Not Approved / Resubmit
- ☐ 4 Retained for Information / Records
- ☐ 5 Reviewed
- ☐ 6 Reviewed as Noted / Resubmit

Remarks for AC2 : This marked-up drawings is hereby approved for fabrication / manufacturing and shall be re-sbumitted after revision. This drawing should be revised only to the extent of tkIS India / Owner / Client comments. Any other changes made by you will not be considered unless clearly highlighted in covering letter asking for approval.

This approval / review does not absolve the supplier from the full responsibility for design and fabrication.

Date : __/__/_____ Name : _____

tkIS India / Owner / Client

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- ☐ 6 Reviewed as Noted / Resubmit

Date : __/__/_____ Name : _____

Rev	Date	Reason for Issue	Prepared	Checked	Approved	Prepared	Review	Review
			Disc. Eng.	Disc. Lead	Contr. Rep	Disc. Eng.	Proj. Eng.	Com.Rep. Dept. Head
01	21.06.2023	Review	AB	AB	HT			
00	23.02.2023	Review	AB	AB	HT			

Vendor / Contractor		NRL / tkIS / Consultant
Category	**Code**	**Description**
Facility Area Code	**1Z**	**Numaligarh Refinery Common Document**
Document Type	**ITP**	**Inspection and Test Plan (ITP)**
System Number	**00**	**General**
Life Cycle		Disk Ref.:

NRL's PO No. to tkIS:
NRL's PO No. to Vendor / Contractor: 4500025832 dt 22.12.2022
Vendor / Contractor Document N0.: FSHO-514-ITP-1P25-VV-3034-001

tkIS Contract No.: **66-6733**
tkIS Engineering Status Code:
tkIS Document Category Code:

Originator/ Contractor	Asset Code	Disc	RFP NO	Document Type	Sequence Number	Revision
TK	**1P25A**	**ME**	**0038**	**ITP**	**0003**	**01**

FABTECH — PROJECTS & ENGINEERS —	thyssenkrupp	**INSPECTION AND TEST PLAN**		NRL
		PROJECT	NUMALIGARH REFINERY EXPANSION PROJECT	

TAG NO:- 1P25-VV-3034	**Equipment Name:-** HIGH PRESSURE SEPERATOR	**DOC NO:- FSHO-514-QAP-1P25-VV-3034 , Rev.01 DATE-16/06/2023**
CLIENT:- M/S NUMALIGARH REFINERY LIMITED		**DESIGN AND FABRICATION CODE:** ASME SEC. VIII DIV-1 ED 2021 **(Wet H2S Service with NACE MR 0103)**
EPC CONTRACTOR: THYSSENKRUPP INDUSTRIAL SOLUTIONS (INDIA) PRIVATE LIMITED.		**PO NO:-**PUR-PRJNUM-1004763/LOA/Fabtech
MANUFACTURER:- FABTECH PROJECTS & ENGINEERS LTD		**INSPECTION AGENCY:- TPIA**

LEGEND:-

CE	Carbon Equivalent	DFT	Dry Film Thickness
DPT / PT	Dye Penetrant Testing / Penetrant Testing	HT	Heat Treatment
HIC	Hydrogen Induced Cracking	ITP	Inspection & Test Plan
IP	Ingress Protection	IGC	Inter-Granular Corrosion
IC	Inspection Certificate	MPT/MT	Magnetic Particle Testing
MR	Material Requisition	MRT	Mechanical Run Test
MTC/TC	Material Test Certificate / Test Certificate	PO	Purchase Order
NDT	Non-Destructive Testing	PR	Purchase Requisition
PQR	Procedure Qualification Record	PMI	Positive Material Identification
RT	Radiography Testing	SSCC	Sulphide Stress Corrosion Cracking
SCC	Stress Corrosion Cracking	TPI/TPIA	Third Party Inspection Agency
UT	Ultrasonic Testing	VDR	Vendor Data Requirement
I	Information	WPQ	Welder Performance Qualification
R	Review	WPS	Weld Procedure Specification
H	Hold Point	R/W	Review or Witness
W	Witness Point	UID	Unique Identification Marking
RW	Random Witness	PTC	Production Test Coupon
R/W	Review or witness	I	Information

Representative	Prepared by QA/QC Engineer	Approved by QA /QC Manager	Accepted by		
			TPIA	PMC	OWNER
Name	Abhinandan Dhamane	Harish Talele			
Signature			SGS Amol Patil Date & Signature SGS INDIA PVT. LTD. PUNE 17/06/2023 ☐WITNESSED ☑REVIEWED		
Date	16/06/2023	16/06/2023			

The SGS stamp & signature is for witnessing/observation purposes only and is subject to the provisions of the SGS General Conditions of Services, Particularly article 2(d), available at http://www.sgs.com/terms_and_conditions.htm

FABTECH — PROJECTS & ENGINEERS —	thyssenkrupp	**INSPECTION AND TEST PLAN**		NRL
		PROJECT	NUMALIGARH REFINERY EXPANSION PROJECT	

TAG NO:- 1P25-VV-3034	**Equipment Name:-** HIGH PRESSURE SEPERATOR	**DOC NO:- FSHO-514-QAP-1P25-VV-3034 , Rev.01 DATE-16/06/2023**
CLIENT:- M/S NUMALIGARH REFINERY LIMITED		**DESIGN AND FABRICATION CODE:** ASME SEC. VIII DIV-1 ED 2021 **(Wet H2S Service with NACE MR 0103)**
EPC CONTRACTOR: THYSSENKRUPP INDUSTRIAL SOLUTIONS (INDIA) PRIVATE LIMITED.		**PO NO:-**PUR-PRJNUM-1004763/LOA/Fabtech
MANUFACTURER:- FABTECH PROJECTS & ENGINEERS LTD		**INSPECTION AGENCY:- TPIA**

SR. No.	INSPECTION ACTIVITY	CHARACTERISTICS TO BE CHECKED	EXTENT OF CHECK	REFERENCE DOCUMENTS	ACCEPTANCE STANDARD	RECORDING FORMAT	Extent of Inspection				REMARKS
							Vendor	TPIA / LSTK Contractor	PMC	Owner	
1	QAP	Review of H, W, R stages, Documentation	100%	Approved Drawing, MDS & PR	Approved Drawing, MDS & PR	QAP	H	R			
2	Approval of Drawing	Drawing parameters	100%	Design Data/code, PR	Design Data/code, PR	Drawing	H	R			
3	Review of WPS, WPQ along with weld map/Weld test plan	Essential variables	100%	ASME SEC. IX., Approved Drawings	ASME SEC. IX.	WPS & WPQ	H	R/W			For Old-R & New –W (Qualified under NRL Project approved TPIA)
4	welding consumable TC's	Documentation	100%	Approved Drawing. & ASME Sec. II C & Sec IX.	Approved Drawing. & ASME Sec. II C & Sec IX.	Weld map, MTC	H	R			
5	Review of all the procedures for NDE, Hydro, Pneumatic, PMI, Blasting & Painting etc.	Documented Procedure	100%	Documents Review.	Documents Review.	Docs. Review.	H	R	I		
6	Raw Material Identification for Pressure Parts including gasket & fastener	Visual, Dimension, Co-relation with MTC, Review of MTC	100 %	Approved Drawing, ASME SEC. II A,	Approved Drawing, ASME SEC. II A,	Material Ident. Report	H	H			Refer Note 3, 4, 5, 6 , 7 & 10. (3.2 for Pr. Parts & critical parts under NRL Approved TPIA)
7	Raw Material Identification for Non-Pressure Parts	Visual, Dimension; review of Chem. & Mech. properties of MTC	100 %	Approved Drawing., ASME SEC. II A	Approved Drawing., ASME SEC. II A	Mat. History Chart	H	R			(Refer Note 4, 5, 6 & 7)

17/06/2023

FABTECH — PROJECTS & ENGINEERS —	thyssenkrupp	**INSPECTION AND TEST PLAN**		NRL
		PROJECT	NUMALIGARH REFINERY EXPANSION PROJECT	

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MANUFACTURER:- FABTECH PROJECTS & ENGINEERS LTD		**INSPECTION AGENCY:- TPIA**

SR. No.	INSPECTION ACTIVITY	CHARACTERISTICS TO BE CHECKED	EXTENT OF CHECK	REFERENCE DOCUMENTS	ACCEPTANCE STANDARD	RECORDING FORMAT	Extent of Inspection				REMARKS
							Vendor	TPIA / LSTK Contractor	PMC	Owner	
8	Heat treatment (Normalizing) After forming of Dish end petal & Crown.	Review of HT chart & Review of calibration Record for Thermocouple & Temp. Recorder.	100 %	Approved Drg., & ASME Sec VIII Div. 1	Approved Drg., & ASME Sec VIII Div. 1	HT Cycle Chart	H	R			Mat. Test Coupon with simulation to be provided. (Test reports review by TPI)
9	D/E Petal - Crown Long Seam set up & Welding after pressing with PTC	Identification Stamping , Alignment, Geometry of Groove, Profile, Dimensions	100 %	Approved. Drawing& ASME Section VIII. Div.1	Approved. Drawing& ASME Section VIII. Div.1	Stage IR	H	R			
10	Back chip & PT of LS of Dish end .	Weld surface defect check	100%	Approved. Drawing& ASME Section VIII. Div.1 & ASME Section V&PT procedure	Approved. Drawing& ASME Section VIII. Div.1 & ASME Section V&PT procedure	IR	H	R			
11	NDE- Radiography of L-Seam of Dish end.	Soundness of weld	100 %	NDE Procedure, ASME Sec. V/ VIII Div. 1	NDE Procedure, ASME Sec. V/ VIII Div. 1	RT Report	P	R			RT Film review by TPI
12	Heat treatment of Boot dish ends (As applicable)	Review of HT chart & Review of calibration Record for Thermocouple & Temp. Recorder.	100 %	Approved Drg., & ASME Sec VIII Div. 1	Approved Drg., & ASME Sec VIII Div. 1	HT Cycle Chart	H	R			Mat. Test Coupon with simulation to be provided. (Test reports review by TPI)

17/06/2023
for SGS

FABTECH — PROJECTS & ENGINEERS —	thyssenkrupp	**INSPECTION AND TEST PLAN**		NRL
		PROJECT	NUMALIGARH REFINERY EXPANSION PROJECT	

TAG NO:- 1P25-VV-3034	**Equipment Name:-** HIGH PRESSURE SEPERATOR	**DOC NO:- FSHO-514-QAP-1P25-VV-3034 , Rev.01 DATE-16/06/2023**
CLIENT:- M/S NUMALIGARH REFINERY LIMITED		**DESIGN AND FABRICATION CODE:** ASME SEC. VIII DIV-1 ED 2021 **(Wet H2S Service with NACE MR 0103)**
EPC CONTRACTOR: THYSSENKRUPP INDUSTRIAL SOLUTIONS (INDIA) PRIVATE LIMITED.		**PO NO:-**PUR-PRJNUM-1004763/LOA/Fabtech
MANUFACTURER:- FABTECH PROJECTS & ENGINEERS LTD		**INSPECTION AGENCY:- TPIA**

SR. No.	INSPECTION ACTIVITY	CHARACTERISTICS TO BE CHECKED	EXTENT OF CHECK	REFERENCE DOCUMENTS	ACCEPTANCE STANDARD	RECORDING FORMAT	Extent of Inspection				REMARKS
							Vendor	TPIA / LSTK Contractor	PMC	Owner	
13	Dished End Inspection (Main Dish end & Boot Dish end)	Identification Stamping, Verification of Template, Visual Inspection; Profile, Dim, Thickness, DPT at Knuckle, SF, weld edge inspection.	100 %	Approved Drawing. & ASME Sec V & Sec VIII Div-1	Approved Drawing. & ASME Sec V & Sec VIII Div-1	D'end IR	H	W			
14	Long Seam fit up of shell / Nozzle Neck	Identification Stamping, Geometry of Groove, Dimension.	100 %	Approved Drawing	Approved Drawing. & ASME Sec VIII Div-1	Stage IR	H	RW			PTC to be attached at Shell long seam.
15	Back chip DP & welding of Long seam	Surface Defect	100 %	Approved Drawing. & NDE Procedure, ASME Sec. V/ Sec. VIII Div-1	Approved Drawing. & NDE Procedure, ASME Sec. V/ Sec. VIII Div-1	LPT Report	H	R			
16	NDE- Radiography of L-Seam of shell, nozzle neck.	Soundness of weld	100 %	NDE Procedure, ASME Sec. V/ VIII Div. 1	NDE Procedure, ASME Sec. V/ VIII Div. 1	RT Report	R	R			RT Film review by TPI
17	Cir. seam fit up & welding of shell to shell/Dish end	Identification Stamping, Geometry of Groove, DP of WEP, Alignment, Mismatch, Dimension, 'L' Seam orientation.	100 %	Approved Drg. & ASME SEC VIII Div.1	Approved Drg. & ASME SEC VIII Div.1	Stage IR	H	RW			PTC to be attached at Shell Cir. seam.

17/06/2023

FABTECH — PROJECTS & ENGINEERS —	thyssenkrupp	**INSPECTION AND TEST PLAN**	NRL
		PROJECT NUMALIGARH REFINERY EXPANSION PROJECT	

TAG NO:- 1P25-VV-3034	**Equipment Name:-** HIGH PRESSURE SEPERATOR	**DOC NO:- FSHO-514-QAP-1P25-VV-3034 , Rev.01 DATE-16/06/2023**
CLIENT:- M/S NUMALIGARH REFINERY LIMITED		**DESIGN AND FABRICATION CODE:** ASME SEC. VIII DIV-1 ED 2021 **(Wet H2S Service with NACE MR 0103)**
EPC CONTRACTOR: THYSSENKRUPP INDUSTRIAL SOLUTIONS (INDIA) PRIVATE LIMITED.		**PO NO:-**PUR-PRJNUM-1004763/LOA/Fabtech
MANUFACTURER:- FABTECH PROJECTS & ENGINEERS LTD		**INSPECTION AGENCY:- TPIA**

SR. No.	INSPECTION ACTIVITY	CHARACTERISTICS TO BE CHECKED	EXTENT OF CHECK	REFERENCE DOCUMENTS	ACCEPTANCE STANDARD	RECORDING FORMAT	Extent of Inspection				REMARKS
							Vendor	TPIA / LSTK Contractor	PMC	Owner	
18	Back chip PT & welding of 'C' seam	Surface defects	100 %	Approved Drg. & NDE Procedure, ASME Sec. V/ Sec. VIII Div-1	Approved Drg. & NDE Procedure, ASME Sec. V/ Sec. VIII Div-1	LPT Report	H	R			
19	NDE- Radiography of C-Seam after Back chip welding	Soundness of weld	100 %	NDE Procedure, ASME Sec. V/ VIII Div. 1	NDE Procedure, ASME Sec. V/ VIII Div. 1	RT Report	H	R			RT Film review by TPI
20	Nozzle neck to flange, pipe to pipe, pipe to fitting fit up & welding	Identification Stamping, Mismatch, PT of Bevel Edge, Geometry of Groove, Dimension etc.	100 %	Approved Drawing. & ASME Sec. VIII Div. 1	Approved Drawing. & ASME Sec. VIII Div. 1	Stage IR	H	R			
21	Back chip & PT of Neck to Flange , pipe to pipe, pipe to fitting seam if accessible from second side	Surface defects	100 %	Approved Drg. & ASME Sec. V/ Sec. VIII Div-1	Approved Drg. & ASME Sec. V/ Sec. VIII Div-1	LPT Report	H	R			
22	NDE- Radiography of C-Seam for nozzle to flange, pipe to pipe, pipe to fitting seam	Soundness of weld	100 %	Approved Drg., NDE Procedure, ASME Sec. V/ VIII Div. 1	Approved Drg., NDE Procedure, ASME Sec. V/ VIII Div. 1	RT Report	H	R			RT Film review by TPI
23	Nozzle marking & opening inspection	Elevation, Orientation, Size of nozzle opening.	100 %	Approved Drg. & ASME Sec VIII Div.1	Approved Drg. & ASME Sec VIII Div.1	Stage IR	H	R			

17/08/2023
For SGS

FABTECH — PROJECTS & ENGINEERS —	thyssenkrupp	**INSPECTION AND TEST PLAN**		NRL
		PROJECT	NUMALIGARH REFINERY EXPANSION PROJECT	

TAG NO:- 1P25-VV-3034	**Equipment Name:-** HIGH PRESSURE SEPERATOR	**DOC NO:- FSHO-514-QAP-1P25-VV-3034 , Rev.01 DATE-16/06/2023**
CLIENT:- M/S NUMALIGARH REFINERY LIMITED		**DESIGN AND FABRICATION CODE:** ASME SEC. VIII DIV-1 ED 2021 **(Wet H2S Service with NACE MR 0103)**
EPC CONTRACTOR: THYSSENKRUPP INDUSTRIAL SOLUTIONS (INDIA) PRIVATE LIMITED.		**PO NO:-**PUR-PRJNUM-1004763/LOA/Fabtech
MANUFACTURER:- FABTECH PROJECTS & ENGINEERS LTD		**INSPECTION AGENCY:- TPIA**

SR. No.	INSPECTION ACTIVITY	CHARACTERISTICS TO BE CHECKED	EXTENT OF CHECK	REFERENCE DOCUMENTS	ACCEPTANCE STANDARD	RECORDING FORMAT	Extent of Inspection				REMARKS
							Vendor	TPIA / LSTK Contractor	PMC	Owner	
24	Nozzle to shell / dish ends fit up & welding	Geometry of groove, DP of Tack weld & Bevel Edge, Orientation, location (Elevation)	100 %	Approved Drg. & ASME Sec VIII Div.1	Approved Drg. & ASME Sec VIII Div.1	Stage IR	H	RW			
25	Root Run & Final Run Weld of nozzle to shell / Dish end	Surface defects	100 %	Approved Drg. & ASME Sec. V/ Sec.VIII Div-1	Approved Drg. & ASME Sec. V/ Sec.VIII Div-1	LPT Report	H	R			
26	Internal & external attachment fit up & welding if any	Visual & dimension	100 %	Approved Drg. & WPS	Approved Drg. & WPS	Stage IR	H	R			
27	PT check at internal attachment's & PT / MT of Temporary attached areas	Internal attachments of full penetration weld joints	100 %	Approved NDT procedure, ASME Sec VIII Div. 1	Approved NDT procedure, ASME Sec VIII Div. 1	PT report	H	W			UT & MT of Lifting Lugs welding
28	Saddle support assembly	Visual & dimension	100 %	Approved Drg. & ASME Sec VIII Div.1	Approved Drg. & ASME Sec VIII Div.1	Stage IR	H	R			
29	Final Visual, Dimensional Inspection of complete vessel & Completeness check & closure of NCR if any	orientation, dimensional checking of various external as well as internal attachment	100 %	Approved Drg. & ASME Sec VIII Div.1	Approved Drg. & ASME Sec VIII Div.1	Visual & Dim. Report	H	W			
30	PWHT of complete vessel With PTC	Review of SR chart	100 %	Approved Drg, ASME Sec VIII Div-1, HT Procedure	Approved Drg, ASME Sec VIII Div-1, HT Procedure	HT Chart	H	R			Testing of PTC Review for TPI.

17/06/2023

FABTECH — PROJECTS & ENGINEERS —	thyssenkrupp	**INSPECTION AND TEST PLAN**		NRL
		PROJECT	NUMALIGARH REFINERY EXPANSION PROJECT	

TAG NO:- 1P25-VV-3034	**Equipment Name:-** HIGH PRESSURE SEPERATOR	**DOC NO:- FSHO-514-QAP-1P25-VV-3034 , Rev.01 DATE-16/06/2023**
CLIENT:- M/S NUMALIGARH REFINERY LIMITED		**DESIGN AND FABRICATION CODE:** ASME SEC. VIII DIV-1 ED 2021 **(Wet H2S Service with NACE MR 0103)**
EPC CONTRACTOR: THYSSENKRUPP INDUSTRIAL SOLUTIONS (INDIA) PRIVATE LIMITED.		**PO NO:-**PUR-PRJNUM-1004763/LOA/Fabtech
MANUFACTURER:- FABTECH PROJECTS & ENGINEERS LTD		**INSPECTION AGENCY:- TPIA**

SR. No.	INSPECTION ACTIVITY	CHARACTERISTICS TO BE CHECKED	EXTENT OF CHECK	REFERENCE DOCUMENTS	ACCEPTANCE STANDARD	RECORDING FORMAT	Extent of Inspection				REMARKS
							Vendor	TPIA / LSTK Contractor	PMC	Owner	
31	Final Visual, Dimensional Inspection of complete vessel after PWHT	orientation, dimensional checking of various external as well as internal attachment	100 %	Approved Drg. & ASME Sec VIII Div.1	Approved Drg. & ASME Sec VIII Div.1	Visual & Dim. Report	H	H			
32	PT check at Temporary attached areas	Surface defects	100 %	Approved Drg. & ASME Sec. V/ Sec.VIII Div-1	Approved Drg. & ASME Sec. V/ Sec.VIII Div-1	LPT Report	H	R			
33	Hardness Testing (After PWHT)	Verification of hardness on weld, HAZ & base metal	100 %	Approved Drg. & ASME Sec VIII Div-1	Approved Drg. & ASME Sec VIII Div-1, 185 BHN Max.	Hardness Test Report	H	R			185 BHN Max. To be tested as per Cl. 15.2 of Spec. TP-1ZZZA-IP-SPE-0001 -Gen. Spec. for welding for Pr. V & HE
34	PMI check (only for SS, Alloy steel)	Material composition & components	100 %	As per ASME sec IIA Ed 2019	As per ASME sec IIA Ed 2019	PMI Report	H	R			
35	Mandatory & Commissioning Spare Verification (As applicable)	Visual & Dimensional check	100 %	Approved drawing.	Approved drawing.	Stage Inspection Report	H	R			
36	RF Pad pneumatic test check	Leak check	100 %	Approved Drg. & ASME Sec VIII Div-1, Pneumatic Test Procedure	Approved Drg. & ASME Sec VIII Div-1, Pneumatic Test Procedure	Pneumatic test report.	H	W			

17/06/2023
For SGS

FABTECH — PROJECTS & ENGINEERS —	thyssenkrupp	**INSPECTION AND TEST PLAN**		NRL
		PROJECT	NUMALIGARH REFINERY EXPANSION PROJECT	

TAG NO:- 1P25-VV-3034	**Equipment Name:-** HIGH PRESSURE SEPERATOR	**DOC NO:- FSHO-514-QAP-1P25-VV-3034 , Rev.01 DATE-16/06/2023**
CLIENT:- M/S NUMALIGARH REFINERY LIMITED		**DESIGN AND FABRICATION CODE:** ASME SEC. VIII DIV-1 ED 2021 **(Wet H2S Service with NACE MR 0103)**
EPC CONTRACTOR: THYSSENKRUPP INDUSTRIAL SOLUTIONS (INDIA) PRIVATE LIMITED.		**PO NO:-**PUR-PRJNUM-1004763/LOA/Fabtech
MANUFACTURER:- FABTECH PROJECTS & ENGINEERS LTD		**INSPECTION AGENCY:- TPIA**

SR. No.	INSPECTION ACTIVITY	CHARACTERISTICS TO BE CHECKED	EXTENT OF CHECK	REFERENCE DOCUMENTS	ACCEPTANCE STANDARD	RECORDING FORMAT	Extent of Inspection				REMARKS
							Vendor	TPIA / LSTK Contractor	PMC	Owner	
37	Hydrostatic Test of complete Vessel	Check for Leakage, seepage, Pressure drop	100 %	Approved Drg. & ASME Sec VIII Div-1, Hydrostatic Test Procedure and water test report.	Approved Drg. & ASME Sec VIII Div-1, Hydrostatic Test Procedure and water test report.	Hydrostatic Test Report	H	W			
38	Drying & inside cleaning of equipment after Hydro test	Visual checking	100 %	Approved Drg. & Approved Procedure	Approved Drg. & Approved Procedure	Inspection Report	H	R			
39	Surface Preparation	Outside blasting	100%	Approved Drg, Aprroved procedure	Approved Drg, Aprroved procedure	Inspection Report	H	RW			
40	Painting inspection	(Protection of machined surface, Marking) DFT of finish paint,	100%	Approved Drg, Painting procedure.	Approved Drg, Painting procedure.	Inspection Report	H	W			Tests to be carried out as specified in Painting Spec.
41	Nitrogen Purging at 0.5 Kg/cm2 (As Applicable)	Pressure checked	100%	Approved Drawing	Approved Drawing	Stage IR	H	R			
42	Final stamping, Name Plate verification & Release Note	Document Review, As-Built drawing	100 %	Approved Drg. & ASME Sec VIII Div-1	Approved Drg. & ASME Sec VIII Div-1	Release Note	H	H			

17/06/2023
For SGS

FABTECH — PROJECTS & ENGINEERS —	thyssenkrupp	**INSPECTION AND TEST PLAN**		NRL
		PROJECT	NUMALIGARH REFINERY EXPANSION PROJECT	

TAG NO:- 1P25-VV-3034	**Equipment Name:-** HIGH PRESSURE SEPERATOR	**DOC NO:- FSHO-514-QAP-1P25-VV-3034 , Rev.01 DATE-16/06/2023**
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EPC CONTRACTOR: THYSSENKRUPP INDUSTRIAL SOLUTIONS (INDIA) PRIVATE LIMITED.		**PO NO:-**PUR-PRJNUM-1004763/LOA/Fabtech
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SR. No.	INSPECTION ACTIVITY	CHARACTERISTICS TO BE CHECKED	EXTENT OF CHECK	REFERENCE DOCUMENTS	ACCEPTANCE STANDARD	RECORDING FORMAT	Extent of Inspection				REMARKS
							Vendor	TPIA / LSTK Contractor	PMC	Owner	
43	Final documentation as per PR	Verification & completion of inspection & test records for submission to costumer	100 %	PR	PR	QC Dossier	H	R			R of Document & H for issuing Despatch clearance

General Notes:-

1. All bolt holes shall be straddle the main axis centre lines.
2. Peening is not permitted.
3. Vessel is under wet H2S service , the requirements of NACE MR0103 and additional requirement of NRL specification NR-OZZZZ-PI-SPE-0025 shall be complied.
4. Material Test Certificate shall reflect all requirements. -as per code for Material in delivery condition, shall report all requirements of Project Spec. for chemical restrictions, mechanical tests in simulated condition including any intermediate heat Treatments.
5. All carbon steel material shall be provided in killed condition. Carbon steel plates shall be normalized.
6. Non pressure part welded to pressure part shall be same as pressure part material.
7. Weld seams of formed ends shall be 100 % Radiographed after forming & Heat Treatment as applicable.
8. Plates and forgings over 2 inches (50 mm) thick or used for pressure containment in hydrogen service shall be Ultrasonically examined with 100% scanning in accordance with the following: (Plates shall be examined before forming in accordance with ASME SA-578-B & Forgings shall be examined in accordance with ASME SA-388 and ASME Section VIII, Division 1.)

17/06/2023

9. The gaskets included in the scope of the supply shall not be utilized for performing the test. However, the test shall be conducted with gaskets of the same type and material of the installed ones during operation for body flanges and blind nozzles. After hydrotest when a flanged assembly with a gasket is opened, the gasket must be replaced with a new service gasket prior to reassembly
10. As per NR-0ZZZZ-ME-SPE 0031, 0026, PI-SPE 0025, NACE MR 0103, Code (Material Procurement & Delivery conditions with Chemical restriction Mech. Testing, Thro' thickness test for Plates ≥ 25mm thick.
11. Project specifications and Standards

    TP-1ZZZA-ME-BOD-0001: Project specifications and Standards
    TP-1ZZZA-ME-SPE-0001: Job Specification for Supply of Pressure Equipment
    NR-0ZZZZ-ME-SPE-0026 : Specification Supplement for Carbon Steel Vessels
    NR-0ZZZZ-ME-SPE-0031 : Specification for Boiler Quality Carbon Steel Plates
    TP-1ZZZA-IP-SPE-0001: General Specification for Welding and NDE of Pressure Vessels and Heat Exchangers
    TP-1ZZZA-PI-SPE-0003 : Specification for Painting
    NR-0ZZZZ-PI-SPE-0025: Specification for Material Requirements for Carbon Steel Components used in Sour Service in Petroleum Refinery Environments
    NR-0ZZZZ-PI-SPE-0032: Specification for Positive Material Identification
    TK-1P25A-ME-RFP-0038_Purchase requisition for PFCC vessels.

17/06/2023
For SGS

FABTECH — PROJECTS & ENGINEERS —	DOCUMENT TITLE : COMMENT RESOLUTION SHEET (SHOP QAP)	DATE-16/06/2023
	PROJECT TITLE: NRL	

CLICENT: ThyssenKrupp Industrial Solutions (India) Private Limited.

DOCUMENT NO:- **FSHO 514-QAP-1P25-VV-3034, Rev.01 , DATE-16/06/2023**

SL. NO.	COMMENT FROM CLIENT	RESPONSE FROM FABTECH PROJECTS & ENGINEERS LTD.	REMARK
1	All Testing Procedures, Welding Doc.(WPS / PQR) duly Reviewed by TPIA to be forwarded to tkIS for Information.	Noted.	
2	Include Project Spec.	Noted & Incorporated In Revised QAP	
3	Non Pr. Part welded to Pr. Part shall be same as Pr. Part Material	Noted & Incorporated In Revised QAP	
4	Material Procurement as per Project Spec, & applicable Codes, All Requirements of material also meet as per Axens IN-042.0-EN - for Chemical, Mechanical tests including heat treatments simulating those anticipated along the fabrication that is PFHT, Intermediate HT if any, , "Z'" quality for Plates-Through thickness ductility as per ASTM A 770, NDE etc. to be met	Noted & Incorporated In Revised QAP	
5	As per NR-0ZZZZ-ME-SPE 0031, 0026, PI-SPE 0025, NACE MR 0103, Code (Material Procurement & Delivery conditions with Chemical restriction, Mech. Testing, Thro' thickness test for Plates ≥ 25mm thick.	Noted & Incorporated In Revised QAP	
6	All raw material for pressure and critical part shall be sourced with EN 10204 3.2 certificate. as per # 3.2.4 of PURCHASE REQUISITION FOR PFCC Vessels - Doc. No. TK-1P25A-ME-RFP-0038	Noted & Incorporated in revised QAP	
5	Review of all Procedures - NDE with summary & Vessel sketch with seam Nos., Hydro, PMI, Blasting & Painting, etc. - R for TPIA	Noted & Incorporated In Revised QAP	

6	PT of Knuckle / SF / WEP, 100% RT of seams	Noted & Incorporated In Revised QAP	
7	Testing of Mat. Test Coupon of Main & Boot DE - R for TPIA	Noted & Incorporated In Revised QAP	
8	NDT of Lifting Lug - PT / MT PT of Temp. attachment areas R by TPIA	Noted & Incorporated In Revised QAP	
9	Include Nozzle RF pad Pneumatic Test before & after PWHT (if PWHT is applicable)	Noted & Incorporated In Revised QAP	
10	Include NDE including for Lifting Lugs , Visual, Dimension after PWHT - if applicable - W by TPIA	Noted & Incorporated In Revised QAP	
11	Hydro Test of Thermowell Pipe if open end of pipe is plugged.	Not Applicable	
12	The gaskets included in the scope of the supply shall not be utilized for performing the test. However, the test shall be conducted with gaskets of the same type and material of the installed ones during operation for body flanges and blind nozzles. After hydro test when a flanged assembly with a gasket is opened, the gasket must be replaced with a new service gasket prior to reassembly	Noted & Incorporated In Revised QAP	
13	While painting Protection of machined surface, Marking, etc.	Noted & Incorporated In Revised QAP	
14	Verification of Name Plate as per Drawing	Noted & Incorporated In Revised QAP	

FABTECH PROJECTS & ENGINEERS LTD
QC MANAGER

General Notes:

01. ALL DIMENSION SHOWN ARE IN MM UNLESS OTHERWISE NOTED .
02. ALL WELDS SHALL BE CONTINUOUS EXCEPT AS NOTED.
03. ALL BOLT HOLE TO STRADDLE THE NORTH / SOUTH AND VERTICAL CENTER LINES.
04. a) FOR NOZZLES ON SHELL PROJECTIONS ARE REFERRED TO FROM TRUE HORIZONTAL LINE TO FLANGE CONTACT FACE.
b) FOR NOZZLES ON HEAD PROJECTIONS ARE REFERRED TO FROM HEAD T.L. TO FLANGE CONTACT FACE.(AND SHALL BE PERPENDICULAR TO TRUE HORIZ C.L.)
05. UNLESS OTHERWISE SPECIFIED, NOZZLE GASKET SURFACE SHALL BE SERRATED CONCENTRIC OR SERRATED SPIRAL FINISH HAVING A RESULTANT SURFACE FINISH 3.2 TO 6.3 MICRON AVERAGE ROUGHNESS.
06. GASKET MATERIAL : SPIRAL WOUND (4.5t) ANSI 16.20, FILLER : FLEXIBLE GRAPHITE , WINDING: 316 SS, INNER RING : 316 SS, OUTER RING : CS
07. ALL REMOVABLE INTERNAL SHALL PASS THROUGH MANHOLE ID OF 580 MM.
08. THI[redacted] SHALL BE VERIFIED FOR STEAMOUT CONDITION OF 0.5 Kg/cm² (a) (VACUUM) AND 0.5 Kg/cm² g AT 170°C.
09. ALL LEVEL GUAGE NOZZLES TOLERANCE : ±2.0MM.
10. SPARE PART LIST :

	MANDATORY SPARE	COMMISSIONING SPARE
GASKET FOR NOZZLE	2 SET FOR EACH INSTALLED GASKET	2 SET FOR EACH INSTALLED GASKET
BOLTS & NUTS FOR NOZZLE	20% (MIN.[redacted]	[redacted] MIN [redacted]
GASKET FOR INTERNALS	2 SET FOR EACH INSTALLED GASKET	
BOLTS & NUTS FOR INTERNALS	20% (MIN.[redacted]	

11. PAINTING SCHEME :

NO	PART NAME TO BE PAINTING	OPERATING TEMP, °C	INSUL.	FIRE PROOF	SURFACE PREPARATION	COATING SYSTEM	PAINT SECTION	PAINT TYPE	PAINT NAME	PAINT COLOR	Cumulative D.F.T.	PAINT COATS	TOTAL D.F.T.
1.2	FOR SADDLE ONLY	[redacted]	YES	YES SADDLE	[redacted]	[redacted]	PRIMER	[redacted]					[redacted]
							FINISH	[redacted]					

NO	PART NAME TO BE PAINTING	OPERATING TEMP, °C	SURFACE PREPARATION	COATING SYSTEM	PAINT SECTION	PAINT TYPE	PAINT NAME	PAINT COLOR	MIN D.F.T.	PAINT COATS	TOTAL D.F.T.
2.1.1	FOR COMPLETE VESSEL	[redacted]	[redacted]	[redacted]	PRIMER	[redacted]					[redacted]
					INTER.						
					FINISH					1	

2

Second coat will apply after pressure water wash and surface rubbing

12. A) PWHT CYCLE : FOR COMPLETE VESSEL WITH SUPPORT.

DESCRIPTION	FULL EQUIPMENT
LOADING TEMP. °C (MAX.)	300
RATE OF HEATING °C/HR.(MAX.)	75
SOAKING TEMP. °C	621 - 648
SOAKING PERIOD (MIN.)	2 Hr 10 Minutes
RATE OF COOLING °C/HR.(MAX.)	75
METHOD OF COOLING	IN FURNACE
UNLOADING TEMP. °C (MAX.)	300

DURING PWHT ALL MACHINED SURFACE SHALL BE PROTECTED AGAINST SCALING AND FLANGE FACES SHALL BE SUITABLY PROTECTED AGAINST OXIDATION.
B) NORMALIZING CYCLE FOR MAIN DISH ENDS & BOOT DISH ENDS:
LOADING TEMP. : 300 °C (MAX.)
HEATING RATE ABOVE 300°C : 150°C/HR.(MAX.)
SOAKING TEMP. : 910±10 °C
SOAKING TIME : 1 MIN PER MM
COOLING IN STILL AIR
13. UNLESS OTHERWISE SPECIFIED, TOLERANCE FOR PRESSURE VESSEL SHALL BE IN ACCORDANCE WITH APPLICABLE PROJECT SPECIFICATION STC-0490-0009
14. A. CHLORIDE CONTENT IN WATER USED FOR HYDRO TEST SHALL BE LESS THAN 100 PPM FOR CARBON STEEL EQUIPMENT & LESS THAN 25 PPM FOR STAINLESS STEEL EQUIPMENT.
B. THE VESSEL SHALL BE FREE OF DEBRIES, DIRT & FOREIGN MATTER AND AFTER HYDROTEST THE EQUIPMENT SHALL BE DRIED THOROUGHLY & CLEANED FROM INSIDE WHEREVER ACCESSIBLE & FROM OUTSIDE.
[redacted]
15. LOW STRESS STAMPING TO BE FOLLOWED ON PRESSURE PARTS.
16. CORROSION ALLOWANCE SHALL BE AS FOLLOW:
A. MAIN BODY: 3mm / BOOT: 6mm
B. SUPPORT: 0
C. WELDED INTERNALS: 6mm (Total)
17. ALL WELDS ACCESSIBLE FROM SECOND SIDE SHALL BE BACK CHIPPED / GAUGED BACK TO SOUND METAL BEFORE WELDING FROM SECOND SIDE. WELDS NOT ACCESSIBLE FROM SECOND SIDE SHALL HAVE ROOT RUN DONE BY TIG WELDING WITH ARGON PURGING.
18. ALL WELDS SHALL BE FULL PENETRATION WELDS, INCLUDING THE WELD BETWEEN INTERNAL RINGS, BAFFLES, PASS PARTITION PLATES AND SHELL. THERE SHALL BE NO CREVICE AND ENCLOSED FREE SPACE.
19. I.D. OF WELD NECK FLANGES SHALL MATCH WITH CORRESPONDING I.D. OF NOZZLE PIPE / SHELL.
20. ALL NDE SHALL BE AS PER APPROVED NDE PROCEDURE.
21. LIFTING ACCESSORIES AS TAILING LUGS, TRUNNIONS AND LIFTING LUGS SHALL BE DESIGNED TO WITHSTAND THE EQUIPMENT LIFTING WEIGHT CONSIDERING AN IMPACT FACTOR OF 2.
22. OUT OF ROUNDNESS SHALL BE AS PER UG80 & UG81 OF ASME SEC VIII DIV 1.
23. ALL MATERIAL USED IN THE VESSEL(S) SHALL BE NEW.
24. PLATES, 1/2 IN.[12.5 MM] AND OVER AND LESS THAN 50 MM IN THICKNESS SHALL BE SUBJECTED TO ULTRASONIC TEST AS PER SA/A435 OR A578 LEVEL B.
25. ORDERED THICKNESS IS THE MINIMUM THICKNESS, THERE IS NO NEGATIVE TOLERANCE, ONLY +VE TOLERANCE.
26. ALL NOZZLES AND MANWAYS, EXCEPT NOZZLES WITH ATTACHED INTERNAL PIPING, SHALL BE SET FLUSH WITH THE INSIDE OF THE VESSEL. THE INSIDE CORNER OF NOZZLE AND MANWAY NECKS SHALL BE ROUNDED TO ELIMINATE ALL SHARP CORNERS.
27. ALL BOLTS / STUDS FOR STANDARD & NON-STANDARD FLANGES SHALL HAVE UNC STANDARD THREAD UP TO 1" AND LARGER SIZES SHALL HAVE UN THREADING (8-THREAD SERIES) AS PER ASME B1.1 UNLESS OTHERWISE SPECIFIED.
28. STUDS SHALL EXTEND BEYOND NUTS AT LEAST BY 2 THREADS & STUDS SHALL BE THREADED TO FULL LENGTH.
29. STUD BOLTS SHALL BE PROVIDED WITH TWO HEAVY SERIES HEXAGONAL NUTS.
30. ALL MAIN WELD SEAMS SHALL BE CLEAR OF NOZZLES, REINFORCEMENT PADS, INTERNALS, TRAY SUPPORT RINGS, CLEATS AND STIFFENING RINGS BY HIGHER OF TWO TIMES SHELL THICKNESS OR 50 MM (WELD EDGE TO WELD EDGE). IN CASE THE SAME IS UNAVOIDABLE FOLLOWING REQUIREMENT SHALL APPLY:
A) NOZZLES WITHOUT REINFORCING PAD
ANY WELD SEAM HAVING DISTANCE (WELD EDGE TO WELD EDGE) TO NOZZLE WITHIN 50MM (BUT NOT FOULING WITH WELD SEAM) SHALL BE FULLY RADIOGRAPHED AND DYE PENETRANT EXAMINED TO A LENGTH EQUAL TO 100MM ON EACH SIDE MEASURED FROM NEAREST POINT TO NOZZLE EDGE.
ANY WELD SEAM FOULING WITH NOZZLE OPENING SHALL BE FULLY RADIOGRAPHED AND DYE PENETRANT EXAMINED TO A LENGTH EQUAL TO 3 TIMES OF OUTSIDE DIAMETER OF NOZZLE I.E. 1.5 TIMES OF OUTSIDE DIAMETER OF NOZZLE ON EACH SIDE AFTER INSTALLATION OF NOZZLES. NOZZLE TO VESSEL FILLET WELD SHALL BE PROVIDED WITH SMOOTH CONCAVE RADIUS.
B) IN CASE OF OTHER ATTACHMENTS LIKE INTERNALS, SUPPORT RINGS, CLEATS ETC. IS FOULING WITH WELD SEAM, THE WELD SEAM PORTION COMING UNDER THE ATTACHMENT PLUS 100 MM LENGTH ON EACH SIDE SHALL BE GROUND FLUSH, FULLY RADIOGRAPHED AND DYE PENETRANT EXAMINED BEFORE WELDING OF ANY SUCH ATTACHMENT.
31. ALL NOZZLES FABRICATED FROM PLATE, IRRESPECTIVE OF THICKNESS OF PLATE, SHALL BE 100% RADIO GRAPHED.
32. ALL NOZZLE TO SHELL WELDS (ROOT AND FINAL RUN) SHALL BE EXAMINED BY MAGNETIC PARTICLE/ DYE PENETRANT EXAMINATION
33. ALL COMPLETED EQUIPMENT SHALL BE CLEANED INTERNALLY AND EXTERNALLY TO REMOVE SCALE, DIRT, SAND, WATER AND FOREIGN MATTER.
34. CENTER OF GRAVITY IN THE SHOP FABRICATED CONDITION SHALL BE MARKED CLEARLY ON OPPOSITE SIDES OF THE VESSEL.
35. THE NOZZLE FLANGES UP TO 24" NPS SHALL CONFIRM TO ASME B16.5 FLANGES ABOVE 24" NPS SHALL BEAS PER ASME B16.47 SERIES A.
36. ALL ATTACHMENTS WELDED TO VESSEL SHALL BE OF SAME MATERIAL AND GRADE OF THE SECTION TO WHICH IT IS ATTACHED AND TO BE SUPPLIED BY THE VESSEL VENDOR.
37. ALL CARBON STEEL MATERIAL SHALL BE KILLED QUALITY.
38. [redacted]S UNDER WET H2S SERVICE. THE REQUIREMENT OF NACE MR0103 AND AN ADDITIONAL REQUIREMENTS OF NRL SPECIFICATION NR-0ZZZZ-PI-SPE-0025 SHALL BE COMPLIED.
39. CARBON CONTENT FOR CS PLATES SHALL NOT EXCEED 0.18%, ADDITIONALLY, ONE OF THE FOLLOWING REQUIREMENTS FOR CARBON EQUIVALENT BASED ON HEAT ANALYSIS SHALL ALSO BE SATISFIED : CARBON EQUIVALENT CE = C + MN/6 + (CR + MO + V)/5 + (NI + CU)/15 SHALL BE < = 0.43 FOR PLATES WITH THICKNESS < 25mm & < = 0.45 FOR PLATES WITH THICKNESS > = 25mm. OTHER CHEMICAL COMPOSITION RESTRICTIONS AS PER NRL SPECIFICATION NR-0ZZZZ-PI-SPE-0025 SHALL BE COMPLIED.
40. HARDNESS OF WELD METAL & HAZ AFTER PWHT SHALL BE < = 185 BHN
[redacted]

[redacted]

Fabricated nozzle neck	1	100%	As per Approved Inspection and Testing Plan Document ID: –
Dish Ends	1	100%	
Shell	1	100%	

Part	Joint eff.	Radiography %	Ultra-sonic %	Magnetic particle %	Dye pe-netrant %	Tests specimens	Others

Tests (Test reports incl. appraisals are required in all cases)

[redacted]

Nozzle/Flange	Bolt Size	BOLT TIGHTENING LOAD
[redacted]	[redacted]	[redacted]

Bolts tightening moments(As Per ASME PCC Ed. 2019)

Part	Materials	Remarks
Shell	SA-516 GR. 60N	
Heads	SA-516 GR. 60N	
Shell Flange	–	
Supports	[redacted]	
Exernals Direct Welded	SA-516 GR. 60N	
Nozzle pipes	SA-106 GR. B	
Nozzle Flange	SA-105	
Internals Welded	SA-516 GR. 60N	
Internals Removable	SA-516 GR. 60N	
Bolts/ Nuts Inside	–	
Bolts/ Nuts Outside	SA 193 Gr. B7M / SA 194 Gr. 2HM	
Gaskets Inside	–	
Gaskets Outside	Spiral Wound gaskets	
Gaskets Shell flange	–	
Davit	IS-2062 Gr. E250B	
Name Plate Brackets	[redacted]	
Lifting Lugs / Trunnions	[redacted]	
Anchor Bolts	IS 2062 : E650 BR OR A 193 GR. B7	(BY OTHER)
[redacted]		

Project Engineering Specifications & Standards

Description	Document ID
Engineering Design Basis for Static Equipment	TP-1ZZZA-ME-BOD-0001
Site Specific Seismic Spectra	TP-1ZZZA-CV-BOD-0002
Job Specification for Supply of Pressure Equipment	TP-1ZZZA-ME-SPE-0001
General Specification for Welding and NDE for Pressure Vessels and Heat Exchangers	TP-1ZZZA-IP-SPE-0001
Job Specification for Painting	TP-1ZZZA-PI-SPE-0003
Specification for Identification of Piping and Equipment	NR-0ZZZZ-CV-SPE-0021
Spare Parts, Special Tools and Consumable philosophy	TP-1ZZZA-PQ-PRC-0005
Standard Construction Drawings for Pressure Equipment	TP-1ZZZA-ME-STD-0001
Specification For CS Components Used in Sour Service in Petroleum Refinery	NR-0ZZZZ-PI-SPE-0025
Packing Marking and Shipping Specification	TP-1ZZZA-PQ-SPE-0003
Specification Supplement for Carbon Steel Vessels	NR-0ZZZZ-ME-SPE-0026
Specification for Boiler Quality Carbon Steel Plates	NR-0ZZZZ-ME-SPE-0031
Vendor/Contractor Documentation Procedure	TK-1ZZZA-DC-PCP-0001
Project Data and Information Handover Specification	NR-0ZZZZ-IF-SPE-0001
Technical Document Numbering Specification	NR-0ZZZZ-GE-SPE-0001
Specification for Identification of Piping & Equipment	NR-0ZZZ-CV-SPE-0021
Standard ITP For Site Fabricated Equipment	–

Spares

Mandatory spare parts	Gaskets : 200% (2 sets of each installed gasket) Bolts : 20%(min.2)(for each gasketed joint)
Commissioning spare parts	Gaskets : 200% (2 sets of each installed gasket) Bolts : 20%(min.2)(for each gasketed joint)

thyssenkrupp Industrial Solutions

Acceptance Code **1**

APPROVED

(WITH MINOR COMMENT)

This approval does not release the vendor / supplier from full responsibility for his design and fabrication.

Date: *May 4, 2023*

Name: *Mamle, Vaibhav* HAS

Rev.	Date	Reason for Issue	Prepared	Checked	Approved	Owner Approved
01	11/04/2023	REVISED AS PER COMMENTS	S.V.P.	L.B.W.	VITTHAL N.	D.P.THORAT
00	25/02/2023	ISSUED FOR APPROVAL	Y.V.J.	L.B.W.	VITTHAL N.	D.P.THORAT

Document belonging to drawing

tkIS India / Vendor

Category Codes (Submission purpose)
- ☐ 1 For Approval
- ☐ 2 For Review / Comments
- ☐ 3 For Information
- ☐ 4 For Engineering
- ☐ 5 For Enquiry
- ☐ 6 For Order Placement
- ☐ 7 Final & Approved
- ☐ 8 Released for Construction

tkIS India / Vendor

Acceptance Codes (Approval Codes)
- ☐ 1 Approved
- ☐ 2 Approved for Manufacturing/ Fabrication With Comments as Marked
- ☐ 3 Not Approved/Resubmit
- ☐ 4 Retained for Information/Records
- ☐ 5 Reviewed
- ☐ 6 Reviewed as Noted/Resubmit

Date : __ /__ /____ Name : _____

MGF. BY
FABTECH PROJECTS & ENGINEERS

FABTECH PROJECTS & ENGINEERS LTD.
CORPORATE OFFICE:- LEVEL-7, M-AGILE, NEAR PAN CARD CLUB ROAD, BANER, PUNE - 411045

thyssenkrupp

NRL's PO No.:	4500025832-/22.12.2022
Vendor's PO No.:	–
Vendor's Document No.:	FSHO-514-DR-1P25-VV-3034-001

Contract No. [redacted]733	Document ID TK-1P25-VV-3034-0001-001	Part –
Store Location: Server/Share –	BAR-Code	
Store Location: Folder –		
Store Name –		

Pro. Unit	Con. Unit	ITEM No.	Group	Order No.	Cat. Code	Acc. Code	Status
–	–	[redacted]	–	–	–	–	01

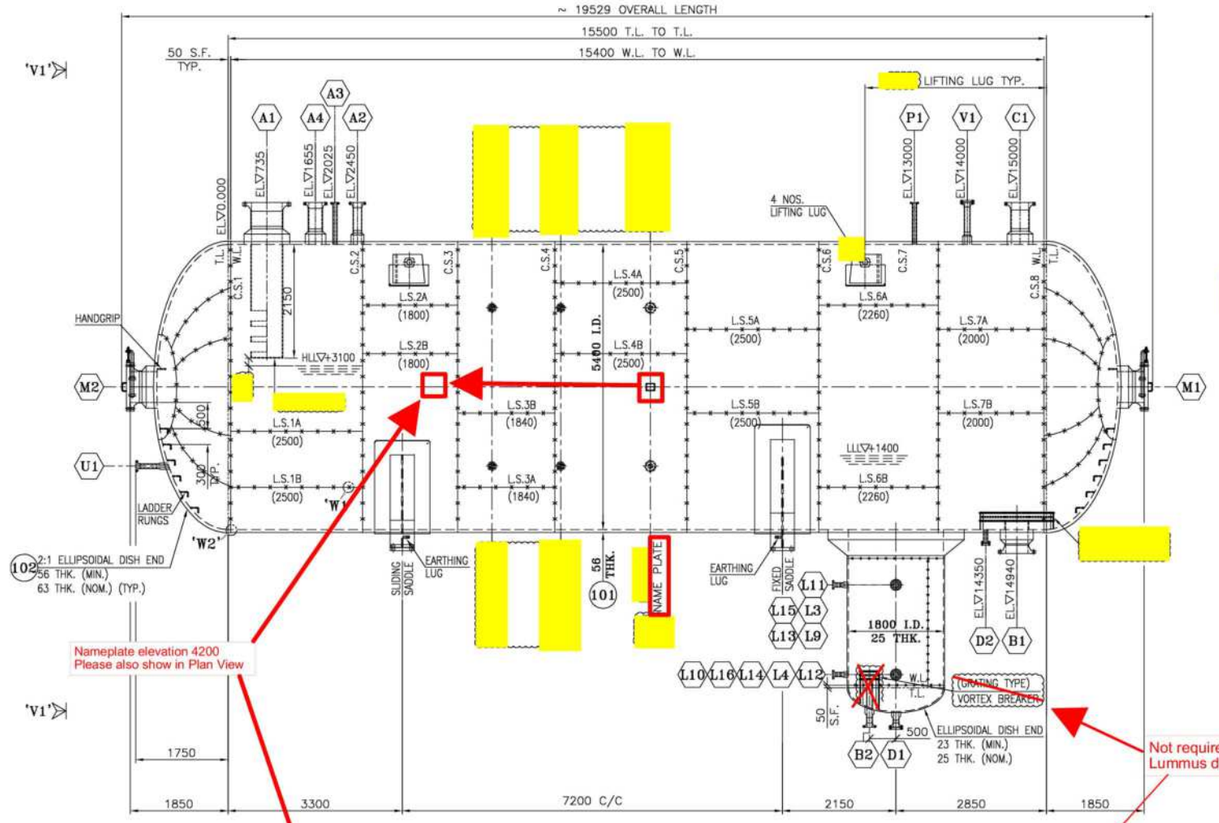
NRL NUMALIGARH REFINERY LIMITED

PROJECT:
UNIT/FACILITY: [redacted]

DRAWING TITLE : GENERAL ARRANGEMENT DRAWING FOR SYSTEM DESCRIPTION : HIGH PRESSURE SEPARATOR (1P25-VV-3034)

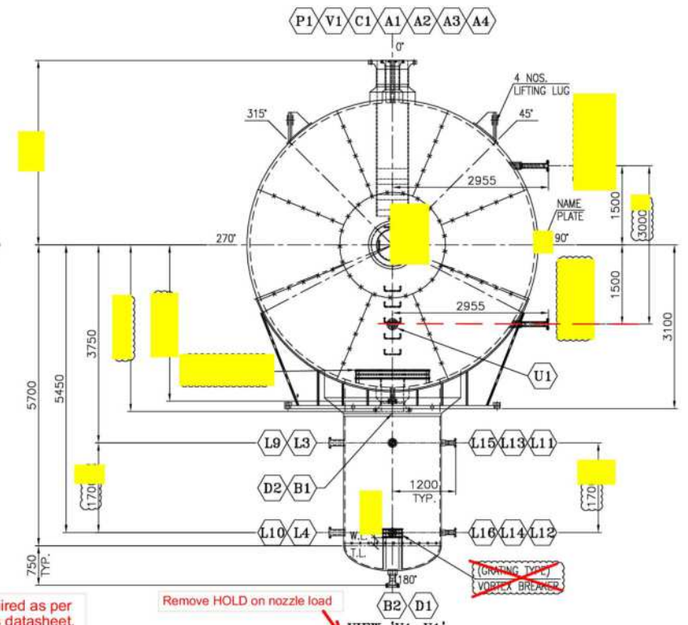
Scale: 1:1 Drg.Size: A1

Originator/ Contractor	Asset Code	Disc	RFP No.	Drawing Type	Sequence Number	Rev.	Sheet
TK	1P25A	ME	0038	GAS	0005	01	1 OF 1



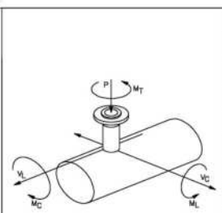
Nameplate elevation 4200
Please also show in Plan View

Not required as per Lummus datasheet.



Remove HOLD on nozzle load

VIEW 'V1–V1'



Nozzle	NPS	V_L	P	V_C	M_C	M_T	M_L
		Forces [kN]			Moments [kN-m]		
U1 (TBD)	3"						
C1	14"	19.6	19.6	14.7	13.7	20.6	17.8
	4"						
B1	18"	25.2	25.2				29.5
A4	10"	15.1	15.1	11.3	8.1	12.1	10.5
A3	2"	3.3	3.3	2.5	0.4	0.6	0.5
A2	6"	9.3	9.3	7.0	3.1	4.6	4.0
A1	24"	33.6			60.5	52.4	

Max. allowable nozzle loads

Design codes: ASME Sec. VIII Div. 1, Edition 2021

Pressure chamber		SHELL	Inspection by:	TPIA	
Design pressure (INT/EXT)	kg/cm²(g)	21.0 / Note–a	Supervision of manuf. by:	FPEL	
Design temperature (INT/EXT)	°C	70 / Note–a	Shipping weight:	184000	kg
Corrosion allowance (INT.)	mm	Shell: 3/Boot: 6	Empty weight:	206000	kg
Other additional allowances	mm	0	Operating weight:	449000	kg
Joint efficiency (SHELL / HEAD)		1.0 / 1.0	Weight at retest:	603000	kg
Radiography (RT1/RT2/RT3/RT4)		RT 1	Mfr's Serial No.:	FSHO–500	
Material		C.S.	Year of manufacture:	2023	
Initial test pressure at top with water/~~air~~ Position: Horizontal (Shop)	kg/cm²(g)	31.477	Wind shear:		N
			Wind moment:		N–m
Operating pressure	kg/cm²(g)	17.28	Seismic shear:		N
Operating temperature	°C	40	Seismic moment:		N–m
Retest pressure at top with water/~~air~~ Position: Horizontal (Site)	kg/cm²(g)		MDMT:	5	°C
			Insulation Thickness:	–	mm
Process fluid		–	Insulation type:	–	
Density	kg/m³	607.2	Fireproofing:	Yes/50	mm
H_2 partial pressure	kg/cm² abs.	N.A.	PWHT (Stress Relieving) : YES		
H_2S partial pressure	kg/cm² abs.	N.A.	Leakage Class: N.A.		
Nominal volume	m³	397.0	Classification Group: 3		
MAWP	kg/cm²(g)	22.06 (LIMITED BY BOOT DISH END)			
MAP	kg/cm²(g)	24.63 (56 THK. MAIN SHELL)	IBR Service : No		
Toxic/Lethal service	(Yes/No)	Yes / No	Wind Design: IS 875 (Part 3) 2015 + Amend 1, K1:1.08, K2: K4: 1		
Flammable service	(Yes/No)	Yes			
H2 service	(Yes/No)	No	Seismic Design:–IS 1893 (Part 4) : 2015+Amend 1 & 2 + site spectra		
H2S service	(Yes/No)	Yes			
Cyclic service	(Yes/No)	No			
Wet H2S Service	(Yes/No)	NACE MR			
Impact testing	(Yes/No)	Yes for plate above 50 thk. AT 0 Deg C			

Notes:
a) Steamout conditions: Temperature 170 °C & Pressure: 0.5 kg/cm^2(a) & Half Vacuum

Note: a) VORTEX BREAKER TO BE CONSTRUCTED FOLLOWING LUMMUS STANDARD DRAWING T–3.9A.

NOZZLE SYMBOL	DESCRIPTION	QTY.	NPS IN	CLASS	ASME	FLANGE TYPE	FLANGE FACING	PIPE SCHEDULE	REINFORCING PLATE	PROJECTION	REMARKS
V1	VENT	1	4	300	B16.5	WN	RF	SCH.120	SRN		WITH B/F
U1	UTILITY CONNECTION	1	3	600	B16.5	WN	RF	SCH.160	SRN	SEE DWG	–
P1	PRESSURE GAUGE	1	2	300	B16.5	LWN	RF	16.6 THK	–		–
M1,M2	MANHOLE	2	24	300	B16.5	WN	RF	14 THK	SRN	SEE DWG	B/F+DAVIT
L11–L16	LEVEL ALARM (INTERFACE)	6	2	300	B16.5	LWN	RF	16.6 THK	SRN	SEE DWG	–
L9,L10	LEVEL CONTROLLER (INTERFACE)	2	2	300	B16.5	LWN	RF	16.6 THK	SRN	SEE DWG	–
L7,L8	LEVEL CONTROLLER	2	2	300	B16.5	LWN	RF	16.6 THK	–	SEE DWG	–
L5,L6	LEVEL INDICATOR	2	2	300	B16.5	LWN	RF	16.6 THK	–	SEE DWG	–
L3,L4	LEVEL GUAGE (INTERFACE)	2	3	300	B16.5	LWN	RF	20.4 THK	–	SEE DWG	–
L1,L2	LEVEL STANDPIPE	2	3	300	B16.5	WN	RF	SCH.160	SRN	SEE DWG	–
D2	DRAIN	1	2		B16.5	LWN	RF	16.6 THK	–		WITH B/F
D1	DRAIN	1	4	300	B16.5	WN	RF	SCH.120	SRN	SEE DWG	WITH B/F
C1		1	14	300	B16.5	WN	RF	14 THK	SRN		–
B2		1	4	300	B16.5	WN	RF	SCH.120	SRN	SEE DWG	
B1		1	18	300	B16.5	WN	RF	16 THK	SRN	3155	Note a
A4		1	10	300	B16.5	WN	RF	SCH.60	SRN		–
A3		1	2	600	B16.5	LWN	RF	16.6 THK	–		–
A2		1	6	300	B16.5	WN	RF	SCH.80	SRN		–
A1		1	24	300	B16.5	WN	RF	14 THK	SRN		–

Nozzle table

TOTAL WEIGHT IN KG 151553.0

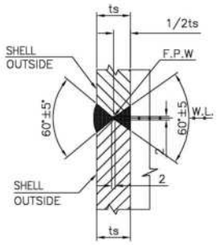
ITEM NO.	DESCRIPTION	QTY	MATERIAL	SIZE	WEIGHT	REMARKS
102	ELLIPSOIDAL DISH END	2	SA–516 Gr.60N	BLANK ⌀6755 x 63 THK.(NOM.)	35450	56 THK (MIN.)
101	SHELL	1	SA–516 Gr.60N	Circ. 17147 x 15400 x 56 THK.	116103	–

BILL OF MATERIAL

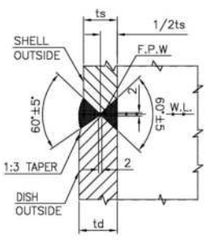
HOLD POINTS:–
1. ~~YV&D & SLIDING SADDLE ELEVATION~~
2. ~~BOOT ELEVATION~~
3. PLATFORM, LADDER & PIPE CLEAT
4. ~~LONG SEAM ORIENTATION~~
5. ~~MANHOLE DAVIT OPENING DIRECTION~~
6. ~~NOZZLE 'V1' SOC~~
7. ~~NOZZLE ORIENTATION OF L15,L16~~

Check tkIS reply to HOLD points sent in email dated 25-04-2023

thyssenkrupp Industrial Solutions
Acceptance Code **2**
APPROVED AS NOTED / RELEASE FOR CONSTRUCTION
This approval does not release the vendor / supplier from full responsibility for his design and fabrication.
Date: May 3, 2023
Name: Mamle, Vaibhav HAS



WELD DETAIL 'W1'



WELD DETAIL 'W2'

TKIS DOCUMENT ID.	NRL DOCUMENT ID.	FABTECH DOCUMENT I.D.	DESCRIPTION
TK–1P25–W–3034–0001–006	TK–1P25A–ME–0038–DTL–0012	FSHO–514–DR–1P25–W–3034–005	NAME PLATE DETAIL DRAWING FOR HIGH PRESSURE SEPARATOR
TK–1P25–W–3034–0001–005	TK–1P25A–ME–0038–DTL–0011	FSHO–514–DR–1P25–W–3034–004	NOZZEL & MANHOLE DETAILS DETAIL DRAWING FOR HIGH PRESSURE SEPARATOR
TK–1P25–W–3034–0001–004	TK–1P25A–ME–0038–DTL–0010	FSHO–514–DR–1P25–W–3034–003	NOZZEL & MANHOLE DETAILS DETAIL DRAWING FOR HIGH PRESSURE SEPARATOR
TK–1P25–W–3034–0001–003	TK–1P25A–ME–0038–CAL–0005	FSHO–514–DC–1P25–W–3034–001	MECHANICAL DESIGN CALCULATION FOR HIGH PRESSURE SEPARATOR
TK–1P25–W–3034–0001–002	TK–1P25A–ME–0038–GAS–0006	FSHO–514–DR–1P25–W–3034–002	GENERAL ARRANGEMENT DRAWING FOR HIGH PRESSURE SEPARATOR
TK–1P25–W–3034–0001–001	TK–1P25A–ME–0038–GAS–0005	FSHO–514–DR–1P25–W–3034–001	GENERAL NOTES FOR HIGH PRESSURE SEPARATO

tkIS India / Vendor

Category Codes (Submission purpose)
- ☐ 1 For Approval
- ☐ 2 For Review / Comments
- ☐ 3 For Information
- ☐ 4 For Engineering
- ☐ 5 For Enquiry
- ☐ 6 For Order Placement
- ☐ 7 Final & Approved
- ☐ 8 Released for Construction

tkIS India / Vendor

Acceptance Codes (Approval Codes)
- ☐ 1 Approved
- ☐ 2 Approved for Manufacturing/ Fabrication With Comments as Marked
- ☐ 3 Not Approved/Resubmit
- ☐ 4 Retained for Information/Records
- ☐ 5 Reviewed
- ☐ 6 Reviewed as Noted/Resubmit

Date : __ /__ /____ Name :

Contract No.	Document ID	Part
6733	TK–1P25–W–3034–0001–002	–

Store Location: Server/Share –
Store Location: Folder –
Store Name – Con. Unit ITEM No.
BAR-Code

Group	Order No.	Cat. Code	Acc. Code	Status
–	–	–	–	01

Rev.	Date	Reason for Issue	Prepared	Checked	Approved	Owner Approved
01	11/04/2023	REVISED AS PER COMMENTS	Y.V.J.	L.B.W.	VITTHAL N.	D.P.THORAT
00	25/02/2023	ISSUED FOR APPROVAL	Y.V.J.	L.B.W.	VITTHAL N.	D.P.THORAT

MGF. BY FABTECH PROJECTS & ENGINEERS
FABTECH PROJECTS & ENGINEERS LTD. CORPORATE OFFICE:- LEVEL-7, M-AGILE, NEAR PAN CARD CLUB ROAD, BANER, PUNE - 411045

thyssenkrupp

NRL's PO No.:	4500025832–/22.12.2022
Vendor's PO No.:	–
Vendor's Document No.:	FSHO–514–DR–1P25–VV–3034–002

NUMALIGARH REFINERY LIMITED

PROJECT:
UNIT/FACILITY:

DRAWING TITLE : GENERAL ARRANGEMENT DRAWING FOR SYSTEM DESCRIPTION : HIGH PRESSURE SEPARATOR (1P25–VV–3034)

Scale: 1:58
Drg.Size: A1

Originator/ Contractor	Asset Code	Disc	RFP No.	Drawing Type	Sequence Number	Rev.	Sheet
TK	1P25A	ME	0038	GAS	0006	01	1 OF 1

`TECHNICAL DOCUMENTATION FRONT SHEET

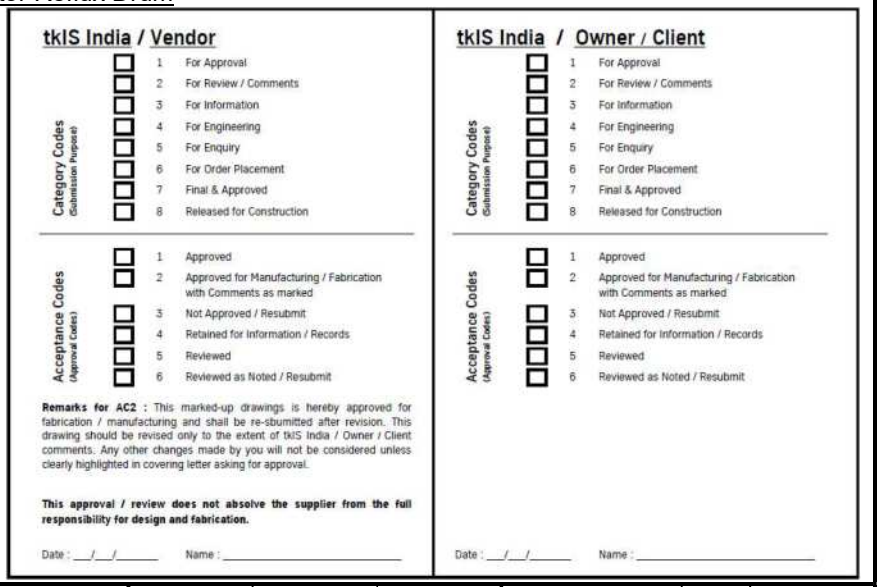
Total Pages: 13

NUMALIGARH REFINERY LIMITED

NRL EXPANSION PROJECT

DOCUMENT DESCRIPTION

Vendor Name: Fabtech Project and Engineers Ltd
Tag / Item No.: 1P25-VV-3031
Tag / Item Description: Main Fractionator Reflux Drum



tkIS India / Vendor

Category Codes (Submission Purpose)
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- 2 Approved for Manufacturing / Fabrication with Comments as marked
- 3 Not Approved / Resubmit
- 4 Retained for Information / Records
- 5 Reviewed
- 6 Reviewed as Noted / Resubmit

Remarks for AC2 : This marked-up drawings is hereby approved for fabrication / manufacturing and shall be re-sbumitted after revision. This drawing should be revised only to the extent of tkIS India / Owner / Client comments. Any other changes made by you will not be considered unless clearly highlighted in covering letter asking for approval.

This approval / review does not absolve the supplier from the full responsibility for design and fabrication.

Date : __/__/_____ Name : _____

tkIS India / Owner / Client

Category Codes (Submission Purpose)
- 1 For Approval
- 2 For Review / Comments
- 3 For Information
- 4 For Engineering
- 5 For Enquiry
- 6 For Order Placement
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Acceptance Codes (Approval Codes)
- 1 Approved
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- 3 Not Approved / Resubmit
- 4 Retained for Information / Records
- 5 Reviewed
- 6 Reviewed as Noted / Resubmit

Date : __/__/_____ Name : _____

01	21.06.2023	Review	AB	AB	HT			
00	23.02.2023	Review	AB	AB	HT			
Rev	Date	Reason for Issue	Prepared	Checked	Approved	Prepared	Review	Review
			Disc. Eng.	Disc. Lead	Contr. Rep	Disc. Eng.	Proj. Eng.	Com.Rep. Dept. Head

Vendor / Contractor		NRL / tkIS / Consultant
Category	**Code**	**Description**
Facility Area Code	**1Z**	**Numaligarh Refinery Common Document**
Document Type	**ITP**	**Inspection and Test Plan (ITP)**
System Number	**00**	**General**
Life Cycle		Disk Ref.:

NRL's PO No. to tkIS:
NRL's PO No. to Vendor / Contractor: 4500025832 dt 22.12.2022
Vendor / Contractor Document N0.: FSHO-514-ITP-1P25-VV-3031-001

tkIS Contract No.: **66-6733**
tkIS Engineering Status Code:
tkIS Document Category Code:

Originator/ Contractor	Asset Code	Disc	RFP NO	Document Type	Sequence Number	Revision
TK	**1P25A**	**ME**	**0038**	**ITP**	**0001**	**01**

INSPECTION AND TEST PLAN

PROJECT	NUMALIGARH REFINERY EXPANSION PROJECT

TAG NO:- 1P25-VV-3031	**Equipment Name:-** Main Fractionator Reflux Drum	**DOC NO:-** FSHO-514-QAP-1P25-VV-3031 , Rev.01 DATE-16/06/2023
CLIENT:- M/S NUMALIGARH REFINERY LIMITED		**Design and Fabrication code:** ASME SEC. VIII DIV-1 ED 2021 (**Wet H2S Service with NACE MR 0103**)
EPC CONTRACTOR: ThyssenKrupp Industrial Solutions (India) Private Limited.		**PO NO:-**PUR-PRJNUM-1004763/LOA/Fabtech
MANUFACTURER:- FABTECH PROJECTS & ENGINEERS LTD		**INSPECTION AGENCY:- TPIA** **Classification Group 3**

LEGEND:-

CE	Carbon Equivalent	DFT	Dry Film Thickness
DPT / PT	Dye Penetrant Testing / Penetrant Testing	HT	Heat Treatment
HIC	Hydrogen Induced Cracking	ITP	Inspection & Test Plan
IP	Ingress Protection	IGC	Inter-Granular Corrosion
IC	Inspection Certificate	MPT/MT	Magnetic Particle Testing
MR	Material Requisition	MRT	Mechanical Run Test
MTC/TC	Material Test Certificate / Test Certificate	PO	Purchase Order
NDT	Non-Destructive Testing	PR	Purchase Requisition
PQR	Procedure Qualification Record	PMI	Positive Material Identification
RT	Radiography Testing	SSCC	Sulphide Stress Corrosion Cracking
SCC	Stress Corrosion Cracking	TPI/TPIA	Third Party Inspection Agency
UT	Ultrasonic Testing	VDR	Vendor Data Requirement
I	Information	WPQ	Welder Performance Qualification
R	Review	WPS	Weld Procedure Specification
H	Hold Point	R/W	Review or Witness
W	Witness Point	UID	Unique Identification Marking
RW	Random Witness	PTC	Production Test Coupon
R/W	Review or witness	I	Information

Representative	Prepared by QA/QC Engineer	Approved by QA /QC Manager	Accepted by TPIA	PMC	OWNER
Name	Abhinandan Dhamane	Harish Talele			
Signature					
Date	16/06/2023	16/06/2023			

FABTECH PROJECTS & ENGINEERS LTD. QC MANAGER

SGS
Amol Patil
Date & Signature 16/06/2023
SGS INDIA PVT. LTD. PUNE
☐ WITNESSED ☐ REVIEWED
The SGS stamp & signature is for witnessing/observation purposes only and is subject to the provisions of the SGS General Conditions of Services. Particularly article 2(d), available at http://www.sgs.com/terms_and_conditions.htm

FABTECH — PROJECTS & ENGINEERS —	thyssenkrupp	**INSPECTION AND TEST PLAN**		NRL
		PROJECT	NUMALIGARH REFINERY EXPANSION PROJECT	

TAG NO:- 1P25-VV-3031	**Equipment Name:-** Main Fractionator Reflux Drum	**DOC NO:-** FSHO-514-QAP-1P25-VV-3031 , Rev.01 DATE-16/06/2023
CLIENT:- M/S NUMALIGARH REFINERY LIMITED		**Design and Fabrication code:** ASME SEC. VIII DIV-1 ED 2021 **(Wet H2S Service with NACE MR 0103)**
EPC CONTRACTOR: ThyssenKrupp Industrial Solutions (India) Private Limited.		**PO NO:-**PUR-PRJNUM-1004763/LOA/Fabtech
MANUFACTURER:- FABTECH PROJECTS & ENGINEERS LTD		**INSPECTION AGENCY:- TPIA** **Classification Group 3**

SR. No.	INSPECTION ACTIVITY	CHARACTERISTICS TO BE CHECKED	EXTENT OF CHECK	REFERENCE DOCUMENTS & PROJECT SPEC.	ACCEPTANCE STANDARD & PROJECT SPEC.	RECORDING FORMAT	Extent of Inspection				REMARKS
							Vendor	TPIA	tkIS	Owner	
1	QAP	Review of H, W, R stages, Documentation	100%	Approved Drawing, MDS & PR	Approved Drawing, MDS & PR	QAP	H	A	A		
2	Approval of Drawing	Drawing parameters	100%	Design Data/code, PR	Design Data/code, PR	Drawing	H	R	A		
3	Review of WPS, WPQ along with weld map/Weld test plan	Essential variables	100%	ASME SEC. IX., Approved Drawings	ASME SEC. IX.	WPS & WPQ	H	R/W			For Old-R & New –W (Qualified under NRL Project approved TPIA)
4	welding consumable TC's	Documentation	100%	Approved Drawing. & ASME Sec. II C & Sec IX.	Approved Drawing. & ASME Sec. II C & Sec IX.	Weld map, MTC	H	R			
5	Review of all the procedures for NDE, Heat treatment, Hardness, Hydro, Pneumatic, PMI, Blasting & Painting etc.	Documented Procedure	100%	Documents Review.	Documents Review.	Docs. Review.	H	R	I		
6	Raw Material Identification for Pressure Parts including gasket & fastener	Visual, Dimension, Co-relation with MTC, Review of MTC	100 %	Approved Drawing, ASME SEC. II A	Approved Drawing, ASME SEC. II A	Material Ident. Report	H	H			Refer Note 3, 4, 5, 6 , 7 & 10. (3.2 for Pr. Parts & critical parts under NRL Approved TPIA)
7	Raw Material Identification for Non-Pressure Parts	Visual, Dimension; review of Chem. & Mech. properties of MTC	100 %	Approved Drawing., ASME SEC. II A	Approved Drawing., ASME SEC. II A	Mat. History Chart	H	R			Refer Note 3, 4, 5, 6 & 7.

17/06/2023

FABTECH — PROJECTS & ENGINEERS —	thyssenkrupp	**INSPECTION AND TEST PLAN**		NRL
		PROJECT	NUMALIGARH REFINERY EXPANSION PROJECT	

TAG NO:- 1P25-VV-3031	**Equipment Name:-** Main Fractionator Reflux Drum	**DOC NO:-** FSHO-514-QAP-1P25-VV-3031 , Rev.01 DATE-16/06/2023
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EPC CONTRACTOR: ThyssenKrupp Industrial Solutions (India) Private Limited.		**PO NO:-**PUR-PRJNUM-1004763/LOA/Fabtech
MANUFACTURER:- FABTECH PROJECTS & ENGINEERS LTD		**INSPECTION AGENCY:- TPIA** **Classification Group 3**

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							Vendor	TPIA	tkIS	Owner	
8	Heat treatment (Normalizing) After forming of Dish end petal & Crown.	Review of HT chart & Review of calibration Record for Thermocouple & Temp. Recorder.	100 %	Approved Drg., & ASME Sec VIII Div. 1	Approved Drg., & ASME Sec VIII Div. 1	HT Cycle Chart	H	R			Mat. Test Coupon with simulation to be provided. (Test reports review by TPI)
9	D/E Petal & Crown Long Seam set up & welding – after pressing.	Identification Stamping , Alignment, Geometry of Groove, Profile, Dimensions PT/MT of WEP.	100 %	Approved. Drawing& ASME Section VIII. Div.1	Approved. Drawing& ASME Section VIII. Div.1	Stage IR	H	W			
10	Back chip & PT of Petal & Crown LS of Dish end	Weld surface defect check	100%	Approved. Drawing& ASME Section VIII. Div.1 & ASME Section V&PT procedure	Approved. Drawing& ASME Section VIII.Div.1 & ASME Section V & PT procedure	IR	H	R			
11	NDE- Radiography of L-Seam of Dish end.	Soundness of weld	100 %	NDE Procedure, ASME Sec. V/ VIII Div. 1	NDE Procedure, ASME Sec. V/ VIII Div. 1	RT Report	P	R			RT Film review by TPI
12	Heat treatment of Boot dish ends (normalized)	Review of HT chart & Review of calibration Record for Thermocouple & Temp. Recorder.	100 %	Approved Drg., & ASME Sec VIII Div. 1	Approved Drg., & ASME Sec VIII Div. 1	HT Cycle Chart	H	R			Mat. Test Coupon with simulation to be provided.
13	Dished End Inspection (Main Dish end & Boot Dish end)	Identification Stamping, Verification of Template, Visual Inspection; Profile, Dim, Thickness, DPT at Knuckle, SF, weld edge inspection.	100 %	Approved Drawing. & ASME Sec VIII Div-1	Approved Drawing. & ASME Sec VIII Div-1	Dish end IR	H	W			

17/06/2023

FABTECH — PROJECTS & ENGINEERS —	thyssenkrupp	**INSPECTION AND TEST PLAN**		NRL
		PROJECT	NUMALIGARH REFINERY EXPANSION PROJECT	

TAG NO:- 1P25-VV-3031	**Equipment Name:-** Main Fractionator Reflux Drum	**DOC NO:-** FSHO-514-QAP-1P25-VV-3031 , Rev.01 DATE-16/06/2023
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EPC CONTRACTOR: ThyssenKrupp Industrial Solutions (India) Private Limited.		**PO NO:-**PUR-PRJNUM-1004763/LOA/Fabtech
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SR. No.	INSPECTION ACTIVITY	CHARACTERISTICS TO BE CHECKED	EXTENT OF CHECK	REFERENCE DOCUMENTS & PROJECT SPEC.	ACCEPTANCE STANDARD & PROJECT SPEC.	RECORDING FORMAT	Extent of Inspection				REMARKS
							Vendor	TPIA	tkIS	Owner	
14	Long Seam of shell / Nozzle Neck	Identification Stamping, Geometry of Groove, Dimension, PT of WEP.	100 %	Approved Drawing	Approved Drawing. & ASME Sec VIII Div-1	Stage IR	P	RW			
15	Back chip DP & welding of Long seam	Surface Defect	100 %	Approved Drawing. & NDE Procedure, ASME Sec. V/ Sec. VIII Div-1	Approved Drawing. & NDE Procedure, ASME Sec. V/ Sec. VIII Div-1	LPT Report	H	R			
16	NDE- Radiography of L-Seam of shell, nozzle neck.	Soundness of weld	100 %	NDE Procedure, ASME Sec. V/ VIII Div. 1	NDE Procedure, ASME Sec. V/ VIII Div. 1	RT Report	P	R			RT Film review by TPI
17	Cir. seam fit up & welding of shell to shell/Dish end	Identification Stamping, Geometry of Groove, DP of WEP, Alignment, Mismatch, Dimension, 'L' Seam orientation.	100 %	Approved Drg. & ASME SEC VIII Div.1	Approved Drg. & ASME SEC VIII Div.1	Stage IR	H	RW			
18	Back chip PT & welding of 'C' seam	Surface defects	100 %	Approved Drg. & NDE Procedure, ASME Sec. V/ Sec. VIII Div-1	Approved Drg. & NDE Procedure, ASME Sec. V/ Sec. VIII Div-1	LPT Report	H	R			
19	NDE- Radiography of C-Seam after Back chip welding	Soundness of weld	100 %	NDE Procedure, ASME Sec. V/ VIII Div. 1	NDE Procedure, ASME Sec. V/ VIII Div. 1	RT Report	H	R			RT Film review by TPI

17/06/2023
For SGS

FABTECH — PROJECTS & ENGINEERS —	thyssenkrupp	**INSPECTION AND TEST PLAN**		NRL
		PROJECT	NUMALIGARH REFINERY EXPANSION PROJECT	

TAG NO:- 1P25-VV-3031	**Equipment Name:-** Main Fractionator Reflux Drum	**DOC NO:-** FSHO-514-QAP-1P25-VV-3031 , Rev.01 DATE-16/06/2023
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EPC CONTRACTOR: ThyssenKrupp Industrial Solutions (India) Private Limited.		**PO NO:-**PUR-PRJNUM-1004763/LOA/Fabtech
MANUFACTURER:- FABTECH PROJECTS & ENGINEERS LTD		**INSPECTION AGENCY:- TPIA** **Classification Group 3**

SR. No.	INSPECTION ACTIVITY	CHARACTERISTICS TO BE CHECKED	EXTENT OF CHECK	REFERENCE DOCUMENTS & PROJECT SPEC.	ACCEPTANCE STANDARD & PROJECT SPEC.	RECORDING FORMAT	Extent of Inspection				REMARKS
							Vendor	TPIA	tkIS	Owner	
20	Nozzle neck to flange, pipe to pipe, pipe to fitting fit up & welding	Identification Stamping, Mismatch, PT of Bevel Edge, Geometry of Groove, Dimension etc.	100 %	Approved Drawing. & ASME Sec. VIII Div. 1	Approved Drawing. & ASME Sec. VIII Div. 1	Stage IR	H	RW			
21	Back chip & PT of nozzle Neck to Flange , pipe to pipe, pipe to fitting seam if accessible from second side	Surface defects	100 %	Approved Drg. & ASME Sec. V/ Sec. VIII Div-1	Approved Drg. & ASME Sec. V/ Sec. VIII Div-1	LPT Report	H	R			PT of Root Pass for single side full Penetration seams
22	NDE- Radiography of C-Seam for nozzle to flange, pipe to pipe, pipe to fitting seam	Soundness of weld	100 %	Approved Drg., NDE Procedure, ASME Sec. V/ VIII Div. 1	Approved Drg., NDE Procedure, ASME Sec. V/ VIII Div. 1	RT Report	H	R			RT Film review by TPI
23	Nozzle marking & opening inspection	Elevation, Orientation, Size of nozzle opening.	100 %	Approved Drg. & ASME Sec VIII Div.1	Approved Drg. & ASME Sec VIII Div.1	Stage IR	H	R			
24	Nozzle to shell / main dish ends/Boot dish ends fit up & welding	Geometry of groove, DP of Tack weld & Bevel Edge, Orientation, location (Elevation)	100 %	Approved Drg. & ASME Sec VIII Div.1	Approved Drg. & ASME Sec VIII Div.1	Stage IR	H	W			
25	Back chip PT of nozzle to shell / main dish ends/Boot dish ends.	Surface defects	100 %	Approved Drg. & ASME Sec. V/ Sec.VIII Div-1	Approved Drg. & ASME Sec. V/ Sec.VIII Div-1	LPT Report	H	R			
26	Internal & external attachment fit up & welding if any	Visual & dimension	100 %	Approved Drg. & WPS	Approved Drg. & WPS	Stage IR	H	R			

17/06/2023

FABTECH — PROJECTS & ENGINEERS —	thyssenkrupp	**INSPECTION AND TEST PLAN**		NRL
		PROJECT	NUMALIGARH REFINERY EXPANSION PROJECT	

TAG NO:- 1P25-VV-3031	**Equipment Name:-** Main Fractionator Reflux Drum	**DOC NO:-** FSHO-514-QAP-1P25-VV-3031 , Rev.01 DATE-16/06/2023
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EPC CONTRACTOR: ThyssenKrupp Industrial Solutions (India) Private Limited.		**PO NO:-**PUR-PRJNUM-1004763/LOA/Fabtech
MANUFACTURER:- FABTECH PROJECTS & ENGINEERS LTD		**INSPECTION AGENCY:- TPIA** **Classification Group 3**

SR. No.	INSPECTION ACTIVITY	CHARACTERISTICS TO BE CHECKED	EXTENT OF CHECK	REFERENCE DOCUMENTS & PROJECT SPEC.	ACCEPTANCE STANDARD & PROJECT SPEC.	RECORDING FORMAT	Extent of Inspection				REMARKS
							Vendor	TPIA	tkIS	Owner	
27	PT check at internal attachment's & PT / MT of Temporary attached areas	Internal attachments of full penetration weld joints	100 %	Approved NDT procedure, ASME Sec VIII Div. 1	Approved NDT procedure, ASME Sec VIII Div. 1	PT report	H	W			UT & MT of Lifting Lugs welding
28	Saddle support assembly	Visual & dimension	100 %	Approved Drg. & ASME Sec VIII Div.1	Approved Drg. & ASME Sec VIII Div.1	Stage IR	H	R			
29	Final Visual, Dimensional Inspection of complete vessel & Completeness check & closure of NCR if any	orientation, dimensional checking of various external as well as internal attachment	100 %	Approved Drg. & ASME Sec VIII Div.1	Approved Drg. & ASME Sec VIII Div.1	Visual & Dim. Report	H	H			
30	PWHT of complete vessel	Review of SR chart	100 %	Approved Drg, ASME Sec VIII Div-1, HT Procedure	Approved Drg, ASME Sec VIII Div-1, HT Procedure	HT cycle Chart	H	R			Loading to be witness & Testing of Mat. Test Coupon of Main & Boot DE - R for TPIA
31	Final Visual, Dimensional Inspection of complete vessel after PWHT	orientation, dimensional checking of various external as well as internal attachment	100 %	Approved Drg. & ASME Sec VIII Div.1	Approved Drg. & ASME Sec VIII Div.1	Visual & Dim. Report	H	W			
32	PT check at Temporary attached areas	Surface defects	100 %	Approved Drg. & ASME Sec. V/ Sec.VIII Div-1	Approved Drg. & ASME Sec. V/ Sec.VIII Div-1	LPT Report	H	W			
33	Hardness Testing (After PWHT)	Verification of hardness on weld, HAZ & base metal	100 %	Approved Drg. & ASME Sec VIII Div-1	Approved Drg. & ASME Sec VIII Div-1, Hardness	Hardness Test Report	H	W			185 BHN Max. To be tested as per Cl. 15.2 of Spec. TP-1ZZZA-IP-

17/06/2023

FABTECH — PROJECTS & ENGINEERS —	thyssenkrupp	**INSPECTION AND TEST PLAN**		NRL
		PROJECT	NUMALIGARH REFINERY EXPANSION PROJECT	

TAG NO:- 1P25-VV-3031	**Equipment Name:-** Main Fractionator Reflux Drum	**DOC NO:-** FSHO-514-QAP-1P25-VV-3031 , Rev.01 DATE-16/06/2023
CLIENT:- M/S NUMALIGARH REFINERY LIMITED		**Design and Fabrication code:** ASME SEC. VIII DIV-1 ED 2021 (**Wet H2S Service with NACE MR 0103**)
EPC CONTRACTOR: ThyssenKrupp Industrial Solutions (India) Private Limited.		**PO NO:-**PUR-PRJNUM-1004763/LOA/Fabtech
MANUFACTURER:- FABTECH PROJECTS & ENGINEERS LTD		**INSPECTION AGENCY:- TPIA** **Classification Group 3**

SR. No.	INSPECTION ACTIVITY	CHARACTERISTICS TO BE CHECKED	EXTENT OF CHECK	REFERENCE DOCUMENTS & PROJECT SPEC.	ACCEPTANCE STANDARD & PROJECT SPEC.	RECORDING FORMAT	Extent of Inspection				REMARKS
							Vendor	TPIA	tkIS	Owner	
					≤185 BHN						SPE-0001 -Gen. Spec. for welding for Pr. V & HE
34	PMI check (only for SS, Alloy steel)	Material composition & components	100 %	As per ASME sec IIA Ed 2019	As per ASME sec IIA Ed 2019	PMI Report	H	W			
35	Mandatory & Commissioning Spare Verification (As applicable)	Visual & Dimensional check	100 %	Approved drawing.	Approved drawing.	Stage Inspection Report	H	W			
36	RF Pad pneumatic test check	Leak check	100 %	Approved Drg. & ASME Sec VIII Div-1, Pneumatic Test Procedure	Approved Drg. & ASME Sec VIII Div-1, Pneumatic Test Procedure	Pneumatic test report.	H	W			
37	Hydrostatic Test of complete Vessel	Check for Leakage, seepage, Pre ssure drop	100 %	Approved Drg. & ASME Sec VIII Div-1, Hydrostatic Test Procedure and water test report.	Approved Drg. & ASME Sec VIII Div-1, Hydrostatic Test Procedure and water test report.	Hydrostatic Test Report	H	H			Holding 1 Hr.
38	Drying & inside cleaning of equipment after Hydro test	Visual checking	100 %	Approved Drg. & Approved Procedure	Approved Drg. & Approved Procedure	Inspection Report	H	R			
39	Surface Preparation	Outside blasting	100%	Approved Drg, Aprroved procedure	Approved Drg, Aprroved procedure	Inspection Report	H	RW			
40	Painting inspection	(Protection of machined surface, Marking) DFT of finish paint.	100%	Approved Drg, Painting procedure.	Approved Drg, Painting procedure.	Inspection Report	H	W			Tests to be carried out as specified in Painting Spec.

FABTECH — PROJECTS & ENGINEERS —	thyssenkrupp	**INSPECTION AND TEST PLAN**		NRL
		PROJECT	NUMALIGARH REFINERY EXPANSION PROJECT	

TAG NO:- 1P25-VV-3031	**Equipment Name:-** Main Fractionator Reflux Drum	**DOC NO:-** FSHO-514-QAP-1P25-VV-3031 , Rev.01 DATE-16/06/2023
CLIENT:- M/S NUMALIGARH REFINERY LIMITED		**Design and Fabrication code:** ASME SEC. VIII DIV-1 ED 2021 **(Wet H2S Service with NACE MR 0103)**
EPC CONTRACTOR: ThyssenKrupp Industrial Solutions (India) Private Limited.		**PO NO:-**PUR-PRJNUM-1004763/LOA/Fabtech
MANUFACTURER:- FABTECH PROJECTS & ENGINEERS LTD		**INSPECTION AGENCY:- TPIA** **Classification Group 3**

SR. No.	INSPECTION ACTIVITY	CHARACTERISTICS TO BE CHECKED	EXTENT OF CHECK	REFERENCE DOCUMENTS & PROJECT SPEC.	ACCEPTANCE STANDARD & PROJECT SPEC.	RECORDING FORMAT	Extent of Inspection				REMARKS
							Vendor	TPIA	tkIS	Owner	
41	Nitrogen Purging at 0.5 Kg/cm2 (As Applicable)	Pressure checked	100%	Approved Drawing	Approved Drawing	Stage IR	H	R			
42	Final stamping, Name Plate verification & Release Note	Document Review, As-Built drawing	100 %	Approved Drg. & ASME Sec VIII Div-1	Approved Drg. & ASME Sec VIII Div-1	Release Note	H	H			
43	Final documentation as per PR	Verification & completion of inspection & test records for submission to costumer	100 %	PR	PR	QC Dossier	H	R			R of Document & H for issuing Despatch clearance

General Notes:-

1. All bolt holes shall be straddle the main axis centre lines.
2. Peening is not permitted.
3. Vessel is under wet H2S service , the requirements of NACE MR0103 and additional requirement of NRL specification NR-OZZZZ-PI-SPE-0025 shall be complied.
4. Material Test Certificate shall reflect all requirements. -as per code for Material in delivery condition, shall report all requirements of Project Spec. for chemical restrictions, mechanical tests in simulated condition including any intermediate heat Treatments.
5. All carbon steel material shall be provided in killed condition. Carbon steel plates shall be normalized.
6. Non pressure part welded to pressure part shall be same as pressure part material.
7. Weld seams of formed ends shall be 100 % Radiographed after forming & Heat Treatment as applicable.

17/06/2023
For SGT

8. Plates and forgings over 2 inches (50 mm) thick or used for pressure containment in hydrogen service shall be Ultrasonically examined with 100% scanning in accordance with the following: (Plates shall be examined before forming in accordance with ASME SA-578-B & Forgings shall be examined in accordance with ASME SA-388 and ASME Section VIII, Division 1.)
9. The gaskets included in the scope of the supply shall not be utilized for performing the test. However, the test shall be conducted with gaskets of the same type and material of the installed ones during operation for body flanges and blind nozzles. After hydrotest when a flanged assembly with a gasket is opened, the gasket must be replaced with a new service gasket prior to reassembly.
10. As per NR-0ZZZZ-ME-SPE 0031, 0026, PI-SPE 0025, NACE MR 0103, Code (Material Procurement & Delivery conditions with Chemical restriction Mech. Testing, Thro' thickness test for Plates ≥ 25mm thick.

1. Project specifications and Standards

TP-1ZZZA-ME-BOD-0001: Project specifications and Standards
TP-1ZZZA-ME-SPE-0001: Job Specification for Supply of Pressure Equipment
NR-0ZZZZ-ME-SPE-0026 : Specification Supplement for Carbon Steel Vessels
NR-0ZZZZ-ME-SPE-0031 : Specification for Boiler Quality Carbon Steel Plates
TP-1ZZZA-IP-SPE-0001: General Specification for Welding and NDE of Pressure Vessels and Heat Exchangers
TP-1ZZZA-PI-SPE-0003 : Specification for Painting
NR-0ZZZZ-PI-SPE-0025: Specification for Material Requirements for Carbon Steel Components used in Sour Service in Petroleum Refinery Environments
NR-0ZZZZ-PI-SPE-0032: Specification for Positive Material Identification
TK-1P25A-ME-RFP-0038_Purchase requisition for PFCC vessels.

16/06/2023
For SGS

FABTECH — PROJECTS & ENGINEERS —	DOCUMENT TITLE : COMMENT RESOLUTION SHEET (SHOP QAP)	DATE-16/06/2023
	PROJECT TITLE: NRL	

CLICENT: ThyssenKrupp Industrial Solutions (India) Private Limited.

DOCUMENT NO:- **FSHO 514-QAP-1P25-VV-3031, Rev.01 , DATE-16/06/2023**

SL. NO.	COMMENT FROM CLIENT	RESPONSE FROM FABTECH PROJECTS & ENGINEERS LTD.	REMARK
1	All Testing Procedures, Welding Doc.(WPS / PQR) duly Reviewed by TPIA to be forwarded to tkIS for Information.	Noted.	
2	Include Project Spec.	Noted & Incorporated In Revised QAP	
3	Non Pr. Part welded to Pr. Part shall be same as Pr. Part Material	Noted & Incorporated In Revised QAP	
4	Material Procurement as per Project Spec, & applicable Codes, All Requirements of material also meet as per Axens IN-042.0-EN - for Chemical, Mechanical tests including heat treatments simulating those anticipated along the fabrication that is PFHT, Intermediate HT if any, , "Z'" quality for Plates-Through thickness ductility as per ASTM A 770, NDE etc. to be met	Noted & Incorporated In Revised QAP	
5	As per NR-0ZZZZ-ME-SPE 0031, 0026, PI-SPE 0025, NACE MR 0103, Code (Material Procurement & Delivery conditions with Chemical restriction, Mech. Testing, Thro' thickness test for Plates ≥ 25mm thick.	Noted & Incorporated In Revised QAP	
6	All raw material for pressure and critical part shall be sourced with EN 10204 3.2 certificate. as per # 3.2.4 of PURCHASE REQUISITION FOR PFCC Vessels - Doc. No. TK-1P25A-ME-RFP-0038	Noted & Incorporated in revised QAP	
7	Review of all Procedures - NDE with summary & Vessel sketch with seam Nos., Hydro, PMI, Blasting & Painting, etc. - R for TPIA	Noted & Incorporated In Revised QAP	

8	PT of Knuckle / SF / WEP, 100% RT of seams	Noted & Incorporated In Revised QAP	
9	Testing of Mat. Test Coupon of Main & Boot DE - R for TPIA	Noted & Incorporated In Revised QAP	
10	NDT of Lifting Lug - PT / MT PT of Temp. attachment areas R by TPIA	Noted & Incorporated In Revised QAP	
11	Include Nozzle RF pad Pneumatic Test before & after PWHT (if PWHT is applicable)	Noted & Incorporated In Revised QAP	
12	Include NDE including for Lifting Lugs , Visual, Dimension after PWHT - if applicable - W by TPIA	Noted & Incorporated In Revised QAP	
13	Hydro Test of Thermowell Pipe if open end of pipe is plugged.	Not Applicable	
14	The gaskets included in the scope of the supply shall not be utilized for performing the test. However, the test shall be conducted with gaskets of the same type and material of the installed ones during operation for body flanges and blind nozzles. After hydro test when a flanged assembly with a gasket is opened, the gasket must be replaced with a new service gasket prior to reassembly	Noted & Incorporated In Revised QAP	
15	While painting Protection of machined surface, Marking, etc.	Noted & Incorporated In Revised QAP	
16	Verification of Name Plate as per Drawing	Noted & Incorporated In Revised QAP	

FABTECH PROJECTS & ENGINEERS LTD
QC MANAGER

General Notes:

01. ALL DIMENSION SHOWN ARE IN MM UNLESS OTHERWISE NOTED .
02. ALL WELDS SHALL BE CONTINUOUS EXCEPT AS NOTED.
03. ALL BOLT HOLE TO STRADDLE THE NORTH / SOUTH AND VERTICAL CENTER LINES.
04. a) FOR NOZZLES ON SHELL PROJECTIONS ARE REFERRED TO FROM TRUE HORIZONTAL LINE TO FLANGE CONTACT FACE.
b) FOR NOZZLES ON HEAD PROJECTIONS ARE REFERRED TO FROM HEAD T.L. TO FLANGE CONTACT FACE.(AND SHALL BE PERPENDICULAR TO TRUE HORIZ C.L.)
05. UNLESS OTHERWISE SPECIFIED, NOZZLE GASKET SURFACE SHALL BE SERRATED CONCENTRIC OR SERRATED SPIRAL FINISH HAVING A RESULTANT SURFACE FINISH 3.2 TO 6.3 MICRON AVERAGE ROUGHNESS.
06. GASKET MATERIAL : SPIRAL WOUND (4.5t) ANSI 16.20, FILLER : FLEXIBLE GRAPHITE , WINDING: 316 SS, INNER RING : 316 SS, OUTER RING : CS
07. ALL REMOVABLE INTERNAL SHALL PASS THROUGH MANHOLE ID OF 580 MM.
08. THIS [redacted] SHALL BE VERIFIED FOR STEAMOUT CONDITION OF 0.5 Kg/cm² (a) (VACUUM) AND 0.5 Kg/cm² g AT 170°C. ⚠
09. ALL LEVEL GUAGE NOZZLES TOLERANCE : ±2.0MM.
10. SPARE PART LIST :

	MANDATORY SPARE	COMMISSIONING SPARE
GASKET FOR NOZZLE	2 SET FOR EACH INSTALLED GASKET	2 SET FOR EACH INSTALLED GASKET
BOLTS & NUTS FOR NOZZLE	20% (MIN. [redacted] ⚠	(MIN. 2 [redacted] ⚠
GASKET FOR INTERNALS	2 SET FOR EACH INSTALLED GASKET	
BOLTS & NUTS FOR INTERNALS	20% (MIN. 2 [redacted] ⚠	

11. PAINTING SCHEME :

NO	PART NAME TO BE PAINTING	OPERATING TEMP, °C	INSUL.	FIRE PROOF	SURFACE PREPARATION	SURFACE PROFILE	PAINT SECTION	PAINT TYPE	PAINT NAME	PAINT COLOR	Cumulative D.F.T.	PAINT COATS	TOTAL D.F.T.
1.2	FIREPROOFING SURFACE OF SADDLE	[redacted] ⚠	YES	[redacted]	[redacted] ⚠	[redacted]	PRIMER	[redacted]					[redacted]
							FINISH	[redacted]					

[redacted] ⚠

NO	PART NAME TO BE PAINTING	OPERATING TEMP, °C	SURFACE PREPARATION	COATING SYSTEM	PAINT SECTION	PAINT TYPE	PAINT NAME	PAINT COLOR	MIN D.F.T.	PAINT COATS	TOTAL D.F.T.
2.1.1	FOR COMPLETE VESSEL	-45 to 200	SSPC-SP-10 Epoxy Phenolic (FP-10), 1 Coat, 125 micr.	AS PER TABLE-2	PRIMER	-	NONE	-	[redacted] ⚠	⚠	⚠
					FINISH	-	Epoxy Phenolic (FP-10), 1 coat, 125 micr.	-	-	-	250

[redacted] ⚠

12. A) PWHT CYCLE : FOR COMPLETE VESSEL WITH SUPPORT.

DESCRIPTION	FULL EQUIPMENT
LOADING TEMP. °C (MAX.)	300
RATE OF HEATING °C/HR.(MAX.)	100
SOAKING TEMP. °C	621 - 648
SOAKING PERIOD (MIN.)	90
RATE OF COOLING °C/HR.(MAX.)	100
METHOD OF COOLING	IN FURNACE
UNLOADING TEMP. °C (MAX.)	300

DURING PWHT ALL MACHINED SURFACE SHALL BE PROTECTED AGAINST SCALING AND FLANGE FACES SHALL BE SUITABLY PROTECTED AGAINST OXIDATION.

B) NORMALIZING CYCLE FOR MAIN DISH ENDS & BOOT DISH ENDS:
LOADING TEMP. : 300 °C (MAX.)
HEATING RATE ABOVE 300°C : 150°C/HR.(MAX.)
SOAKING TEMP. : 910±10 °C
SOAKING TIME : 1 MIN PER MM
COOLING IN STILL AIR

13. UNLESS OTHERWISE SPECIFIED, TOLERANCE FOR PRESSURE VESSEL SHALL BE IN ACCORDANCE WITH APPLICABLE PROJECT SPECIFICATION STC-0490-0009
14. A. CHLORIDE CONTENT IN WATER USED FOR HYDRO TEST SHALL BE LESS THAN 100 PPM FOR CARBON STEEL EQUIPMENT & LESS THAN 25 PPM FOR STAINLESS STEEL EQUIPMENT.
B. THE VESSEL SHALL BE FREE OF DEBRIES, DIRT & FOREIGN MATTER AND AFTER HYDROTEST THE EQUIPMENT SHALL BE DRIED THOROUGHLY & CLEANED FROM INSIDE WHEREVER ACCESSIBLE & FROM OUTSIDE.
[redacted] ⚠
15. LOW STRESS STAMPING TO BE FOLLOWED ON PRESSURE PARTS.
16. CORROSION ALLOWANCE SHALL BE AS FOLLOW:
A. MAIN BODY: 3mm / BOOT: 6mm
B. SUPPORT: 0
C. WELDED INTERNALS: 6mm (Total)
17. ALL WELDS ACCESSIBLE FROM SECOND SIDE SHALL BE BACK CHIPPED / GAUGED BACK TO SOUND METAL BEFORE WELDING FROM SECOND SIDE. WELDS NOT ACCESSIBLE FROM SECOND SIDE SHALL HAVE ROOT RUN DONE BY TIG WELDING WITH ARGON PURGING.
18. ALL WELDS SHALL BE FULL PENETRATION WELDS, INCLUDING THE WELD BETWEEN INTERNAL RINGS, BAFFLES, PASS PARTITION PLATES AND SHELL. THERE SHALL BE NO CREVICE AND ENCLOSED FREE SPACE.
19. I.D. OF WELD NECK FLANGES SHALL MATCH WITH CORRESPONDING I.D. OF NOZZLE PIPE / SHELL.
20. ALL NDE SHALL BE AS PER APPROVED NDE PROCEDURE.
21. LIFTING ACCESSORIES AS TAILING LUGS, TRUNNIONS AND LIFTING LUGS SHALL BE DESIGNED TO WITHSTAND THE EQUIPMENT LIFTING WEIGHT CONSIDERING AN IMPACT FACTOR OF 2.
22. OUT OF ROUNDNESS SHALL BE AS PER UG80 & UG81 OF ASME SEC VIII DIV 1.
23. ALL MATERIAL USED IN THE VESSEL(S) SHALL BE NEW.
24. PLATES, 1/2 IN.[12.5 MM] AND OVER AND LESS THAN 50 MM IN THICKNESS SHALL BE SUBJECTED TO ULTRASONIC TEST AS PER SA/A435 OR A578 LEVEL B.
25. ORDERED THICKNESS IS THE MINIMUM THICKNESS, THERE IS NO NEGATIVE TOLERANCE, ONLY +VE TOLERANCE.
26. ALL NOZZLES AND MANWAYS, EXCEPT NOZZLES WITH ATTACHED INTERNAL PIPING, SHALL BE SET FLUSH WITH THE INSIDE OF THE VESSEL. THE INSIDE CORNER OF NOZZLE AND MANWAY NECKS SHALL BE ROUNDED TO ELIMINATE ALL SHARP CORNERS.
27. ALL BOLTS / STUDS FOR STANDARD & NON-STANDARD FLANGES SHALL HAVE UNC STANDARD THREAD UP TO 1" AND LARGER SIZES SHALL HAVE UN THREADING (8-THREAD SERIES) AS PER ASME B1.1 UNLESS OTHERWISE SPECIFIED.
28. STUDS SHALL EXTEND BEYOND NUTS AT LEAST BY 2 THREADS & STUDS SHALL BE THREADED TO FULL LENGTH.
29. STUD BOLTS SHALL BE PROVIDED WITH TWO HEAVY SERIES HEXAGONAL NUTS.
30. ALL MAIN WELD SEAMS SHALL BE CLEAR OF NOZZLES, REINFORCEMENT PADS, INTERNALS, TRAY SUPPORT RINGS, CLEATS AND STIFFENING RINGS BY HIGHER OF TWO TIMES SHELL THICKNESS OR 50 MM (WELD EDGE TO WELD EDGE). IN CASE THE SAME IS UNAVOIDABLE FOLLOWING REQUIREMENT SHALL APPLY:
A) NOZZLES WITHOUT REINFORCING PAD
ANY WELD SEAM HAVING DISTANCE (WELD EDGE TO WELD EDGE) TO NOZZLE WITHIN 50MM (BUT NOT FOULING WITH WELD SEAM) SHALL BE FULLY RADIOGRAPHED AND DYE PENETRANT EXAMINED TO A LENGTH EQUAL TO 100MM ON EACH SIDE MEASURED FROM NEAREST POINT TO NOZZLE EDGE.
ANY WELD SEAM FOULING WITH NOZZLE OPENING SHALL BE FULLY RADIOGRAPHED AND DYE PENETRANT EXAMINED TO A LENGTH EQUAL TO 3 TIMES OF OUTSIDE DIAMETER OF NOZZLE I.E. 1.5 TIMES OF OUTSIDE DIAMETER OF NOZZLE ON EACH SIDE AFTER INSTALLATION OF NOZZLES. NOZZLE TO VESSEL FILLET WELD SHALL BE PROVIDED WITH SMOOTH CONCAVE RADIUS.
B) IN CASE OF OTHER ATTACHMENTS LIKE INTERNALS, SUPPORT RINGS, CLEATS ETC. IS FOULING WITH WELD SEAM, THE WELD SEAM PORTION COMING UNDER THE ATTACHMENT PLUS 100 MM LENGTH ON EACH SIDE SHALL BE GROUND FLUSH, FULLY RADIOGRAPHED AND DYE PENETRANT EXAMINED BEFORE WELDING OF ANY SUCH ATTACHMENT.
31. ALL NOZZLES FABRICATED FROM PLATE, IRRESPECTIVE OF THICKNESS OF PLATE, SHALL BE 100% RADIO GRAPHED.
32. ALL NOZZLE TO SHELL WELDS (ROOT AND FINAL RUN) SHALL BE EXAMINED BY MAGNETIC PARTICLE/ DYE PENETRANT EXAMINATION
33. ALL COMPLETED EQUIPMENT SHALL BE CLEANED INTERNALLY AND EXTERNALLY TO REMOVE SCALE, DIRT, SAND, WATER AND FOREIGN MATTER.
34. CENTER OF GRAVITY IN THE SHOP FABRICATED CONDITION SHALL BE MARKED CLEARLY ON OPPOSITE SIDES OF THE VESSEL.
35. THE NOZZLE FLANGES UP TO 24" NPS SHALL CONFIRM TO ASME B16.5 FLANGES ABOVE 24" NPS SHALL BEAS PER ASME B16.47 SERIES A.
36. ALL ATTACHMENTS WELDED TO VESSEL SHALL BE OF SAME MATERIAL AND GRADE OF THE SECTION TO WHICH IT IS ATTACHED AND TO BE SUPPLIED BY THE VESSEL VENDOR.
37. ALL CARBON STEEL MATERIAL SHALL BE KILLED QUALITY [redacted] ⚠
38. [redacted] UNDER WET H2S SERVICE. THE REQUIREMENT OF NACE MR0103 AND AN ADDITIONAL REQUIREMENTS OF NRL SPECIFICATION NR-0ZZZZ-PI-SPE-0025 SHALL BE COMPLIED. ⚠
39. CARBON CONTENT FOR CS PLATES SHALL NOT EXCEED 0.18%, ADDITIONALLY, ONE OF THE FOLLOWING REQUIREMENTS FOR CARBON EQUIVALENT BASED ON HEAT ANALYSIS SHALL ALSO BE SATISFIED : CARBON EQUIVALENT CE = C + MN/6 + (CR + MO + V)/5 + (NI + CU)/15 SHALL BE < = 0.43 FOR PLATES WITH THICKNESS < 25mm & < = 0.45 FOR PLATES WITH THICKNESS > = 25mm. OTHER CHEMICAL COMPOSITION RESTRICTIONS AS PER NRL SPECIFICATION NR-0ZZZZ-PI-SPE-0025 SHALL BE COMPLIED.
40. HARDNESS OF WELD METAL & HAZ AFTER PWHT SHALL BE < = 185 BHN
[redacted] ⚠

[redacted] ⚠

Fabricated nozzle neck	1	100%	As per Approved Inspection and Testing Plan Document ID: –
Dish Ends	1	100%	
Shell	1	100%	

Part	Joint eff.	Radiography %	Ultra-sonic %	Magnetic particle %	Dye pe-netrant %	Tests specimens	Others

Tests (Test reports incl. appraisals are required in all cases)

[redacted] ⚠

Nozzle M1/M2	1+1/4" 8UN	MIN: 141 kN/ MAX: 248 kN
Nozzle/Flange	Bolt Size	BOLT TIGHTENING LOAD

Bolts tightening moments(As Per ASME PCC Ed. 2019)

Part	Materials	Remarks
Shell	SA-516 GR. 60N	
Heads	SA-516 GR. 60N	
Shell Flange	–	
Supports	IS-2062 Gr. E250B	
Exernals Direct Welded	SA-516 GR. 60N	
Nozzle pipes	SA-106 GR. B	
Nozzle Flange	SA-105	
Internals Welded	SA-516 GR. 60N	
Internals Removable	SA-516 GR. 60N	
Bolts/ Nuts Inside	–	
Bolts/ Nuts Outside	SA 193 Gr. B7M / SA 194 Gr. 2HM	
Gaskets Inside	–	
Gaskets Outside	Spiral Wound gaskets	
Gaskets Shell flange	–	
Davit	IS-2062 Gr. E250B	
Name Plate Brackets	[redacted] ⚠	
Lifting Lugs / Trunnions	IS-2062 Gr. E250B	
Anchor Bolts	IS 2062 : E650 BR OR A 193 GR. B7	(BY OTHER)
[redacted]		

As per MDS, only NACE and Wet H2S service required.
HIC resistance is not required.
(As per email dated 14-03-2023)

Project Engineering Specifications & Standards

Description	Document ID
Engineering Design Basis for Static Equipment	TP-1ZZZA-ME-BOD-0001
Site Specific Seismic Spectra	TP-1ZZZA-CV-BOD-0002
Job Specification for Supply of Pressure Equipment	TP-1ZZZA-ME-SPE-0001
General Specification for Welding and NDE for Pressure Vessels and Heat Exchangers	TP-1ZZZA-IP-SPE-0001
Job Specification for Painting	TP-1ZZZA-PI-SPE-0003
Specification for Identification of Piping and Equipment	NR-0ZZZZ-CV-SPE-0021
Spare Parts, Special Tools and Consumable philosophy	TP-1ZZZA-PQ-PRC-0005
Standard Construction Drawings for Pressure Equipment	TP-1ZZZA-ME-STD-0001
Specification For CS Components Used in Sour Service in Petroleum Refinery	NR-0ZZZZ-PI-SPE-0025
Packing Marking and Shipping Specification	TP-1ZZZA-PQ-SPE-0003
Specification Supplement for Carbon Steel Vessels	NR-0ZZZZ-ME-SPE-0026
Specification for Boiler Quality Carbon Steel Plates	NR-0ZZZZ-ME-SPE-0031
Vendor/Contractor Documentation Procedure	TK-1ZZZA-DC-PCP-0001
Project Data and Information Handover Specification	NR-0ZZZZ-IF-SPE-0001
Technical Document Numbering Specification	NR-0ZZZZ-GE-SPE-0001
Specification for Identification of Piping & Equipment	NR-0ZZZ-CV-SPE-0021
Standard ITP For Site Fabricated Equipment	–

Spares

Mandatory spare parts	Gaskets : 200% (2 sets of each installed gasket) Bolts : 20%(min.2)(for each gasketed joint)
Commissioning spare parts	Gaskets : 200% (2 sets of each installed gasket) Bolts : 20%(min.2)(for each gasketed joint)

thyssenkrupp Industrial Solutions

Acceptance Code **1**

APPROVED

WITH MINOR COMMENT

This approval does not release the vendor / supplier from full responsibility for his design and fabrication.

Date: *May 2, 2023*

Name: *Mamle, Vaibhav* HAS

Rev.	Date	Reason for Issue	Prepared	Checked	Approved	Owner Approved
01	05/04/2023	REVISED AS PER COMMENTS	SAGAR P.	LALIT W.	VITTHAL N.	D.P.THORAT
00	21/02/2023	ISSUED FOR APPROVAL	YOGESH J.	LALIT W.	VITTHAL N.	D.P.THORAT

Document belonging to drawing

tkIS India / Vendor

Category Codes (Submission purpose)
- ☐ 1 For Approval
- ☐ 2 For Review / Comments
- ☐ 3 For Information
- ☐ 4 For Engineering
- ☐ 5 For Enquiry
- ☐ 6 For Order Placement
- ☐ 7 Final & Approved
- ☐ 8 Released for Construction

tkIS India / Vendor

Acceptance Codes (Approval Codes)
- ☐ 1 Approved
- ☐ 2 Approved for Manufacturing/ Fabrication With Comments as Marked
- ☐ 3 Not Approved/Resubmit
- ☐ 4 Retained for Information/Records
- ☐ 5 Reviewed
- ☐ 6 Reviewed as Noted/Resubmit

Date : __ /__ /____ Name : _____

Contract No.	Document ID	Part
4[redacted]-6733	TK-1P25-VV-3031-0001-001	–

Store Location: Server/Share –
Store Location: Folder –
Store Name –
BAR-Code

Pro. Unit	Con. Unit	ITEM No. ⚠	Group	Order No.	Cat. Code	Acc. Code	Status
–	–	[redacted]	–	–	–	–	01

MFG. BY
FABTECH PROJECTS & ENGINEERS

FABTECH PROJECTS & ENGINEERS LTD.
CORPORATE OFFICE:- LEVEL-7, M-AGILE, NEAR PAN CARD CLUB ROAD, BANER, PUNE - 411045

thyssenkrupp

NRL's PO No.:	4500025832-/22.12.2022
Vendor's PO No.:	–
Vendor's Document No.:	FSHO-514-DR-1P25-VV-3031-001

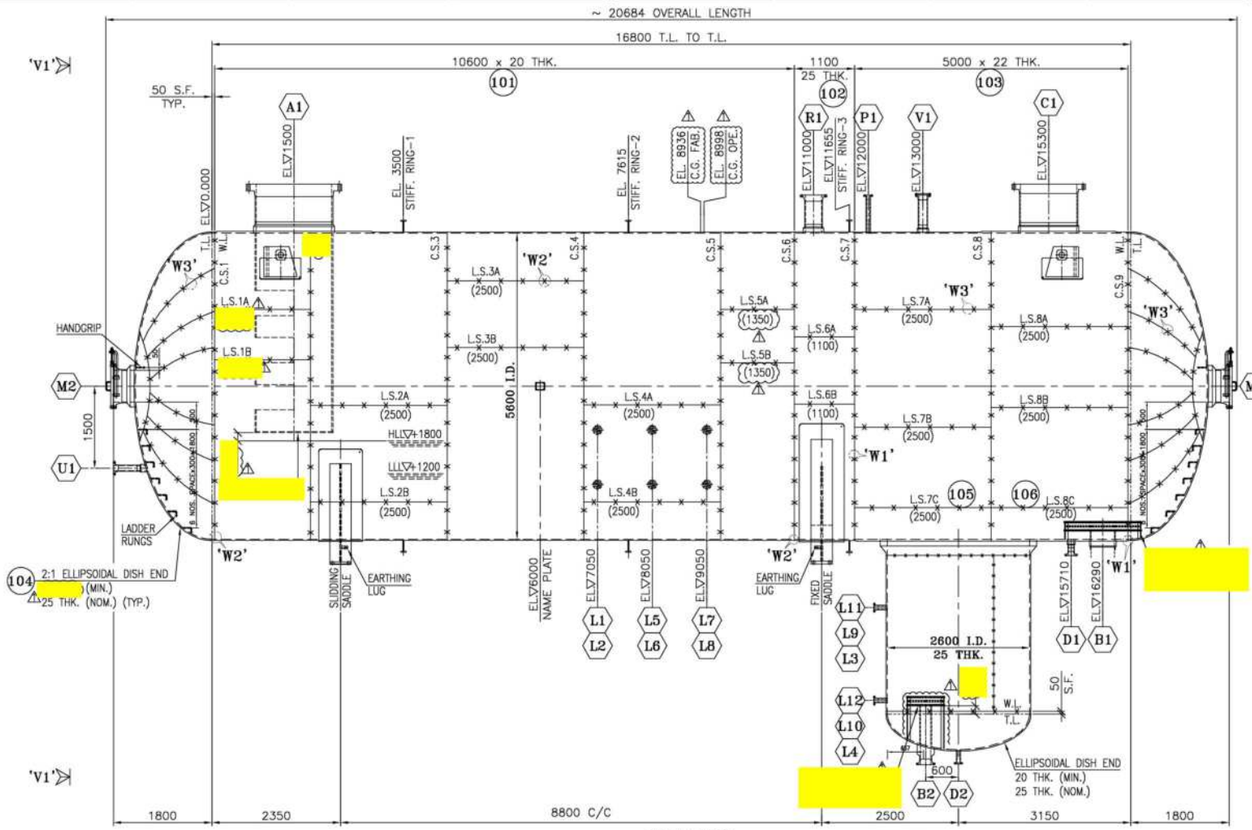
NUMALIGARH REFINERY LIMITED

PROJECT:
UNIT/FACILITY: [redacted]

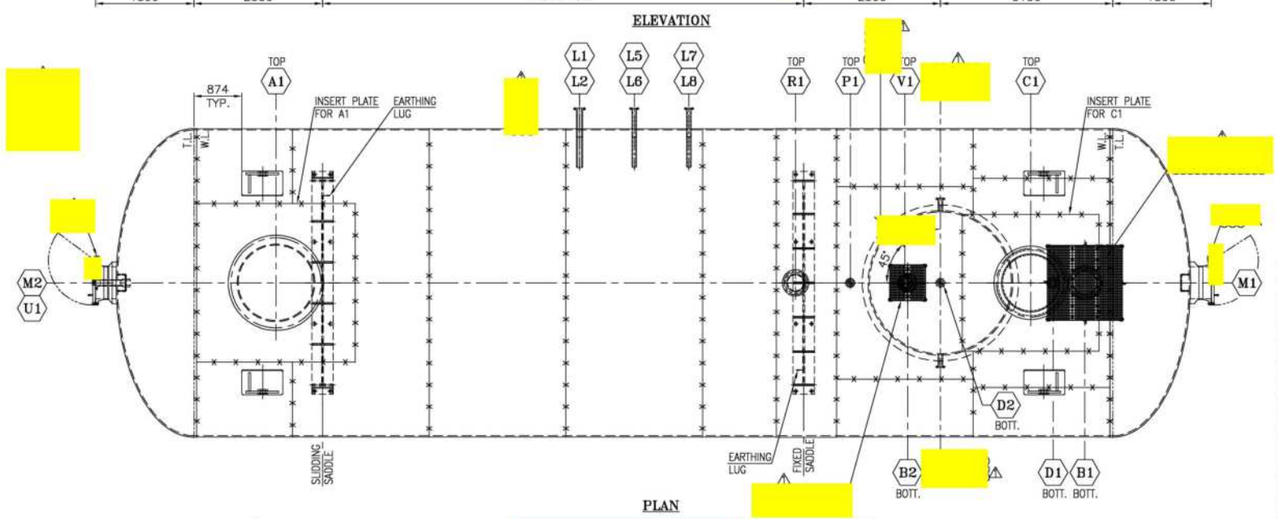
DRAWING TITLE : GENERAL ARRANGEMENT DRAWING FOR SYSTEM DESCRIPTION : MAIN FRACTIONATOR REFLUX DRUM (1P25-VV-3031)

Scale: 1:1 Drg.Size: A1

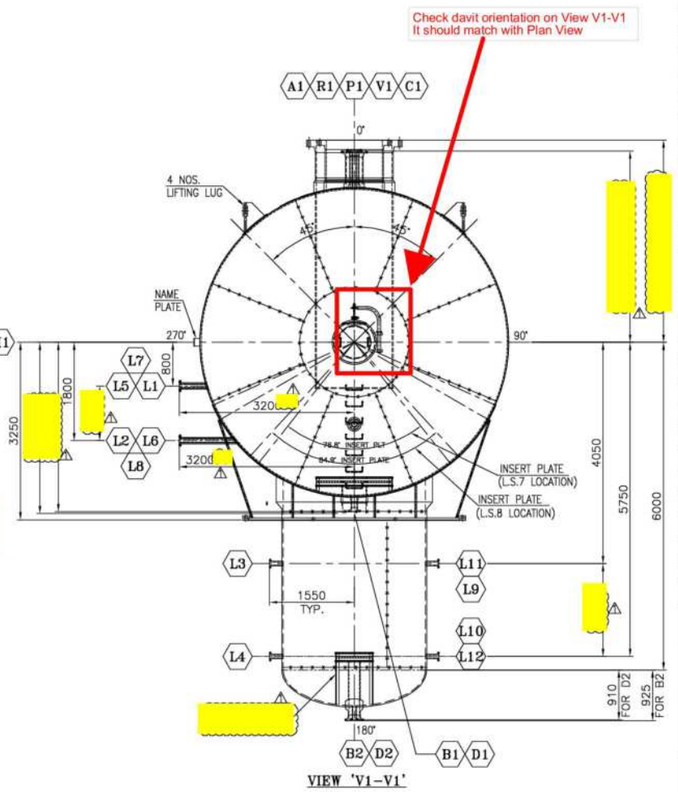
Originator/ Contractor	Asset Code	Disc	RFP No.	Drawing Type	Sequence Number	Rev.	Sheet
TK	1P25A	ME	0038	GAS	0001	01	1 OF 1



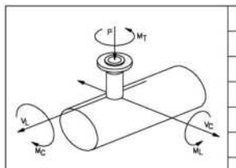
ELEVATION



PLAN



VIEW 'V1–V1'



Max. allowable nozzle loads

Nozzle	NPS	V_L	P	V_C	M_C	M_T	M_L
		Forces [kN]			Moments [kN-m]		
C1	42"	58.8	58.8	44.1	123.5	185.2	160.5
B2	8"	12.1	12.1	9.1	5.2	7.8	6.8
B1	18"	25.2	25.2	18.9	22.7	34	29.5
A1	56"	78.4	78.4	58.8	219.5	329.3	285.4

NOTE d: WITH INSERT PLATE, REFER DETAILS x 36 THK.
NOTE c: WITH INSERT PLATE, REFER DETAILS x 36 THK.
NOTE b: WITH INSERT PLATE 2500 SQUARE x 36 THK.
NOTE a: WITH INSERT PLATE 2900 SQUARE x 36 THK.

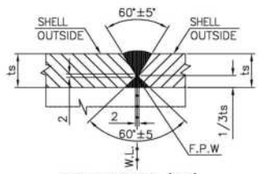
NOZZLE SYMBOL	DESCRIPTION	QTY.	NPS IN	CLASS	ASME	FLANGE TYPE	FLANGE FACING	PIPE SCHEDULE	REINFORCING PLATE	PROJECTION	REMARKS
	BOOT	1	2600 I.D.	–	–	–	–	25 THK.	–	–	NOTE c
V1	VENT	1	6"	150	B16.5	WN	RF	SCH.80	SRN	3500	WITH B/F
U1	UTILITY CONNCTION	1	4"	300	B16.5	WN	RF	SCH.120	SRN	SEE DWG	–
R1	SAFETY VALVE	1	12"	150	B16.5	WN	RF	SCH.60	SRN	3500	–
P1	PRESSURE INDICATOR	1	2"	300	B16.5	LWN	RF	16.6 THK.	–	3500	–
M1,M2	MANHOLE	2	24"	150	B16.5	WN	RF	14 THK.	SRN	SEE DWG	B/F+DAVIT
L11,L12	LEVEL CONTROLLER (INTERFACE)	2	2"	300	B16.5	LWN	RF	16.6 THK.	–	SEE DWG	–
L9,L10	LEVEL INDICATOR (INTERFACE)	2	2"	300	B16.5	LWN	RF	16.6 THK.	–	SEE DWG	–
L7,L8	LEVEL CONTROLLER	2	2"	300	B16.5	LWN	RF	16.6 THK.	–	SEE DWG	–
L5,L6	LEVEL INDICATOR	2	2"	300	B16.5	LWN	RF	16.6 THK.	–	SEE DWG	–
L3,L4	LEVEL GUAGE (INTERFACE)	2	3"	300	B16.5	LWN	RF	20.4 THK.	–	SEE DWG	–
L1,L2	LEVEL GAUGE	2	2"	300	B16.5	LWN	RF	16.6 THK.	–	SEE DWG	–
D2	DRAIN	1	2"	150	B16.5	LWN	RF	13.6 THK.	–	SEE DWG	–
D1	DRAIN	1	4"	150	B16.5	WN	RF	SCH.120	SRN	3100	–
C1		1	42"	150	B16.47A	WN	RF	20 THK.	SRN		NOTE b
B2		1	8"	150	B16.5	WN	RF	SCH.120	SRN	SEE DWG	–
B1		1	18"	150	B16.5	WN	RF	14 THK.	SRN	3135	NOTE d
A1		1	56"	150	B16.47A	WN	RF	20 THK.	SRN		NOTE a

Nozzle table

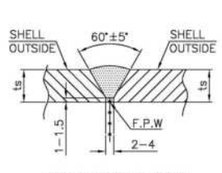
BILL OF MATERIAL (ONLY FOR 1 EQUIPMENT)

ITEM NO.	DESCRIPTION	QTY	MATERIAL	SIZE	WEIGHT	REMARKS
				TOTAL WEIGHT IN KG	68924.9	
106	INSERT PLATE	1	SA-516 Gr.60N	4200 x 2500 x 36 THK.	2967.3	–
105	INSERT PLATE	1	SA-516 Gr.60N	3800 x 2500 x 36 THK.	2684.7	–
104	2:1 ELLIP. DISH END	2	SA-516 Gr.60N	BLANK #6930 x 25 THK.(NOM.)	14804.5	22 THK (MIN.)
103	SHELL	1	SA-516 Gr.60N	Circ. 17669 x 5000 LG. x 22 THK.	15257.2	–
102	SHELL	1	SA-516 Gr.60N	Circ. 17679 x 1100 LG. x 25 THK.	3816.4	–
101	SHELL	1	SA-516 Gr.60N	Circ. 17663 x 10600 LG. x 20 THK.	29394.8	–

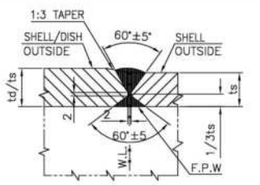
WELD DETAIL 'W3'



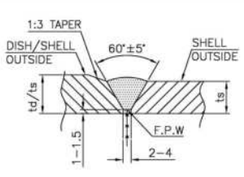
WELD DETAIL 'W4'



WELD DETAIL 'W1'



WELD DETAIL 'W2'



HOLD POINTS :-

1. LIFTING LUG ELEVATION
2. LONG. SEAM ORIENTATION
3. THICKNESS OF WELDED INTERVALS

Check tkIS reply to HOLD points sent in email dated 25-04-2023

FOULING POINTS :-

TK-1P25-W-3031-0001-006	TK-1P25A-ME-0038-DTL-0003	FSHO-514-DR-1P25-W-3031-005	NAME PLATE DETAIL DRAWING FOR MAIN FRACTIONATOR REFLUX DRUM
TK-1P25-W-3031-0001-005	TK-1P25A-ME-0038-DTL-0002	FSHO-514-DR-1P25-W-3031-004	SADDLE DETAIL DRAWING FOR MAIN FRACTIONATOR REFLUX DRUM
TK-1P25-W-3031-0001-004	TK-1P25A-ME-0038-DTL-0001	FSHO-514-DR-1P25-W-3031-003	NOZZEL & MANHOLE DETAILS DETAIL DRAWING FOR MAIN FRACTIONATOR REFLUX DRUM
TK-1P25-W-3031-0001-004	TK-1P25A-ME-0038-DTL-0001	FSHO-514-DR-1P25-W-3031-003	NOZZEL & MANHOLE DETAILS DETAIL DRAWING FOR MAIN FRACTIONATOR REFLUX DRUM
TK-1P25-W-3031-0001-003	TK-1P25A-ME-0038-CAL-0001	FSHO-514-DC-1P25-W-3031-001	MECHANICAL DESIGN CALCULATION FOR MAIN FRACTIONATOR REFLUX DRUM
TK-1P25-W-3031-0001-002	TK-1P25A-ME-0038-GAS-0002	FSHO-514-DR-1P25-W-3031-002	GENERAL ARRANGEMENT DRAWING FOR MAIN FRACTIONATOR REFLUX DRUM
TK-1P25-W-3031-0001-001	TK-1P25A-ME-0038-GAS-0001	FSHO-514-DR-1P25-W-3031-001	GENERAL NOTES FOR MAIN FRACTIONATOR REFLUX DRUM
TKIS DOCUMENT ID.	NRL DOCUMENT ID.	FABTECH DOCUMENT I.D.	DESCRIPTION

Design codes: ASME Sec. VIII Div. 1, Edition 2021

Pressure chamber		SHELL	Inspection by: TPIA
Design pressure (INT/EXT)	kg/cm²(g)	3.5 / Note–a	Supervision of manuf. by: FPEL
Design temperature (INT/EXT)	°C	150 / Note–a	Shipping weight: kg
Corrosion allowance (INT.)	mm	Shell: 3/Boot: 6	Empty weight: kg
Other additional allowances	mm	0	Operating weight: kg
Joint efficiency (SHELL / HEAD)		1.0 / 1.0	Weight at retest: kg
Radiography (RT1/RT2/RT3/RT4)		RT 1	Mfr's Serial No.: FSHO–498
Material		C.S.	Year of manufacture: 2023
Initial test pressure at top with water/oil Position: Horizontal (Shop)	kg/cm²(g)	10.556	Wind shear: N
		649968	Wind moment: 639968 N–m
Operating pressure	kg/cm²(g)	0.57	Seismic shear: N
Operating temperature	°C	50 2505286	Seismic moment: 2466743 N–m
Retest pressure at top with water/oil Position: Horizontal (Site)	kg/cm²(g)	5.143	MDMT: 5 °C
Process fluid		–	Insulation Thickness: 25 mm
Density	kg/m³	757.3	Insulation type: HT (HOT)
H_2 partial pressure	kg/cm² abs.	N.A.	Fireproofing: Yes/50 mm
H_2S partial pressure	kg/cm² abs.	N.A.	PWHT (Stress Relieving) : YES
Nominal volume	m³	462	Leakage Class: N.A.
MAWP	kg/cm²(g)	3.956 (LIMITED BY B2 WN FLANGE)	Classification Group: 3
MAP	kg/cm²(g)	8.55 (20 THK. SHELL)	IBR Service : No
Toxic/Lethal service	(Yes/No)	Yes / No	Wind Design: IS 875 (Part 3) 2015 + Amend 1, K1:1.08, K2: Cat.1, K4: 1
Flammable service	(Yes/No)	Yes	
H2 service	(Yes/No)	No	Seismic Design:–IS 1893 (Part 4) : 2015+Amend 1 & 2 + site spectra
H2S service	(Yes/No)	Yes	
Cyclic service	(Yes/No)	No	
Wet H2S Service	(Yes/No)	NACE MR	
Impact testing	(Yes/No)	No	

Notes:
a) Steamout conditions: Temperature 170 °C & Pressure: 0.5 kg/cm^2(a) & Half Vacuum

For dished ends composed by a central disk and several petals, kindly ensure to fulfill requirements of clause 8.2.3 of Job Specification for Supply of Pressure Equipment TP-1ZZZA-ME-SPE-0001_D2 .

Category Codes (Submission purpose): tkIS 1 2 3 4 5 6 7 8

thyssenkrupp Industrial Solutions

Acceptance Code **2**

APPROVED AS NOTED / RELEASE FOR CONSTRUCTION

This approval does not release the vendor / supplier from full responsibility for his design and fabrication.

Date: April 27, 2023
Name: Mamle, Vaibhav HAS

Date : __ /__ /____ Name : _____

Contract No.	Document ID	Part
6733	TK–1P25–VV–3031–0001–002	–

Store Location: Server/Share –
Store Location: Folder –
Store Name –
BAR-Code

Con. Unit	ITEM No.	Group	Order No.	Cat. Code	Acc. Code	Status
–		–	–	–	–	01

Rev.	Date	Reason for issue	Prepared	Checked	Approved	Owner Approved
01	15/04/2023	REVISED AS PER COMMENTS	SAGAR P.	LALIT W.	VITTHAL N.	D.P.THORAT
00	21/02/2023	ISSUED FOR APPROVAL	YOGESH J.	LALIT W.	VITTHAL N.	D.P.THORAT

MGF. BY
FABTECH PROJECTS & ENGINEERS
FABTECH PROJECTS & ENGINEERS LTD. CORPORATE OFFICE:- LEVEL-7, M-AGILE, NEAR PAN CARD CLUB ROAD, BANER, PUNE - 411045

thyssenkrupp

NRL's PO No.:	4500025832–/22.12.2022
Vendor's PO No.:	–
Vendor's Document No.:	FSHO–514–DR–1P25–VV–3031–002

NRL NUMALIGARH REFINERY LIMITED

PROJECT:
UNIT/FACILITY:

DRAWING TITLE : GENERAL ARRANGEMENT DRAWING FOR SYSTEM DESCRIPTION : MAIN FRACTIONATOR REFLUX DRUM (1P25–VV–3031)

Scale: 1:56 Drg.Size: A1

Originator/ Contractor	Asset Code	Disc	RFP No.	Drawing Type	Sequence Number	Rev.	Sheet
TK	1P25A	ME	0038	GAS	0002	01	1 OF 1