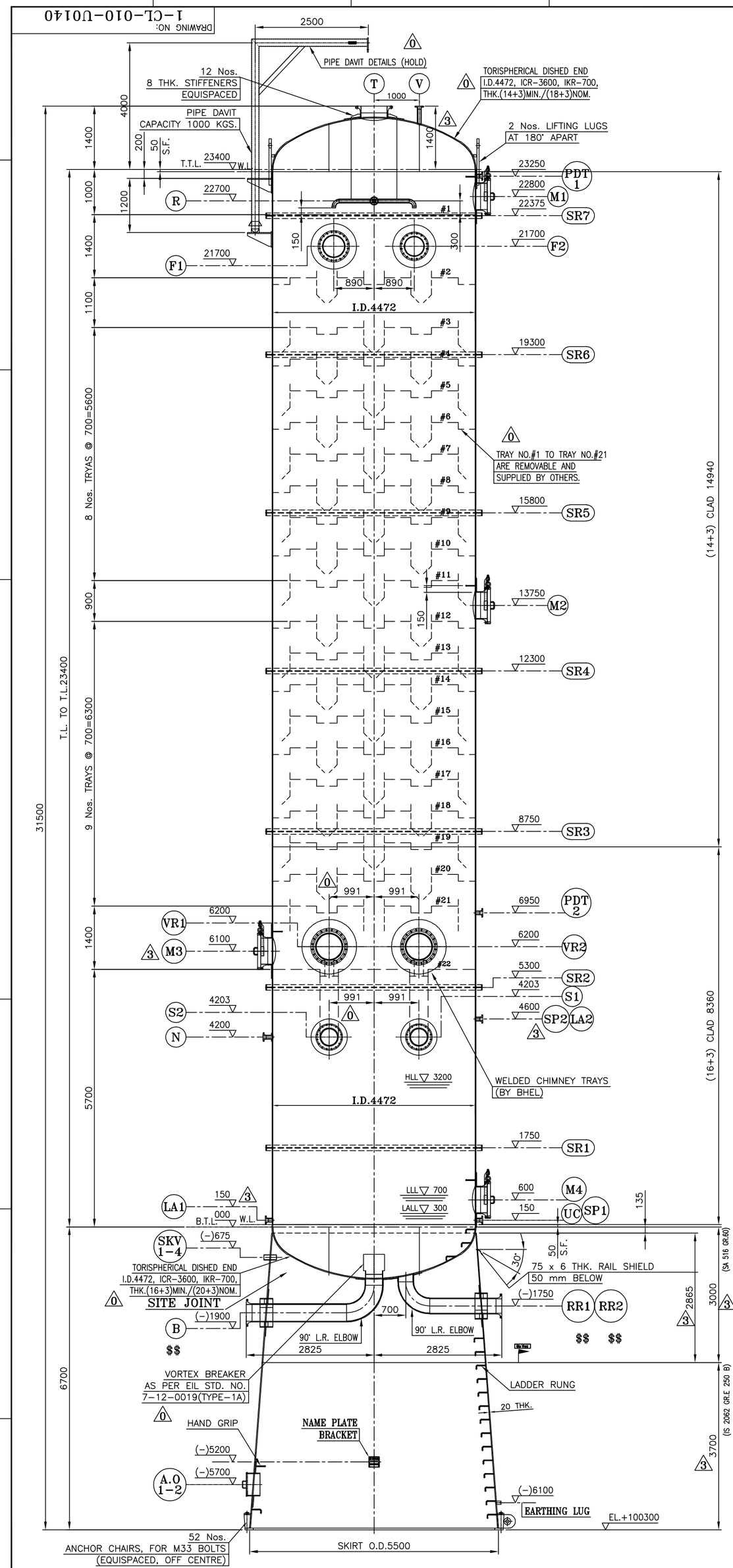
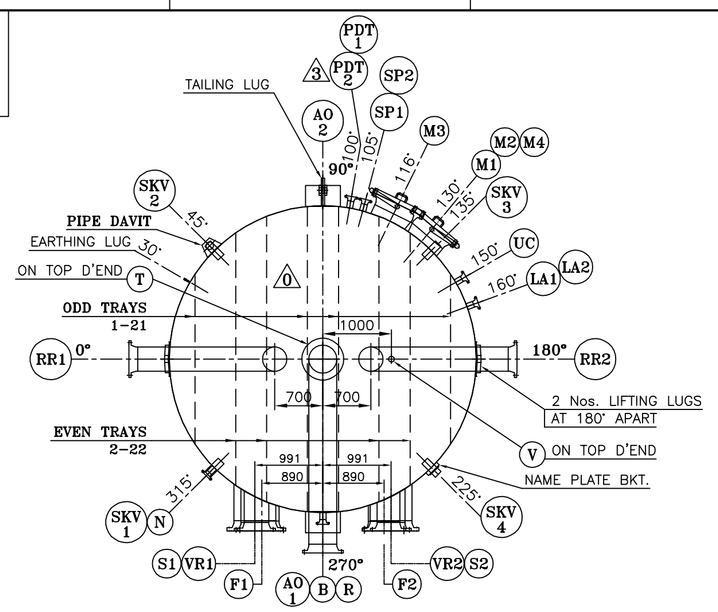
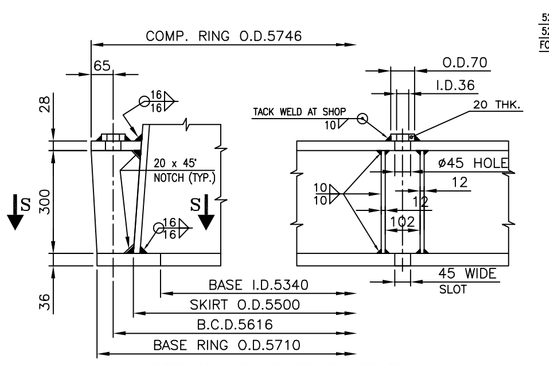
DRAWING NO: 1-CL-010-U0140

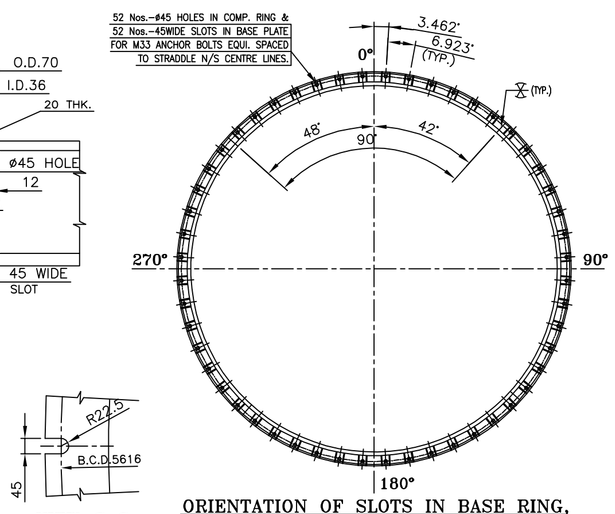




PLAN VIEW OF NOZZLE ORIENTATIONS

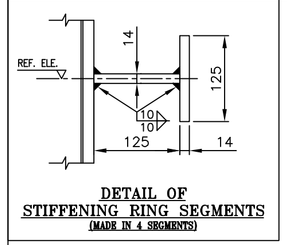


DETAIL OF ANCHOR CHAIRS (52 Nos.)



ORIENTATION OF SLOTS IN BASE RING, BOLT HOLES IN COMPRESSION RING (52 Nos.)

VIEW-S S



DETAIL OF STIFFENING RING SEGMENTS (MADE IN 4 SEGMENTS)

STANDARDS	
VESSEL TOLERANCES	7-12-0001
SKIRT BASE DETAILS	7-12-0004
SKIRT OPENING DETAIL	7-12-0005
MANHOLE WITH DAVIT	7-12-0010
LADDER RUNGS FOR MANHOLE/DEMISTER	7-12-0011
NOZZLE REINFORCEMENT AND PROJECTION	7-12-0013
STANDARD BOLT HOLE ORIENTATION	7-12-0015
ALLOY LINER DETAILS	7-12-0016
INTERNAL FLANGES	7-12-0018
VORTEX BREAKERS	7-12-0019
SUPPORT RING AND BOLTING BARS	7-12-0021
PIPE DAVIT	7-12-0023
LIFTING LUG TOP HEAD TYPE	7-12-0024
FIRE PROOFING AND INSULATION SUPPORTS	7-12-0025
EARTHING LUG	7-12-0026
NAME PLATE	7-12-0027
MANUFACTURER NAME PLATE	7-12-0028
BRACKET FOR NAME PLATE	7-12-0029
SUPPORTS FOR INTERNAL FEED PIPE	7-12-0032
ALLOWABLE NOZZLE LOADS	7-12-0038
SPECIFICATIONS	
GENERAL SPECIFICATION FOR PRESSURE VESSELS	6-12-0001
SUPPLEMENTARY SPECIFICATION FOR CS VESSELS	6-12-0002
SUPPLEMENTARY SPECIFICATION FOR CLAD VESSEL	6-12-0007
STD. SPECIFICATION FOR BQCS PLATES	6-12-0011
STD. SPECIFICATION FOR STRUCTURAL QUALITY PLATES	6-12-0014
SUPPLEMENTARY SPECIFICATION FOR CLAD PLATE	6-12-0015
STD. SPECIFICATION FOR SS PLATE	6-12-0020
JOB SPECIFICATION FOR SURFACE PREPARATION & PROTECTIVE COATING (NEWCONSTRUCTION)	B297-000-2-42-PCS-0001

APPLICABLE STANDARDS :

1. ASME BOILER & PRESSURE VESSEL CODE SEC VIII DIV 1 : ED-2019
2. ASME BOILER & PRESSURE VESSEL CODE SEC II PART A, C & D : ED-2019
3. ASME BOILER & PRESSURE VESSEL CODE SEC V : ED-2019
4. ASME BOILER & PRESSURE VESSEL CODE SEC IX ED-2019
5. ASME B16.5 ED-2013-STANDARD FOR PIPE FLANGES AND FLANGED FITTINGS.
6. ASME B16.11 ED-2016 FORGED STEEL FITTINGS, SOCKET WELDED & THREADED
7. ASME B36.10M ED-2018 WELDED AND SEAMLESS WROUGHT STEEL PIPE
8. ASME B1.20.1 ED2013 PIPE THREADS, GENERAL PURPOSE (INCH)

REFERENCE DRAWING LIST

DRAWING / DOCUMENT TITLE	BHEL DOCUMENT NUMBER
GENERAL ASSEMBLY OF REGENERATOR (COLUMN/TOWER-SS CLADED) (06-CC-102)	1-CL-010-U0140
ASSEMBLY DETAILS OF REGENERATOR (COLUMN/TOWER-SS CLADED) (06-CC-102)	1-CL-010-U0141
SHELL ASSEMBLY OF REGENERATOR (COLUMN/TOWER-SS CLADED) (06-CC-102)	1-CL-010-U0154
SKIRT ASSEMBLY OF REGENERATOR (COLUMN/TOWER-SS CLADED) (06-CC-102)	1-CL-010-U0155
INTERNAL DETAILS FOR REGENERATOR (06-CC-102)	1-CL-010-U0142
TRAY SUPPORT RING & BOLTING BARS FOR REGENERATOR (06-CC-102)	1-CL-010-U0156,211,212
EXTERNAL ATTACHMENTS OF REGENERATOR (06-CC-102)	1-CL-010-U0145
INSULATION & FIRE PROOFING SUPPORT DETAILS FOR REGENERATOR (06-CC-102)	1-CL-010-U0146
SHELL DEVELOPMENT OF REGENERATOR (06-CC-102)	0-CL-010-U0006
MANWAY DAVIT DETAILS FOR REGENERATOR (COLUMN/TOWER-SS CLADED)(06-CC-102)	3-CL-010-U0198
PIPE DAVIT DETAILS FOR REGENERATOR (COLUMN/TOWER-SS CLADED) (06-CC-102)	3-CL-010-U0195
TEMPLATE FOR FOUNDATION OF REGENERATOR (COLUMN/TOWER-SS CLADED) (06-CC-102)	3-CL-010-U0204
NAME PLATE DETAILS FOR REGENERATOR (COLUMN/TOWER-SS CLADED) (06-CC-102)	3-CL-010-U0200
SCHEDULE OF MANDATORY SPARES & COMMISSIONING SPARES (06-CC-102)	4-CL-010-U0057
GENERAL NOTES FOR REGENERATOR (06-CC-102)	4-CL-010-U0058
TRANSPORTATION ARRANGEMENT FOR REGENERATOR (06-CC-102)	2-CL-010-U0047
MECHANICAL DESIGN OF REGENERATOR (06-CC-102)	PPPV-2440-CL-010-001
ASSEMBLY DETAILS FOR HYDROTEST OF REGENERATOR (06-CC-102)	3-CL-010-U0215

LIST OF HOLDS

1. PIPE DAVIT

DESIGN DATA

CODE		ASME SEC.VIII DIV.1 LATEST EDITION
WORKING PRESSURE	(Kg/cm^2g)	TOP : 0.9, BOTTOM : 1.2
DESIGN PRESSURE	(Kg/cm^2g)	INT. : 3.5, EXT. : FULL VACCUM
WORKING TEMPERATURE	(°C)	TOP : 97, BOTTOM : 125
DESIGN TEMPERATURE	(°C)	150
MDMT	(°C)	1.7
CORROSION ALLOWANCE	(MM)	NIL
TYPE OF HEAD		TORISPHERICAL
JOINT EFFICIENCY		SHELL : 1, HEAD : 1
RADIOGRAPHY		SHELL : FULL, HEAD : FULL
POST WELD HEAT TREATMENT		YES (COMPLTE EQUIPMENT)
HEAT TREATMENT		HEAD AS PER SPEC./CODE
OPERATING MEDIUM		AMINE
SP. GRAVITY		0.9775 TO 1.027
WIND SPECIFICATON		IS 875
SEISMIC		IS 1893+SITE SPECTRA
CAPACITY	(M^3)	391
VESSEL SL. NO.		**26683**
INSULATION THICKNESS	(mm)	125 HOT
FIRE PROOFING		YES (BY OTHERS)
HYDROSTATIC TEST PRESSURE	(Kg/cm^2g) (NEW & COLD)	HORIZONTAL (AT TOP) 5.25
CONSIGNMENT SIZE		ODC
INSPECTION BY		E.I.L.

MATERIAL OF CONSTRUCTION ($) (AS PER AMSE/IS)

SHELL, HEADS, INSERT PLATES,	SA 516 GR.60 + SS 316L CLAD $
RAINFORCEMENT PADS	SA 516 GR.60
NOZZLE FLANGE UPTO 50 NB	SA 182 GR. F316L
NOZZLE FLANGE ABOVE 50 NB	SA 105+WELD OVERLAY OF SS 316L $
NOZZLE NECK UPTO 50 NB	SA 312 TP 316L
NOZZLE NECK ABOVE 50 NB UPTO 150 NB	SA 106 GR.B+WELD OVERLAY OF SS 316L $
NOZZLE NECK ABOVE 150 NB	SA 516 GR.60+SA 240 GR.316L CLAD $
PIPE FITTINGS	SA 234 GR.WPB+WELD OVERLAY OF SS 316L $
GASKET EXTERNAL	SPIRAL WOUND WITH SS 316L WINDING & GRAFOIL FILLER WITH CS OUTER RING & SS INNER RING AS PER ASME B16.20
GASKET INTERNAL	COMPRESSED FIBRE ASBESTOS FREE
EXTERNAL STUDS/BOLTS/NUTS	SA 193 GR.B7 / SA 194 GR.2H
INTERNAL STUDS/BOLTS/NUTS	SS 316L
SKIRT (PART)	SA 516 GR.60/IS 2062 GR E250 QUALITY-B
SKIRT / SUPPORT BASE	IS 2062 GR. E250 QUALITY-B
INTERNAL PARTS (WELDED)	SA 240 GR.316L
INTERNAL PARTS (BOLTED)	SA 240 GR.316L
CLIPS & ATTACHMENTS (EXTERNAL) DIRECTLY WELDED	SA 516 GR.60
CLIPS & ATTACHMENTS (EXTERNAL) WELDED OVER PAD	IS 2062 GR. E250 QUALITY-B
PAD FOR EXTERNAL ATTACHMENTS	SA 516 GR.60
LIFTING LUGS	SA 516 GR.60
PIPE DAVIT	SA 106 GR.B

$ ALL CLAD PLATES SHALL CONFIRM TO SA 264

FOUNDATION LOADING DATA (OPERATING CONDITION)

TYPE	MAX. MOMENT AT BASE (M) (Kgm.)	MAX. SHEAR FORCE AT BASE (H) (Kg.)
SEISMIC (DBE)	**1007000**	**47000**
SEISMIC (MCE)	**1496500**	**73600**
WIND	**566000**	**28000**

APPROXIMATE WEIGHT (kgs.) (PER ITEM)

ERECTION	91000	OPERATING	332500
HYDROTEST (SHOP)	482000	HYDROTEST (FIELD)	630000

NOZZLES — FLANGES AS PER ASME B16.5-2013

MARK NO.	QTY.	SERVICE	NB (N.P.S.)	O.D.	SCH. THK.	RATING CLASS	TYPE/ FACE	PROJECTION	R.F. PAD W x THK.	REMARKS
AO1,2	2	ACCESS OPENING	500 (20")	508.0	– 16 THK.	AS PER E.I.L. STD.			250 x 20	
SKV1-4	4	SKIRT VENT	100 (4")	114.3	SCH.40 –	AS PER E.I.L. STD.			–	
SP1,2	2	STAND PIPE	80 (3")	88.9	SCH.80 + #	150	WN/RF	2405	–	
N	1	NITROGEN CONNECTION	80 (3")	88.9	SCH.80 + #	150	WN/RF	2455	45 x 16	
PDT1,2	2	DIFFERENTIAL PRESSURE TRANSMITTER	80 (3")	88.9	SCH.80 + #	150	WN/RF	2405	–	
LA1,2	2	LEVEL SWITCH	80 (3")	88.9	SCH.80 + #	150	WN/RF	2405	–	
UC	1	UTILITY CONNECTION	80 (3")	88.9	SCH.80 + #	150	WN/RF	2405	–	0
V	1	VENT	80 (3")	88.9	SCH.80 + #	150	WN/RF	REF. DRG.	–	0
M1,2	2	MANHOLE+B.F.+DAVIT+ BOLTING+GASKET	600 (24")	609.6	– (14+3)	150	WN/RF	2505	300 x 14	
M3,4	2	MANHOLE+B.F.+DAVIT+ BOLTING+GASKET	600 (24")	609.6	– (16+3)	150	WN/RF	2505	300 x 16	
RR1,2	2	LIQUID RETURN (FROM REBOILER)	350 (14")	355.6	– (16+3)	150	WN/RF	REF. DRG.	175 x 16	
VR1,2	2	VAPOR RETURN (FROM REBOILER)	600 (24")	609.6	– (16+3)	150	WN/RF	2505	300 x 16	
S1,2	2	SIDE DRAWOFF (TO REBOILER)	400 (16")	406.4	– (16+3)	150	WN/RF	2505	200 x 16	
R	1	REFLUX	80 (3")	88.9	7.62+ 5mm W.O.L	150	WN/RF	2455	45 x 14	
T	1	TOP OUTLET	600 (24")	609.6	Clad 14+3	150	WN/RF	REF. DRG.	350 x 14	
B	1	BOTTOM OUTLET	400 (16")	406.4	Clad 16+3	150	WN/RF	REF. DRG.	200 x 16	
F1, F2	2	FEED	500/450 20")/(18"	508.0/ 457.0	Clad 14+3	150	WN/RF	2505	250 x 14	0

TABLE OF NOZZLES AND FLANGES

$$– TO BE WELDED AT SITE TO AVOID TRANSPORTATION CONSTRAINT IF ANY. ALL REQUIRED NDT AS PER CODE SHALL BE DONE BY BHEL AT SITE.

REV NO.	ZONE	BRIEF RECORD OF REVISIONS	PPD.	CHD.	APPD.	DATE
3		E.I.L. COMMENTS INCORPORATED.	SMG	IM	YPK	24.02.20
1		E.I.L. COMMENTS INCORPORATED.	SMG	IM	YPK	05.01.20
0		E.I.L. COMMENTS INCORPORATED.	NPR	IM	YPK	03.10.20

OWNER: GAIL (PATA).

LICENSOR : ENGINEERS INDIA LIMITED (भारत सरकार का उपक्रम) (A Govt. of India Undertaking)

E.I.L. JOB NO. B315, PR NO. B315-006-CC-PR-6010/0001

FORM NO. 0425/2

Bharat Heavy Electricals Limited
UNIT: HEAVY PLATES & VESSELS PLANT
VISAKHAPATNAM-530012

	NAME	SIGNATURE	DATE
DRN	N PRAKASH		13.08.20
CHD	IM / YPK		13.08.20
APPD	SKB		13.08.20

DEPT / CODE | ALL DIMENSIONS ARE IN MM | PROJECTION | SCALE: 1 : 60 & N.T.S | WEIGHT (Kg.): XXX | REF TO ASSY / OLD DWG: —

TITLE: GENERAL ASSEMBLY OF REGENERATOR (ITEM NO.06-CC-102)

DRAWING NO : 1-CL-010-U0140 | REV 3

A1 SIZE

	MANUFACTURER'S NAME & ADDRESS **BHEL-VISAKHAPATNAM OR APPROVED SUB-CONTRACTORS**	**QUALITY ASSURANCE PLAN FOR CLADDED COLUMN** Item: **Cladded Column** QAP No: CQP 2501 Rev **1** Date: 09.12.2020 Project: GAIL- Pata Page 1 of 15 EIL PR No. B315-006-CC-PR-6010/0001 Rev. 0	Customer: M/s GAIL, Pata. Licensor: EIL BHEL Sale Order No: 2440 GAIL FOA Ref: GAIL/PATA/C&P/2020/ REGENRATOR COLUMN/AD Dt:30.05.2020

Code of Construction: ASME Section VIII Div.1, Edition 2019

Sl. No.	Item Description	Customer / Unit	Tag Number
1.	Regenerator	M/s GAIL, Pata	06-CC-102

Approved with minor comment on 15-12-2020

P. Gopi Kishore/Mgr/QA/BHEL	A.K. Mandal/AGM/Q & BE /BHEL	ENGINEERS INDIA LTD. K BHAGYARAJ EIL 260 INSPECTION AUTHORITY
Prepared By	Reviewed By	Approved by Customer (as applicable)

MANUFACTURER'S NAME & ADDRESS :**BHEL-VISAKHAPATNAM OR APPROVED SUB-CONTRACTORS**	**QUALITY ASSURANCE PLAN FOR CLADDED COLUMN** Item**: Cladded Column** Project: GAIL- Pata EIL PR No. B315-006-CC-PR-6010/0001 Rev. 0	QAP No: CQP 2501 Rev **1** Date: 09.12.2020 Page 2 of 15	Customer: M/s GAIL, Pata. Licensor: EIL BHEL Sale Order No: 2440 GAIL FOA Ref: GAIL/PATA/C&P/2020/ REGENRATOR COLUMN/AD Dt:30.05.2020

SL NO	ACTIVITY	REFERENCE DOCUMENT	CHARACTERISITIC TO BE VERIFIED	ACCEPTANCE NORMS	VERIFYING DOCUMENTS /RECORDS	BHEL		EIL	Remarks
						Prod	Qua		
1.0	Design & Drawings approval	ASME Sec VIII Div.1 Ed 2019, MDS	Approved Drawings & Calculations	ASME Sec VIII Div.1 Ed 2019	Approved Drawings	-	H	H	
2.0	Inspection & Test Plan	ASME Sec VIII Div.1 Ed 2019 & Approved Drawings, PR	Documents & inspection stages	ASME Sec VIII Div.1 Ed 2019 & Approved Drg & PR	ITP	-	H	H	
3.0	**Review of Procedures**								
3.1	All Manufacturing, Test procedures (NDE, Surface Preparation & Painting, Forming & Heat Treatment)	ASME SEC.V, ASME Sec IX & Sec VIII Div.1 1 Ed 2019, PR, APPROVED DRAWING, PR Specifications.	Compliance to ASME CODES & PR	ASME SEC.V, ASME Sec IX & Sec VIII Div.1 1 Ed 2019, PR, APPROVED DRAWING	Procedures	-	H	R	To be submitted for information
3.2	Welding Process	WPS/PQR/WPQ (shall be within 5 years)	Compliance to ASME CODES & PR.	ASME SEC.V, ASME Sec IX & Sec VIII Div.1 1 Ed 2019, PR, APPROVED DRAWING	WPS/PQR/WPQ	-	H	R / W	R-for existing; W-for New.
4.0	**Raw materials**								
4.1	Plates, Pipes & Forgings at sourcing locations	Approved Drawings & Purchase Order, PR	As per PR and ASME Sec IIA Ed 2019	As per PR and ASME Sec IIA Ed 2019	Test Certificates	-	H	W*	*Refer Note -9

SL NO	ACTIVITY	REFERENCE DOCUMENT	CHARACTERISITIC TO BE VERIFIED	ACCEPTANCE NORMS	VERIFYING DOCUMENTS /RECORDS	BHEL		EIL	Remarks
						Prod	Qua		
4.2	**Raw materials after receipt**								
4.2.1	Plates for shells, PTC and dished ends, All parts welded to Pr parts + All process wetted parts	Approved Drawings & Purchase Order, PR	As per PR and ASME Sec IIA Ed 2019	As per PR and ASME Sec IIA Ed 2019	Test Certificates	-	H	H	
4.2.2	Nozzles, forgings, pipes & flanges, and Fittings.	Approved Drawings & Purchase Order	As per TDC and ASME Sec IIA Ed 2019 & PR	As per TDC and ASME Sec IIA Ed 2019 & PR	Test Certificates	-	H	H	
4.2.3	Non-Pressure parts	Approved Drawings & Purchase Order	As per material specification	As per material specification	Test Certificates	-	H	R	
4.2.4	Welding consumables	Purchase Order	As per ASME Sec IIC Ed 2019 & PR	As per ASME Sec IIC Ed 2019 & PR	Test Certificates	-	H	R	
4.2.5	Fasteners and Gaskets	Approved Drawings & Purchase Order	As per TDC and ASME Sec IIA Ed 2019	As per TDC and ASME Sec IIA Ed 2019	Test Certificates	-	H	R	
4.2.6	Base Ring Template	Approved Drawings & Purchase Order	As per TDC and ASME Sec IIA Ed 2019	As per TDC and ASME Sec IIA Ed 2019	Test Certificates	P	H	R	~~IRN by EIL based on review of internal QC Records.~~

SL NO	ACTIVITY	REFERENCE DOCUMENT	CHARACTERISITIC TO BE VERIFIED	ACCEPTANCE NORMS	VERIFYING DOCUMENTS /RECORDS	BHEL		EIL	Remarks
						Prod	Qua		
5.0	**Fabrication of Dished ends**								
5.1	Transfer of marking and heat number	As per Material test certificates	Heat no and material specification	Approved drawing	-	P	H	W	
5.2	Fit up & welding of long seam	Approved Drawings	Offset & weld geometry	Approved drawing & WPS	Fit up report	P	H	W	
5.3	100 % PT on root & final weld, chipped back LS weld, Cu SO4 solution test after clad removal (TYP)	Approved Drawings	Detection of flaws	Approved PT Procedure	PT Report	P	H	RW	
5.4	100 % RT of completed LS weld	Approved Drawings	Detection of flaws	Approved RT Procedure	RT Films	P	H	R	
5.5	Clad restoration on Long seam	Approved Drawings	Parameters as per WPS, Welder Qualification	WPS	-	P	H	-	
5.6	100 % PT on clad restoration after each pass	Approved Drawings	Detection of flaws	Approved PT Procedure	PT Report	P	H	RW	
5.7	Chemical analysis of clad (2 samples) per seam	ASME Sec IIC & Clad procedure	As per specification	As per specification	Analysis report (Note-3)	-	H	R	Per WPS/ Welder basis

SL NO	ACTIVITY	REFERENCE DOCUMENT	CHARACTERISITIC TO BE VERIFIED	ACCEPTANCE NORMS	VERIFYING DOCUMENTS /RECORDS	BHEL		EIL	Remarks
						Prod	Qua		
5.8	Forming of dished end	Approved Drawings ASME Sec VIII Div. 1	Visual & Dimensional check, Template check	Approved Drawings	Dimension Report	P	H	-	
5.9	100 % PT of knuckle area (Note-2)	Approved Drawings	Detection of flaws	Approved PT Procedure	PT Report	P	H	W	
5.10	100% UT on Crown , Knuckle, WEP and straight face	Approved procedures	Thickness measurement & Dis-bondment check	Approved Drawing, procedures & A 568 with S6 Level 2	UT report	P	H	W	
5.11	Visual & Final Dimensions including Dished end profile checking with Template	Approved Drawing ASME Sec VIII Div. 1	Dimensions	Approved Drawing	Dimension Report	P	H	W	
6.0	**Fabrication of Main shell along with PTC**								
6.1	Plate marking & cutting	Approved drawing & cutting plan	Dimensions	Approved Drawings	-	P	-	-	Refer Note-6
6.2	Shell rolling	Approved drawing & cutting plan	Dimensions	Approved Drawings	-	P	H	-	
6.3	Long seam fit up & welding along with test coupon	Approved Drawings	Offset & weld geometry	Approved drawing & WPS	Fit up report	P	H	W	
6.4	100 % PT on root & final weld ,chipped back LS weld	Approved Drawings	Detection of flaws	Approved PT Procedure	PT Report	P	H	R	
6.5	RT of completed LS weld & test coupon	Approved drawings	Detection of flaws	Approved RT Procedure	RT Films	P	H	R	

SL NO	ACTIVITY	REFERENCE DOCUMENT	CHARACTERISITIC TO BE VERIFIED	ACCEPTANCE NORMS	VERIFYING DOCUMENTS /RECORDS	BHEL		EIL	Remarks
						Prod	Qua		
6.6	Clad restoration on Long seam & test coupon	Approved Drawings	Parameters as per WPS	WPS	-	P	-	-	
6.7	100 % PT on clad restoration each layer	Approved Drawings	Detection of flaws	Approved PT Procedure	PT Report	P	H	RW	
6.8	Chemical analysis of clad (2 samples) per seam	ASME Sec IIC & Clad procedure	As per specification & PR	As per specification & PR	Analysis report (Note-3)	-	H	W	Per welder / WPS/ shell course basis
6.9	Ferrite check of clad overlay (2 spots per seam)	ASME Sec IIC Ed 2019	Ferrite content	As per drawing	Ferrite Report	-	H	RW	
6.10	UT on Rolled sections of clad and weld overlay	Approved procedures	Disbondment	Approved procedures,	UT report	P	H	W	
6.11	Testing of test coupon	ASME Sec VIII Div.1 Ed 2019	Tensile & Hardness	ASME Sec VIII Div.1 Ed 2019	Test reports	-	H	RW	
7.0	**Shell to Shell to Circular seam fabrication**								
7.1	CS fit up & welding	Approved Drawings	Offset & weld geometry	Approved drawing & WPS	Fit up report	P	H	W	
7.2	100 % PT on root & final weld, chipped back CS weld	Approved Drawings	Detection of flaws	Approved PT Procedure	PT Report	P	H	R	
7.3	RT of completed CS weld	Approved drawings	Detection of flaws	Approved RT Procedure	RT Films	P	H	R	
7.4	Clad restoration on C-seam	Approved Drawings	Parameters as per WPS	WPS	-	P	-	-	
7.5	100 % PT on clad restoration after each pass	Approved Drawings	Detection of flaws	Approved PT Procedure	PT Report	P	H	RW	

SL NO	ACTIVITY	REFERENCE DOCUMENT	CHARACTERISITIC TO BE VERIFIED	ACCEPTANCE NORMS	VERIFYING DOCUMENTS /RECORDS	BHEL		EIL	Remarks
						Prod	Qua		
7.6	Chemical analysis of clad (2 samples) per seam	ASME Sec IIC & Clad procedure	As per specification & PR	As per specification & PR	Analysis report (Note-3)	-	H	RW	
7.7	Ferrite check of clad overlay (2 spots per seam)	ASME Sec IIC Ed 2019	Ferrite content	As per drawing	Ferrite Report	-	H	RW	
8.0	**Shell to Dished end circular seam fabrication**								
8.1	CS fit up & welding	Approved Drawings	Offset & weld geometry	Approved drawing & WPS	Fit up report	P	H	W	
8.2	100 % PT on root & final weld, chipped back CS weld	Approved Drawings	Detection of flaws	Approved PT Procedure	PT Report	P	H	R	
8.3	RT of completed CS weld	Approved Drawings	Detection of flaws	Approved RT Procedure	RT Films	P	H	R	
8.4	Clad restoration on C-seam	Approved Drawings	Parameters as per WPS	WPS	-	P	H	-	
8.5	100 % PT on clad restoration after each pass	Approved Drawings	Detection of flaws	Approved PT Procedure	PT Report	P	H	RW	
8.6	Chemical analysis of clad (2 samples) per seam	ASME Sec IIC & Clad procedure	As per specification & PR	As per specification & PR	Analysis report (Note-3)	-	H	RW	
8.7	Ferrite check of clad overlay (2 spots per seam)	ASME Sec IIC Ed 2019	Ferrite content	As per drawing	Ferrite Report	-	H	RW	

SL NO	ACTIVITY	REFERENCE DOCUMENT	CHARACTERISITIC TO BE VERIFIED	ACCEPTANCE NORMS	VERIFYING DOCUMENTS /RECORDS	BHEL		EIL	Remarks
						Prod	Qua		
9.0	**Weld overlay of Nozzles, Pipes, Elbows and blind flanges**								
9.1	Weld overlay	Approved drawings	Welding parameters	Adherence to WPS	-	P	-	-	
9.2	Weld overlay thickness from inside the nozzles	Approved drawings	Thickness	Approved drawings	Inspection Report	-	H	W	
9.3	Chemical analysis of weld overlay (1 sample per size representing manual weld overlays of Nozzles, Pipes, Fittings) per seam	ASME Sec IIC & Clad procedure	As per specification	As per specification	Analysis report (Note-3)	-	H	RW	RW-by EIL is applicable during sample collection only.
9.4	Ferrite check of weld overlay(2 spots per weld overlay) (1 sample per size representing manual weld overlays of Nozzles, Pipes, Fittings)	ASME Sec IIC Ed 2019	Ferrite content	As per drawing	Ferrite Report	-	H	RW	
9.5	100 % PT of weld overlay after each pass	Approved Drawings	Detection of flaws	Approved PT Procedure	PT Report	P	H	R	
10.0	**Fabrication of Nozzle Assemblies**								
10.1	Fit up & welding of C-seams of pipes/ elbows/ flanges / nozzle neck, internal pipes	Approved Drawings	Offset & weld geometry	Approved drawing & WPS	Fit up report	P	H	R	Functional test for Davit.
10.2	RT of completed CS weld & L-seam of rolled nozzles	Approved Drawings	Detection of flaws	Approved RT Procedure	RT Films	P	H	R	

SL NO	ACTIVITY	REFERENCE DOCUMENT	CHARACTERISITIC TO BE VERIFIED	ACCEPTANCE NORMS	VERIFYING DOCUMENTS /RECORDS	BHEL		EIL	Remarks
						Prod	Qua		
10.3	Clad restoration on C-seam	Approved Drawings	Parameters as per WPS	WPS	-	P	-	-	
10.4	100 % PT of weld overlay after each pass, nozzle to flange root welds	Approved Drawings	Detection of flaws	Approved PT Procedure	PT Report	P	H	RW	
10.5	Chemical analysis of weld overlay(2 samples) per seam	ASME Sec IIC & Clad procedure	As per specification	As per specification	Analysis report (Note-3)	-	H	RW	RW-by EIL is applicable during sample collection only.
10.6	Ferrite check of weld overlay (2 spots per seam (1 sample per size representing Nozzles, Pipes, Fittings)	ASME Sec IIC Ed 2019	Ferrite content	As per drawing	Ferrite Report	-	H	RW	
11.0	**Nozzle to shell/dished end fabrication**								
11.1	Marking and openings of nozzles on shells	Approved Drawings	Location and orientation	Approved Drawings	-	P	H	R	
11.2	PT on gas cut edges	Approved Drawings	Detection of flaws	Approved PT Procedure	PT Report	P	H	R	
11.3	Fit up & welding of nozzles on shells or dished ends	Approved Drawings	Offset & weld geometry	Approved drawing & WPS	Fit up report	P	H	RW	
11.3.1	Pneumatic test on RF Pads	Approved Drawing	Detection of leakage	Approved Drawing	Approved Drawing	P	H	RW	
11.4	100 % PT on chipped back CS weld	Approved Drawings	Detection of flaws	Approved PT Procedure	PT Report	P	H	R	
11.5	Clad restoration on welds	Approved Drawings	Parameters as per WPS	WPS	-	P	-	-	

SL NO	ACTIVITY	REFERENCE DOCUMENT	CHARACTERISITIC TO BE VERIFIED	ACCEPTANCE NORMS	VERIFYING DOCUMENTS /RECORDS	BHEL		EIL	Remarks
						Prod	Qua		
11.6	100 % PT of weld overlay after each pass	Approved Drawings	Detection of flaws	Approved PT Procedure	PT Report	P	H	RW	
11.7	Chemical analysis of weld overlay(2 samples) per seam	ASME Sec IIC & Clad procedure	As per specification	As per specification	Analysis report (Note-3)	-	H	RW	RW-by EIL is applicable during sample collection only.
11.8	Ferrite check of weld overlay (2 spots per seam)	ASME Sec IIC Ed 2019	Ferrite content	As per drawing	Ferrite Report	-	H	RW	
11.9	100 % UT for nozzle to shells and nozzle to pipe	Approved Drawings	Detection of flaws	Approved UT Procedure	UT Report	P	H	W	
12.0	**Skirt fabrication, assembly and Final Inspection**								
12.1	Fit up & welding of Skirt, Skirt with Vessel	Approved Drawings	Dimensions & weld geometry	Approved drawing & WPS	Fit up report	P	H	W	
12.1 12.2	RT of C-seam & L-seam	Approved Drawings	Detection of flaws	Approved RT Procedure	RT Films	P	H	R	
12.3	100 % PT of welds (including root and final welds as applicable)	Approved Drawings	Detection of flaws	Approved PT Procedure	PT Report	P	H	W	
12.4	Dimensional inspection of Skirt	Approved Drawings	Dimensions	Approved Drawings	Report	P	H	W	
12.5	Marking of Internal and external cleats, supports	Approved Drawings	Dimensions	Approved Drawings	Report	P	H	R	

	MANUFACTURER'S NAME & ADDRESS :**BHEL-VISAKHAPATNAM OR APPROVED SUB-CONTRACTORS**	**QUALITY ASSURANCE PLAN FOR CLADDED COLUMN**	Customer: M/s GAIL, Pata. Licensor: EIL BHEL Sale Order No: 2440 GAIL FOA Ref: GAIL/PATA/C&P/2020/ REGENRATOR COLUMN/AD Dt:30.05.2020
		Item**: Cladded Column** Project: GAIL- Pata EIL PR No. B315-006-CC-PR-6010/0001 Rev. 0	QAP No: CQP 2501 Rev **1** Date: 09.12.2020 Page 11 of 15

SL NO	ACTIVITY	REFERENCE DOCUMENT	CHARACTERISITIC TO BE VERIFIED	ACCEPTANCE NORMS	VERIFYING DOCUMENTS /RECORDS	BHEL		EIL	Remarks
						Prod	Qua		
13.0	100% UT of attachments welded directly to cladding	Approved procedures	Detection of flaws	Approved procedures	UT report	P	H	R	Refer Note-12
14.0	Pneumatic test on RF Pads	Approved Drawing	Detection of leakage	Approved Drawing	Approved Drawing	P	H	RW	
15.0	Visual & Final dimensional inspection before PWHT including internals	Approved Drawings	Dimensions, orientations	Approved Drawings	Dimensional report	P	H	H	
15.1	Internals inside the column	Approved Drawings	Dimension, Orientation and 1) Ovality in Column ID 2) Support Ring Levelness 3) Bolting Bar offset distances 4) Bolting Bar Height including UDFC dimensions 5) Down-comer & Major Beam Stool Distance from top of Support Ring etc.	Approved Drawings, & EIL Standard Drawing No. 7-12-0001 & 7-14-0001	Dimensional report	P	H	H	
16.0	PWHT of equipment along with PTC	PWHT procedure	Calibration of thermocouples/ Recorders	PWHT procedure	HT Chart review	P	H	H for relea se	

SL NO	ACTIVITY	REFERENCE DOCUMENT	CHARACTERISITIC TO BE VERIFIED	ACCEPTANCE NORMS	VERIFYING DOCUMENTS /RECORDS	BHEL		EIL	Remarks
						Prod	Qua		
17.0	Testing of test coupons (PTC)	ASME Sec VIII Div. 1Ed 2019	Tensile & Hardness	ASME Sec VIII Div. 1Ed 2019	Test Reports	P	H	W	
18.0	NDE after PWHT 100% UT on pressure retaining weld	Approved Drawings	Detection of flaws	Approved UT Procedures	UT Report	P	H	W	
19.0	Spot PT on internal & external welds.	Approved Drawings	Detection of flaws	Approved PT Procedure	PT Report	P	H	W	
20.0	Hardness check of all pressure part joints on weld / HAZ / PM	ASME Sec VIII Div. 1Ed 2019	Hardness	ASME Sec VIII Div. 1Ed 2019 & PR	Test report	P	H	RW	
21.0	Final dimensional inspection after PWHT	Approved Drawings	Dimensions, orientations	Approved Drawings	Dimensional report	P	H	H	
22.0	PMI Check (only for SS , Alloy Steels)	PR Specification	As per ASME Sec IIC Ed 2019	ASME Sec IIA Ed 2019.	PMI report	P	H	RW	
23.0	Shop Hydro test & Draining, drying, inside cleaning.	Approved Drawings	No pressure drop or leaks	Approved hydro test procedure; draining & drying procedure	Test report	P	H	H	Chloride content in hydro testing water to be less than 25ppm.
24.0	Pickling & passivation of weld overlay of nozzles, clad surface of shells, dished ends and further cleaning and drying	Approved Drawings	Visual examination	Approved Drawings & PR	Report	P	H	RW	

SL NO	ACTIVITY	REFERENCE DOCUMENT	CHARACTERISITIC TO BE VERIFIED	ACCEPTANCE NORMS	VERIFYING DOCUMENTS /RECORDS	BHEL		EIL	Remarks
						Prod	Qua		
25.0	Surface preparation & Primer painting,	Approved Drawings	Visual examination & DFT check	Approved Drawings	Report	P	H	RW	
26.0	Primer Paint application	Approved Drawings	Visual & DFT	Approved Drawings	Report	P	H	R	
27.0	Cutting of Complete Vessel into sections & Weld edge preparation for site weld	Approved drawing / cutting plan	Dimensions	Approved Drawings	-	P	H	W	Refer Note-6
28.0	Trial assembly of cut sections, match marking	Approved drawing / cutting plan	Dimensions	Approved Drawings	-	P	H	W	
29.0	Issue of IRN & clearance for dispatch	Approved drawings	All stages as per this approved ITP	-	Release Note	-	-	H	
30.0	**Site fabrication**								
30.1	Weld edge, CS fit up & welding	Approved Drawings	Visual, Offset & weld geometry	Approved drawing & WPS	Fit up report	P	H	W	
30.2	100 % PT on root & final weld, chipped back CS weld	Approved Drawings	Detection of flaws	Approved PT Procedure	PT Report	P	H	R	
30.3	RT of completed CS weld	approved drawings	Detection of flaws	Approved RT Procedure	RT Films	P	H	R	For site weld in Pressure part
30.4	Local Box Type Hydro test (as specified in drawing)	Approved Drawings	No pressure drop or leaks	Approved hydro test procedure; draining & drying procedure	Test report	P	H	H	
30.5	Local PWHT for the column	PWHT procedure	Calibration of thermocouples/ Recorders	PWHT procedure	HT Chart review	P	H	H for relea se	

SL NO	ACTIVITY	REFERENCE DOCUMENT	CHARACTERISITIC TO BE VERIFIED	ACCEPTANCE NORMS	VERIFYING DOCUMENTS /RECORDS	BHEL		EIL	Remarks
						Prod	Qua		
30.6	Surface preparation & Primer painting	Approved Drawings	Visual examination & DFT check	Approved Drawings	Report	P	H	RW	Only where touch up is applicable
30.7	Issue of site IRN	Approved drawings	All stages as per this approved ITP	-	Release Note	-	-	H	
30.8	Manufacturer's Data Report & Final documentation	Approved drawings & this ITP	Completeness	Approved drawings & this ITP	Reports	-	H	H	QAP sign off by EIL

	MANUFACTURER'S NAME & ADDRESS :**BHEL-VISAKHAPATNAM OR APPROVED SUB-CONTRACTORS**	**QUALITY ASSURANCE PLAN FOR CLADDED COLUMN** Item**: Cladded Column** QAP No: CQP 2501 Rev **1** Date: 09.12.2020 Project: GAIL- Pata Page 15 of 15 EIL PR No. B315-006-CC-PR-6010/0001 Rev. 0	Customer: M/s GAIL, Pata. Licensor: EIL BHEL Sale Order No: 2440 GAIL FOA Ref: GAIL/PATA/C&P/2020/ REGENRATOR COLUMN/AD Dt:30.05.2020

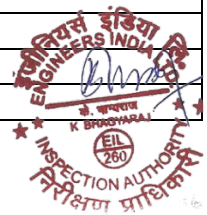
SL NO	ACTIVITY	REFERENCE DOCUMENT	CHARACTERISITIC TO BE VERIFIED	ACCEPTANCE NORMS	VERIFYING DOCUMENTS /RECORDS	BHEL		EIL	Remarks
						Prod	Qua		

Notes:

1) For qualification any new WPS, or new WPQ, witness of TPIA is envisaged.
2) In case, the bevel edges are made with gas cutting, the edges shall be 100 % PT tested.
3) Wherever chemical analysis of weld metal overlay shall be measured, it shall be at a depth of 2/3rd of the cladding thickness from top of the finished overlay surface.
4) Weld over lay thickness cannot be more than 3 mm over and above the required clad thickness.
5) All specifications as available in drawings shall be complied.
6) In case site weld is required to be done in line to drawing, suitable extra dimensions are to be provided such that complete equipment after shop hydro test is cut into pieces and transported to site followed by seam welding at site.
7) All requirements as per PR (Purchase Requisition) shall be met.
8) For weld overlay, electrode for barrier layer E309MoL shall be used in line with EIL Spec. No. 6-12-0007.
9) Witness by EIL for indigenous clad plates during explosion bonding activity of base plate with stainless steel plate followed by identification. Witness by TPIA for imported plate material.
10) Extent of RT will be in line to approved drawings.
11) EIL Spec 6-12-0005 Rev 5 Cl. No. 5.1.5: For welding of clad piping components such as pipe to pipe / pipe fitting from single side where approach from clad side is not accessible, shall be done with a welding consumable matching the clad material followed by an intermediate layer of pure iron (ARMCO/KARDO Iron) welding filler material and then by a welding consumable matching the base material.
12) EIL Spec 6-12-0005 Rev 5 Cl. No. 6.1.4: 100% UT shall be carried out of areas where attachments are to be welded directly to the cladding. The above areas shall include 50mm width of adjacent areas on both sides of attachment.
13. Clause no 30.5 for PWHT to be done before Hydro test of site joint for clause no 30.4

Legends:

P: Perform	**WPS: Welding procedure specification**	**DFT: Dry film thickness**	**LS: Longitudinal Seam welding**
R: Review	**WPQ; Welder performance Qualification**	**HT Chart: Heat Treatment chart**	**CS-Circular Seam welding**
H: Hold	**RT: Radiographic testing**	**PR-Purchase Requisition**	
W: Witness	**UT: Ultrasonic testing**	**Prod: Production**	
RW: Random Witness	**PT: Dye penetrant testing**	**Qua: Quality**	
	MPT: Magnetic particle testing	**IRN: Inspection release note issued by EIL**	



JOB SPECIFICATION FOR SITE ASSEMBLED COLUMNS (HORIZONTAL ASSEMBLY) AT GAIL PATA

Rev. No	Date	Purpose	Prepared by	Checked by	Approved by
B	29.11.2019	REVISED AND REISSUED FOR BIDS	AKR	PKP	NK
A	14.11.2019	ISSUED FOR BIDS	AKR	PKP	NK

COLUMN ASSEMBLY AT SITE

1. GENERAL

This specification covers scope of work and supply at site for site assembled columns viz. 06-CC-102

a) Vendor shall fabricate the complete column at shop, carry out all inspections and tests including the hydrotesting & PWHT of entire column in single piece at shop. After completion of above activities, the column shall be cut in sections (Site seam location as per drawing); primer painted and weld edge prepared for welding at site. Vendor shall consider extra length to account for cutting in sections & re-welding at site. Fabricator shall trial assemble the column sections after cutting the column into sections at shop, match mark, provide alignment/fitment cleats, spiders at open end sections to maintain circularity, etc., before dispatch of column sections to site.

2. SCOPE OF SITE WORK:

a) Unloading and handling of column sections at client designated location at site.

b) Conducting visual inspection of the weld edges and conducting MP/DP test.

c) Completing site seam as per approved WPS using qualified welders for all the above mentioned columns.

d) If site weld is located in pressure part, the following must be followed in addition to rest of the activities listed above for the subject seam.

- Carrying out all the NDT as per requirements of the requisition.
- Local box type hydrotest (as applicable) in Horizontal condition.
- Local PWHT for the column

e) Carrying out MP/DP test for the weld joint on non pressure part.

f) Surface preparation and primer painting of the site seam is in vendor's scope.

g) Installation of Platform, Ladder, Grating, Hand railing & Other structural works on Column in horizontal position.

h) It is vendor's responsibility to ensure the verticality & plumbness of the columns.

3. EXCLUSIONS

Further transportation of completed columns to equipment foundation and Erection of completed columns is by OTHERS.

4. RESOURCES TO BE ARRANGED BY VENDOR AT SITE FOR FABRICATION

a) During transportation and handling at site, equipment sections shall be supported properly with adequate supports of proper design so that no damage occurs to any component. Suitable steel saddles shall be designed, fabricated & supplied by vendor for transportation of these sections from their works to site. These saddles shall be taken back by the vendor.

b) Assembly of column sections shall not be undertaken without the use of power rollers. Fabricator shall mobilize crane(s) of adequate capacity to handle column sections for site assembly. Fabricator shall provide power rollers of adequate capacity and numbers for carrying out the job at site. The rollers shall be properly placed so that equipment is not damaged while fabrication. In addition, supply of idlers of adequate capacity and number is the responsibility of the fabricator. All power rollers and idlers shall be kept on compacted ground/hard stand, as necessary and shall be properly leveled before rollers are kept. In case the ground is not having adequate strength, compaction of ground has to be made meeting all load requirements arising from assembly/hydrotest point of view. The same shall be included in quoted price. Only plain leveled ground shall be provided for site activities by Owner.

c) All material, equipment like rollers, welding machine, cranes/hydra/trailer, other handling equipment etc., tools and tackles, labour and consumables etc. shall be arranged by vendor.

d) Fabricator shall erect stationary shed for all site activities. In addition, fabricator shall provide proper storage for all critical equipments, machinery, tools & tackles, consumables etc.

e) Based on the schedule and quantum of site activities, fabricator shall provide all resources such as welders, fitters, markers, supervisors, QA/QC personnel, NDT personnel, NDT equipments, welding materials, temporary circumferential stiffeners, saddles of adequate strength, tools & tackles, baking ovens/portable ovens for electrodes, saw machines etc. required for carrying out C-seam welds, NDT etc. All welding shall be carried out by qualified welders with approved procedures. NDT personnel shall be qualified to ASNT level-II.

f) Lifting Lug and tailing lug shall be provided by vendor on the column sections for proper handling and assembly. Validation of design of tailing lug by carrying out calculation is in vendor's scope. Temporary stiffeners, alignment cleats, tailing lug & lifting lugs used for assembly shall be cut after completion of the job leaving 12 mm from vessel surface such that no damage occurs to the shell.

g) Barricading for safety shall be required (in the vicinity of the operating plant). Design, supply of all material and related works for Barricading and, later on, taking back the same, after the completion of Project work, shall be in the scope of the bidder for this requisition. Dimensions for required total barricading shall be as per equipment proposed site work duly approved by client safety norms.

5. GENERAL REQUIREMENTS

a) Location of site Circumferential seam (C-seam) is shown in the Mechanical Datasheet of equipment. This location may be changed slightly to avoid fouling during fabrication. Fabricator to provide additional length to take care of cutting and welding allowance.

b) Fabricator shall carry out complete route survey taking into account the overall dimensions of column sections from fabricator works to site (including inside the plant upto assembly point). It is the responsibility of the vendor to take approval from various statutory bodies such as follows for the movement of the consignment.

- **Electricity Board**
- **Railways**
- **P.W.D.**
- **Local Authorities**
- **Mercantile Marine Deptt.**
- **Irrigation authorities**
- **Environment authorities**

B

Any modification/repair etc. required enroute including civil works are in bidder's scope. However, any modification/repair required inside the petrochemical complex shall be carried out by others. Temporary approaches within petrochemical Complex for transport of column section shall be in bidder's scope.

c) Pumps for hydrostatic test shall be of adequate capacity (to be arranged by fabricator) so that filling and pressurizing is being carried out to the required conditions. While draining water, adequate care shall be taken to avoid any damage to the equipment. All top nozzles shall be kept open and the draining shall be so regulated that occurrence of vacuum and subsequent damage is avoided.

d) All necessary treatment for water for hydrotest purpose shall be carried out by vendor at his own cost.

e) Fabricator shall keep the column sections well ventilated and well illuminated during all activities inside the column. For this purpose suitable exhaust, air purge connections and low voltage connection shall be provided.

f) All safety requirements of the plant as dictated by the operation group of the client shall be adhered to by fabricator. All necessary safety equipments required shall be arranged by fabricator. Fabricator shall provide dedicated safety engineer throughout the contract period.

g) Vendor may carry out the site work himself or employ a site contractor for carrying out site activities limited to assembly and site welding of circumferential joints & NDT. All other site activities shall be carried out by bidder.

The subcontractor proposed by vendor should have carried out such activities of similar equipment in the past. His past track record shall be submitted for owner/EIL approval post award. Column vendor shall have single point responsibility and shall stand guarantee for above site activities of site contractor.

h) Adequate space near equipment foundation for site assembly of equipment in horizontal position shall be provided at site. Completely assembled equipment shall be handed over at assembly point.

i) Space for dark room for development and review of radiographs and heat treatment facility shall be provided. Dark room facility will be approved by EIL. Proper storage arrangement for radiography films shall be provided.

j) While making assembled sections in horizontal condition, adequate care shall be taken to provide proper stiffeners at the open ends as well as in between the sections so that no buckling takes place.

k) It is vendor responsibility to remove all debris and clean the fabrication yard once all the activities are completed as per instruction of Engineer-in-charge.

l) All safety requirements of the plant as dictated by EIL/Owner shall be adhered to by vendor. All necessary safety equipments required shall be arranged by vendor. Vendor shall provide dedicated safety engineer throughout the contract period. The following health/safety / Environment points shall be taken care of by vendor.

1. Helmets, fall arrestors, safety belts, goggles etc. for personnel safety of people working on ground and at elevations.
2. Welding fumes to be vented out and exhausted suitably.
3. Waste water after testing shall be disposed suitably.
4. Safety/work permits to be obtained, as and when required

6. OWNER'S SCOPE OF SUPPLY:

a. Construction Power: Refer commercial document.

b. Water: Refer commercial document.

7. Local PWHT: Vendor shall develop PWHT facilities at site for carrying out PWHT of site seam.(If applicable)

SCOPE OF SUPPLY

Rev. No	Date	Purpose	Prepared by	Checked by	Approved by
B	29.11.2019	REVISED & REISSUED FOR BIDS	AKR	PKP	NK
A	14.11.2019	ISSUED FOR BIDS	AKR	PKP	NK

SCOPE OF SUPPLY

[X] Indicates applicability

The following materials will be supplied by

1. Owner

1.1 Boiler quality/low-alloy/stainless/clad steel plate conforming to specification **NIL** for

[ ] Shell

[ ] Dished head/intermediate head/cone

[ ] Sump and sump head

[ ] Skirt

[ ] Manhole neck, nozzle neck 300 NB and above in carbon steel and 125 NB and above in stainless steel

[ ] Reinforcement pad

[ ] Wrapper plate

[ ] Plate type flange

[ ] Internal piping

[ ] Tray support ring/bolting bar/seal pan welded to the vessel

[ ] Pad for external attachment (directly welded to shell)

[ ] Insulation support

[ ] Lifting lugs

[ ] Baffle

[ ] Demister support

1.2 [ ] Forged flange/matching blind flange

[ ] Pipe for nozzle neck

[ ] Pipe fitting

[ ] Gasket

1.3 [X] Foundation/anchor bolts

[X] Permanent instruments

[ ] Demister with grid, bolting and support beams

[X] Fire proofing and insulation

[ ] Pump assembly with bolting

[ ] Agitator assembly with bolting

[X] Tray/downcomer/seal pan not welded to the vessel

[ ] Brick lining

[ ] Refractory lining

[ ] Spray nozzle/ Distributor Nozzles

[ ] Tower packing & associated internals including distributor, feed pipes, support grid / plates, retaining grid / bed limiters

[ ] Light and sight glass assembly

[ ] Thermowells

[ ] Vane type feed device for feed nozzles.

2. VENDOR

2.1 Boiler quality/~~low alloy/stainless/~~ SS316L ~~-~~clad steel / ~~Monel plate~~ conforming to specification in Mechanical Datasheet for

[X] Shell

[X] Dished head~~/intermediate head/cone~~ / ~~toricone.~~

[ ] Sump and sump head

[X] Skirt

[X] Manhole neck, nozzle neck 150 NB and above in clad steel shall be fabricated from clad plate.

[X] Reinforcement pad

[ ] Wrapper plate

[X] Plate type flange

[X] Internal piping

[X] Tray support ring/bolting bar/~~seal pan/~~Chimney Tray welded to the vessel

[X] Pad for external attachment

[X] Fire proofing and insulation support

[ ] Saddle support/bracket/leg support

[X] Lifting lugs/~~Trunions/~~ Tailing lug

[X] Baffle, vortex breaker, ladder rungs

[ ] Welded demister support ring

[ ] Catalyst support ring, support beam & frame

[X] Wear plate

[X] Vacuum stiffening rings, structural & Piping cleats.

[X] Insert Plate (if any)

[X] All welded support for ~~packing,~~ distributors, chimney trays, other internals

2.2 Structural steel section and plate conforming to ~~IS:226/~~IS:2062 Gr.B/ ~~SA-283 Gr.C~~ for

[ ] Shell

[X] Skirt/anchor chair/base plate/~~saddle and bracket support~~

[ ] Internals

[X] Insulation support/fire proofing support over BQCS pad or on skirt(IS 2062 portion)

[ ] Flat cover

[ ] Manway flange/cover

[X] ~~Lifting lugs/~~tailing lug in skirt portion

[ ] Structural and piping clips

[ ] Section for stiffeners

[ ] Leg supports and base plate

[ ] Vortex breaker/inlet deflector baffle

2.3 [X] Forged flanges / matching blind flange wherever shown

[X] Studs/bolts and nuts for manway/handholes/internal flanges /nozzles with matching flange/~~shell flange~~, including jack bolts for manway

[X] Gasket for manway/internal flange/~~shell flange~~/ nozzles shown with blind flanges

[X] Welding consumables and gases

[ ] Wire meshes

[ ] Demister with grid and bolting

[ ] Agitator assembly with bolting

[ ] Pump assembly with bolting

[X] Seamless nozzle neck 150 NB and below upto 80 NB for weld overlayed nozzles and below 80 NB in SS316L

[X] Internal piping, ~~coupling~~ and pipe fitting

[ ] Spray nozzle

[ ] Internal packing

[ ] Light and sight glass assembly with 4 sets of spare glasses for each size

[X] Davit/~~hinge~~ assembly for manway

[X] Pipe davit assembly for equipment

[X] Items covered in applicable EIL standards

[X] All other metallic and non-metallic parts, consumables and gases not covered under 1 and 2 but required to complete fabricated equipments including inspection, testing and supply of equipments as per this requisition

[X] Supply of lifting lug

[X] Validation of design and Supply of Tailing Lug

[ ] Design and supply of self reinforced nozzles

[X] Spares - 10% of fasteners (minimum two numbers) and two sets of gaskets for each nozzle shown with blind flange/~~for each shell flange~~./Internal Flanges wherever applicable

[ ] Spares(demister) - 10% (min. 4 nos. of each size/type) extra fasteners (bolts,nuts, clamps, spacers etc.) as required for holding the demister.

[X] All machinery including crane, tools etc., required for fabrication, assembly, loading / unloading, heat treatment, testing, transportation and all equipments for site activities.

[X] Template for foundations.

[X] Rain shield as specified in MDS.

[X] Supply and Installation of Platform, ladder, railing including grating in horizontal position of column.(Refer Schedule of Quantities Doc # B315-006-81-41-SOQ-6010)

[X] Design, supply of all material and related works for **localized** Barricading/booth for safety in working plant and, later on, taking back the same, after the completion of Project work.

B

2.4 **Site Works inside plant shall normally be carried out in General Shift Hours on all working days. If EIL/Owner allows working beyond General Shift/Holidays as per job requirement on case to case basis, contractor shall deploy additional/necessary resources for execution of works**

NOZZLES AND CONNECTIONS (नोजल व कनैक्शन)

MARK / मार्क	QTY / क्वान्टिट	NOM. DIA / नामिनल डाया	SCH./THK. / शेड्यूल व थिकनैस	FLANGES CLASS / क्लास	FLANGES TYPE / टाईप	FLANGES FACING / फेसिंग	PROJECTION NOTE-4 / प्रोजेक्शन	PAD W x T / पैड	SERVICE / सर्विस
F1,2	2	500/ 450	14+3 CLAD	150	WN	RF	2505	250X14	FEED
B	1	400	16+3 CLAD	150	WN	RF	REFER DWG	200X16	BOTTOM OUTLET
T	1	600	14+3 CLAD	150	WN	RF	REFER DWG	350X14	TOP OUTLET
R	1	80	SCH.160 +#	150	WN	RF	2455	45X14	REFLUX
S1,2	2	400	16+3 CLAD	150	WN	RF	2505	200X16	SIDE DRAWOFF (TO REBOILER)
VR1,2	2	600	16+3 CLAD	150	WN	RF	2505	300X16	VAPOR RETURN (FROM REBOILER)
RR1,2	2	350	16+3 CLAD	150	WN	RF	REFER DWG	175X16	LIQUID RETURN (FROM REBOILER)
M 3,4	2	600	16+3 CLAD	150	WN	RF	2505	300X16	MANHOLE+B.F.+DAVIT+ BOLTING+GASKET B
M 1,2	2	600	14+3 CLAD	150	WN	RF	2505	300X14	MANHOLE+B.F.+DAVIT+ BOLTING+GASKET B
V	1	50 (HOLD)	80S	150	WN	RF	2405	_	VENT
UC	1	50 (HOLD)	80S	150	WN	RF	2405	_	UTILITY CONNECTION
LA1,2	2	50 @ (HOLD)	80S	150@ (HOLD)	WN	RF	2405	_	LEVEL SWITCH
PDT 1,2	2	40 @ (HOLD)	80S	150@ (HOLD)	WN	RF	2405	_	DIFFERENTIAL PRESSURE TRANSMITTER
SKV 1-3	3	100	40	AS PER EIL STD.				_	SKIRT VENT
AO 1,2	2	500	16THK.	AS PER EIL STD.				250 X20	ACCESS OPENING
N	1	80	SCH.160 +#	150	WN	RF	2455	45X16	NITROGEN CONNECTION
SP1,2	2	50 @ (HOLD)	80S	150@ (HOLD)	WN	RF	2405	_	STAND PIPE

5MM WELD OVERLAY (WO) FOR MINIMUM 3MM UNDILUTED CHEMISTRY

@ CLIENT TO CONFIRM SIZE & RATING WRT EXISTING NOZZLES/INSTRUMENTS CURRENT OPERATING PRACTICES

30 SUPPLY OF LADDERS AND PLATFORMS IS IN THE SCOPE OF EQUIPMENT FABRICATOR. EQUIPMENT VENDOR SHALL FURNISH ALL THE STRUCTURAL MEMBERS FOR PLATFORMS SUPPORTED ON THE EQUIPMENT.

31 ALLOY CLADDING REPRESENTATIVE OF EACH HEAT SHALL BE SUBJECTED TO IGC TEST AS PER ASTM A262 PRACTICE-E

32 AT SHOP:EQUIPMENT SHALL BE FIRST COMPLETELY FABRICATED,HYDROTESTED AND PAINTED AT SHOP. THERE AFTERCUT IN TWO SECTION.TENTATIVE LOCATION IS SHOWN IN SHEET-2.THE LOCATION MAY CHANGE SLIGHTLY TO AVOID FOULING FABRICATION.FABRICATOR TO PROVIDE ADDITIONAL LENGTH TO TAKE CARE OF CUTTING AND BEVELLING ALLOWANCE.
AT SITE:ITHE CIRCUMFERENTIAL SEAM SHALL BE COMPLETED AT SITE LOCAL PWHT,NDT SHALL BE CARRIED OUT AS PER DRAWING.ONLY LOCAL BOX TYPE HYDROTESTING (As Applicable) FROM INSIDE SHALL BE CARRIED OUT FOR THIS CIRC.SEAM AND COMPLETE HYDROTEST OF ENTIRE COLUMN IS NOT ENVISAGE AT SITE.

33 VACUUM STIFFENING RINGS SHALL NOT BE WELDED TO SHELL UNTIL ALL FOULINGS WITH RESPECT TO PIPING AND STRUCTURAL CLEATS ARE RESOLVED.

LICENSOR'S SPECIFICATION / लाईसन्सर स्पेसीफिकेशन्स

LICENSOR'S STANDARD / लाईसन्सर स्टेण्डर्स

FOUNDATION LOADING DATA (OPERATING CONDITION) / फाऊंडेशन लोडिंग डाटा (ऑपरेटिंग कनडिशन)

TYPE	MAX MOMENT AT BASE (M) (kgm)	MAX. SHEAR FORCE AT BASE (H) (kg)
SEISMIC (DBE)	1007000	47000
SEISMIC (MCE)	1496500	73600
WIND	566000	26000

GENERAL NOTES (जनरल नोट्स)

UNLESS STATED OTHER WISE

1 ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE STATED.
2 ALL ANCHOR BOLT HOLES TO STRADDLE N/S CENTRE
3 NORTH DIRECTION WHEREVER SHOWN IS WITH RESPECT TO PLAN VIEW.
4 (A) FOR NOZZLES ON SHELL PROJECTIONS ARE REFERRED FROM VESSEL CENTER LINE TO FLANGE CONTACT FACE.
4 (B) FOR NOZZLES ON HEAD PROJECTIONS ARE REFERRED FROM HEAD T.L TO FLANGE CONTACT FACE.
5 THE INDICATED THICKNESS IS THE MINIMUM ACCEPTABLE AFTER CONSTRUCTION.
6 DIMENSIONS OF FLANGES FOR NOZZLES UPTO 600NB SHALL BE AS PER ASME B16.5. NOZZLE ABOVE 600 NB SHALL BE AS PER ASME B16.47 SERIES-B UNLESS SPECIFIED OTHERWISE.
7 FLANGE GASKET FACE SHALL HAVE 125 AARH FINISH.
8 ID OF WELD NECK FLANGES SHALL MATCH WITH CORRESPONDING ID OF NOZZLE PIPE.
9 NOZZLES 50NB AND BELOW SHALL BE STIFFENED WITH 2 NOS. 40 x 6 THK FLATS 90 DEG APART.
10 ALL BUTT WELDS IN PRESSURE PART SHALL BE 100% RADIOGRAPHED.
11 FOR INSTRUMENT NOZZLES I.D. SHALL BE MAINTAINED WHEREVER INDICATED.
12 VENDOR TO VALIDATE DESIGN AND PROVIDE TAILING LUG & BRACING ARRANGEMENT (IF REQUIRED) FOR SKIRT, CONSIDERING AN IMPACT FACTOR OF 2. CALCULATION SHALL BE SUBMITTED FOR EIL REVIEW.
13 NOZZLES SHOWN WITH BLIND FLANGES/SHELL FLANGES SHALL BE PROVIDED WITH BOLTS/NUTS AND GASKETS.
14 SURFACE CLEANING & SHOP PRIMER SHALL BE AS PER PAINTING JOB SPEC.
15 ALL INTERNALS SHALL BE SIZED SO AS TO PASS THROUGH THE NEAREST MANHOLE EASILY EXCEPT OTHERWISE SPECIFIED.
16 PIPE TO PIPE , PIPE TO FLANGE, PIPE TO FITTING & FITTING TO FLANGE JOINT SHALL BE WELDED WITH THE SAME TECHNIQUE USED FOR MAIN EQUIPMENT WELDING.
17 ALL STAINLESS STEEL SURFACES SHALL BE PICKLED AND PASSIVATED AS PER ASTM A380.
18 ALL SKIRT SEAM SHALL BE SPOT RADIOGRAPHED.
19 ALL ITEM FABRICATED BY ROLLING/DEEP DRAWING OR ANY OTHER TECHINQUE SHALL BE SOLUTION ANNEALED IF THE HARDNESS EXCEEDS ACCEPTABLE LIMITS SPECIFIED IN CODE/SPECIFICATION.
20 PROVIDE M12 SQ. NUTS TACK WELDED ON INSIDE & OUTSIDE OF SKIRT ON 450 TRIANGULAR PITCH FOR FIRE PROOFING AS PER STD. 7-12-0025.
21 COMPLETE COLUMN INCLUDING TOP SHELL COURSE OF SKIRT SUPPORT IS TO BE STRESS RELIEVED. HARDNESS OF BASE METAL, WELD & HAZ SHALL NOT EXCEED 200BHN.
22 DP CHECK OF COMPLETE SURFACE OF WELD DEPOSIT SHALL BE CARRIED OUTAFTER WELDING ON CLAD SIDE.
23 CLAD DISH END SHALL BE ULTRSONICALLY TESTED AFTER FORMING AS PER ASTM A-568 AND SHALL MEET SUPPLEMENTARY REQUIREMENT OF S-6 WITH ACCEPTANCE LEVEL 2
24 ALL BUTT WELD (CIRCUMFERENTIAL AND LONGITUDINAL SEAMS) IN PRESSURE PART INCLUDING NOZZLE NECK TO FLANGE, PIPE TO PIPE, PIPE TO PIPE FITTING SHALL BE FULLY RADIOGRAPHED.
25 EQUIPMENT SHALL BE ERECTED IN DRESSED UP CONDITION (BY OTHERS). DRESSED UP IMPLIES THAT THE EQUIPMENT WILL BE ERECTED AFTER INSTALLATION OF INSULATION, PLATFORM/LADDERS AND PIPING SPOOLS. CORRESPONDINGLY EQUIPMENT VENDOR SHALL SELECT LIFTING LUG BASED ON 1.5 TIMES THE ACTUAL ERECTION WEIGHT.
28 FOR WELD OVERLAY, INDICATED THICKNESSES ARE MINIMUM. FABRICATOR MAY USE HIGHER THICKNESS/LWN TO AVOID DEFORMATION DURING WELD OVERLAY.
29 REFER CL.7 OF STD. 7-12-0016 : BARRIER LAYER FOR SS316L WELD OVERLAY SHALL BE DONE WITH E309MoL ELECTRODE INLINE WITH SPEC. 6-12-0007

SPECIFICATIONS (स्पेसिफिकेशन्स)

X	DENOTES APPLICABILITY	
X	GENERAL SPEC. FOR PRESSURE VESSELS	6-12-0001
X	SUPP. SPEC. FOR CS VESSELS	6-12-0002
X	SUPPLEMENTARY SPECIFICATION FOR CLAD VESSEL	6-12-0007
X	STD. SPEC. FOR BQCS PLATES	6-12-0011
X	STD. SPEC. FOR STRUCTURAL QUALITY PLATE	6-12-0014
X	SUPPLEMENTARY SPECIFICATION FOR CLAD PLATE	6-12-0015
X	STD. SPEC. FOR SS PLATE	6-12-0020
X	JOB SPEC. FOR SURFACE PREPARATION & PROTECTIVE COATING(NEW CONSTRUCTION)	B297-000-2-42-PCS-0001

STANDARDS (स्टैण्डर्स)

X	VESSEL TOLERANCES	7-12-0001
	SUPPORT FOR HORIZONTAL VESSEL	7-12-0002
	WOODEN PILLOWS FOR SADDLE SUPPORT	7-12-0003
X	SKIRT BASE DETAILS	7-12-0004
X	SKIRT OPENING DETAIL	7-12-0005
	ANGLE LEG SUPPORT	7-12-0006
	PIPE LEG SUPPORT	7-12-0007
	BRACKET SUPPORT FOR VERTICAL VESSEL	7-12-0008
	MANHOLE WITH HINGED COVER	7-12-0009
X	MANHOLE WITH DAVIT	7-12-0010
X	LADDER RUNGS FOR MANHOLE/DEMISTER RETAINING PLATE	7-12-0011 / 7-12-0012
X	NOZZLE REINFORCEMENT AND PROJECTION PAD NOZZLES FOR VESSELS	7-12-0013 / 7-12-0014
X	STANDARD BOLT HOLE ORIENTATION	7-12-0015
X	ALLOY LINER DETAILS	7-12-0016
	SIGHT GLASSES FOR PRESSURE VESSELS	7-12-0017
X	INTERNAL FLANGES	7-12-0018
X	VORTEX BREAKERS	7-12-0019
	INLET DEFLECTOR BAFFLE	7-12-0020
X	SUPPORT RING AND BOLTING BAR	7-12-0021
	SUPPORT RING SIZES FOR PACKED TOWERS INTERNALS	7-12-0022
X	PIPE DAVIT	7-12-0023
X	LIFTING LUG TOP HEAD TYPE	7-12-0024
X	FIRE PROOFING AND INSULATION SUPPORTS	7-12-0025
X	EARTHING LUG	7-12-0026
X	NAME PLATE	7-12-0027
X	MANUFACTURER NAME PLATE	7-12-0028
X	BRACKET FOR NAME PLATE	7-12-0029
	NAME PLATE FOR SMALL EQUIPMENT	7-12-0030
	DETAILS OF FORGED NOZZLES	7-12-0031
X	SUPPORTS FOR INTERNAL FEED PIPE	7-12-0032
	HOT INSULATION SUPPORT FOR HORIZONTAL VESSEL	7-12-0033
	PIPE DAVIT SUPPORT FOR COLD INS. VESSELS	7-12-0034
	TYP. DETAILS OF WIRE MESH DEMISTER SUPPORTS	7-12-0036
	S.R NOZZLE NECK (FOR GUIDANCE)	7-12-0037
X	ALLOWABLE NOZZLE LOADS	7-12-0038

REFERENCE DRAWINGS

NOZZLE ORIENTATIONS	
LADDERS/PLATFORM CLEATS	
PIPE SUPPORT CLEATS	
DEMISTER DATA SHEET	

HOLD UPS (होल्ड अप्स)

X	NOZZLE ORIENTATIONS	X	SIZE OF NOZZLES-V,UC,LA1-2,PDT 1-2,SP1-2
	NOZZLE ELEVATION	X	PIPE SUPPORT CLEATS
	SUPPORT HEIGHT	X	LADDER/PLATFORM CLEATS
			PIPE DAVIT

DESIGN DATA (डिजाइन डाटा)

CODE			ASME SEC VIII DIV. 1 LATEST EDITION
WORKING PRESSURE	(kg/cm²g)	TOP 0.9	BOTTOM 1.2
DESIGN PRESSURE	(kg/cm²g)	INT. 3.5	EXT. FULL VACCUM
WORKING TEMPERATURE	(°C)	TOP 97	BOTTOM 125
DESIGN TEMPERATURE	(°C)	150	
MDMT	(°C)	1.7	
CORROSION ALLLOWANCE	(MM)	NIL	
TYPE OF HEAD		TORISPHERICAL	
JOINT EFFICIENCY		SHELL 1	HEAD 1
RADIOGRAPHY	(REFER NOTE-9 & 15)	SHELL FULL	HEAD FULL
POST WELD HEAT TREATMENT		YES (COMPLETE EQUIPMENT)(NOTE-21)	
HEAT TREATMENT		HEAD AS PER SPEC / CODE	
OPERATING MEDIUM		AMINE	
SP. GRAVITY		0.9775 TO 1.027	
WIND SPECIFICATION		IS 875	
SEISMIC		IS 1893 + SITE SPECTRA	
CAPACITY	(M³)	391	
PRIMER PAINTING/CLEANING		AS PER SPEC.	
INSULATION THICKNESS	(mm)	125 ☒ HOT ☐ COLD	
FIRE PROOFING	(REFER NOTE-20)	(BY OTHERS) ☒ YES ☐ NO	
HYDROSTATIC TEST	(kg/cm2g)	HORIZONTAL (AT TOP)	
PRESSURE (NEW & COLD)		5.25	
INSPECTION BY		☒ EIL ☐ CIB ☐ TPIA	

MATERIAL OF CONSTRUCTION) $ (AS PER ASME / IS ~~OR EQUIVALENT~~)

SHELL/INSERT PLATE	SA 516 GR.60+ SS 316L CLAD $
REINFORCEMENT PAD	SA516 GR.60
HEADS	SA 516 GR.60 + SS 316L CLAD $
NOZZLE FLANGE UPTO 50 NB	SA 182 GR.F316L
NOZZLE FLANGE ABOVE 50 NB	SA 105 + WELD OVERLAY OF SS 316L $
NOZZLE NECK UPTO 50 NB	SA 312 TP 316L
NOZZLE NECK ABOVE 50 NB UPTO 150NB	SA 106 GR.B+ WELD OVERLAY OF SS 316L$
NOZZLE NECK ABOVE 150 NB	SA 516 GR.60 + SA 240 GR.316 CLAD $
PIPE FITTINGS	SA 234 GR. WPB + WELD OVERLAY OF SS 316L$
GASKET EXTERNAL	SPIRAL WOUND WITH SS 316L WINDING & GRAFOIL FILLER WITH CS OUTER RING & SS INNER RING AS PER ASME B16.20
GASKET INTERNAL	COMPRESSED FIBRE ASBESTOS FREE
EXTERNAL STUDS/BOLTS/NUTS	SA 193 GR.B7/ SA 194 GR.2H
INTERNAL STUDS/BOLTS/NUTS	SS 316L
SKIRT/ ~~SUPPORT~~ (PART)	SA 516 GR.60/ IS 2062 GR.E250 QUALITY-B
SKIRT/ SUPPORT BASE	IS 2062 GR.E250 QUALITY-B
INTERNAL PARTS (WELDED)	SA 240 GR.316L
INTERNAL PARTS (BOLTED)	SA 240 GR.316L
CLIPS & ATTACHMENTS (EXTERNAL) DIRECTLY WELDED	SA 516 GR.60
CLIPS & ATTACHMENTS (EXTERNAL) WELDED OVER PAD	IS 2062 GR.E250 QUALITY-B
PAD FOR EXTERNAL ATTACHMENTS	SA 516 GR.60
DEMISTER / GRID	-
LIFTING LUG	SA 516 GR. 60
PIPE DAVIT	SA 106 GR.B

$ ALL CLAD PLATE SHALL CONFIRM TO SA 264.

STATUTORY REGULATIONS (सांविधिक विनियम)

INDIAN BOILER REGULATIONS (IBR)
DEPARTMENT OF EXPLOSIVES, NAGPUR (PESO)

APPROXIMATE WEIGHT (kgs) (PER ITEM) (अनुमानित वजन)

ERECTION	91000	OPERATING	332500
HYDROTEST (SHOP)	482000	HYDROTEST (FIELD)	630000

NUMBER OF ITEMS : ONE

REV	DATE	REVISION	BY	CHECKED	APPROVED
B	29.11.19	REVISED AS MARKED & REISSUED FOR BIDS/ENGG	AK	AKR/PKP	NK
A	13.11.19	ISSUED FOR BIDS/ENGG.	AK	AKR/PKP	NK

ENGINEERS INDIA LIMITED
(A Govt. OF India Undertaking)
इंजीनियर्स इंडिया लिमिटेड
(भारत सरकार का उपक्रम)

JOB NO: कार्य संख्या B315 UNIT: 006
CLIENT : क्लाईंट M/S GAIL PATA
PROJECT : प्रोजेक्ट REPLACEMENT OF REGENERATOR COLUMN IN GSU AT GAIL PATA

DESIGN DATA
REGENERATOR
ITEM NO. 06-CC-102

वेसल डिजाइन डाटा
रिजनरेटर
आइटम नम्बर 06-सीसी-102

DRAWING NUMBER / डाईंग नम्बर: B315-006-80-42-DS-3001 REV: B
SHEET 1 OF 3

FORMAT NO.9-1646-0113 REV.0 A3-420 X 297

FILE NAME : A747-200-80-42-DS-3322-1-1

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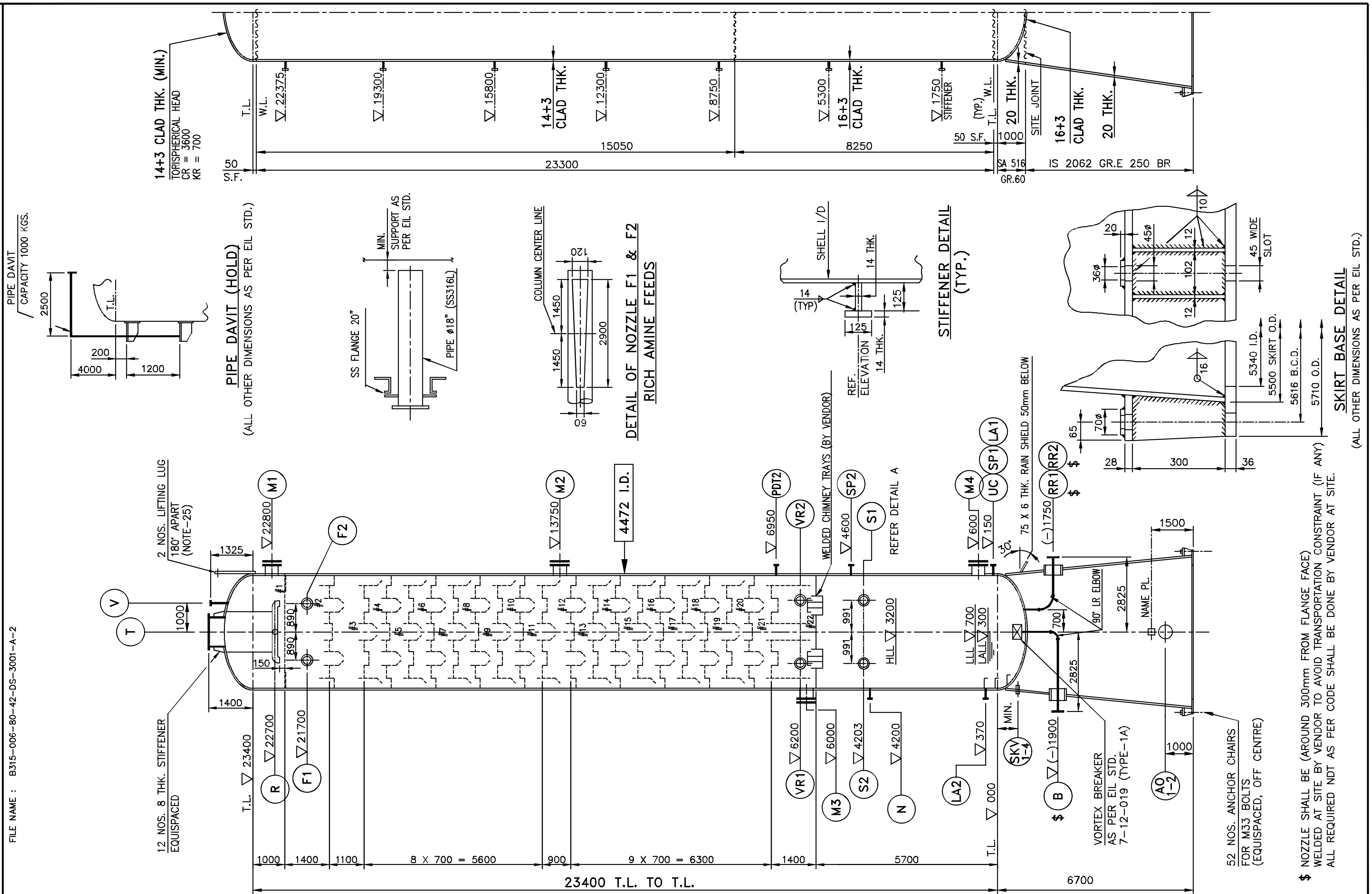
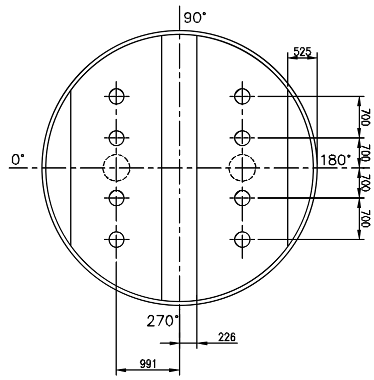
FILE NAME : B315-006-80-42-DS-3001-A-2



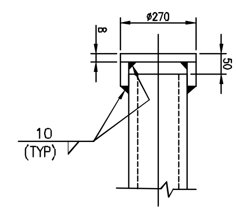
ENGINEERS INDIA LIMITED NEW DELHI	JOB NO. : B315 UNIT NO. : 006							VESSEL DESIGN DATA / वेसेल डिजाइन डाटा	DRAWING NO.	REV.
	CLIENT : GAIL PATA	B	29.11.2019	REVISED & REISSUED FOR BIDS/ENGG	AK	AKR/PP	NK		REGENERATOR / रिजनरेटर	B315-006-80-42-DS-3001	B
	PLANT : REPLACEMENT OF REGENERATOR COLUMN IN GSU AT GAIL PATA	A	13.11.2019	ISSUED FOR BIDS/ENGG.	AK	AKR/PP	NK		ITEM NO. 06-CC-102 / आइटम नम्बर 06-सीसी-102	SHEET 2 OF 3	
		REV.	DATE	REVISION	BY	CHK	APPROVED	APPROVED			

1-1641-0503 REV.0 A3-420x297

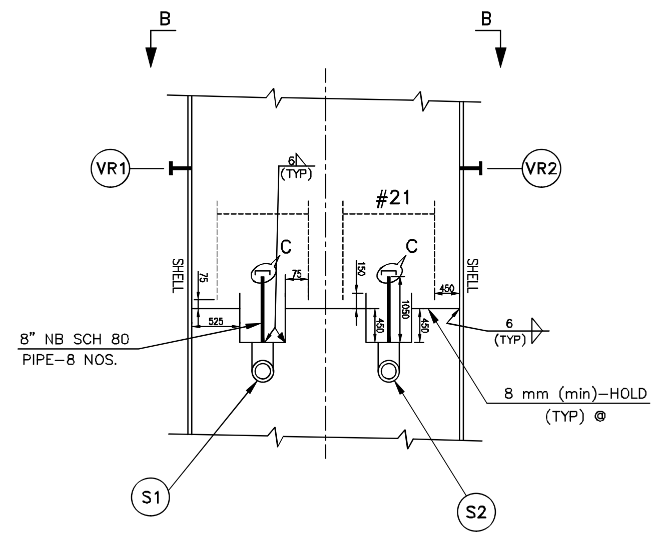
FILE NAME : B315-006-80-42-DS-3001-A-3



VIEW B-B

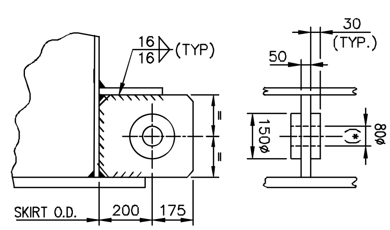


DETAIL-C



DETAIL-A (BY VENDOR)

@ DESIGN SHALL BE VETTED BY VENDOR



TAILING LUG DETAIL

VENDOR TO ENSURE THE ADEQUACY OF HOLE DIA. (REFER NOTE-12)

ENGINEERS INDIA LIMITED
NEW DELHI

JOB NO. : B315 UNIT NO. : 006
CLIENT : GAIL PATA
PLANT : REPLACEMENT OF REGENERATOR COLUMN IN GSU AT GAIL PATA

REV.	DATE	REVISION	BY	CHK	APPROVED	APPROVED
B	29.11.2019	REVISED & REISSUED FOR BIDS/ENGG.	AK	AKR/PP	NK	
A	13.11.2019	ISSUED FOR BIDS/ENGG.	AK	AKR/PP	NK	

VESSEL DESIGN DATA वेसेल डिजाइन डाटा
REGENERATOR रिजनरेटर
ITEM NO. 06-CC-102 आइटम नम्बर 06-सीसी-102

DRAWING NO. B315-006-80-42-DS-3001
SHEET 3 OF 3
REV. B

1-1641-0503 REV.0 A3-420x297

110