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Heavy Plates & Vessels Plant
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INVITATION TO TENDER

Ref.: OS/20-21/2439/PVLG/31/104 Date: 20.03.2021

Sub: **Fabrication of Clad portion of Main Fractionator Column (LAS with SS Clad) in 4 sections at Lovagarden site of BHEL-HPVP, Visakhapatnam**.

Dear Sir,

Sealed tenders are invited for the subject work in **two part bid** system from Vendors who are experienced in fabrication of similar jobs and fulfil the eligibility criteria specified below in clause-1. Scope of work and techno-commercial terms and conditions are as follows.

1. ELIGIBILITY CRITERIA:

1.1 Average annual turnover of the contractor during the last 3 financial years ending 31st March 2021 should be at least Rs. 480 Lakhs. Bidders shall enclose Turnover Certificate (duly certified by a practitioner CA), IT Returns and other necessary documents in support of the same.

1.2 The Contractor should have experience of executing fabrication work orders of value specified below during the last 7 years ending on 28th Feb'2021.

1.2.1 Three similar completed works costing ≥ Rs.500 Lakhs each **OR**

1.2.2 Two similar completed works costing ≥ Rs.625 Lakhs each **OR**

1.2.3 One similar completed work costing ≥ Rs.1000 Lakhs

1.3 Must have experience of executing similar works of Fabrication of Higher Diameter i.e., ≥ 4 Meters Columns/Pressure Vessels for process industries.

Note: Work Order and Work Completion Certificate / any other relevant document from the customer shall be enclosed in support of successful and satisfactory completion of the work with respect to both point nos. 1.2 & 1.3 above.

1.4 Bidders shall also have to enclose the documents of Registration of Firm/ Factory License/ Certificate of Incorporation, EPF, ESI, PAN, GSTIN, Udyog Aadhar Memorandum (if registered with MSME) etc.

1.5 The works executed in the name of individual / firm will only be considered for eligibility criteria.

2. VENDOR'S SCOPE OF WORK: Detailed scope of the fabrication work will be as follows:

Fabrication of Main Fractionator Column (vessel Tag No. 111-C-2101: and weight 478 MT approximately) in 4 sections consisting of Shell, Toricone section and Dished-End (as per the approved drawings, QAP / ITP, WPS, Procedures, Specifications & Standards) **with material** (cladded plates; LAS with SS Clad as per applicable Technical Specifications, TDC, QAP).

It may be noted that the weight indicated above is tentative and may vary on both sides due to revision in the drawings, if any.

2.1 The Vendor has to procure LAS plates with SS Clad from reputed well known Manufacturers as per the details furnished at Annexure-II (A) and as per applicable Technical Specifications, TDC, QAP. The vendor has to obtain approval from BHEL-HPVP, Visakhapatnam for Technical qualification of the offers received from the Plate Manufacturers before placement of order for supply of LAS clad plates.

2.1.1 Raw material Inspection by approved TPIA / EIL as per approved QAP along with all Material Test certificates and relevant inspection documents as per approved QAP / ITP.

2.1.2 Submission of all MTC's with all relevant tests reviewed and inspected by TPIA for BHEL's review and dispatch clearance.

2.1.3 Transportation including transit insurance of LAS clad plates other than (76+4) mm Thick & (128+4) mm Thick Clad plates and delivery at BHEL- HPVP Lovagarden site, Visakhapatnam (A sea front facility of BHEL near Hindustan Shipyard Limited – OPF site, Visakhapatnam, Andhra Pradesh).

2.1.4 Transportation including transit insurance of (76+4) mm Thick & (128+4) mm Thick Clad plates and delivery at BHEL-HPVP, Visakhapatnam as the rolling of the same will be carried out inside HPVP workshop.

The clad plates of (76+4) mm Thick & (128+4) mm Thick after rolling at HPVP works have to be transported to Lovagarden site for further operations after carrying out rolling operation at HPVP workshop by HPVP. Marking, cutting and Edge preparation of the same shall be carried out inside HPVP workshop by HPVP.

2.2 Fabrication of LAS Clad portion of Shell in 4 sections consisting of Shell, Toricone section and Dished end excluding Internals & Externals as per applicable approved drawings, QAP / ITP, WPS, Approved Procedures, Specifications & Standards etc., and it includes the following activities but not limited to the same:

2.2.1 <u>Dished End:</u>

2.2.1.1 Forming of Dished end including submission of Petal development drawings for BHEL – HPVP approval, Cutting of Petals from Plates, Forming of Petals & Crown through Cold pressing, Assembly, Fit-up and Welding of Dish End Petals & Crown including weld edge preparation as per approved drawings along with Production Test Coupons as per approved QAP.

2.2.1.2 100% PT on Knuckle inside & outside including Welds and Weld Edge Preparation as per approved QAP.

2.2.1.3 100% RT of L-seam Welds & C-seam welds as per approved QAP.

2.2.1.4 Central Hole, if any, on the Dished End shall be plugged followed by 100% RT.

2.2.1.5 Height Marking, Cutting of extra height and Edge preparation at SF as per the applicable drawings

2.2.1.6 100% UT of Complete Dished End as per QAP.

2.2.1.7 Clad overlay over the L-seams and C-seams as per approved QAP.

2.2.1.8 100% PT on chipped back L-seam & C-seam Welds of Dished Ends, Tori-cone and Shell as per approved QAP.

2.2.1.9 All NDT activities like DPT, MPT, RT, UT, etc., shall be carried out as per approved QAP by NDT personnel qualified by BHEL as per BHEL Procedure No. BHEL:NDE:WP01.

2.2.2 <u>Toricone:</u>

2.2.2.1 Forming of Toricone including Cutting of Petals from Plates, Forming of Petals through Cold pressing, Assembly, Fit-up and Welding of Toricone Petals as per approved drawings along with Production Test Coupons as per approved QAP.

2.2.2.2 100% PT on Knuckle inside & outside of Toricone including Welds and Weld Edge Preparation as per approved QAP.

2.2.2.3 100% RT of L-seam Welds & C-seam welds of Toricone as per approved QAP.

2.2.2.4 Height Marking, Cutting of extra height and Edge preparation as per the drawings.

2.2.2.5 100% PT on chipped back L-seam & C-seam Welds of Dished Ends, Tori-cone and Shell as per approved QAP.

2.2.3 Main Shell:

2.2.3.1 The LAS clad portion of the Main Shell shall be fabricated in 4 sections as detailed at Annexure-II(C).

2.2.3.2 After receipt of LAS clad plates at BHEL-HPVP Lovagarden site- Visakhapatnam, the inspection clearance of the same shall be obtained from HPVP (QC) / TPIA / EIL as per approved QAP.

2.2.3.3 Marking, Squaring, Cutting, Weld Edge preparation / Beveling of all the clad Shell plates including removal of clad at edges as per drawings & approved QAP. Test plates of clad material shall be arranged to BHEL-HPVP/ Welding Technology for establishing PQRs to release welding documents during fabrication.

2.2.3.4 DP Test of all Weld Edges as per approved QAP.

2.2.3.5 Rolling of LAS clad shell segments less than 50 mm thickness as per approved drawings / approved QAP and Rerolling as per requirement.

2.2.3.6 Profile of the rolled segments shall be maintained by temporary spider's / profile plates, for which raw materials shall be arranged by the vendor.

2.2.3.7 Assembly, Fit-up & Welding of L-seams of LAS clad portion of Main Shell as per drawings & approved QAP / ITP along with Production Test Coupons.

2.2.3.8 Assembly, Fit-up & Welding of C-seams of Shell to Shell, Shell to Tori-cone & Shell to Dished end.

2.2.3.9 100% RT of L-seam Welds and Production Test Coupons as per approved QAP.

2.2.3.10 100% RT of C-seam Welds as per approved QAP.

2.2.3.11 Offering the job for stage wise inspection and obtaining stage wise inspection clearance, Final Inspection clearance from HPVP (QC) / TPIA / EIL as per approved QAP.

2.2.3.12 All NDT activities like DPT, MPT, RT, UT, etc., shall be carried out as per approved QAP by NDT personnel qualified by BHEL as per BHEL Procedure No. BHEL: NDE: WP01.

2.2.3.13 NDT agency engaged by fabrication contractors shall have to ensure that their NDE personnel are qualified by BHEL in advance before starting of the job.

2.2.3.14 Spot UT to check dis-bondment for rolled sections of Clad and Weld Overlay as per approved QAP / Procedures.

2.2.3.15 Prior to Weld overlay, MPT shall be carried out on the surfaces which are to be covered with Weld Overlay as per approved QAP/ Procedures

2.2.3.16 Clad Restoration on L-seam & C-seam welds and 100% PT on Clad restoration / Weld Overlay of each layer as per approved QAP/ Procedures

2.2.3.17 PMI Check for Clad Weld Overlay as per approved QAP / Procedures

2.2.3.18 Chemical Analysis of the samples to be collected & tested after Clad restoration / Weld Overlay of Dished Ends, Main Shell and shell to Toricone / dished end as per approved QAP / Procedures.

2.2.3.19 PT of the entire surface shall be performed before PWHT as per Appendix 8 of ASME Section–VIII, Div.1 / Div.2

2.2.3.20 Production Test Coupons after RT to be tested as per approved QAP / Procedures.

2.2.3.21 Handing over of Production Test Coupons to SR agency for PWHT / SR along with the Vessel.

2.2.4 Work Instruction/ Procedures to be followed during fabrication:

2.2.4.1 Welding is to be carried out by ASME qualified welders only. Vendor shall arrange for Qualification of Welders at HPVP under the supervision of BHEL / WT dept. at their own cost. However, Test Coupons shall be provided by BHEL as free issue.

2.2.4.2 All consumables like welding electrodes, gases, grinding wheels etc. required for fabrication are in the scope of the Vendor. The Tentative list of required Electrodes are E8018B2, E308L, E309L, ER309L, ER308L, E9018B3, ER80SB2, ER90SB3, ENiCrFe3 etc. The electrodes / filler wire shall be of BHEL / EIL approved makes only and the vendor shall submit the Batch Test Certificates to BHEL for verification before using on the job.

2.2.4.3 Experienced Site in charge and Qualified Engineers & Supervisors shall be deployed for proper co-ordination of the job.

2.2.4.4 Vendors should deploy Qualified QC personnel for carrying out the inspection activities in coordination with BHEL QC inspector / TPIA / EIL.

2.2.4.5 Vendors should deploy Qualified NDT personnel for carrying out the NDT inspection activities in coordination with BHEL QC –NDT / TPIA / EIL. Vendors shall have to engage sufficient man power for fabrication to meet HPVP delivery schedules.

2.2.4.6 Vendor shall deploy sufficient no. of calibrated Welding machines, Main Ovens & Portable Ovens required for baking of electrodes etc., at site. All relevant documents shall also be made available for verification & approval by BHEL - HPVP (QC) / AIA.

2.2.4.7 Vendor shall deploy suitable Cranes for handling of the raw materials plates/ shell segments required during the fabrication. However, for heavy components, BHEL will be deploying One No. 75 T Crawler crane and One 300 T Crawler Crane for handling of shell sections

2.2.4.8 Diesel required for the operation of cranes and DG set is to be taken care by the Vendor.

2.2.4.9 Vendor has to provide exclusive Helpers for One No. 75 T Crane and One No. 300 T DEMAG Crane for regular maintenance and for assistance to Crane operators during the entire contract period. Non-deployment will attract penalty and same will be deducted in RA Bills.

2.2.4.10 Sufficient No. of Rollers & Idlers required for fabrication of Vessel in sections have to be arranged by the vendor.

2.2.4.11 Required tools & tackles like Measuring instruments, Thermal Chalks / Pyrometer, etc. shall be calibrated and valid calibration certificates must be presented, if required.

2.2.4.12 All the Scaffolding materials like Pipes, Clamps, Jallies etc. for temporary platform works are to be arranged by the Vendor.

2.2.4.13 Gate passes for the Manpower, Materials, Cranes. Trailers etc. are to be taken care by the contractor.

2.2.4.14 Any modification work due to revision of drawings during fabrication is to be carried out by the vendor without any extra cost.

2.2.4.15 Submission of economic Cutting Plans for the plate materials and approval shall be obtained from BHEL-HPVP before taking up the same. Wherever fabrication is done without proper approved cutting plans, any loss of materials arising due to the same will be recovered as per BHEL recovery rates.

2.2.4.16 Vendors shall have to return the excess / balance materials including off-cuts and total scrap available with the vendors exclusive of process allowance & invisible wastage to HPVP Stores after material reconciliation but before submission of their final bill. In case the same are not returned by the vendor, Recovery shall be made as per BHEL Rates / MSTC rates plus applicable taxes, prevailing at the time of processing of the final bills.

2.2.4.17 Though not mentioned specifically, any activity which is required for completion of the work is deemed to be included in the scope of work of vendor.

3. BHEL SCOPE: BHEL – HPVP shall provide the following as free issue:

3.1 Drawings, GMS, QAP, WPS, Painting Schedule, applicable Standards & Specifications.

3.2 Rolling of (76+4) mm Thk & (128+4) mm Thk Clad plates of Shell segments shall be done by HPVP at shop including marking, cutting, Edge preparation and Clad removal.

3.3 300 MT & 75 MT crane along with operator will be provided by BHEL free of charge for fabrication. Maintenance of the crane including spares shall also be in the scope of BHEL. However, Riggers required for handling the job and Diesel required for operation of cranes shall have to be provided by the vendor.

3.4 DG set will be provided as a Standby during power breakdown. However, diesel for operation of DG set is to be taken care by the vendor.

3.5 Area required for fabrication, Site Office and Stores at Lovagarden site will be provided free of charge.

3.6 Power & Water shall also be provided free of charge at one point inside the fabrication yard but further distribution to the desired location is in vendor's scope.

3.7 Vendor's scope shall include arranging Distribution Board with suitable capacity Switch Fuse unit as incomer, all outgoings with necessary safe trips like MCB, ELCB etc., as per the industrial safety norms and their installation, all outgoing cables from Distribution Board, termination at the distribution board, Working Area Lighting.

4. INSPECTION:

4.1 Inspection shall be carried out by M/s. BHEL–HPVP, Vizag / BHEL Authorized Inspection Agency (AIA) / EIL / Customer as per approved QAP. Contractor shall have to offer for Stage wise and Final inspection as per approved QAP and obtain necessary stage wise & final clearances before proceeding for further operations.

4.2 Fabrication Vendor shall be solely responsible for preparation and submission of all Inspection Reports & documents duly certified by Inspection Authority along with the finished equipments.

4.3 All the documentation related to inspection clearance of M/s. BHEL / TPI / EIL / Customer, Generation of Inspection Reports, Preparation of Final Documents as per BHEL standard formats etc., are included in the scope of vendor and scanned copy as well as hard copy of the same is to be submitted to BHEL-QA.

Note: QAP / ITP enclosed with the tender document is tentative only and may be subject to revision due to incorporation of comments of the approving authority. Hence, the approved QAP / ITP issued to the vendor after ordering shall only be followed for execution and inspection of the job.

5. DELIVERY:

5.1 The total delivery period including procurement of Raw materials, fabrication of components i.e., LAS Clad portion of Shell in 4 sections consisting of Shell, Toricone section and Dished end along with inspection documents and all other certificates will be 30 weeks from the date of issue of order.

Note: In case the delivery period offered by the vendor is more than the tender delivery, Price quoted by the bidder shall be loaded for additional period @1/2 % per week or part thereof for the purpose of evaluation of Bidder Status.

5.2 The documents submitted by the vendor for BHEL approval shall be approved within 4 working days from the date of submission of clear documents.

6. SITE MOBILISATION:

6.1 Successful bidders shall have to complete site mobilization within 15 days from the date of receipt of First consignment of LAS Clad Plates at HPVP, Lovagarden site.

7. PRICE:

7.1 The price shall be quoted strictly as per the Schedule of Rates enclosed at Annexure – I for the detailed scope of work and the quoted price shall be inclusive of all applicable taxes & duties except GST.

7.2 The prices shall be fixed & firm without any escalation during the entire period of contract and till completion of the work.

7.3 GST shall be reimbursable to the vendor as detailed in Clause - 9 and as per Annexure – GST.

7.4 Income tax will be deducted at applicable rates from RA & Final bills.

8. PAYMENT TERMS:

8.1 Payment shall be made against RA Bills for **90% of the order value** for the following stages of supply and fabrication of the equipment:

a) After supply & receipt of materials at HPVP / Lovagarden site - 50%
b) After Completion of L-Seams of shell sections including NDE - 10%
c) After Completion of C-seams of shell sections including NDE - 20%
d) After Completion of Dished End & Toricone section - 10%

8.2 Balance 10% payment shall be made after completion of the job in all respects including material reconciliation and handing over of the balance materials & returnable items, if any and submission of total documentation to BHEL (QC/QA).

8.3 The weight indicated in the tender are tentative and may be subject to increase or decrease after completion of detailed engineering. Hence, payment shall be made for the actual weights executed as per approved engineering drawings and documents with due certification by BHEL-HPVP site in-charge and QC.

8.4 This clause shall be read in conjunction with the clause 17.0 of Annexure – III i.e. General Terms & Conditions.

9. GOODS & SERVICES TAX (GST):

9.1 Bidders shall make a note of the following points of GST before submission of their offer:

a) Vendors shall have to mention their GSTIN no. (15 Digits) in their Technical Bid. If any specific exemption is available, a declaration with due supporting documents need to be furnished for considering the offer.

b) Semi-finished goods are to be delivered by the Vendors in BHEL, HPVP premises within a maximum period of one year from the date of issue of the material, failing which the whole transaction will be considered as Supply & Sale and GST is required to be paid along with interest (calculated @ SBI Base Rate + 6%) along with penalty, if any, from the date of Challan on the whole value of materials. Hence vendors shall have to ensure that materials issued to them are returned within 365 days.

c) After fabrication, the vendors shall have to deliver the Semi - finished Goods by fulfilling the following formalities:

i) GST invoice should be raised by the vendors by paying GST on job work charges at applicable rates and by incorporating the HPVP GSTIN no. in the invoice for availing the reimbursement of GST from HPVP.

ii) The vendor shall also have to enter in their GST Return -1 (GSTR-1) the details of invoice raised for payment of GST so as to enable HPVP to avail input credit.

10. REVERSE AUCTION:

10.1 BHEL shall be resorting to Reverse Auction (RA) for this tender. RA shall be conducted among the techno-commercially qualified bidders. Business Rules for Reverse Auction are given at Annexure – V and Guidelines for Reverse Auction are available on our website, **www.bhel.com**

10.2 Sealed envelope / Electronic Price bids of all the techno-commercially qualified bidders shall be opened and the same shall be considered as initial bids of the bidders in RA. In case any bidder(s) do(es) not participate in online Reverse Auction, their sealed envelope / Electronic price bid along with applicable loading, if any, shall be considered for ranking.

10.3 BHEL will inform bidders the details of service provider who will provide business rules, all necessary training and assistance before commencement of online bidding. The bidders participating in the Reverse Auction shall have to necessarily submit **'Process Compliance Form'** (PCF) to the designated Service Provider.

10.4 Bidders are advised to read the 'Business Rules' (Annexure – V) indicating details of RA event carefully, before reverse auction event.

11. Other Terms & Conditions, whichever applicable, shall be as per Annexure – III enclosed.

12. RISK PURCHASE:

In case the contractor fails to execute the work within the scheduled time or due to any other reasons, BHEL - HPVP reserves the right to get the same completed through some other party at the risk & cost of the contractor and any additional expenditure incurred due to the same shall be charged to the contractor**.**

13. VALIDITY OF OFFER:

The offer shall be valid for a period of **3 months** from the date of Reverse Auction.

14. GENERAL:

14.1 The bidders shall study the Tender documents, Drawings, Quality Documents and all other relevant documents in detail for understanding the scope of work and the processes involved before submission of offer. Bidders shall get clarifications, if any, from concerned officials on the scope of work, clarifications related to welding or any other details of the tender document, over phone between 09:00 AM and 04:00 PM on any working day or through e-mail.

14.2 Drawings, QAP, Clarifications related to Welding, other reference documents etc., shall be sent to the bidder's e-mail address upon their written/e-mail request.

14.3 **Conditional / Partial Price Bids** and any other deviations to the tender terms & conditions are not acceptable and BHEL reserves the right to reject such offers without further correspondence. Bidders shall confirm their acceptance to all the terms & conditions of the tender enquiry in the Techno-commercial Bids and any deviations mentioned in the Price Bids shall not be considered

14.4 BHEL reserves the right to modify or cancel the tender enquiry at any stage without assigning any reasons thereof.

14.5 The General Terms & Conditions, if any, contradicting with the specific terms & conditions given in the tender, then specific terms & conditions shall only be considered.

15 The following documents shall form part of the tender enquiry:

i)	Schedule of Rates	: Annexure – I
ii)	Details of Clad Plates to be procured	: Annexure – II (A)
iii)	Details of Sections of the Vessel to be fabricated	: Annexure – II (B)
iv)	List of Reference Drawings & Documents	: Annexure – II (C)
v)	General Terms & Conditions	: Annexure – III
vi)	Acceptance to tender terms & conditions	: Annexure – IV
vii)	Business Rules for Reverse Auction	: Annexure – V
viii)	GST Compliance for Indigenous Suppliers	: Annexure – GST
ix)	Integrity Pact	: Annexure - VI
x)	Applicable Drawings, Tentative ITP / QAP as per Annexure - II (C)	

16 TENDER SUBMISSION (Through E - Mail):

16.1 Techno-commercial bids including the tender document duly signed & stamped by the bidder on all pages along with a covering letter on Company's Letter Head addressed to DGM (Outsourcing), BHEL – HPVP, Visakhapatnam shall be sent through an e-mail to the e-mail ID **technicalbid-hpvp@bhel.in**

16.2 Tentative List of Man Power, Machinery, Tools & Tackles to be engaged by the vendor shall also be attached to the Techno-Commercial Bid.

16.3 Price bid (i.e., Annexure – I) shall also be sent separately through e-mail to another e-mail ID **pricebid-hpvp@bhel.in**

16.4 Offers completed in all respects along with all the supporting documents shall be sent to the above e-mails only latest by **14.00 Hrs.** on **05.04.2021** duly mentioning the Name of Work, Tender Ref. No. & Date and Technical Bid / Price Bid in the subject of the e-mail.

16.5 TENDERS RECEIVED AFTER THE DUE DATE & TIME ARE NOT ACCEPTABLE.

16.6 OFFERS SENT IN ANY OTHER FORM WILL BE TREATED AS INVALID AND WILL BE SUMMARILY REJECTED.

17. TENDER OPENING:

17.1 Techno-commercial Bids will be opened **at 14.00 Hrs** on **05.04.2021.** The bidders may depute their representatives at the time of opening of Technical bids.

17.2 After evaluation of the Techno-commercial Bids, intimation regarding the date & procedure of conducting reverse auction shall be given by the service provider to all the eligible techno-commercially qualified bidders through an e-mail in advance at an appropriate time.

18. INTEGRITY PACT:

18.1 IP is a tool to ensure that activities and transactions between the Company and its Bidders/ Contractors are handled in a fair, transparent and corruption free manner. A panel of Independent External Monitors (IEMs) have been appointed to oversee implementation of IP in BHEL.
The IP as enclosed with the tender is to be submitted (duly signed by authorized signatory who signs in the offer) along with techno-commercial bid. Only those bidders who have entered into such an IP with BHEL would be competent to participate in the bidding. In other words, entering into this Pact would be a preliminary qualification.
Details of IEM for this tender is furnished below:

S.No.	IEM	E-Mail ID
01	Shri Arun Chandra Verma, IPS (Retd.)	acverma1@gmail.com
02	Shri Virendra Bahadur Singh, IPS (Retd.)	vbsinghips@gmail.com

18.2 Please refer Section-8 of IP for Role and Responsibilities of IEMs. In case of any complaint arising out of the tendering process, the matter may be referred to any of the above IEMs.

Note:
No routine correspondence shall be addressed to the IEM (phone/ post/ email) regarding the clarifications, time extensions or any other administrative queries, etc on the tender issued. All such clarification/ issues shall be addressed directly to the tender issuing (procurement) department.
For all clarifications/ issues related to the tender, please contact:

Name: Dept.: Address: Phone: (Landline/ Mobile)	**1.** D N Murthy, Dy. Manager Outsourcing BHEL – HPVP, Visakhapatnam 0891 – 6681359 / 1358	**2.** Y V R Rao, DGM Outsourcing BHEL – HPVP, Visakhapatnam 0891 – 6681332

For Bharat Heavy Electricals Limited,

20/03/2021
(Y V R Rao)
DGM (OS)

ANNEXURE - I

SCHEDULE OF RATES

Ref : OS/20-21/2439/PVLG/31/104 **Date : 20.03.2021**

Sub : Fabrication of Clad portion of Main Fractionator Column (LAS with SS Clad) in 4 sections at Lovagarden site of BHEL-HPVP, Visakhapatnam

Item No.	S.O. No.	Description of Work	Unit	Qty.	Unit Rate (in ₹)	Total Amount (in ₹)
		Procurement & supply of LAS Plates with SS Clad as per Annexure-II(A) and applicable TDCs including testing, inspection as per approved QAP and Transportation of materials to HPVP works / Lovagarden site. Fabrication of LAS Clad portion of Main Fractionator Column (LAS with SS Clad) in 4 sections as per Annexure-II(C), applicable drawings, Rolling of shell clad plates < 50 mm Thk, Assembly, Fit-up & Welding of Shell segments, cold forming of Dished end in Petals & Crown and Toricone in Petals including Assembly, fit-up, welding, NDT as per the approved QAP, Drawings, Specifications, WPS, etc., complete in all respects as per the detailed scope of work mentioned in the tender document.				
1	**2439**	**Procurement & supply of LAS Plates with SS Clad**				
1.1		Size : Thk (76+4) x 1800 mm x 9000 mm, Specn. : SA264 (SA387Gr.22Cl.2+304L)-HRR, Qty. : 18 Nos.	**MT**	**183.30**		
1.2		Size : Thk (128+4) x 2100 mm x 4200 mm, Specn. : SA264 (SA387Gr.22Cl.2+304L)-HRR, Qty. : 04 Nos.	**MT**	**36.60**		
1.3		Size : Thk (74+4) x 2000 mm x 7100 mm, Specn. : SA264 (SA387Gr.22Cl.2+304L)-HRR, Qty. : 07 Nos.	**MT**	**61.00**		
1.4		Size : Thk (46+3) mm x 2200 mm x 8600 mm, Specn. : SA264 (SA387Gr.11Cl.2+304L)-HRR, Qty. : 09 Nos.	**MT**	**65.60**		
1.5		Size : Thk (38+3) mm x 2000 mm x 8600 mm, Specn. : SA264 (SA387Gr.11Cl.2+304L)-HRR, Qty. : 06 Nos.	**MT**	**33.27**		
1.6		Size : Thk (26+3) mm x 3000 mm x 8600 mm, Specn. : SA264 (SA387Gr.11Cl.2+304L)-HRR, Qty. : 12 Nos.	**MT**	**70.62**		
1.7		Size : Thk (24+3) mm x 2000 mm x 9000 mm, Specn. : SA264 (SA387Gr.11Cl.2+304L)-HRR, Qty. : 04 Nos.	**MT**	**15.30**		
1.8		Size : Thk (28+3) mm x 3000 mm x 8000 mm, Specn. : SA264 (SA387Gr.11Cl.2+304L)-HRR, Qty. : 02 Nos.	**MT**	**11.70**		
2		**Fabrication of LAS clad portion of Main Fractionator column (Eqpt. Tag No.111-C-2101) in 4 sections as detailed at Annexure-II(C)**	**MT**	**478**		
		TOTAL				
Total Amount in words:						

Notes :

i) **L1 status will be evaluated based on total quoted value.**

ii) The quantity indicated above is tentative and may vary on both sides subject to the requirement at the time of ordering / execution. However, payment shall be made for the actual quantity only.

iii) The prices shall be fixed & firm without any escalation during the entire period of contract and till completion of work.

iv) The quoted price shall be for detailed scope of work and inclusive of all applicable taxes & duties **except GST**. However, GST shall be reimbursed by BHEL on submission of proof of GST payment.

v) The bidders are advised to go through all the drawings & documents before quoting the tender.

vi) The evaluation currency for this tender shall be **INR**.

vii) Tenderer should quote the amount in figures & words. It may be noted that corrections, overwriting etc. are not allowed. If there is a discrepancy between amount in figures & words, the amount in words shall prevail unless the amount expressed in words is related to an arithmetic error, in which case the amount in figures shall prevail. If there is an error in the total corresponding to the addition or subtraction of sub-totals, the sub-totals shall prevail and total shall be corrected accordingly.

In case of mismatch between rate and amount in figures, rate in figures shall be taken into consideration for further evaluation and processing.

Signature of the Bidder with Stamp

Annexure - II (A)

Ref : OS/20-21/2439/PVLG/31/104

Date: 20.03.2021

Details of Procurement & Supply of LAS Clad Plates

Sub: Fabrication of Clad portion of Main Fractionator Column (LAS with SS Clad) in 4 sections at Lovagarden site of BHEL-HPVP, Visakhapatnam

S.No	Item	Material Description	Thk (mm)	SS Clad Thk (mm)	Width (mm)	Length (mm)	Qty. (Nos.)	Weight (kg)	TDC No./ Rev.no.	Remarks
1	Bottom Shell	THK(76+4), SA264(SA387Gr.22Cl.2+304L)-HRR	76	4	1800	9000	18	183300	PV-PL-TDC-019, Rev.02	
2	Insert Plate for 1A/B	THK(128+4), SA264(SA387Gr.22Cl.2+304L)-HRR	128	4	2100	4200	4	36578	PV-PL-TDC-019, Rev.02	
3	Tori Cone	THK(74+4), SA264(SA387Gr.22Cl.2+304L)-HRR	74	4	2000	7100	7	60922	PV-PL-TDC-019, Rev.02	
4	Shell Section	THK(46+3), SA264(SA387Gr.11Cl.2+304L)-HRR	46	3	2200	8600	9	65575	PV-PL-TDC-018, Rev.02	
5	Shell Section	THK(38+3), SA264(SA387Gr.11Cl.2+304L)-HRR	38	3	2000	8600	6	33261	PV-PL-TDC-018, Rev.02	
6	Shell Section	THK(26+3), SA264(SA387Gr.11Cl.2+304L)-HRR	26	3	3000	8600	12	70620	PV-PL-TDC-018, Rev.02	
7	Shell Section (Ø 4950 mm)	THK(24+3), SA264(SA387Gr.11Cl.2+304L)-HRR	24	3	2000	9000	4	15293	PV-PL-TDC-018, Rev.02	
8	Bottom Dished End	THK(28+3), SA264(SA387Gr.11Cl.2+304L)-HRR	28	3	3000	8000	2	11702	PV-PL-TDC-018, Rev.02	
		TOTAL						**477251**		

ANNEXURE - II (B)

Ref : OS/20-21/2439/PVLG/31/104 **Date : 20.03.2021**

LIST OF REFERENCE DRAWINGS & DOCUMENTS

Sub : Fabrication of Clad portion of Main Fractionator Column (LAS with SS Clad) in 4 sections at Lovagarden site of BHEL-HPVP, Visakhapatnam

Sl. No.	S.O. No.	PGMA	Eqpt. Name	Description of Drawings / Documents	Drawing / Document No.	Rev. No.	No. of Sheets
01	2439	CL-010	Main Fractionator Column (LAS with SS Clad) (Eqpt. Tag No. 111-C-2101)	General Assembly of Main Fractionator	1-CL-010-U0169	A	01
02				General Notes for Main Fractionator	1-CL-010-U0192	00	01
03				ITP for SS Cladded Pressure Vessels / Columns / Reactors	6-81-0013	04	08
04				Technical Delivery Conditions for SS Cladded Plates (SA387 Gr.11 CL.2 + SS304L)	TDC No. PV-PL-TDC-018	02	02
05				Technical Delivery Conditions for SS Cladded Plates (SA387 Gr.22 CL.2 + SS304L)	TDC No. PV-PL-TDC-019	02	02
06				Technical Delivery Conditions for LAS Plates (SA387 Gr.11 CL.2)	TDC No. PV-PL-TDC-022	00	02
07				Technical Delivery Conditions for LAS Plates (SA387 Gr.22 CL.2)	TDC No. PV-PL-TDC-023	00	03
08				Technical Specification for SS Plates	TDC No. PV-PL-TDC-024	00	02

Note : Drawings & Documents indicated above are purely tentative and may be subject to revisions due to incorporation of comments of the approving authority. Hence, the approved drawings and documents issued to the vendor after ordering shall only be followed for execution & inspection of the job.

Annexure - II (C)

Ref : OS/20-21/2439/PVLG/31/104

Date: 20.03.2021

Details of Sections of the Vessel to be fabricated

Sub: Fabrication of Clad portion of Main Fractionator Column (LAS with SS Clad) in 4 sections at Lovagarden site of BHEL-HPVP, Visakhapatnam

S.No.	Section No.	Drawing No. / Rev.	Material Description	Specification
1	**SECTION-1**	1-CL-010-U0169, Rev. A	**Shell Section-7 to 10** (excluding externals & internals)	SA387 Gr.11 CL.2 + Clad SS 304L
2	**SECTION-2**		**Shell Section-11 to 15** (excluding externals & internals)	SA387 Gr.11 CL.2 + Clad SS 304L
3	**SECTION-3**		**Shell Section-16 to 21 including Insert Plates 1A & 1B** (excluding externals & internals)	SA387 Gr.22 CL.2 + Clad SS 304L
4	**SECTION-4**		**Toricone section-I & II, Shell Section-22 & 23 and Bottom Dished End** (excluding externals & internals)	SA387 Gr.22 CL.2 + Clad SS 304L & SA387 Gr.11 CL.2 + Clad SS 304L

NOTE: The clad portion of the Shell of the Vessel shall be fabricated in 4 sections as detailed above excluding internals & externals.

ANNEXURE - III

GENERAL TERMS & CONDITIONS

1. **TECHNICAL DELIVERY CONDITIONS:**

   The work should conform to the technical data given in our drawings, GMS, Shipping List Specifications, QAP, WPS etc.

2. **PARTY'S SCOPE:**

   The scope of the party shall be as follows: -

   a) All welding equipments, baking oven, tools, jigs and fixtures, measuring instruments duly calibrated, handling facilities, testing facilities etc.

   b) All materials other than those mentioned under ñFree Issue Materials", which are required for completion of the work.

   c) All consumables such as electrodes, gases, grinding wheels etc.

   Note: Electrodes of specification mentioned in the drawings / WPS and of BHEL approved brands only shall be used and MTCs of the same shall be submitted to BHEL for verification before use.

3. **REVISION OF DRAWINGS:**

   There may be minor changes in the drawings during execution. In such a case, party should accommodate the same without any extra claim.

4. **WELDING QUALIFICATION:** Qualification of required number of Welders is partyôs responsibility at their cost.

5. **X–RAY:**

   All welding shall be of X-ray quality where specified on drawings. Inspection would specify the quantum of X-ray based on drawings / code requirement. Party should strictly follow the WPS and QAP issued by BHEL during welding. Getting the welds radiographed and getting them cleared by inspection is the responsibility of the party.

6. **RECTIFICATIONS / REJECTIONS:**

   Any rectification due to defective work, if required, shall be done by the party free of charge with a suitable technology approved before hand by BHEL in writing. The cost of material, if any used for rectification work / rejection work, will be estimated by BHEL and the same shall be debited to party's account. In case any rectification / rework is to be carried out due to defective material supplied by BHEL, the replacement material and consumables will be supplied by BHEL free of Cost.

7. **SECURITY DEPOSIT:**

   Vendors shall have to submit a Bank Guarantee for **10%** of the order value in case of **HPVP ADM site** or **25%** of the material cost in case of Vendor works towards Security Deposit and safe custody of materials within one week from the date of issue of Order. The BG shall be valid for the contract period with a claim period of 12 months. This Bank Guarantee shall be released to the contractor after completion of work and on acceptance of the same by BHEL / Owner and on submission of Performance BG (claim period of 12 months) for 10 % of the order value covering for the defects liability period. If PBG is not submitted, 10% of the order value shall be deducted towards PBG from the final bill and shall be refundable after performance guarantee period, if no defects are found during this period.

8. **RAW MATERIALS ISSUE**:

   Raw materials shall be issued with appropriate processing allowance and invisible wastage over the theoretical requirement of raw materials **(Plates, Sheets, Sections and Pipes).**

9. **TRANSFER / RETURN OF LEFT OVER MATERIALS:**

   Party should maintain proper records for receipt & use of all free issue materials. The left over materials & scrap as per the material accounting statement shall be returned to HPVP stores along with finished job. Material Transfer Vouchers (MTV) from one order to another or from one vendor to another and Material Return Vouchers should be submitted immediately after transfer / return. The material reconciliation statement shall be submitted by the contractor after verification and certification by BHEL along with the final bill **within 30 days from the date of completion of work**. Otherwise, recovery for the balance materials shall be made from any of their pending bills without further intimation.

10. MATERIAL RECONCILIATION:

Orders issued to the vendors have to be completed in all respects including Material Accounting within a maximum of **180 days** from the **date of issue of the first material** from BHEL - HPVP stores.

Maximum of 0.5 % on the requirement of materials **(Plates, Sections and Pipes)** is admitted towards **process allowance and invisible wastage**.

Scrap quantity is permissible up to a **maximum of 1% on Structurals (Beams, Channels, Angles, Rods, Pipes etc.), 2% on Sheets, 3% for Plates** on the theoretical requirement of materials.

If wastage and scrap is beyond the above limits, it should be fully justified with cutting diagrams etc. which are to be approved in advance by BHEL. **Otherwise, the cost of raw materials beyond approved limits will be recovered from the contractor as per BHEL recovery rates including applicable taxes & duties**.

Material reconciliation including return of balance materials, off-cuts is to be completed within 20 days from the date of completion of the order. The material reconciliation statement shall be submitted by the contractor after verification and certification by BHEL-HPVP along with the final bill **within 30 days from the date of completion of work**. Otherwise, recovery for the balance materials shall be made from any of their pending bills without further intimation,

Repeated occurrence of inordinate delays in returning and settling the material accounting will entail BHEL the right to terminate the contract forthwith or impose a temporary suspension on further loading at the discretion of BHEL.

11. SCRAP & OFF-CUT NORMS:

Sl. No.	Description	Scrap Size (in mm)	Off-Cut (in MM)
1.	CS/AS Sheets & Plates	Below 500 × 250	500 × 250 & above
2.	Rolled sections Rod, angles etc. (other than -tubes, pipes)	Below 1000	1000 & above
3.	Tubes & Pipes	Below 500	500 & above
4.	Universal column	Below 1000	1000 & Above
5.	SS Sheets & Plates	Below 500 × 250	500 × 250 & above
6.	SS Structural, Rods, Tubes, Pipes	Below 250	250 & above
7.	Non – ferrous: sheets & plates, rods & tubes	Below 500 × 250 (S & PL), Below 250 (Rods & Tubes)	500 × 250 & above, 250 & above
8.	Big size Scrap	(2500 & above) × (150 to 249)	-

12. INSPECTION:

Party shall contact our Quality Control Dept. for stages of inspection before commencement of job and should strictly follow the stages of inspection as per QAP.

13. WORKMANSHIP GUARANTEE:

The vendors should give workmanship guarantee for fabricated items for a period of 18 months from the date of last delivery of the order. Any defects due to incomplete work, faulty workmanship found in the fabricated items after delivery during the defects liability period shall be rectified / replaced by the vendor free of cost. Otherwise, the expenditure incurred towards the same will be recovered from the pending bills of vendors.

14. WORK PROGRESS:

The fabricator shall furnish a weekly report on the progress of work along with the status of availability of free issue materials and requirement of further materials, if any.

Outsourcing dept. personnel will visit vendorôs works from time to time to assess and review the work progress. Free access shall be provided to BHEL or its inspection agency at all reasonable times of the day / night.

In case the progress is not satisfactory or supplies are delayed abnormally beyond the contractual delivery date, BHEL-HPVP, Visakhapatnam reserves the right to cancel the order in part or full or get the balance job in as is where is condition completed elsewhere by another agency at the risk and cost of Fabricator. The value of the work carried out by the party will be assessed by BHEL and the same shall be final. No compensation will be given to the fabricator in case of cancellation of order or diversion of balance job even if the jobs have been processed partly.

15. DELIVERY:

Finished items should be handed over to BHEL-HPVP on party's delivery challans along with Job completion certificate / Final Inspection Report from inspection agency / HPVP-QC department.

16. PENALTY:

If delivery exceeds the stipulated delivery schedule, penalty 1/2 % of the total value of order per week or part there of subject to a maximum of 10% on the total value of the order will be levied. However, time taken for the following will not be considered as delay on the part of the Sub-Contractor.

1) Intermediate operations, if any, carried out by BHEL.
2) Waiting time for BHEL / Third party Inspection beyond a normal time of 3 days.

17. PAYMENT TERMS:

Payment shall be made against RA Bills within 45 days from the date of submission of Bill.

90% payment will be made after handing over of the finished equipments along with all inspection documents to HPVP shops / Logistics dept. / ADM site / Lova Garden site, duly inspected & cleared by Inspection authority. Balance 10% payment shall be made along with the Final Bill against completion of total order in all respects including documentation.

Vendors shall have to submit the bills in the formats specified by HPVP-Outsourcing and the bills submitted in the specified format along with necessary supporting documents are only admitted for processing. The following documents shall be submitted along with the Final Bill: -

1. No Claim Certificate from the contractor
2. No Dues Certificate from BHEL
3. Work Completion Certificate from BHEL
4. Material Reconciliation Statement submitted by the Contractor and certified by concerned authority of BHEL (if applicable)
5. Workmanship Guarantee certificate from the contractor

18. SECRECY:

All the documents of BHEL inclusive of Drawings, GMS and Standards made available to the fabricator should be kept in strict confidence and under no circumstance be made available to others or allow others to make use of them. Such documents shall be returned to BHEL on demand after completion of the job. This secrecy clause is binding on the employees of the fabricators also. Violation of the same may lead to suspension of business with the vendor and necessary legal action.

19. SUB-LETTING:

In general, sub-letting of jobs will not be permitted. But in special circumstances, this may be allowed. In such case, the party should obtain written approval from BHEL-HPVP, Visakhapatnam before sub-letting.

20. FACTORY RULES AND REGULATIONS:

Party shall abide by all the rules and statutory regulations in force from time to time as per factories act. It shall be partyôs responsibility to ensure the safety of their workmen and fulfilling the ESI, PF and other relevant statutory regulations.

21. **SAFETY:**

a) Contractor shall adhere to safe construction practices, guard against hazardous & unsafe working conditions and shall comply with the safety rules of BHEL and local authorities. He shall maintain First Aid facilities for all his employees and labour. Contractorûs responsibility includes supply of welder kit, all safety items such as safety belts, white and colour glasses, goggles, safety helmets, safety shoes etc.

b) *Contractor and his employees shall follow all fire & safety, security regulations of BHEL.*

22. **HOUSE KEEPING**:

During execution of work, the contractor at all times keep the working place and storage area clean and free from accumulation of waste materials, rubbish etc.,

23. **ACCIDENT / DAMAGE / CONDUCT ETC.:**

Contractor will be held responsible for any disorderly conduct / misconduct, indiscipline, theft, smoking etc., on the part of his men. He will ensure summarily eviction of such men from his premises failing which BHEL would remove them from the factory on his responsibility. Any damage to and or loss of equipment, machinery, building etc., to BHEL or BHEL employees, visitors or other contractors resulting from his own or any of his menûs negligence shall be liable to be made good by him. Contractor shall be solely responsible for any accident in which you or your men or your equipment may be involved during the execution of contract on account of any reason what so ever.

24. **TERMINATION OF CONTRACT:**

In the event of any failure on the part of the contractor, BHEL reserves the right to terminate the contract by giving a notice of 2 weeks for any of the following lapses and contractual violations: -

a) Failure to make labour payments in time as per the rules
b) Failure to progress the job according to the agreed schedule
c) Failure to mobilize adequate man power, tools & tackles and consumables in time
d) Failure to adhere to Quality Standards of BHEL
e) Refused to co-operate with other agencies working in the same area
f) Failure to resolve labour disputes like strikes etc., within 7 days of occurrence
g) Failure to comply with statutory regulations applicable at BHEL

BHEL shall also be free to intervene and take necessary remedial measures. All costs incurred with interest and overheads shall be recovered from contractor by such foreclosing or off-loading any part of the contract work.

25. DISPUTES:

Head of BHEL- HPVP Unit will be the final authority for any disputes arising out of this contract. The disputes / arbitration / settlement of contractual or legal issues shall be under the Jurisdiction of Visakhapatnam Court.

26. For this procurement, Public Procurement (Preference to Make in India), Order 2017 dated 15.06.2017 & 28.05.2018 and subsequent Orders issued by the respective Nodal Ministry shall be applicable even if issued after issue of this NIT but before finalization of Contract / PO / WO against this NIT.

In the event of any Nodal Ministry prescribing higher or lower percentage of purchase preference and / or local content in respect of this procurement, same shall be applicable**.**

27. The Bidder declares that they will not enter into any illegal or undisclosed agreement or understanding, whether formal or informal with other Bidder(s). This applies in particular to prices, specifications, certifications, subsidiary contracts, submission or non-submission of bids or any other actions to restrict competitiveness or to introduce cartelization in the bidding process.

In case, the Bidder is found having indulged in above activities, suitable action shall be taken by BHEL as per extant policies/ guidelines.

Signature of the Bidder with Stamp

Annexure – IV

Acceptance to Tender Terms & Conditions

I / We hereby confirm that the Tender documents, Drawings, Quality documents, Specifications, TDC etc. have been studied in detail and we have fully understood the scope of work.

I / We accept to all the Terms and Conditions of the Tender Enquiry and the prices quoted are in accordance with the same.

I / We give our acceptance to participate in reverse auction for this tender.

Tender documents duly signed on all the pages by the Owner / authorized representative of the bidder are attached herewith.

Signature of the Bidder with Stamp

ANNEXURE – V

BUSINESS RULES FOR REVERSE AUCTION (RA)

This has reference to tender no. **OS/20-21/2439/PVLG/31/104, dated 20.03.2021**. BHEL shall finalise the Rates for **Fabrication of Clad portion of Main Fractionator Column (LAS with SS Clad) in 4 sections at Lovagarden site of BHEL-HPVP, Visakhapatnam** through Reverse Auction mode. BHEL has made arrangement with an authorized Service provider (details will be shared before reverse auction) for conducting RA. Bidders should go through the instructions given below and submit acceptance of the same.

The technical & commercial terms are as per (a) BHEL Tender Enq. No. **OS/20-21/2439/PVLG/31/104, dated 20.03.2021**, (b) Bidders' technical & commercial bid (in case of two-part bid) and (c) subsequent correspondences between BHEL and the bidders, if any.

1. **Procedure of Reverse Auctioning:**
   i) Price bids of all techno-commercially qualified bidders shall be opened.
   ii) **Reverse Auction**: The 'bid decrement' will be decided by BHEL.
   iii) The lowest bidder in sealed envelope price bid shall be shown as current L1 automatically by the system and no acceptance of that price is required. System shall have the provision to indicate this bid as current L1.
   iv) Bidders by offering a minimum bid decrement or the multiples thereof can displace a standing lowest bid and become "L1" and this continues as an iterative process. However, no bidder shall be allowed to lower its bid below the current L1 by more than 5 decrements at one go.
   v) After the completion of the reverse auction, the Closing Price shall be available for further processing.
   vi) Wherever the evaluation is done on total cost basis, after Reverse Auction, prices of individual line items shall be reduced on pro-rata basis.

2. **Schedule for reverse auction:** The Reverse Auction schedule will be intimated to the techno-commercially qualified bidders at a later stage.

3. **Auction extension time:** If a bidder places a bid in the last {…} minutes of closing of the Reverse Auction and if that bid gets accepted, then the auction's duration shall get extended automatically for another {…} minutes, for the entire auction (i.e. for all the items in the auction), from the time that bid comes in. Please note that the auto-extension will take place only if a bid comes in those last {…} minutes and if that bid gets accepted as the lowest bid. If the bid does not get accepted as the lowest bid, the auto-extension will not take place even if that bid might have come in the last {…} minutes. In case, there is no bid in the last {…} minutes of closing of Reverse Auction, the auction shall get closed automatically without any extension. However, bidders are advised not to wait till the last minute or last few seconds to enter their bid during the auto-extension period to avoid complications related with internet connectivity, network problems, system crash down, power failure, etc.
   The above process will continue till completion of Reverse Auction.
   Complaints/ Grievances, if any, regarding denial of service or any related issue should be given in writing thru e-mail/ fax to M/s. {Service provider} with a copy to BHEL within 15 minutes prior to initial closing time of Reverse Auction.

4. **Bid price:** The Bidder has to quote the {……} Price inclusive of Packing & Forwarding charges, all the routine & type tests as per tender scope, taxes, duties, freight and insurance as specified in tender document including loading (if indicated by BHEL due to deviations in technical/ commercial terms) for the Items specified. Details are as shown in Excel Sheet for calculation of total cost to BHEL (To be specified by Unit as per NIT conditions).

5. **Bidding currency and unit of measurement:** Bidding will be conducted in *Indian Rupees* per *Unit* of the material as per the specifications mentioned in the tender.
   In case of foreign currency bids, exchange rate (TT selling rate of State Bank of India) as on scheduled date of tender opening (Part-I bid) shall be considered for conversion in Indian Rupees. If the relevant day happens to be a Bank holiday, then the forex rate as on the previous bank (SBI) working day shall be taken.

6. **Validity of bids:** Price shall be valid for 90 days from the date of reverse auction. These shall not be subjected to any change whatsoever.

7. **Lowest bid of a bidder**: In case the bidder submits more than one bid, the lowest bid at the end of Reverse Auction will be considered as the bidder's final offer to execute the work.

8. Unique user IDs shall be used by bidders during bidding process. All bids made from the Login ID given to the bidders will be deemed to have been made by the bidders/ bidders' company.

9. **Post auction procedure**: BHEL will proceed with the Lowest Bid in the Reverse Auction for further processing.

10. Any commercial/ technical loading shall be separately intimated to respective bidders prior to RA. The excel sheet provided in this regard shall cover all these aspects. Commercial/ technical loading if any, shall be added by the respective bidder in its price during Reverse Auction.
    Modalities of loading & de-loading shall be separately intimated to the bidders. The responsibility for correctness of total cost to BHEL shall lie with the bidders.

11. Reverse auction shall be conducted by BHEL (through M/s {*Service Provider}*), on pre-specified date, while the bidders shall be quoting from their own offices/ place of their choice. Internet connectivity shall have to be ensured by bidders themselves.

    During the RA process if a bidder is not able to bid and requests for extension of time by FAX/ email/ phone then time extension of additional 15 minutes will be given by the service provider provided such requests come before 5 minutes of auction closing time. However, only one such request per bidder can be entertained.

    In order to ward-off contingent situation of connectivity failure bidders are requested to make all the necessary arrangements/ alternatives whatever required so that they are able to circumvent such situation and still be able to participate in the reverse auction successfully. Failure of power or loss of connectivity at the premises of bidders during the Reverse auction cannot be the cause for not participating in the reverse auction. On account of this, the time for the auction cannot be extended and neither BHEL nor M/s. {*Service provider*} is responsible for such eventualities.

12. Proxy bids: Proxy bidding feature is a pro-bidder feature to safe guard the bidder's interest of any internet failure or to avoid last minute rush. The proxy feature allows bidders to place an automated bid in the system directly in an auction and bid without having to enter a new amount each time a competing bidder submits a new offer. The bid amount that a bidder enters is the minimum that the bidder is willing to offer. Here the software bids on behalf of the bidder. This obviates the need for the bidder participating in the bidding process until the proxy bid amount is decrementally reached by other bidders. When proxy bid amount is reached, the bidder (who has submitted the proxy bid) has an option to start participating in the bidding process.

    The proxy amount is the minimum amount that the bidder is willing to offer. During the course of bidding, the bidder cannot delete or change the amount of a proxy bid.

    Bids are submitted in decrements (decreasing bid amounts). The application automates proxy bidding by processing proxy bids automatically, according to the decrement that the auction originator originally established when creating the auction, submitting offers to the next bid decrement each time a competing bidder bids, regardless of the fact whether the competing bids are submitted as proxy or standard bids. However, it may please be noted that if a manual bid and proxy bid are submitted at the same instant manual bid will be recognized as the L1 at that instant.

    In case of more than one proxy bid, the system shall bid till it crosses the threshold value of 'each lowest proxy bid' and thereafter allow the competition to decide the final L1 price.

    Proxy bids are fed into the system directly by the respective bidders. As such this information is privy only to the respective bidder(s).

13. Bidders are advised to get fully trained and clear all their doubts such as refreshing of Screen, quantity being auctioned, tender value being auctioned etc. from M/s. {*Service provider*}.

14. M/s. {*Service provider}*, shall arrange to demonstrate/ train the bidder or bidder's nominated person(s), without any cost to bidders. M/s. {*Service provider}*, shall also explain the bidders, all the business rules related to the Reverse Auction. Bidders are required to submit their acceptance to the terms/ conditions/ modalities before

participating in the Reverse Auction in the process compliance form as enclosed. Without this, the bidder will not be eligible to participate in the event.

15. Successful bidder shall be required to submit the final prices (L1) in prescribed format (Annexure – VI) for price breakup, quoted during the Reverse Auction, duly signed and stamped as token of acceptance without any new condition (other than those already agreed to before start of auction), after the completion of auction to M/s. {*Service provider*} besides BHEL within two working days of Auction without fail.

16. Any variation between the final bid value and that in the confirmatory signed price breakup document will be considered as tampering the tender process and will invite action by BHEL as per extant guidelines for suspension of business dealings (as available on www.bhel.com).

17. Bidders' bid will be taken as an offer to execute the work/ supplies the item as per enquiry no. **OS/20-21/2439/PVLG/31/104, dated 20.03.2021.** Bids once made by the bidder, cannot be cancelled/ withdrawn and bidder shall be bound to execute the work as mentioned above at bidder's final bid price. Should bidder back out and not execute the contract as per the rates quoted, BHEL shall take action as per extant guidelines for suspension of business dealings (as available on www.bhel.com).

18. Bidders shall be able to view the following on their screen along with the necessary fields during Reverse Auction:
a. Leading (Running Lowest) Bid in the Auction (only total price of package)
b. Bid Placed by the bidder
c. Start Price
d. Decrement value
e. Rank of their own bid during bidding as well as at the close of auction.

19. BHEL's decision on award of contract shall be final and binding on all the Bidders.

20. BHEL reserves the right to extend, reschedule or cancel the Reverse Auction process at any time, before ordering, without assigning any reason, with intimation to bidders.

21. BHEL shall not have any liability to bidders for any interruption or delay in access to the site irrespective of the cause. In such cases, the decision of BHEL shall be binding on the bidders.

22. Other terms and conditions shall be as per bidder's techno-commercial offers and other correspondences, if any, till date.

23. If there is any clash between this business document and the FAQ available, if any, in the website of M/s. {*Service provider},* the terms & conditions given in this business document will supersede the information contained in the FAQs. Any changes made by BHEL/ service provider (due to unforeseen contingencies) after the first posting shall be deemed to have been accepted if the bidder continues to access the portal after that time.

24. Bidder shall not divulge either his Bids or any other exclusive details of BHEL to any other party. If the Bidder or any of his representatives are found to be involved in Price manipulation/ cartel formation of any kind, directly or indirectly by communicating with other bidders, action *as per extant BHEL guidelines for suspension of business dealings (as available on www.bhel.com)*, shall be initiated by BHEL.

Signature of the Bidder with Stamp

ANNEXURE - GST

PROCEDURE FOR GST PAYMENT

1. In Response to Tenders for Indigenous supplier will be entertained only if the vendor has a valid GSTIN which should be clearly mentioned in the offer. If any specific exemption is available, a declaration with due supporting documents need to be furnished for considering the offer.
2. Supplier shall mention their GSTIN in all their invoices and invoices shall be in the format as specified/prescribed under GST laws. Invoices shall necessarily contain Invoice number (in case of multiple numbering system is being followed for billing like SAP invoice no, commercial invoice no etc., then the Invoice No which is linked/uploaded in GSTIN network shall be clearly indicated), item description as per P0, Quantity, Rate, Value, applicable taxes with nomenclature (like IGST, SGST, CGST & UTGST) separately, HSN/ SAC Code, etc.
3. All invoices shall bear the HSN Code for each item separately (Harmonized System of Nomenclature)/ SAC code (Services Accounting Code).
4. A declaration to the effect that all invoice particulars are/were uploaded in the GSTIN network/ portal & all tax liability as per GST rules and regulations have been and will be discharged, shall be mentioned in the invoice. If not mentioned in the invoice, a separate declaration shall be submitted as per the requirement of BHEL.
5. All documents like Test Certificate, LR copy, Guarantee/Warrantee certificate, work completion certificate, any other document mentioned in PO, shall be sent along with the vehicle/consignment where ever applicable. For all consignments received within the calendar month, input credit will be availed within that month in line with monthly returns filing cycle. In case of any discrepancy in the document or non-submission of documents mentioned in the PO, then BHEL will not be able to accept or account the material, in such case availing of tax credit will be deferred to next month or so.
6. In case of discrepancy in the data uploaded by supplier in the GSTIN portal or in case of any shortages or rejection in the supply, then BHEL will not be able to avail the tax credit and will notify the supplier of the same. Supplier has to rectify the data discrepancy in the GSTIN portal or issue credit note (details to be uploaded in GSTIN portal) for the shortages or rejections in the suppliers, within the calendar month notified by BHEL.
7. For any such delay in availing of tax credit for reasons attributable to supplier (as mentioned above), interest (calculated @ SBI Base Rate + 6%) along with penalty if any will be deducted for the delayed period i.e. from the month of receipt till the month tax credit is availed, from the running bills.
8. Under GST regime, BHEL has to discharge GST liability on LD recovered from suppliers/contractors. Hence applicable GST shall also be recoverable from suppliers/contractors on LD amount. For this Debit note will be issued by BHEL indicating the respective supply invoice number.
9. This is to inform that GST portion of invoice, shall be released only upon Vendor declaring such invoice in his GSTR-1 and receipt of goods and Tax invoice by BHEL and Confirmation of payment of GST thereon by vendor on GSTIN portal. Alternatively, BG of appropriate value may be obtained from vendor which shall be valid At least one month after the confirmation of date of payment of GST by vendor on GSTIN portal and receipt of Tax invoice and receipt of goods, whichever is later. Above is subject to receipt of goods/service and tax invoice thereof along with vendor declaring invoice in his return and paying GST within timeline prescribed for availing ITC by BHEL.
10. That in case vendor delays Declaring such invoice in his return and GST credit availed by BHEL is denied or reversed subsequently as per GST law, GST amount paid by BHEL towards such ITC reversal as per GST law shall be recoverable from vendor/contractor along with interest levied/ leviable on BHEL.

Note: The above will be followed strictly for processing vendor payments to ensure GST Compliance.

*****

Annexure-VI

INTEGRITY PACT

Between

Bharat Heavy Electricals Ltd. (BHEL), a company registered under the Companies Act 1956 and having its registered office at "BHEL House", Siri Fort, New Delhi - 110049 (India) hereinafter referred to as "The Principal", which expression unless repugnant to the context or meaning hereof shall include its successors or assigns of the ONE PART

and

_____, (description of the party along with address), hereinafter referred to as "The Bidder/ Contractor" which expression unless repugnant to the context or meaning hereof shall include its successors or assigns of the OTHER PART

Preamble

The Principal intends to award, under laid-down organizational procedures, contract/s for _____ _____ _____ . The Principal values full compliance with all relevant laws of the land, rules and regulations, and the principles of economic use of resources, and of fairness and transparency in its relations with its Bidder(s)/ Contractor(s).

In order to achieve these goals, the Principal will appoint Independent External Monitor(s), who will monitor the tender process and the execution of the contract for compliance with the principles mentioned above.

Section 1- Commitments of the Principal

1.1 The Principal commits itself to take all measures necessary to prevent corruption and to observe the following principles:-

1.1.1 No employee of the Principal, personally or through family members, will in connection with the tender for, or the execution of a contract, demand, take a promise for or accept, for self or third person, any material or immaterial benefit which the person is not legally entitled to.

1.1.2 The Principal will, during the tender process treat all Bidder(s) with equity and reason. The Principal will in particular, before and during the tender process, provide to all Bidder(s) the same information and will not provide to any Bidder(s) confidential/ additional information through which the Bidder(s) could obtain an advantage in relation to the tender process or the contract execution.

1.1.3 The Principal will exclude from the process all known prejudiced persons.

1.2 If the Principal obtains information on the conduct of any of its employees which is a penal offence under the Indian Penal Code 1860 and Prevention of Corruption Act 1988 or any other statutory penal enactment, or if there be a substantive suspicion in this regard, the Principal will inform its Vigilance Office and in addition can initiate disciplinary actions:

Section 2 - Commitments of the Bidder(s)/ Contractor(s)

2.1 The Bidder(s)/ Contractor(s) commit himself to take all measures necessary to prevent corruption. He commits himself to observe the following principles during his participation in the tender process and during the contract execution.

2.1.1 The Bidder(s)/ Contractor(s) will not, directly or through any other person or firm, offer, promise or give to the Principal or to any of the Principal's employees involved in the tender process or the execution of the contract or to any third person any material, immaterial or any other benefit which he/ she is not legally entitled to, in order to obtain in exchange any advantage of any kind whatsoever during the tender process or during the execution of the contract.

2.1.2 The Bidder(s)/ Contractor(s) will not enter with other Bidder(s) into any illegal or undisclosed agreement or understanding, whether formal or informal. This applies in particular to prices, specifications, certifications, subsidiary contracts, submission or non-submission of bids or any other actions to restrict competitiveness or to introduce cartelization in the bidding process.

2.1.3 The Bidder(s)/ Contractor(s) will not commit any penal offence under the relevant Indian Penal Code (IPC) and Prevention of Corruption Act; further the Bidder(s)/ Contractor(s) will not use improperly, for purposes of competition or personal gain, or pass on to others, any information or document provided by the Principal as part of the business relationship, regarding plans, technical proposals and business details, including information contained or transmitted electronically.

2.1.4 Foreign Bidder(s)/ Contractor(s) shall disclose the name and address of agents and representatives in India and Indian Bidder(s)/ Contractor(s) to disclose their foreign principals or associates. The Bidder(s)/ Contractor(s) will, when presenting his bid, disclose any and all payments he has made, and is committed to or intends to make to agents, brokers or any other intermediaries in connection with the award of the contract.

2.2 The Bidder(s)/ Contractor(s) will not instigate third persons to commit offences outlined above or be an accessory to such offences.

2.3 The Bidder(s)/ Contractor(s) shall not approach the Courts while representing the matters to IEMs and will await their decision in the matter.

Section 3 - Disqualification from tender process and exclusion from future contracts

If the Bidder(s)/ Contractor(s), before award or during execution has committed a transgression through a violation of Section 2 above, or acts in any other manner such as to put his reliability or credibility in question, the Principal is entitled to disqualify the Bidder(s)/ Contractor(s) from the tender process or take action as per the separate "Guidelines on Banning of Business dealings with Suppliers/ Contractors", framed by the Principal.

Section 4 - Compensation for Damages

4.1 If the Principal has disqualified the Bidder from the tender process prior to the award according to Section 3, the Principal is entitled to demand and recover the damages equivalent Earnest Money Deposit/ Bid Security.

4.2 If the Principal has terminated the contract according to Section 3, or if the Principal is entitled to terminate the contract according to section 3, the Principal shall be entitled to

demand and recover from the Contractor liquidated damages equivalent to 5% of the contract value or the amount equivalent to Security Deposit/ Performance Bank Guarantee, whichever is higher.

Section 5 - Previous Transgression

5.1 The Bidder declares that no previous transgressions occurred in the last 3 years with any other company in any country conforming to the anti-corruption approach or with any other Public Sector Enterprise in India that could justify his exclusion from the tender process.

5.2 If the Bidder makes incorrect statement on this subject, he can be disqualified from the tender process or the contract, if already awarded, can be terminated for such reason.

Section 6 - Equal treatment of all Bidders/ Contractors / Sub-contractors

6.1 The Principal will enter into agreements with identical conditions as this one with all Bidders and Contractors. In case of sub-contracting, the Principal contractor shall be responsible for the adoption of IP by his sub-contractors and shall continue to remain responsible for any default by his sub-contractors.

6.2 The Principal will disqualify from the tender process all bidders who do not sign this pact or violate its provisions.

Section 7 - Criminal Charges against violating Bidders/ Contractors /Subcontractors

If the Principal obtains knowledge of conduct of a Bidder, Contractor or Subcontractor, or of an employee or a representative or an associate of a Bidder, Contractor or Subcontractor which constitutes corruption, or if the Principal has substantive suspicion in this regard, the Principal will inform the Vigilance Office.

Section 8 - Independent External Monitor(s)

8.1 The Principal appoints competent and credible Independent External Monitor for this Pact. The task of the Monitor is to review independently and objectively, whether and to what extent the parties comply with the obligations under this agreement.

8.2 The Monitor is not subject to instructions by the representatives of the parties and performs his functions neutrally and independently. He reports to the CMD, BHEL.

8.3 The Bidder(s)/ Contractor(s) accepts that the Monitor has the right to access without restriction to all contract documentation of the Principal including that provided by the Bidder(s)/ Contractor(s). The Bidder(s)/ Contractor(s) will grant the monitor, upon his request and demonstration of a valid interest, unrestricted and unconditional access to his contract documentation. The same is applicable to Sub-contractor(s). The Monitor is under contractual obligation to treat the information and documents of the Bidder(s)/ Contractor(s) / Sub-contractor(s) with confidentiality in line with Non- disclosure agreement.

8.4 The Principal will provide to the Monitor sufficient information about all meetings among the parties related to the contract provided such meetings could have an impact on the contractual relations between the Principal and the Contractor. The parties offer to the Monitor the option to participate in such meetings.

8.5 The role of IEMs is advisory, would not be legally binding and it is restricted to resolving issues raised by an intending bidder regarding any aspect of the tender which allegedly restricts competition or bias towards some bidders. At the same time, it must be understood that IEMs are not consultants to the Management. Their role is independent in nature and the advice once tendered would not be subject to review at the request of the organization.

8.6 For ensuring the desired transparency and objectivity in dealing with the complaints arising out of any tendering process, the matter should be examined by the full panel of IEMs jointly as far as possible, who would look into the records, conduct an investigation, and submit their joint recommendations to the Management.

8.7 The IEMs would examine all complaints received by them and give their recommendations/ views to CMD, BHEL, at the earliest. They may also send their report directly to the CVO and the Commission, in case of suspicion of serious irregularities requiring legal/ administrative action. IEMs will tender their advice on the complaints within 10 days as far as possible.

8.8 The CMD, BHEL shall decide the compensation to be paid to the Monitor and its terms and conditions.

8.9 IEM should examine the process integrity, they are not expected to concern themselves with fixing of responsibility of officers. Complaints alleging mala fide on the part of any officer of the organization should be looked into by the CVO of the concerned organisation.

8.10 If the Monitor has reported to the CMD, BHEL, a substantiated suspicion of an offence under relevant Indian Penal Code/ Prevention of Corruption Act, and the CMD, BHEL has not, within reasonable time, taken visible action to proceed against such offence or reported it to the Vigilance Office, the Monitor may also transmit this information directly to the Central Vigilance Commissioner, Government of India.

8.11 The number of Independent External Monitor(s) shall be decided by the CMD, BHEL.

8.12 The word `Monitor' would include both singular and plural.

Section 9 - Pact Duration

9.1 This Pact shall be operative from the date IP is signed by both the parties till the final completion of contract for successful bidder and for all other bidders 6 months after the contract has been awarded. Issues like warranty / guarantee etc. should be outside the purview of IEMs.

9.2 If any claim is made/ lodged during currency of IP, the same shall be binding and continue to be valid despite the lapse of this pact as specified above, unless it is discharged/ determined by the CMD, BHEL.

Section 10 - Other Provisions

10.1 This agreement is subject to Indian Laws and jurisdiction shall be registered office of the Principal, i.e. New Delhi.

10.2 Changes and supplements as well as termination notices need to be made in writing. Side agreements have not been made.

10.3 If the Contractor is a partnership or a consortium, this agreement must be signed by all partners or consortium members.

10.4 Should one or several provisions of this agreement turn out to be invalid, the remainder of this agreement remains valid. In this case, the parties will strive to come to an agreement to their original intentions.

10.5 Only those bidders / contractors who have entered into this agreement with the Principal would be competent to participate in the bidding. In other words, entering into this agreement would be a preliminary qualification.

20/3/2021

For & On behalf of the Principal

Y.V.R. RAO
Dy. Manager (QS)
Bharat Heavy Electricals Ltd
HPVP VISAKHAPATNAM-17

(Office Seal)

For & On behalf of the Bidder/

Contractor

(Office Seal)

Place----------

Date----------

Witness:_____ 20/03/2021

(Name & Address)_____

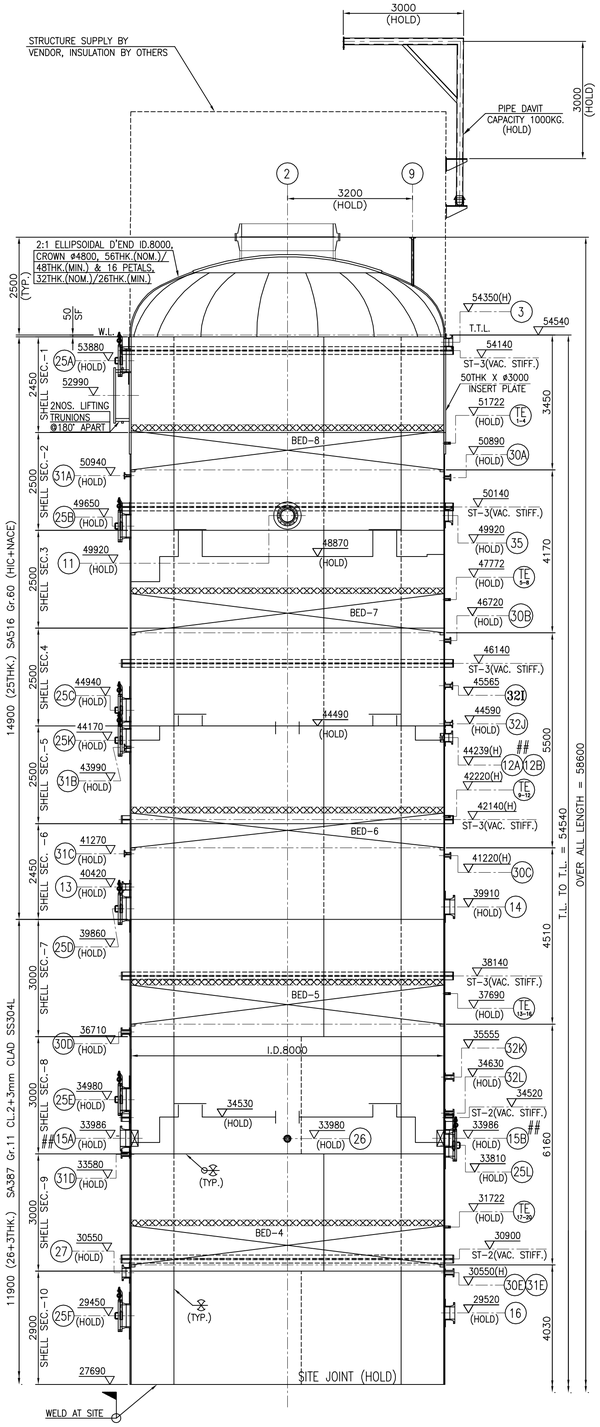
D. N. MURTHY
Dy. Manager (QS)
Bharat Heavy Electricals Ltd.
HPVP, Visakhapatnam-530 012

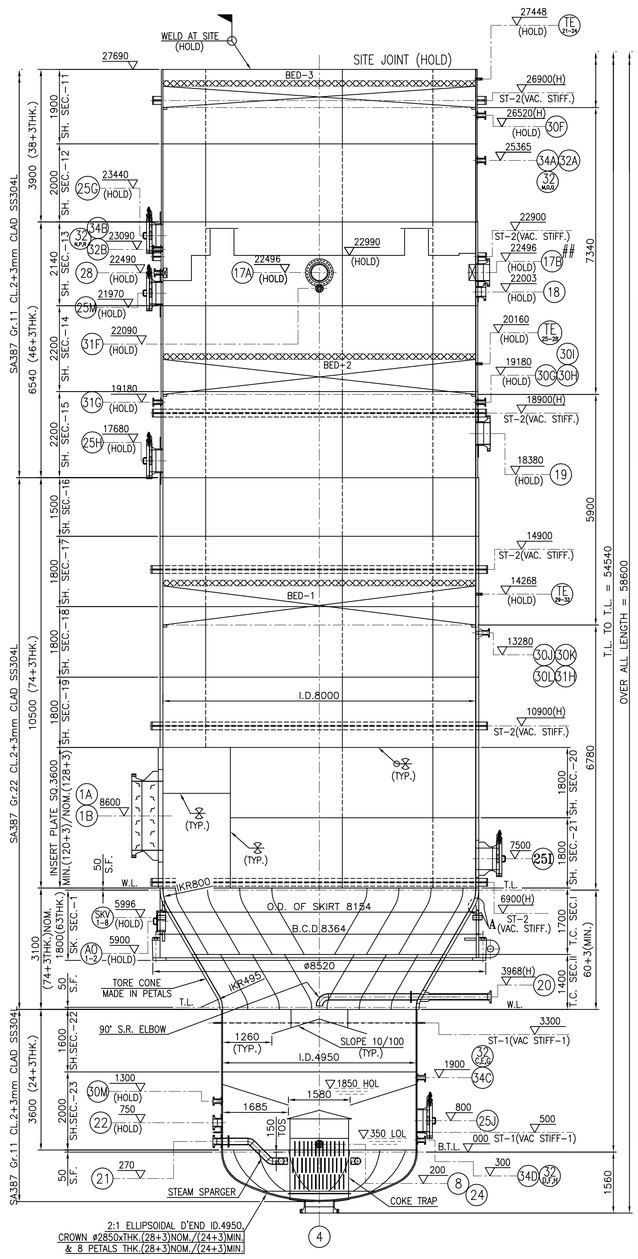
Witness:_____

(Name & Address) _____

_____

DRAWING NO: 1-CL-010-U0169





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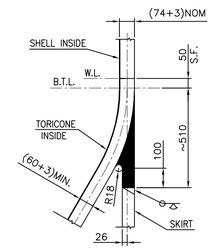

DETAIL-A

# R.F. PAD SIZE	
NOZZLE MARK	W X T
30D & 30E	45 X 26
30F	45 X 38
30G-I	45 X 46
31D & 31E	45 X 26
31F & 31G	45 X 46
32A,32M,32O,32Q	45 X 38
32B,32N,32P,32R	45 X 46

TABLE-1

BEDS		BOTTOM 1-2	MIDDLE 3-5	TOP 6-8
OPERATING PRESSURE (Kg/Cm²g)	NORMAL	0.79	0.78	0.72
	MAXIMUM	1.083	1.065	1.009
OPERATING TEMPERATURE (°C)	NORMAL	349	271	172
	MAXIMUM	355	277	178

** TOP SECTION=200°C, MIDDLE SECTION=295', BOTTOM SECTION=475°C, BOTTOM SECTION FROM TOP OF BED1 TO BOTTOM OF CONE SECTION DESIGNED FOR INTERMITTENT/EXCURSION OF 570°C FOR ≤100 HOURS/YEAR FOR 30 YEARS.

*** TOP SECTION = 40 mm
MIDDLE SECTION = 65 mm
BOTTOM SECTION = 90 mm
NO INSULATION SHALL BE PROVEDED FOR NOZZLE-1

DESIGN DATA

OPERATING MEDIUM / SERVICE	--		
DESIGN PRESSURE (Kg/Cm²g)	INT. 3.5 AT TOP	EXT. FV @ 200°C	
WORKING PRESSURE (Kg/Cm²g)	REFER TABLE-1		
WORKING TEMPERATURE (°C)	REFER TABLE-1		
DESIGN TEMPERATURE (°C)	**		
MDMT (°C)	3.4		
CORROSION ALLOWANCE (mm)	3.0 (FOR CS PORTION ONLY)		
JOINT EFFICIENCY	SHELL : 1.0	HEAD/TORICONE : 1.0	
RADIOGRAPHY	SHELL : 100%	HEAD/TORICONE : 100%	
POST WELD HEAT TREATMENT	YES		
HEAT TREATMENT	NO (IF COLD FORMED)		
SP. GRAVITY	0.91 @ 340°	ERECTION WEIGHT (Kg)	~664,000
CAPACITY (M³)	2640	OPERATING WT. (Kg)	~11,46,300
INSULATION THICKNESS (MM) (BY OTHERS)	*** (HOT)	HYD.TEST WEIGHT (Kg) (SHOP)	~3304,000
FIRE PROOFING (BY OTHERS)	50 mm	HYD.TEST WEIGHT (Kg) (FIELD)	~3426,000
HYTDROSTATIC TEST (kg/cm²g) PRESSURE (NEW & COLD)	4.732 VERTICAL (AT TOP)	WIND SPECIFICATION	IS: 875
		EARTH QUAKE SPECIFICATION	IS: 1893 & SITE SPECTRA
CODE	ASME SEC VIII DIV.1 EDITION 2017	VESSEL SL. No.	26686
		CONSIGNMENT SIZE	O.D.C.
INSPECTION :	TPIA		

ENGINEERING STANDARDS / SPECIFICATIONS / REFERENCE DRAWINGS

1.	GENERAL SPECN. FOR PRESSURE VESSELS.	6-12-0001 REV.6
2.	SUPP. SPEC. FOR C.S VESSELS.	6-12-0002 REV.8
3.	SUPP. SPEC. FOR LOW ALLOY STEEL VESSELS.	6-12-0003 REV.5
4.	SUPP. SPEC. FOR CLAD VESSELS.	6-12-0007 REV.5
5.	STD. SPEC. FOR BQCS PLATE.	6-12-0011 REV.8
6.	STD. SPEC. FOR STRUCTURAL QUALITY PLATES.	6-12-0014 REV.6
7.	STD. SPEC. FOR CLAD PLATES.	6-12-0015 REV.5
8.	STD. SPEC. FOR 1.25% Cr.-1/2% Mo STEEL PLATES.	6-12-0017 REV.5
9.	STD. SPEC. FOR 2.25% Cr.-12% Mo STEEL PLATES.	6-12-0018 REV.4
10.	STD. SPEC. FOR SS PLATES.	6-12-0020 REV.8
11.	SPEC. FOR SURFACE PREPARATION & PROTECTIVE COATING.	B224-000-79-41-PLS-01 REV.5
12.	STD. SPEC. FOR CS COMPONENT IN SOUR SERVICE.	6-79-0013 REV.2
13.	VESSEL TOLERANCES.	7-12-0001 REV.6
14.	SKIRT BASE DETAILS.	7-12-0004 REV.7
15.	SKIRT OPENING DETAILS.	7-12-0005 REV.6
16.	MANHOLE WITH DAVIT.	7-12-0010 REV.7
17.	LADDER RUNGS FOR MANHOLE / DEMISTER	7-12-0011 REV.6
18.	NOZZLE REINFORCEMENT AND PROJECTION.	7-12-0013 REV.7
19.	STANDARD BOLT HOLE ORIENTATION.	7-12-0015 REV.6
20.	ALLOY LINER DETAILS.	7-12-0016 REV.6
21.	SUPPORT RING SIZES FOR PACKED TOWERS.	7-12-0022 REV.6
22.	PIPE DAVIT (FOR GUIDANCE)	7-12-0023 REV.7
23.	FIRE PROOFING AND INSULATION SUPPORTS	7-12-0025 REV.6
24.	EARTHING LUG.	7-12-0026 REV.6
25.	NAME PLATE.	7-12-0027 REV.6
26.	MANUFACTURER NAME PLATE.	7-12-0028 REV.6
27.	BRACKET FOR NAME PLATE.	7-12-0029 REV.6
28.	SUPPORTS FOR INTERNAL FEED PIPE.	7-12-0032 REV.5
29.	S.R. NOZZLE NECK.	7-12-0037 REV.4
30.	SKIN THERMOCOUPLE MOUNTING DRG.	B224-111-YT-SK-6003
31.	PROCESS DATA SHEETS	076405C001-111-PDS-0500-2101

NOZZLES (2.25 Cr+1 MO+CLAD ZONE)

MARK NO.	QTY.	SERVICE	N.P.S	O.D.	SCH. THK.	R.F.PAD WIDTH x THK.	RATING CLASS	TYPE / FACE	PROJE.	REMARKS
31H	1	PRESSURE CONNECTION	3" I.D.	--	-- / 20.4 + ⊖	--	300	SRLWN/RF	4350	LIP TYPE ⊖=5mm WOL
30 J-L	3	THERMOWELLS (LIQUID SHIELD)	3" I.D.	--	-- / 20.4 + ⊖	--	300	SRLWN/RF	4350	LIP TYPE ⊖=5mm WOL
25J	1	MANHOLE + B.F. + DAVIT	24"	609.6	-- / 30+3 CLAD	--	300	SRWN/RF	4600	LIP TYPE
20	1	QUENCH RETURN	6"	168.3	-- / 20+3 CLAD	--	300	SRWN/RF	4400	LIP TYPE
1 A-B	2	FEED (NOTE-XX & XX)	72"	1828.8	-- / 30+3 CLAD	--	300	SRWN/RF	4800	LIP TYPE

NOZZLES (1.25 Cr+0.5 MO+CLAD ZONE)

MARK NO.	QTY.	SERVICE	N.P.S	O.D.	SCH. THK.	R.F.PAD WIDTH x THK.	RATING CLASS	TYPE / FACE	PROJE.	REMARKS
AO 1-2	2	ACCESS OPENING	20"	--	-- / 32THK.	250 x 63	--	--	--	
SKV 1-8	8	SKIRT VENT	4"	114.3	40 / 6.02	--	--	--	--	
34 C-D	2	MAGNETIC LEVEL GAUGE	3" I.D.	76.2 (I.D.)	-- / 20.4 + ⊖	45 x 28	300	L.W.N/R.F.	2720	⊖=5mm WOL
34 A-B	2	MAGNETIC LEVEL GAUGE	3" I.D.	76.2 (I.D.)	-- / 20.4 + ⊖	45 x 50	300	L.W.N/R.F.	4260	⊖=5mm WOL
32 K-L	2	DP TYPE LEVEL TRANSMITTER	3" I.D.	76.2 (I.D.)	-- / 20.4 + ⊖	45 x 28	300	L.W.N/R.F.	4260	⊖=5mm WOL
32 C-H	6	DP TYPE LEVEL TRANSMITTER	3" I.D.	76.2 (I.D.)	-- / 20.4 + ⊖	45 x 24	300	L.W.N/R.F.	2720	⊖=5mm WOL # REFER TABLE
32 A,M-R	8	DP TYPE LEVEL TRANSMITTER	3" I.D.	76.2 (I.D.)	-- / 20.4 + ⊖	45 x #	300	L.W.N/R.F.	4260	⊖=5mm WOL # REFER TABLE
31 D-G	4	PRESSURE CONNECTION	3" I.D.	76.2 (I.D.)	-- / 20.4 + ⊖	45 x #	300	L.W.N/R.F.	4260	⊖=5mm WOL # REFER TABLE
30M	1	THERMOWELL	3" I.D.	76.2 (I.D.)	-- / 20.4 + ⊖	45 x 28	300	L.W.N/R.F.	2720	⊖=5mm WOL
30 D-I	6	THERMOWELLS (LIQUID SHIELD)	3" I.D.	76.2 (I.D.)	-- / 20.4 + ⊖	45 x #	300	L.W.N/R.F.	4260	⊖=5mm WOL # REFER TABLE
28	1	PRESSURE BALANCE (FROM 111-V-2601)	3" I.D.	76.2 (I.D.)	-- / 20.4 + ⊖	45 x 50	300	L.W.N/R.F.	4230	⊖=5mm WOL
26	1	PRESSURE BALANCE (FROM 111-V-2602)	3" I.D.	76.2 (I.D.)	-- / 15.9 + ⊖	45 x 28	150	L.W.N/R.F.	4230	⊖=5mm WOL
27	1	PRESSURE BALANCE (FROM 111-V-1104)	10"	273.0	-- / 24+3 CLAD	135 x 28	150	W.N/R.F.	4230	
25J	1	MANHOLE + B.F. + DAVIT	24"	610	-- / 24+3 CLAD	300 x 28	300	W.N/R.F.	2820	
25 G,H,M	3	MANHOLE + B.F. + DAVIT	24"	610	-- / 24+3 CLAD	300 x 50	300	W.N/R.F.	4350	
25 E,F,L	3	MANHOLE + B.F. + DAVIT	24"	610	-- / 24+3 CLAD	300 x 28	150	W.N/R.F.	4280	
24	1	UTILITY	3" I.D.	76.2 (I.D.)	-- / 20.4 + ⊖	45 x 28	300	L.W.N/R.F.	2720	⊖=5mm WOL
22	1	FRESH FEED (START UP)	8"	219.1	-- / 24+3 CLAD	110 x 28	300	W.N/R.F.	2720	
21	1	SPARGE STEAM	6"	168.3	80 / 10.97 + ⊖	85 x 28	300	W.N/R.F.	2720	⊖=5mm WOL
19	1	SLURRY PA RET.	20"	508.0	-- / 24+3 CLAD	250 x 50	300	W.N/R.F.	4370	
18	1	HCO WASH	10"	273.0	-- / 24+3 CLAD	135 x 50	300	W.N/R.F.	4260	
17 A-B	2	HCO DRAW+ VORTEX BREAKER	18"	457.0	-- / 24+3 CLAD	225 x 50	300	W.N/R.F.	4360	
16	1	HCO PA RETURN	14"	355.6	-- / 24+3 CLAD	175 x 28	150	W.N/R.F.	4280	
15 A-B	2	LCO DRAW+ VORTEX BREAKER	18"	457.0	-- / 24+3 CLAD	225 x 28	150	W.N/R.F.	4280	
8	1	STEAM OUT	3" I.D.	76.2 (I.D.)	-- / 20.4 + ⊖	45 x 28	300	L.W.N/R.F.	2720	⊖=5mm WOL
4	1	BOTTOMS	30"	768.4	-- / 24+3 CLAD	380 x 28	300	W.N/R.F.	SEE DRG.	

NOZZLES (1.25 Cr+0.5 MO+CLAD ZONE)

MARK NO.	QTY.	SERVICE	N.P.S	O.D.	SCH. THK.	R.F.PAD WIDTH x THK.	RATING CLASS	TYPE / FACE	PROJE.	REMARKS
35	1	LO STRIPPER VAP. RET.	12"	323.8	-- / 25THK.	160 x 25	150	W.N/R.F.	4230	
32 I-J	2	DP TYPE LEVEL TRANSMITTER	3"	88.9	160 / 11.13	45 x 25	150	W.N/R.F.	4230	
31 A-C	3	PRESSURE CONNECTION	2"	60.3	160 / 8.74	--	300	W.N/R.F.	4180	
30 A-C	3	THERMOWELLS + (LIQUID SHIELD)	2 1/2"	50.8 (I.D.)	-- / 13.6	--	300	L.W.N/R.F.	4180	
25 A-D,K	5	MANHOLE + B.F. + DAVIT	24"	610	-- / 25THK.	300 x 25	150	W.N/R.F.	4280	
14	1	LCO PA RERURN	16"	406.4	-- / 25THK.	200 x 25	150	W.N/R.F.	4280	
13	1	LCO STRIPPER VP. RET.	6"	168.3	80 / 10.97	85 x 25	150	W.N/R.F.	4230	
12A-B	2	LEAN OIL DRAW + VORTEX BREAKER	8"	219.1	80 / 12.70	110 x 25	150	W.N/R.F.	4230	
11	1	RICH OIL RETURN	14"	355.6	-- / 25THK.	175 x 25	150	W.N/R.F.	4250	
9	1	VENT	2"	60.3	160 / 8.74	--	150	W.N/R.F.	SEE DRG.	
3	1	REFLUX IN	8"	219.1	80 / 12.70	110 x 25	150	W.N/R.F.	4230	
2	1	O.H. VAPOR+COMP. FLG.	96"	2438.4	-- / 50THK.	48THK.(MIN.)	--	W.N/R.F.	SEE DRG.	INSERT PL. ø4800 x 48THK.(MIN.)

NOZZLES (CS+HIC & NACE ZONE)

TABLE OF NOZZLES AND FLANGES

S.NO.	BHEL DRAWING NO.	DRAWING TITLE
40	3-CL-010-U0216	DETAILS OF ANCHOR BOLTS FOR MAIN FRACTIONATOR(111-C-2101)
39	1-CL-010-U0205	DETAILS OF FOUNDATION TEMPLATE FOR MAIN FRACTIONATOR(111-C-2101)
38	1-CL-010-U0204	DETAILS OF ACCESS LADDERS FOR MAIN FRACTIONATOR(111-C-2101)
37	1-CL-010-U0203	DETAILS OF ACCESS LADDERS OF MAIN FRACTIONATOR(111-C-2101)
36	1-CL-010-U0202	GRATING DETAILS OF MAIN FRACTIONATOR(111-C-2101)
35	1-CL-010-U0201	GRATING DETAILS FOR MAIN FRACTIONATOR(111-C-2101)
34	1-CL-010-U0200	DETAILS OF PLATFORMS IN P22 SECTION FOR MAIN FRACTIONATOR(111-C-2101)
33	1-CL-010-U0199	DETAILS OF PLATFORMS IN P11 SECTION FOR MAIN FRACTIONATOR(111-C-2101)
32	1-CL-010-U0198	DETAILS OF PLATFORMS IN BQ SECTION FOR MAIN FRACTIONATOR(111-C-2101)
31	1-CL-010-U0197	DETAILS OF TRANSPORTATION OF MAIN FRACTIONATOR(111-C-2101)
30	1-CL-010-U0196	LIST OF SPARES OF MAIN FRACTIONATOR(111-C-2101)
29	1-CL-010-U0195	DETAILS OF PIPE DAVIT OF MAIN FRACTIONATOR(111-C-2101)
28	1-CL-010-U0194	DETAILS OF ACCESS OPENING OF MAIN FRACTIONATOR(111-C-2101)
27	1-CL-010-U0193	DETAILS OF NAME PLATE OF MAIN FRACTIONATOR(111-C-2101)
26	1-CL-010-U0192	GENERAL NOTES OF MAIN FRACTIONATOR(111-C-2101)
25	1-CL-010-U0191	ORIENTATION DETAILS OF MAIN FRACTIONATOR(111-C-2101)
24	1-CL-010-U0190	LIFTING DETAILS OF MAIN FRACTIONATOR(111-C-2101)
23	1-CL-010-U0189	ANCHOR CHAIR DETAILS OF MAIN FRACTIONATOR(111-C-2101)
22	0-CL-010-U0011	SHELL DEVELOPMENT OF P22 SECTION OF MAIN FRACTIONATOR(111-C-2101)
21	1-CL-010-U0188	MH Davit Details on P22 Section of Main Fractionator(111-C-2101)
20	1-CL-010-U0187	INSULATION & FIREPROOFING DETAILS ON P22 SECTION OF MAIN FRACTIONATOR(111-C-2101)
19	1-CL-010-U0186	PLATFORM CLEAT DETAILS ON P22 SECTION OF MAIN FRACTIONATOR(111-C-2101)
18	1-CL-010-U0185	PIPE SUPPORT CLEAT ON P22 SECTION OF MAIN FRACTIONATOR(111-C-2101)
17	1-CL-010-U0184	INTERNAL DETAILS IN P22 SECTION OF MAIN FRACTIONATOR(111-C-2101)
16	1-CL-010-U0183	ASSEMBLY DETAILS OF P22 SECTION OF MAIN FRACTIONATOR(111-C-2101)
15	0-CL-010-U0010	SHELL DEVELOPMENT OF P11 SECTION OF MAIN FRACTIONATOR(111-C-2101)
14	1-CL-010-U0182	MH DAVIT DETAILS ON P11 SECTION OF MAIN FRACTIONATOR(111-C-2101)
13	1-CL-010-U0181	INSULATION CLEAT DETAILS ON P11 SECTION OF MAIN FRACTIONATOR(111-C-2101)
12	1-CL-010-U0180	PLATFORM CLEAT DETAILS ON P11 SECTION OF MAIN FRACTIONATOR(111-C-2101
11	1-CL-010-U0179	PIPE SUPPORT CLEAT ON P11 SECTION OF MAIN FRACTIONATOR(111-C-2101)
10	1-CL-010-U0178	INTERNAL DETAILS IN P11 SECTION OF MAIN FRACTIONATOR(111-C-2101)
9	1-CL-010-U0177	ASSEMBLY DETAILS OF P11 SECTION OF MAIN FRACTIONATOR(111-C-2101)
8	0-CL-010-U0009	SHELL DEVELOPMENT OF BQ SECTION OF MAIN FRACTIONATOR(111-C-2101)
7	1-CL-010-U0176	MH DAVIT DETAILS ON BQ SECTION OF MAIN FRACTIONATOR(111-C-2101)
6	1-CL-010-U0175	INSULATION CLEAT DETAILS ON BQ SECTION OF MAIN FRACTIONATOR(111-C-2101)
5	1-CL-010-U0174	PLATFORM CLEAT DETAILS ON BQ SECTION OF MAIN FRACTIONATOR(111-C-2101)
4	1-CL-010-U0173	PIPE SUPPORT CLEAT ON BQ SECTION OF MAIN FRACTIONATOR(111-C-2101)
3	1-CL-010-U0172	INTERNAL DETAILS IN BQ SECTION OF MAIN FRACTIONATOR(111-C-2101)
2	1-CL-010-U0171	ASSEMBLY DETAILS OF BQ SECTION OF MAIN FRACTIONATOR(111-C-2101)
1	1-CL-010-U0170	ASSEMBLY DETAIL OF MAIN FRACTIONATOR(111-C-2101)

REFER NOTE : INVERT INSIDE OF WITH DRAWAL NOZZLE TO BE FLUSH WITH TOP OF DRAW-OFF PAN SUPPORT RING

FOUNDATION LOADING DATA (OPERATING CONDITION)

TYPE	MAX. MOMENT AT BASE (M) (kgm)	MAX. SHEAR FORCE AT BASE (H) (Kg)
SEISMIC (DBE)	9953000	261000
SEISMIC (MCE)	12740000	342000
WIND	7896000	227000

REV NO.	ZONE	BRIEF RECORD OF REVISIONS	PPD.	CHD.	APPD.

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

Customer : HPCL Rajasthan Refinery Limited Barmer

CAUTION: The information on this document is the property of BHARAT HEAVY ELECTRICALS LTD. It must not be used directly or indirectly in any way detrimental to the interest of the company.

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

	NAME	DATE
DRN	G.DEMUDU	22.12.20
CHD	D.SATISH	22.12.20
APPD	D.SATISH	22.12.20

DEPT P.P.ENGG. | CODE 031 | ALL DIMENSIONS ARE IN MM | PROJECTION | SCALE 1 : 75 & N.T.S | WEIGHT (Kg.) - | REF TO ASSY / OLD DWG --

TITLE: GENERAL ASSEMBLY OF MAIN FRACTIONATOR (ITEM NO. 111-C-2101)

DRAWING NO : 1-CL-010-U0169 | REV A

FORM NO. 0425/2

A1 SIZE

DRAWING NO: 1-CL-010-U0192

A. GENERAL

1. ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE STATED.
2. ALL ANCHOR BOLT HOLES TO STRADDLE NORTH/SOUTH CENTRE LINE.
3. NORTH DIRECTION WHEREVER SHOWN IS WITH RESPECT TO PLAN VIEW.
4. COLUMN SHALL BE SUBJECTED TO STEAM OUT CONDITIONS OF 0.5 kg/sq. cm^2 g @150°C

B. MATERIAL

1. DIMENSIONS OF FLANGES FOR NOZZLES UPTO 600 NB (24") SHALL BE AS PER ASME B16.5 AND FOR NOZZLE ABOVE 600 NB (24") SHALL BE AS PER ASMEB16.47 SERIES 'B' UNLESS SPECIFIED OTHERWISE. FLANGE GASKET FACE SHALL HAVE 125 AARH FINISH.
2. ALL INTERNAL GASKETS SHALL BE SUITABLE FOR THE DESIGN TEMPERATURE.
3. CS/LAS PLATES SHALL BE IMPACT TESTED AS PER CODE/SPEC.
4. ALL CLAD PLATES SHALL CONFIRM TO SA263.
5. THE CLAD SURFACE SHALL BEAR No. 1 FINISH AS PER SA 480 OR THE FINISH OBTAINED BY GRINDING WITH GRIT 80 ABRASIVE BELT.
6. PLATE MATERIAL TO SPECIFICATION IS 2062 MAY BE REPLACED BY B.Q. PLATES TO SPECN. SA515/516 GR.60/70.
7. MOC FOR NOZZLE NECK / FLANGE / GASKET / NUTS / BOLTS SHALL BE COMPATIBLE WITH CORRESPONDING SHELL MOC.
8. ALL INTERNALS SHALL HAVE ANSI RF FLANGE CONNECTIONS & BE SIZED TO PASS THROUGH THE NEAREST MANHOLE.
9. ALL BOLTS/STUDS SHALL HAVE ISO THREADING UNLESS OTHERWISE SPECIFIED.
10. PLATES & FORGINGS USED FOR PRESSURE PARTS SHALL CONFORM TO EN 10204 TYPE 3.2

C. FABRICATION

1. FOR NOZZLES ON SHELL, PROJECTIONS ARE REFERRED FROM VESSEL CENTER LINE TO FLANGE CONTACT FACE AND FOR NOZZLES ON HEAD, PROJECTIONS ARE REFERRED FROM HEAD T.L TO FLANGE CONTACT FACE.
2. NOZZLES 50 NB AND BELOW SHALL BE STIFFENED WITH 2 NOS. FLATS 90° APART. SIZE OF STIFFENERS SHALL BE 60 mm WIDE X 6 mm(Min.) THICK.
3. ALL REMOVABLE INTERNALS SHALL BE SIZED SO AS TO PASS THROUGH NEAREST MANHOLE.
4. WHEREVER R.F.PADS/ PADS CROSS OVER THE WELD SEAMS OF COLUMN THE WELD SEAM IS TO BE GROUND FLUSH AND PADS WELDED OVER IT & RADIOGRAPHED AS PER CODE. WELD EDGE TO EDGE DISTANCE SHALL BE AS PER CL. 4.7.5 OF GENERAL SPECIFICATION FOR PRESSURE VESSEL 6-12-0001.
5. ALL MAIN WELD SEAMS SHALL BE CLEAR OF NOZZLES, REINFORCEMENT PADS, INTERNALS, TRAY SUPPORT RINGS, CLEATS AND STIFFENING RINGS BY 50 mm MINIMUM (WELD EDGE TO WELD EDGE). IN CASE THE SAME IS UNAVAOIDABLE FOLLOWING REQUIREMENTS SHALL APPLY:

   a) NOZZLES WITHOUT REINFORCING PAD

   i) ANY WELD SEAM HAVING DISTANCE (WELD EDGE TO WELD EDGE) TO NOZZLE WITHIN 50 mm (BUT NOT FOULING WITH WELD SEAM) SHALL BE FULLY RADIOGRAPHED AND DYE PENETRANT EXAMINED TO A LENGTH EQUAL TO 100 mm ON EACH SIDE MEASURED FROM NEAREST POINT TO NOZZLE EDGE.

   ii) 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) NOZZLES WITH REINFORCING PAD

   i) ANY WELD SEAM HAVING DISTANCE (WELD EDGE TO WELD EDGE) TO REINFORCING PAD WITHIN 50 mm (BUT NOT FOULING WITH WELD SEAM) SHALL BE FULLY RADIOGRAPHED AND DYE PENETRANT EXAMINED TO A LENGTH EQUAL TO 100 mm ON EACH SIDE MEASURED FROM NEAREST POINT TO REINFORCING PAD EDGE.

   ii) ANY WELD SEAM NOT FOULING WITH NOZZLE OPENING BUT COMING UNDER REINFORCEMENT PAD SHALL BE GROUND FLUSH, FULLY RADIOGRAPHED AND DYE PENETRANT EXAMINED TO A LENGTH EQUAL TO PORTION OF WELD SEAM BELOW REINFORCEMENT PAD + 100 mm ON EACH SIDE.

   iii) ANY WELD SEAM FOULING WITH NOZZLE OPENING SHALL BE GROUND FLUSH, FULLY RADIOGRAPHED AND DYE PENETRANT EXAMINED TO A LENGTH EQUAL TO HIGHER OF 3 TIMES OF OUTSIDE DIAMETER OF NOZZLE i.e. 1.5 TIMES OF OUTSIDE DIAMETER OF NOZZLE ON EACH SIDE OR LENGTH EQUAL TO PORTION OF WELD SEAM BELOW REINFORCEMENT PAD + 100 mm ON EACH SIDE.

   IN CASE OF OTHER ATTACHMENTS LIKE INTERNALS, TRAY 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.

6. ID OF WELD NECK FLANGES SHALL MATCH WITH CORRESPONDING ID OF NOZZLE PIPE.
7. NOZZLE SCHEDULES INDICATED FOR WELD OVERLAY NOZZLES ARE MINIMUM REQUIRED.
8. ALL SS SURFACES SHALL BE PICKLED AND PASSIVATED AS PER ASTM A380.
9. ALL 80 NB NOZZLES COMING IN CLAD PORTION SHALL BE LWN TYPE AND WELD OVERLAY.
10. INVERT INSIDE OF WITHDRAWAL NOZZLE TO BE FLUSH WITH TOP OF DRAW-OFF PAN SUPPORT RING.
11. NO INSULATION SHALL BE PROVIDED FOR NOZZLE-1. PROVIDE RETAINING PLATE FOR REINFORCING REFRACTORY.
12. ALL FLANGE BOLT HOLES SHALL BE STRADDLE TO CENTRE LINES AS PER E.I.L.STD.No. 7-12-0015 REV.6
13. PROTECT ALL MACHINED SURFACES AND THREADED CONNECTIONS WITH RUST PREVENTIVE IMMEDIATELY AFTER MACHINING. INSTALL WOOD OR STEEL PROTECTORS FOR FITTINGS IMMEDIATELY AFTER TESTING .
14. DISHED ENDS SHALL BE IN CROWN & PETAL CONSTRUCTION.
15. R.F. PAD IS TO BE WELDED TO SHELL SUCH THAT ONE TELL-TALE HOLE WILL BE AT THE BOTTOM OF THE PAD IN ASSEMBLED POSITION OF THE COLUMN.
16. NO ATTACHMENT OTHER THAN SHOWN ON THE DRAWING IS TO BE WELDED WITHOUT PRIOR APPROVAL OF THE TECHNOLOGY DEPARTMENT.
17. NO WELDING IS TO BE DONE ON THE COLUMN AFTE RHEAT TREATMENT UNLESS OTHERWISE PERMITTED BY CODE/ SPECN.
18. ALL SHARP CORNERS ARE TO BE ROUNDED OFF TO A MINIMUM RADIUS OF 5 mm (OR) AS SPECIFIED IN DRAWING.
19. FILLET WELD SIZES INDICATED ARE MINIMUM.
20. TRAY ELEVATIONS GIVEN ARE TO THE TOP OF SUPPORT RINGS.
21. WELDING SHALL NOT COMMENCE UNLESS THE CONCERNED PROCEDURES ARE APPROVED.

D. TOLERANCES

1. EQUIPMENT TOLERANCE SHALL BE IN ACCORDANCE WITH EIL STD. 7-12-0001 OR DESIGN CODE WHICH EVER IS STRINGENT.
2. THE INDICATED THICKNESS IS THE MINIMUM ACCEPTABLE AFTER CONSTRUCTION.
3. TOLERANCE ON COLUMN DIAMETER UPTO & ABOVE 8000mm SHALL BE GREATER OF ±20mm OR ±0.2% OF DIAMETER. HOWEVER IF STRINGER TOLERANCE ARE RECOMMENDED BY INTERNALS SUPPLIER. THE SAME SHALL BE COMPLIED WITH.
4. TOLERANCES INDICATED IN THE DRAWING ARE NON CUMULATIVE.

E. NDE

1. ALL FABRICATED NOZZLES SHALL BE FULLY RADIOGRAPHED.
2. ALL C & L SEAMS INCLUDING C-SEAM, NOZZLE NECK TO FLANGE, PIPE TO PIPE FITTING & PIPE TO PIPE SHALL BE FULLY RADIOGRAPHED.
3. ALL C & L SEAMS OF SKIRT SHALL BE FULLY RADIOGRAPHED.
4. FULL RADIOGRAPHY WHEREVER SPECIFIED SHALL IMPLY 100% RADIOGRAPHY OF ALL BUTT WELDS.
5. ALL BUTT WELDED JOINTS IN DISHED ENDS AND TORICONES SHALL BE FULLY RADIOGRAPHED.
6. CLAD DISHED ENDS AND TORICONES SHALL BE ULTRA SONICALLY TESTED AFTER FORMING AS PER A:578 AND SHALL MEET THE SUPPLEMENTARY REQUIREMENTS OF S6, WITH ACCEPTABLE LEVEL-II
7. KNUCKLE PORTIONS OF DISHED ENDS/TORICONES BOTH INSIDE AND OUTSIDE SHALL BE D.P.CHECKED.

F. SHIPMENT & HANDLING

1. COLUMN SHALL BE TRANSPORTED TO THE SITE IN TWO PIECES & SITE ASSEMBLED AS PER JOB SPEC. NO. 8224-80-43-SP-6006.
2. AFTER HYDROTEST, EQUIPMENT SHALL BE THOROUGHLY DRAINED & DRIED OUT.
3. ALL THE NOZZLE OPENINGS SHALL BE CLOSED WITH SUITABLE STEEL COVERS.

G. TESTING

1. R.F.PADS SHALL BE PNEUMATICALLY TESTED FOR LEAK TIGHTNESS TO 1.05 Kg./ Sq. Cm IN C.S. PORTION AND TO 1.8 Kg/Sq.Cm BEFORE DEPOSITING S.S WELD METAL IN CLAD ZONE WITH SOAP SOLUTION ON ALL ATTACHMENT WELDS.
2. ALL REINFORCING PADS SHALL BE PROVIDED WITH TWO 1/8" (3 mm) NPT TAPPED HOLES 180° APART FOR AIR SOAP SOLUTION TEST. HIGHER TEST PRESSURES ARE NOT RECOMMENDED BECAUSE OF ACCOMPANYING RISKS AND ALSO BECAUSE THE SOAP BUBBLES HAVE A CHANCE TO BLOW OFF. TELL-TALE HOLES IN THE REINFORCING PADS SHALL BE PLUGGED WITH HARD GREASE UNLESS OTHERWISE INDICATED AFTER THE HYDRO TEST OF THE VESSEL.
3. GASKETS USED DURING HYDRAULIC TEST SHALL BE OF SAME SPECIFICATION AS SERVICE GASKETS.
4. COLUMN SHALL BE HYDROTEST IN SHOP.
5. IN SITE: i) SITE JOINT SHALL BE HYDRO TESTED (BOX TYPE).
   ii) SITE JOINT SHALL BE FULLY RADIOGRAPHED.

H. PAINTING

A) SECTION : FOR 8000 mm DIA SHELL SECTION & 8000 mm DIA D'END AND RESPECTIVE ATTACHMENTS ON IT.
LOCATION : SHOP PRIMER / PRE-ERECTION.
SURFACE PREPARATION : SSPC-SP-10.
PRIMER PAINT : 1 COAT OF F16 @ 125 µ DFT / COAT.
FINAL PAINT : 1 COAT OF F16 @ 125 µ DFT / COAT.

B) SECTION : FROM TORI CONE & BOTTOM SHELL/SKIRT SECTIONS.
LOCATION : SHOP PRIMER / PRE-ERECTION.
SURFACE PREPARATION : SSPC-SP-10.
PRIMER PAINT : 1 COAT OF F16 @ 125 µ DFT / COAT.
FINAL PAINT : 1 COAT OF F16 @ 125 µ DFT / COAT.

REV NO.	ZONE	BRIEF RECORD OF REVISIONS	PPD.	CHD.	APPD.

ENGINEERS INDIA LIMITED (A Govt. of India Undertaking)

Customer : HPCL Rajasthan Refinery Limited Barmer

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

	NAME	DATE
DRN	G.DEMUDU	04.01.21
CHD	D.SATISH	04.01.21
APPD	D.SATISH	04.01.21

DEPT: P.P.ENGG. | CODE: 031 | ALL DIMENSIONS ARE IN MM | PROJECTION | SCALE: 1 : 75 & N.T.S | WEIGHT (Kg.): - | REF TO ASSY / OLD DWG: 1-CL-010-U0169

TITLE: GENERAL NOTES FOR MAIN FRACTIONATOR (ITEM NO. 111-C-2101)

DRAWING NO : 1-CL-010-U0192 | REV: 0

FORM NO. 0425/2

A1 SIZE

SL. NO.	DESCRIPTION	Vendor's Confirmation/ Comments (See note)
1.0	This specification covers cladded plates of a low alloy steel base integrally and continuously bonded on one side with a layer of chromium nickel steel. Base plate as well as the alloy cladding metal shall meet the requirements of ASME BPVC-Latest The supplied plate shall meet the above requirements & in additional requirements as indicated in this specification.	
1.1	Plates supplied to this specification shall conform to the latest issue of specification SA-264, SA-20 & SA-578 with additional requirements mentioned herein.	
1.2	Base Plate: Shall meet the requirements of TDC No: PV-PL-TDC-022.	
1.3	Clad Plate: Shall meet the requirement of TDC No: PV-PL-TDC-024 in addition to requirements specified in this specification.	
2.0	The tolerance on thickness of base metal as well as cladding metal shall be positive only.	
2.1	Final rolling shall be lengthwise.	
2.2	Outside surface of base metal shall meet requirements of EN 10163 class- A sub clause 3.	
2.3	Unless otherwise specified in the requisition the surface of alloy cladding shall have No.1 finish for hot rolled and 2B finish for cold rolled.	
2.4	Acid pickling shall be done for chromium nickel stainless steel cladding as per ASTM A-380.	
2.5	Repair of cladding surface by welding shall not exceed 3% of surface area of individual plate.	
2.6	The integral & continuous cladding shall be produced by roll bonding or explosion bonding process with bond integrity Class 1.	
2.7a	After explosion bonding or Roll Bonding, cladded plate shall be Stress Relived at 690 Deg C ±10 Deg C.(The SR cycle will be confirmed during tender elevation stage.)	
2.7b	Mechanical properties of base plate shall be re-ensured after SR.	
3.1	IGC test shall be carried out after cladding process.	
3.2	During the mill tension test of all cladded steel plates, the cladding shall be removed and the tensile properties shall meet the requirements of the base material. Test specimen shall be taken transverse to rolling direction.	
3.3	For all cladded steel plates, shear test shall be conducted. Strength of bond shall be at least 20,000 psi in shear.	
3.4	The ultrasonic examination shall be conducted after final heat treatment of the cladded plate.	

PREPARED: (Satish P) (10/03/021) | CHECKED: (Y. Prasad Naga Kumar) 10-03-2021 | APPROVED (Engg): (S K Bas) | APPROVED (QA):

3.5	All cladded steel plates shall be ultrasonically examined in accordance with SA-578 with acceptance standard Level-C and shall meet the supplementary requirements S1. Integrity of clad plate shall be ensured Quality level: class-1 as per SA 264.	
4.0	INSPECTION: As per P.O.	
4.1	MARKING: As per material specification with Inspector's symbol. The purchase order No. and item No. is to be suitably marked. PACKING: Plates are not be painted / coated, but shall be covered with plastic or paper or by other means for careful protection and shall be packed against any damage during transit and sea-worthy condition.	
4.2	CERTIFICATION: a. The supplier shall furnish 6 copies of the following certificates/documents inclusive of all tests required as per specification, duly certified by the Inspecting Authority before shipment of plates. The actual values obtained shall be recorded in the test certificates/documents. Technical requirements shall be clearly shown in the test certificates. Material certificate shall conform to EN 10204 Type3.2 b. Chemical Analysis for both cladding metal and base metal. c. Mechanical test results for base metal & shear strength for clad plate. d. Data of heat treatment of clad plate i.e. initial temperature, heating rate, soaking temperature / time, cooling rate etc. For simulation heat treatment of base plate test coupon, chart of heat treatment is to be attached to Mill's certificate. e. Ultrasonic examination, IGC. f. Finish for cladding & Base Metal. g. Method of cladding. h. Pickling Procedure. i. Date of manufacture. The Material test certificates copy shall be sent to BHEL-HPVP in advance for our review and issuing despatch clearance. All certificates shall be in English Language.	

PREPARED: (10/03/021) (Satish.R)

CHECKED: (Y PRASANNA KUMAR) 10-03-2021

APPROVED (Engg): S.K BASHA

APPROVED (Q):

	TECHNICAL DELIVERY CONDITIONS FOR Stainless Steel Cladded Plates (SA387 Gr 22 Cl 2+SS304L)	PV-PL-TDC-019 REV. NO. 02

SL. NO.	DESCRIPTION	Vendor's Confirmation/ Comments (See note)
1.0	This specification covers cladded plates of a low alloy steel base integrally and continuously bonded on one side with a layer of chromium nickel steel. Base plate as well as the alloy cladding metal shall meet the requirements of ASME BPVC-Latest The supplied plate shall meet the above requirements & in additional requirements as indicated in this specification.	
1.1	Plates supplied to this specification shall conform to the latest issue of specification SA-264, SA-20 & SA-578 with additional requirements mentioned herein.	
1.2	Base Plate: Shall meet the requirements of TDC No: PV-PL-TDC-023.	
1.3	Clad Plate: Shall meet the requirement of TDC No: PV-PL-TDC-024 in addition to requirements specified in this specification.	
2.0	The tolerance on thickness of base metal as well as cladding metal shall be positive only.	
2.1	Final rolling shall be lengthwise.	
2.2	Outside surface of base metal shall meet requirements of EN 10163 class- A sub clause 3.	
2.3	Unless otherwise specified in the requisition the surface of alloy cladding shall have No.1 finish for hot rolled and 2B finish for cold rolled.	
2.4	Acid pickling shall be done for chromium nickel stainless steel cladding as per ASTM A-380.	
2.5	Repair of cladding surface by welding shall not exceed 3% of surface area of individual plate.	
2.6	The integral & continuous cladding shall be produced by roll bonding or explosion bonding process with bond integrity Class 1.	
2.7a	After explosion bonding or Roll Bonding, cladded plate shall be Stress Relived at 690 Deg C ±10 Deg C.(The SR cycle will be confirmed during tender elevation stage.)	
2.7b	Mechanical properties of base plate shall be re-ensured after SR.	
3.1	IGC test shall be carried out after cladding process.	
3.2	During the mill tension test of all cladded steel plates, the cladding shall be removed and the tensile properties shall meet the requirements of the base material. Test specimen shall be taken transverse to rolling direction.	
3.3	For all cladded steel plates, shear test shall be conducted. Strength of bond shall be at least 20,000 psi in shear.	
3.4	The ultrasonic examination shall be conducted after final heat treatment of the cladded plate.	

PREPARED: (Satish) 10/03/021

CHECKED: 10-03-2021

APPROVED (Engg): S.K. BASWAS

APPROVED (Q):

3.4	All cladded steel plates shall be ultrasonically examined in accordance with SA-578 with acceptance standard Level-C and shall meet the supplementary requirements S1. Integrity of clad plate shall be ensured Quality level: class-1 as per SA 264.	
4.0	INSPECTION: As per P.O.	
4.1	MARKING: As per material specification with Inspector's symbol. The purchase order No. and item No. is to be suitably marked. PACKING: Plates are not be painted / coated, but shall be covered with plastic or paper or by other means for careful protection and shall be packed against any damage during transit and sea-worthy condition.	
4.2	CERTIFICATION: a. The supplier shall furnish 6 copies of the following certificates/documents inclusive of all tests required as per specification, duly certified by the Inspecting Authority before shipment of plates. The actual values obtained shall be recorded in the test certificates/documents. Technical requirements shall be clearly shown in the test certificates. Material certificate shall conform to EN 10204 Type3.2 b. Chemical Analysis for both cladding metal and base metal. c. Mechanical test results for base metal & shear strength for clad plate. d. Data of heat treatment of clad plate i.e. initial temperature, heating rate, soaking temperature / time, cooling rate etc. For simulation heat treatment of base plate test coupon, chart of heat treatment is to be attached to Mill's certificate. e. Ultrasonic examination, IGC. f. Finish for cladding & Base Metal. g. Method of cladding. h. Pickling Procedure. i. Date of manufacture. The Material test certificates copy shall be sent to BHEL-HPVP in advance for our review and issuing despatch clearance. All certificates shall be in English Language.	

PREPARED: (Satish.R) 10/03/021

CHECKED: (Y. Prasanna Kumar) 10-03-2021

APPROVED (Engg): (S.K. Biswas)

APPROVED (Q):

बी एच ई एल BHEL	**TECHNICAL DELIVERY CONDITIONS FOR** **LAS PLATES TO MATERIAL SPECIFICATION SA 387 Gr.11 CL.2**	**PV-PL-TDC-022** **REV. NO. 0**

SL. NO.	DESCRIPTION	Vendor's Confirmation/ Comments (See note)
1.0	Plates shall strictly comply with the requirements of this TDC in addition to the requirements of material specification as per ASME BPVC Sec.II Part-A - 2019. This shall be explicitly reported in Test Certificates. Additionally the following requirements shall be met with and reported in Test Certificates.	
2.1	Plates shall conform to the specification SA-20 with additional requirements mentioned herein.	
2.2	The tolerance on thickness of steel plates shall be positive only.	
2.3	Final rolling of plate shall be in lengthwise.	
2.4	The plates shall be free from injurious defects and shall have workman like finish. Reconditioning / repair of plates by welding shall not be permitted. Surface condition shall meet requirements of EN 10163 (Part: 2) Class A Sub-Class 3.	
3.1	All plates shall be Killed, Normalized and Tempered (N+T) or accelerated cooling from an austenitizing temperature by liquid Quenching followed by Tempering (N+ACC+T). Plates shall be supplied in normalized (at 945 °C ± 10 °C) and tempered (at 720 °C to 740 °C) condition. After completing the holding time at the soaking temperature, the time required to cool the components to 800°F (426°C) shall be at least one hour.	
3.2	One product analysis for each plate shall be carried out. Chemical composition shall be as per applicable material specification with additional requirement of phosphorus equal to 0.01% maximum and phosphorus plus tin equal to 0.016% maximum.	
3.3	Additional requirements for plates of thickness 50 mm and above. a) Vacuum treatment as per supplementary requirement S1 of specification SA-20. b) Through thickness tensile test shall be carried out as per specification SA-770 for each plate and reduction of area shall be determined as per SA-370. Minimum reduction in area shall not be less than 35%.	
4	Plates shall be ultrasonically examined after specified heat treatment as per following. a) Plates having thickness 16 mm to 50 mm (both inclusive) shall be examined ultrasonically as per SA-435. b) For thickness above 50mm UT examination shall be carried out as per SA-578 and shall have acceptance standard of Level-B.	
5	Charpy V-notch impact test shall be carried out for each plate at minus 18°C with average value of three specimens as 33 joules with minimum value of each specimen as 22 joules.	
6	The hardness of each plate shall not exceed 225 BHN.	
7	**Simulation heat treatment of test coupons: -** All test specimen's representative of heat treated plates shall be subjected to	

PREPARED: CHECKED: APPROVED (Engg): S.K. BISWAS APPROVED (Q):

	simulated heat treatments before the specified mechanical tests like tensile, impact etc. and these details shall be recorded on the test certificates. Simulated heat treatments shall include all heat treatments involved during fabrication of the equipment (including intermediate stress-relief etc.) and final PWHT plus two additional PWHT cycles (One for repair at shop and another for future). Impact tests and hardness tests shall be carried out in both minimum and maximum heat treatment condition while other mechanical tests (tensile etc.) shall be conducted at maximum heat treatment condition. Tempering temperature shall be minimum 20°C higher than the final PWHT temperature. The PWHT cycle will be provided during tender elevation stage.	
8	The defective material if any, shall be replaced free of cost by the supplier.	
9	**Inspection:** - As per P.O	
10	**MARKING**: As per material specification with Inspector's symbol. The purchase order No. and item No. is to be suitably marked.	
11	**Painting and coating: -** No painting of any kind is permitted on the steel plates. However, steel plates shall be carefully protected against any damage during transit and shall be sea-worthy condition (if applicable).	
12	**Certification**: - Supplier shall furnish 6 copies of mill's original test certificates/ documents inclusive of all tests required as per specification and as mentioned in these technical delivery conditions duly certified the inspecting authority. The actual values obtained shall be recorded in the test certificates / documents. All certificates shall be as per EN10204 Type 3.2 & as per ASME Code. i) Chemical analysis (both heat and product analysis) ii) Mechanical test results iii) Data of heat treatment i.e. initial temperature, heating rate, soaking temperature/time, cooling rate etc. iv) Simulated heat treatment of Mechanical test coupons (S3 of SA-20 / SA-20M) at indicated heat treatment cycle only v) Ultrasonic examination (S12 of SA-20 / SA-20M) vi) Charpy V-Notch Impact test (S5 of SA-20 / SA-20M) vii) Through thickness tensile test as per SA-770 viii) All other tests as per TDC The test certificates should send in advance before dispatch of material for scrutiny and inspection at the time of receipt of material. All certificates shall be in English Language.	

NOTE: In case the space is not sufficient, a separate sheet may be added as an annexure to this TDC.

PREPARED: CHECKED: APPROVED (Engg): APPROVED (Q):

बीएचईएल BHEL	**TECHNICAL DELIVERY CONDITIONS FOR** **LAS PLATES TO MATERIAL SPECIFICATION SA 387 Gr.22 CL.2**	**PV-PL-TDC-023** **REV. NO. 0**

SL. NO.	DESCRIPTION	Vendor's Confirmation/ Comments (See note)
1.0	Plates shall strictly comply with the requirements of this TDC in addition to the requirements of material specification as per ASME BPVC Sec.II Part-A - 2019. This shall be explicitly reported in Test Certificates. Additionally the following requirements shall be met with and reported in Test Certificates.	
2.1	Plates shall conform to the specification SA-20 with additional requirements mentioned herein.	
2.2	The tolerance on thickness of steel plates shall be positive only.	
2.3	Final rolling shall be lengthwise.	
2.4	The plates shall be free from injurious defects and shall have workman like finish. Reconditioning / repair of plates by welding shall not be permitted. Surface condition shall meet requirements of EN 10163 (Part: 2) Class A Sub-Class 3.	
3.1	The steel shall be made by electric furnace or basic oxygen process and shall be vacuum degassed.	
3.2	Plates shall be Killed, Normalized and Tempered (N+T) or accelerated cooling from an austenitizing temperature by liquid Quenching followed by Tempering (N+ACC+T). Plates shall be supplied in normalized (at 945 °C ± 10 °C) and tempered (at 720 °C to 740 °C) condition.	
3.3	Tensile strength at room temperature shall not exceed 690 MPa and Yield strength should not exceed 620 MPa.	
3.4	Chemical analysis shall be carried out on heat as well as on product. In addition to chemical analysis required by applicable material specification, analysis of Ni, Cu, As, Sn, and Sb shall be reported. However, Copper and Nickel content shall be limited to 0.20% (max.) and 0.30% (max.) respectively. Material shall have a J factor, as defined as (Si + Mn) x (P + Sn) x 10^4 less than or equal to 100, where the concentration of elements are in percent.	
3.5	The material shall have an austenitic grain size 5 (five) or finer as determined by method of ASTM E112.	
3.6	Additional requirements for plates of thickness 50 mm and above. a) Vacuum treatment as per supplementary requirement S1 of specification SA-20. b) Through thickness tensile test shall be carried out as per specification SA-770 for each plate and reduction of area shall be determined as per SA-370. Minimum reduction in area shall not be less than 35%.	
4	**Ultrasonic examination: -** Plates shall be ultrasonically examined after specified heat treatment as per following. a) Plates having thickness 16 mm to 50 mm (both inclusive) shall be examined ultrasonically as per SA-435. b) For thickness above 50mm UT examination shall be carried out as per	

PREPARED: CHECKED: APPROVED (Engg): (S.K. BISWAS) APPROVED (Q):

	SA-578 and shall have acceptance standard of Level-B.	
5	Impact test (Charpy V-Notch) shall be carried out at minus 29 °C with 55 joules average value for three specimens and with no single specimen below 48J. The orientation of test specimen shall be transverse to the direction of final rolling.	
6	The hardness of each plate shall not exceed 225 BHN.	
7	**Simulation heat treatment of test coupons: -** All test specimen's representative of heat treated (N+T) / (N+ACC+T) plates shall be subjected to simulated heat treatments. Simulated heat treatments shall include all heat treatments involved during fabrication of the equipment. This shall include PWHT of the equipment plus two additional PWHT cycle (one for shop repair and one for future) including all intermediate heat treatments (ISR). Simulated heat treatment shall be conducted on the test coupons before the specified mechanical tests like tensile, bend, impact tests etc. All tests shall be carried out with minimum PWHT condition and maximum PWHT condition including all ISR. These details shall be recorded on test certificates clearly indicating all heat cycle conditions. The PWHT cycle will be provided during tender elevation stage.	
8	Impact energy versus temperature (transition) curves shall be developed for each heat of plate. A minimum of eight sets of three impact tests of completely heat treated material with minimum PWHT condition and maximum PWHT condition including all ISR shall be performed for each curve. Sample location shall be as specified in ASME code. The eight sets of impact test shall be performed at different temperature but shall include minus 29 °C. The generated transition curve shall clearly define the transition zone and the upper shelf. The maximum test temperature shall correspond to the upper shelf energy level. b) Step cool tests shall be performed on completely heat treated material with minimum PWHT condition and maximum PWHT condition including all ISR from each heat of plate. i) Samples shall be heated from 316°C to 593°C with maximum rate of 56°C. ii) Step cooling shall be in accordance with the following temperatures, holding times and cooling rates to the next lower temperature: **Temperature °C** / **Holding time Hrs.** / **Cooling rate to the next temperature °C/hr** 593 / 1 / 5.6 538 / 15 / 5.6 524 / 24 / 5.6 496 / 60 / 2.8 468 / 100 / 27.8 315 / - / air cooling iii) Impact test of each step cooled sample shall be performed and transition curve shall be developed following the procedure outlined in clause 3.8(a) above. c) Acceptance criteria for materials shall be in accordance with the following: $vTr\ 55 + 3.0 \times \Delta\ vTr\ 55_{sc} \leq 10\ °C$	

PREPARED: CHECKED: APPROVED (Engg): APPROVED (Q):

	Where vTr 55 = Charpy V-notch 55J impact energy transition temperature of completely heat treated specimens before step cooling. $\Delta vTr\ 55_{sc}$ = The shift in Charpy V-notch 55J impact energy transition temperature after step cooling tests.	
9	The defective material if any, shall be replaced free of cost by the supplier.	
10	**Inspection:** - As per P.O	
11	**MARKING**: As per material specification with Inspector's symbol. The purchase order No. and item No. is to be suitably marked.	
12	**Painting and coating: -** No painting of any kind is permitted on the steel plates. However, steel plates shall be carefully protected against any damage during transit and shall be sea-worthy condition (if applicable).	
13	**Certification**: - Supplier shall furnish 6 copies of mill's original test certificates/ documents inclusive of all tests required as per specification and as mentioned in these technical delivery conditions duly certified the inspecting authority. The actual values obtained shall be recorded in the test certificates / documents. All certificates shall be as per EN10204 Type 3.2 & as per ASME Code. i) Chemical analysis (both heat and product analysis) ii) Mechanical test results iii) Data of heat treatment i.e. initial temperature, heating rate, soaking temperature/time, cooling rate etc. iv) Simulated heat treatment of Mechanical test coupons (S3 of SA-20 / SA-20M) at indicated heat treatment cycle only v) Ultrasonic examination (S12 of SA-20 / SA-20M) vi) Charpy V-Notch Impact test (S5 of SA-20 / SA-20M) vii) All other tests as per TDC viii) Date of manufacture The test certificates should be sent by Air Mail at the time of dispatch of material so as to reach us in advance for scrutiny and inspection at the time of receipt of material. All certificates shall be in English Language.	

NOTE: In case the space is not sufficient, a separate sheet may be added as an annexure to this TDC.

PREPARED: CHECKED: APPROVED (Engg): APPROVED (Q):

SL. No.	DESCRIPTION	Vendor's confirmation/ comments (See note)
1.0	Plates shall strictly conform to the requirements of the material specification as per ASME Sec.II, Part-A (latest). In addition, the plates shall also meet the following requirements over and above those specified in the material specification and reported in test certificate.	
2.1	Hot rolled, Solution annealed (fully annealed). All Stabilized grades of stainless steel (SS 321, SS 347 etc.) shall be given stabilization heat treatment in addition to solution annealing. The soaking temperatures for stabilization heat treatment shall be 915°C ± 10°C and soaking period shall be minimum of 4 hours (2 hours for thickness <= 3.5mm).	
2.2	Final rolling shall be lengthwise.	
2.3	Plate length and width: Provide tolerance for shear and plasma cutting only. The tolerance on thickness shall be positive only.	
2.4	No.1 finish (or the finish obtained by grinding with grit 80 abrasive belt) on both sides as per SA 480.	
2.5	All 300 series materials: -Plate representative of each heat shall be subjected to Inter-Granular Corrosion (IGC) test as per ASTM A262 Practice- "E" (test shall be carried out after the specified heat treatment and sensitization per specification). The bend test specimen shall be examined at a magnification of 200X and bent specimen shall be free of any cracks (or) grain dropping. The micro structure shall be submitted to Inspection Agency for review / approval and same shall be reported in test certificate.	
2.6	For straight chrome (13% Cr) material, maximum carbon content shall not exceed 0.06%. Hardness of UNS No. S41000, S41008 and S40500 shall not exceed 88 RB.	
2.7	All Plates shall be supplied in Pickled & Passivated condition as per ASTM-A380.	
3.0	Plate having thickness 16 mm to 50 mm (both inclusive) shall be examined ultrasonically as per SA-435.	
4.0	For plates of thickness above 50 mm ultrasonic examination shall be carried out as per SA 578 and shall have acceptance standard of level-B.	
5.0	All mandatory tests as per material specification shall be carried out. However, tension test specimen shall be from finished material and shall be selected in transverse direction.	

PREPARED: CHECKED: APPROVED (E): APPROVED (Q):

(Satish.D) (S.K.BISWAS) (AK Mandal)

6.0	Supplier shall furnish 6 copies of original mill test certificates / documents inclusive of all tests required as per specification and as mentioned in these technical delivery conditions duly certified by the inspecting authority before shipment of plates. The actual values obtained shall be recorded in the test certificate / document. The test certificate shall be sent in advance for scrutiny and inspection at the time of receipt of materials. All certificates shall be in English language and shall confirm to EN10204 Type 3.2. a) Chemical analysis b) Mechanical tests c) Data of applicable heat treatment i.e. initial temp, Heating rate, soaking mp./time, cooling rate etc. d) Ultrasonic examination e) Inter-granular corrosion test for 300 series f) Type of finish for plate surfaces g) Date of manufacture (i.e. date of final rolling) h) Pickling procedure	
7.0	Marking: - As per specification with Inspector's Symbol, BHEL (HPVP) Purchase Order No. & Item No. etc. are to be stencilled. Plates & sheets are not to be painted /coated.	
8.0	Packing: - Plates are not to be painted / coated but shall be covered with plastic foils or paper or by other means for careful protection and shall be packed against any damage during transit and sea weather conditions.	
9.0	Inspection: - As indicated in Purchase Order.	
10.0	EN10163: Delivery requirements for surface conditions.	

NOTE: In case the space is not sufficient, a separate sheet may be added as an annexure to this TDC.

PREPARED: CHECKED: (Satish.D) APPROVED (E): S.K. Biswas APPROVED (Q): (AK Mandal)

कार्बन स्टील प्रैशर वेसल / कॉलम के लिए निरीक्षण व परीक्षण योजना

INSPECTION AND TEST PLAN FOR PRESSURE VESSELS/ COLUMNS CARBON STEEL

Rev. No.	Date	Purpose	Prepared by	Checked by	Convenor Standards Committee	Chairman Standards Bureau
					Approved by	
4	14.05.2020	REVISED AND RE-ISSUED	SK	CS	RKS	SKS
3	09.09.2013	REVISED AND RE-ISSUED	TKK	RKS	SCG	DM
2	15.07.2011	REVISED AND RE-ISSUED	HP	SCG	AKC	DM
1	28.09.2007	REVISED AND RE-ISSUED	PD	RB	MVKK	VC
0	10.12.2002	ISSUED FOR IMLEMENTATION	NKN	SPS	AKB	GRR

Abbreviations:

AS / CS / SS		Alloy Steel / Carbon Steel / Stainless Steel	MRT	:	Mechanical Run Test
CEIL	:	Certification Engineers International Limited	NDT	:	Non Destructive Testing
CIMFR	:	Central Institute of Mining & Fuel Research	NPSH	:	Net Positive Suction Head
CE	:	Carbon Equivalent	PO	:	Purchase Order
DFT	:	Dry Film Thickness	PESO	:	Petroleum Explosive Safety Organization
DPT	:	Dye Penetrant Testing	PQR	:	Procedure Qualification Record
DHT	:	De-hydrogen Heat Treatment	PR	:	Purchase Requisition
ERTL	:	Electronics Regional Test Laboratory	PMI	:	Positive Material Identification
FCRI	:	Fluid Control Research Institute	PWHT	:	Post Weld Heat Treatment
HT	:	Heat Treatment	RT	:	Radiography Testing
HIC	:	Hydrogen Induced Cracking	SSCC	:	Sulphide Stress Corrosion Cracking
ITP	:	Inspection and Test Plan	TC	:	Test Certificate
IP	:	Ingress Protection	TPI or TPIA	:	Third Party Inspection Agency
IHT	:	Intermediate Heat Treatment	UT	:	Ultrasonic Testing
IC	:	Inspection Certificate	VDR	:	Vendor Data Requirement
IGC	:	Inter Granular Corrosion	WPS	:	Welding Procedure Specification
MPT/MT	:	Magnetic Particle Testing	WPQ	:	Welders Performance Qualification
MTC	:	Material Test Certificate			
				:	

Inspection Standards Committee

Convenor : Mr. R K Singh

Members:

Mr. Rajesh Sinha
Mr. Chandrashekhar
Mr. Mahendra Mittal
Mr. Himangshu Pal
Mr. Avdhesh Agrawal
Mr. R. Muthuramalingam (RPO Representative)
Mr. P V Satyanarayana (Engg. Representative)

1.0 SCOPE

This Inspection and test plan covers the minimum testing requirements of Pressure vessels/ Columns carbon steel

2.0 REFERENCE DOCUMENTS

PO/PR/ Standards referred there in/ Job specifications /approved documents.

3.0 INSPECTION AND TEST REQUIREMENTS

SL NO.	STAGE/ ACTIVITY	CHARACTERISTICS	QUANTUM OF CHECK	RECORD	SCOPE OF INSPECTION		
					SUB SUPPLIER	SUPPLIER	EIL/TPIA
1.0	**Procedures**						
1.1	Hydro test, heat treatment, NDT, hot forming and other Procedures	Documented procedures.	100%	Procedure documents	-	H	R
1.2	Weld Plan & NDT Plan	As per PR/ Purchase Specification/ Applicable codes	100%	Procedure documents	-	H	R
1.3	WPS/ PQR /WPQ	Documented procedures.	100%	Procedure documents	-	H	R-Existing W-New
2.0	**Materials Procurement**						

SL NO.	STAGE/ ACTIVITY	CHARACTERISTICS	QUANTUM OF CHECK	RECORD	SCOPE OF INSPECTION		
					SUB SUPPLIER	SUPPLIER	EIL/TPIA
2.1	Plates, pipes, Forgings, Expansion Bellows, Fittings, Fasteners, Gaskets, etc (As applicable) (Note-3)	As per PR/Purchase Specification	100%	Mill TC	H	H	R
2.2	Internals like Demister, Johnson screen, support grid etc (As applicable) (Note-4)	As per PR/Purchase Specification	100%	Mill TC	H	H	R
3.0	**In process inspection**						
3.1	Materials identification for plates, pipes (pressure parts)	Review of test certificates, markings visual & dimensional inspection, identity correlation & transfer of identity	100%	Material clearance record	-	H	H
3.2	Material identification _for forgings, fittings, fasteners, gaskets (pressure parts)	Review of test certificates, markings Identity correlation.	100%	Material clearance record	-	H	R
3.3	Non pressure parts (including internals, supports etc.)	Review of test certificates	100%	Material test certificate	W	R	R
3.4	Inspection of formed components (cold or hot formed)	NDT of weld seam as applicable	100%	NDT Reports / Films	H	H	R
		NDT (dished ends and tori-cone) on inside & outside surfaces in knuckle zone and edges.	100%	Inspection report	H	H	R

SL NO.	STAGE/ ACTIVITY	CHARACTERISTICS	QUANTUM OF CHECK	RECORD	SCOPE OF INSPECTION		
					SUB SUPPLIER	SUPPLIER	EIL/TPIA
		HT chart review as applicable	100%	HT Chart	W	W	R
		Test coupon as applicable	100%	Inspection report	H	H	W
		Visual & dimensional (min. thickness, profile, ovality etc) inspection	100%	Inspection report	H	H	H
3.5	Welding consumable	Chemical & mechanical properties	100%	Batch test certificates	W	R	R
3.6	Weld edge preparation & set up of pressure parts	Visual & dimensional inspection, weld edge, root gap, offset, alignment, cleanliness etc	100%	Inspection check list	-	W	-
		NDT of weld edges, as applicable	100%	NDT Reports	-	W	R
3.7	Intermediate inspection of welds	Visual, Welding Parameters, NDT	100%	Inspection report	-	W	-
4.0	**Final inspection**						
4.1	Visual and dimensional inspection (internals & externals) including welds (before PWHT as applicable)	Visual, dimensions, completeness of assembly and weld visual for reinforcement, undercuts, Surface defects, etc.	100%	Inspection report	-	H	H

SL NO.	STAGE/ ACTIVITY	CHARACTERISTICS	QUANTUM OF CHECK	RECORD	SCOPE OF INSPECTION		
					SUB SUPPLIER	SUPPLIER	EIL/TPIA
4.2	PMI (AS/SS components)	Chemical check	Each component	Inspection report		W	RW
4.3	Pneumatic test of RF pads	Leak check	100%	Test report	-	W	R
4.4	Trial assembly of internals and column/vessel sections as applicable	Dimensions, completeness of assembly and alignment	100%	Inspection report	-	H	W
4.5	Inspection of completed welds	PWHT as applicable	100%	HT chart		W	R
		NDT as applicable	100%	NDT Reports / RT Films	-	W	R
4.6	Hardness check on all welds, HAZ as applicable	Hardness	100%	Inspection report	-	W	RW
4.7	Production test coupon as applicable	Production test coupon testing	As per spec/drg.	Inspection report	-	H	H
4.8	Hydrostatic test	Leak check	100%	Test report	-	H	H
5.0	**Template Inspection**						
5.1	Foundation Template & Gauge plate inspection	Visual & Dimensions, Orientation markings	100%	Inspection report	-	H	H
6.0	**Painting**						

SL NO.	STAGE/ ACTIVITY	CHARACTERISTICS	QUANTUM OF CHECK	RECORD	SCOPE OF INSPECTION		
					SUB SUPPLIER	SUPPLIER	EIL/TPIA
6.1	Final painting	Visual inspection (after surface preparation and final painting for workmanship, uniformity) DFT check	100%	Inspection report	-	H	-
7.0	**Documentation and IC**						
7.1	Final stamping, review of inspection documents and issue of IC	Verifying stamping details and review of inspection documents	100%	IC / Inspection reports	-	H	H
7.2	Final documents as per PR	Verification & compilation of inspection & test records for submission to customer	100%	Final dossier	-	H	H

Legend: H- Hold (Do not proceed without approval), P-Perform, RW - Random Witness (As specified or 10% (min.1 no. of each size and type of Bulk item)), R-Review, W-Witness (Give due notice, work may proceed after scheduled date).

NOTES (As applicable):

1. This document describes the generic test requirements. Any additional test or Inspection scope if specified in contract documents shall also be applicable. (Unless otherwise agreed upon)
2. Acceptance Norms for all the activities shall be as per PO/PR/STANDARDS referred there in /Job Specification /Approved Documents.
3. Third Party Certifications shall be as per EN 10204 Type 3.2 for CS Plates (NACE/H2/HIC), Forgings, Fittings and Expansion Bellows and TPIA shall be arranged by supplier. Certifications shall be as per EN 10204 Type 3.1 for Pipes, CS Plates (non-NACE/H2/HIC), Gaskets and Fasteners.
4. Inspection of Internals shall be as per EIL Std ITP no. 6-81-0060.
5. For EPC jobs, all inspection shall be carried out by TPIA, unless notified otherwise.

लो एलॉय स्टील के प्रैशर वेसल / कॉलम / रिएक्टर के लिए निरीक्षण व परीक्षण योजना

INSPECTION AND TEST PLAN FOR LOW ALLOY STEEL PRESSURE VESSELS / COLUMNS/REACTORS

Rev. No.	Date	Purpose	Prepared by	Checked by	Convenor Standards Committee	Chairman Standards Bureau
					Approved by	
4	14.05.2020	REVISED AND RE-ISSUED	SK	CS	RKS	SKS
3	09.09.2013	REVISED AND RE-ISSUED	TKK	RKS	SCG	DM
2	15.07.2011	Revised and Re-Issued	HP	SCG	AKC	DM
1	28.09.2007	Revised and Re-Issued	PD	RB	MVK	VC
0	19.07.2002	Issued For Implementation	NKN	SPS	AKB	SB

Abbreviations:

AS/CS/SS	:	Alloy Steel/Carbon Steel/Stainless Steel	MRT	:	Mechanical Run Test
CEIL	:	Certification Engineers International Limited	NDT	:	Non Destructive Testing
CIMFR	:	Central Institute of Mining & Fuel Research	NPSH	:	Net Positive Suction Head
CE	:	Carbon Equivalent	PO	:	Purchase Order
DFT	:	Dry Film Thickness	PESO	:	Petroleum Explosive Safety Organization
DPT	:	Dye Penetrant Testing	PQR	:	Procedure Qualification Record
DHT	:	De-hydrogen Heat Treatment	PR	:	Purchase Requisition
ERTL	:	Electronics Regional Test Laboratory	PMI	:	Positive Material Identification
FCRI	:	Fluid Control Research Institute	PWHT	:	Post Weld Heat Treatment
HT	:	Heat Treatment	RT	:	Radiography Testing
HIC	:	Hydrogen Induced Cracking	SSCC	:	Sulphide Stress Corrosion Cracking
ITP	:	Inspection and Test Plan	TC	:	Test Certificate
IP	:	Ingress Protection	TPI or TPIA	:	Third Party Inspection Agency
IHT	:	Intermediate Heat Treatment	UT	:	Ultrasonic Testing
IC	:	Inspection Certificate	VDR	:	Vendor Data Requirement
IGC	:	Inter Granular Corrosion	WPS	:	Welding Procedure Specification
MPT/MT	:	Magnetic Particle Testing	WPQ	:	Welders Performance Qualification
MTC	:	Material Test Certificate			

Inspection Standards Committee

Convenor : Mr. R.K. Singh

Members:

Mr. Rajesh Sinha	Mr. Himangshu Pal	Mr. R. Muthuramalingam (RPO-Representative)
Mr. Chandrashekhar	Mr. Avdhesh Agrawal	Mr. P V Satyanarayana (Engg. Representative)
Mr. Mahendra Mittal		

1.0 SCOPE

This Inspection and Test Plan covers the minimum testing requirements of Pressure vessels/ Columns/Reactors low alloy steel

2.0 REFERENCE DOCUMENTS

PO/PR/ Standards referred there in/ Job specifications /approved documents.

3.0 INSPECTION AND TEST REQUIREMENTS:

SL NO.	STAGE/ ACTIVITY	CHARACTERISTICS	QUANTUM OF CHECK	RECORD	SCOPE OF INSPECTION		
					SUB SUPPLIER	SUPPLIER	EIL/TPIA
1.0	**Procedures**						
1.1	Hydro test, heat treatment, NDT, hot forming, and other Procedures	Documented procedures.	100%	Procedure Documents	-	H	R
1.2	Weld Plan & NDT Plan	As per PR/ Purchase Specification/ Applicable codes	100%	Procedure documents	-	H	A
1.3	WPS/ PQR /WPQ	Documented procedures.	100%	Procedure documents	-	H	R-Existing W-New
2.0	**Materials Procurement**						

SL NO.	STAGE/ ACTIVITY	CHARACTERISTICS	QUANTUM OF CHECK	RECORD	SCOPE OF INSPECTION		
					SUB SUPPLIER	SUPPLIER	EIL/TPIA
2.1	Plates, pipes, forging, fittings, Expansion Bellows, Fasteners, Gaskets etc (as applicable) (NOTE – 3)	As per PR / Purchase Specification	100%	Mill Test Certificates and TPI reports	H	H	R
2.2	Internals like Demisters, Johnson screens, support grids, Diffusers etc. (as applicable) (NOTE – 4)	As per PR/Purchase Specification	100%	Mill TC and TPI reports	H	H	R
3.0	**In process inspection**						
3.1	Materials identification for plates, pipes (pressure parts)	Review of test certificates, markings visual & dimensional inspection, identity, correlation & transfer of identity	100%	Material clearance record	-	H	H
3.2	Material identification for forgings, fittings, fasteners, gaskets (pressure parts)	Review of test certificates, markings Identity correlation.	100%	Material clearance record	-	H	R
3.3	Non pressure parts (including internals, supports etc.)	Review of test certificates	100%	Material test certificate	W	R	R
3.4	Inspection of formed components	NDT of weld seam as applicable	100%	NDT report/ RT Films	H	H	R

SL NO.	STAGE/ ACTIVITY	CHARACTERISTICS	QUANTUM OF CHECK	RECORD	SCOPE OF INSPECTION		
					SUB SUPPLIER	SUPPLIER	EIL/TPIA
		NDT (dished ends and tori-cone) on inside & outside surfaces in knuckle zone and edges.	100%	NDT report	H	H	R
		HT chart review as applicable	100%	HT Chart	W	W	R
		Test coupon as applicable	100%	Inspection report	H	H	W
		Visual & dimensional (min. thickness, profile, ovality etc) inspection	100%	Inspection report	H	H	H
3.5	Welding consumable	Chemical & mechanical properties	100%	Batch test certificates	W	R	R
3.6	Weld edge preparation & set up of pressure parts	Visual & dimensional inspection, weld edge, root gap, offset, alignment, cleanliness etc	100%	Inspection check list	-	W	R
		NDT of weld edges as applicable for cracks, laminations or segregations	100%	NDT report	-	W	R
3.7	Intermediate inspection of welds	Visual, Welding parameters, NDT (as applicable)	100%	Inspection report	-	W	R
		Heat treatment as applicable during welding	100%	HT chart	-	H	R
3.8	Intermediate Stress Relieving / De-Hydrogen Treatment	Heat treatment cycle	100%	HT Chart	-	H	R

SL NO.	STAGE/ ACTIVITY	CHARACTERISTICS	QUANTUM OF CHECK	RECORD	SCOPE OF INSPECTION		
					SUB SUPPLIER	SUPPLIER	EIL/TPIA
4.0	**Final Inspection**						
4.1	Visual and dimensional inspection (internals & externals) including welds (before PWHT as applicable)	Visual, dimensions, completeness of assembly and weld visual for reinforcement, undercuts, surface defects, etc.	100%	Inspection report	-	H	H
4.2	PMI	Chemical check	All components and weld	Inspection report	-	W	RW
4.3	Pneumatic test of RF pads	Leak check	100%	Test report	-	W	R
4.4	Trial assembly of internals and column/vessel sections as applicable	Dimensions, completeness of assembly and alignment	100%	Inspection report	-	H	H
4.5	Inspection of completed welds	PWHT as applicable	100%	HT chart		W	R
		NDT, as applicable	/100%	NDT Reports / Films	-	W	R
		Production test coupon Testing as applicable	As per spec/drg.	Inspection report	-	H	H

SL NO.	STAGE/ ACTIVITY	CHARACTERISTICS	QUANTUM OF CHECK	RECORD	SCOPE OF INSPECTION		
					SUB SUPPLIER	SUPPLIER	EIL/TPIA
4.6	Hardness Checking of welds after PWHT	Hardness	100%	Inspection report	-	W	RW
4.7	Hydrostatic test	Leak check	100%	Hydro test report	-	H	H
4.8	NDT of all weld surfaces (external and internal) after hydro test as applicable	Check for cracks	100%	NDT Reports	-	W	R
4.9	Drying and Nitrogen Purging (as applicable)	Visual, Gas Pressure	100%	Inspection report	-	W	-
5.0	**Template Inspection**						
5.1	Foundation Template and Gauge plate	Visual & Dimensions, Orientation markings	100%	Inspection report	-	H	H
6.0	**Painting**						
6.1	Final painting (As applicable)	Visual inspection (after surface preparation and final painting for workmanship, uniformity) , DFT check	100%	Inspection report	-	H	-
7.0	**Documentation and IC**						
7.1	Final stamping , review of inspection documents and issue of IC	Verifying stamping details and review of inspection documents	100%	IC / Inspection reports	-	H	H

SL NO.	STAGE/ ACTIVITY	CHARACTERISTICS	QUANTUM OF CHECK	RECORD	SCOPE OF INSPECTION		
					SUB SUPPLIER	SUPPLIER	EIL/TPIA
7.2	Final documents as per PR	Verification & compilation of inspection & test records for submission to customer	100%	Final dossier	-	H	H

Legend: A-Approval, H- Hold (Do not proceed without approval), P-Perform, RW - Random Witness (As specified or 10% (min.1 no. of each size and type of Bulk item)), R-Review, W-Witness (Give due notice, work may proceed after scheduled date).

NOTES (As applicable):

1. This document describes the generic test requirements. Any additional test or Inspection scope if specified in contract documents shall also be applicable. (Unless otherwise agreed upon)
2. Acceptance Norms for all the activities shall be as per PO/PR/STANDARDS referred there in /Job Specification /Approved Documents.
3. Third Party Certifications shall be as per EN 10204 Type 3.2 for Plates, Pipes, Forgings, Fittings, Fasteners and Expansion Bellows; and TPIA shall be arranged by supplier. Certifications shall be as per EN 10204 Type 3.1 for Gaskets.
4. Inspection of Internals shall be as per relevant EIL Std ITP's attached with PR; if not attached with PR, separate ITP's shall be submitted for EIL approval.
5. For EPC jobs, all inspection shall be carried out by TPIA, unless notified otherwise.

एस एस क्लैड प्रैशर वेसल / कॉलम / रिएक्टर के लिए निरीक्षण व परीक्षण योजना

INSPECTION AND TEST PLAN FOR SS CLAD PRESSURE VESSELS/ COLUMNS/ REACTORS

Rev. No.	Date	Purpose	Prepared by	Checked by	Convenor Standards Committee	Chairman Standards Bureau
					Approved by	
4	14.05.2020	REVISED AND RE-ISSUED	SK	CS	RKS	SKS
3	09.09.2013	REVISED AND RE-ISSUED	TKK	RKS	SCG	DM
2	15.07.2011	REVISED AND RE-ISSUED	HP	SCG	AKC	DM
1	15.07.08	REVISED AND RE-ISSUED	NKR	SSL	SKP	VC
0	19.07.02	ISSUED FOR IMPLEMENTATION	NKN	SPS	AKB	GRR

Abbreviations:

AS/CS/SS	:	Alloy Steel/Carbon Steel/Stainless Steel	MRT	:	Mechanical Run Test
CEIL	:	Certification Engineers International Limited	NDT	:	Non Destructive Testing
CIMFR	:	Central Institute of Mining & Fuel Research	NPSH	:	Net Positive Suction Head
CE	:	Carbon Equivalent	PO	:	Purchase Order
DFT	:	Dry Film Thickness	PESO	:	Petroleum Explosive Safety Organization
DPT	:	Dye Penetrant Testing	PQR	:	Procedure Qualification Record
DHT	:	De-hydrogen Heat Treatment	PR	:	Purchase Requisition
ERTL	:	Electronics Regional Test Laboratory	PMI	:	Positive Material Identification
FCRI	:	Fluid Control Research Institute	PWHT	:	Post Weld Heat Treatment
HT	:	Heat Treatment	RT	:	Radiography Testing
HIC	:	Hydrogen Induced Cracking	SSCC	:	Sulphide Stress Corrosion Cracking
ITP	:	Inspection and Test Plan	TC	:	Test Certificate
IP	:	Ingress Protection	TPI or TPIA	:	Third Party Inspection Agency
IHT	:	Intermediate Heat Treatment	UT	:	Ultrasonic Testing
IC	:	Inspection Certificate	VDR	:	Vendor Data Requirement
IGC	:	Inter Granular Corrosion	WPS	:	Welding Procedure Specification
MPT/MT	:	Magnetic Particle Testing	WPQ	:	Welders Performance Qualification
MTC	:	Material Test Certificate			

Inspection Standards Committee

Convenor : Mr. R.K. Singh

Members:

Mr. Rajesh Sinha	Mr. Himangshu Pal	Mr. R. Muthuramalingam (RPO Representative)
Mr. Chandrashekhar	Mr. Avdhesh Agrawal	Mr. P V Satyanarayana (Engg. Representative)
Mr. Mahendra Mittal		

1.0 SCOPE

This Inspection and Test Plan covers the minimum testing requirements of SS clad pressure vessels/ columns/ reactors

2.0 REFERENCE DOCUMENTS

PO/PR/ Standards referred there in/ Job specifications /approved documents.

3.0 INSPECTION AND TEST REQUIREMENTS

SL NO.	STAGE/ ACTIVITY	CHARACTERISTICS	QUANTUM OF CHECK	RECORD	SCOPE OF INSPECTION		
					SUB SUPPLIER	SUPPLIER	EIL/TPIA
1.0	**Procedure**						
1.1	Hydro test, heat treatment, NDT, hot forming, and other Procedures	Documented procedures	100%	Procedure Documents	-	H	R
1.2	Weld Plan & NDT Plan	As per PR/ Purchase Specification/ Applicable codes	100%	Procedure documents	-	H	A
1.3	WPS/ PQR /WPQ	Documented procedures	100%	Procedure documents	-	H	R-Existing W-New
2.0	**Material Procurement**						

SL NO.	STAGE/ ACTIVITY	CHARACTERISTICS	QUANTUM OF CHECK	RECORD	SCOPE OF INSPECTION		
					SUB SUPPLIER	SUPPLIER	EIL/TPIA
2.1	Plates, Clad plates, pipes, forging, fittings, Expansion Bellows, Fasteners, Gaskets etc. (as applicable) (Note-3)	As per PR / Purchase specification	100%	Mill test certificates and TPI reports	H	H	R
2.2	Internals like Demisters, Johnson screens, support grids, Diffusers etc. (as applicable) (Note-4)	As per PR/Purchase Specification	100%	Mill TC and TPI reports	H	H	R
3.0	**In process inspection**						
3.1	Materials identification for plates, pipes (pressure parts)	Review of test certificates, markings, visual & dimensional inspection, identity, correlation & transfer of identity	100%	Material clearance record	-	H	H
3.2	Material identification for forgings, fittings, fasteners, gaskets (pressure parts)	Review of test certificates, markings identification, correlation .	100%	Material clearance record	-	H	R
3.3	Non pressure parts (including internals, supports etc.)	Review of test certificates	100%	Material test certificate	W	R	R
3.4	Inspection of formed components rolled shell belts (cold or hot formed)	NDT of Weld Seam, as applicable	100%	NDT Report/ Films	W	W	R
		NDT on knuckle & straight face and weld deposit overlays	100%	DPT report	W	W	R

SL NO.	STAGE/ ACTIVITY	CHARACTERISTICS	QUANTUM OF CHECK	RECORD	SCOPE OF INSPECTION		
					SUB SUPPLIER	SUPPLIER	EIL/TPIA
		UT for lack of bond (after final heat treatment if any) and area where attachments to be welded on clad surfaces	As per Purchase specification	UT report	W	W	RW
		HT chart review (as applicable)	100%	HT Chart	W	W	R
		Test Coupon (as applicable)	100%	Inspection report	W	W	W
		Visual & dimensional (min. thickness, profile, roundness, ovality etc) inspection	100%	Inspection report	H	H	H
3.5	Welding consumable	Chemical & mechanical properties including IGC	100%	Batch test certificates	W	R	R
3.6	Weld edge preparation & Set up of pressure Parts	Visual & dimensional inspection, weld edge, root gap, offset, alignment, cleanliness etc.	100%	Inspection check list	-	W	-
		DPT of weld edges	100%	DPT Report	-	W	R
3.7	Intermediate Inspection of Base Metal Welding	Visual, Welding parameters	100%	Inspection report	-	W	-
		NDT (as applicable)	100%	NDT Report	-	W	R
		Heat treatment as applicable	100%	HT chart		W	R
3.8	Intermediate Inspection of weld overlay	Visual inspection for reinforcement, undercuts, Surface defects, etc.	100%	Inspection report	-	W	-
		DPT after each layer	100%	DPT report	-	W	R

SL NO.	STAGE/ ACTIVITY	CHARACTERISTICS	QUANTUM OF CHECK	RECORD	SCOPE OF INSPECTION		
					SUB SUPPLIER	SUPPLIER	EIL/TPIA
4.0	**Final Inspection**						
4.1	Visual and dimensional inspection (internals & externals) including welds (before PWHT as applicable)	Visual, dimensions, completeness of assembly and weld visual for reinforcement, undercuts, Surface defects, etc.	100%	Inspection report	-	H	H
4.2	PMI	Chemical check	All component and weld	Inspection report	-	W	RW
4.3	Pneumatic test of RF pads	Leak check	100%	Test report	-	W	R
4.4	Trial assembly of internals and column/vessel sections as applicable	Dimensions, completeness of assembly and alignment	100%	Inspection report	-	H	H
4.5	Inspection of completed welds	PWHT as applicable	100%	HT chart		W	R
		NDT as applicable	100%	NDT report/ Films	-	W	R
		Production test coupon testing as applicable	100%	Inspection report	-	H	H
		Sample selection for weld overlay chemistry, as applicable	as per specification / drawing	Inspection report	-	H	W
		Weld chemical results for undiluted chemistry	As per specification/ drawing	Inspection check list	-	W	R

SL NO.	STAGE/ ACTIVITY	CHARACTERISTICS	QUANTUM OF CHECK	RECORD	SCOPE OF INSPECTION		
					SUB SUPPLIER	SUPPLIER	EIL/TPIA
4.6	Hardness check of welds after PWHT (As applicable)	Hardness as applicable	100%	Inspection report	-	W	RW
4.7	Hydrostatic test	Leak check	100%	Inspection report	-	H	H
		Water Quality check	One sample per equipment	Laboratory Test Report	-	H	R
4.8	NDT after hydro test as applicable	NDT of welds as applicable	100%	Inspection report	-	W	R
4.9	Pickling/ passivation, drying of equipment as applicable	Visual inspection for cleanliness	100%	Inspection report	-	W	R
4.10	Ferroxyl test/ Copper Sulphate Test, as applicable	Fe pick up check	100%	Inspection report	-	W	RW
4.11	Drying and Nitrogen Purging (as applicable)	Visual, Gas Pressure	100%	Inspection report	-	W	-
5.0	**Template Inspection**						
5.1	Foundation Template and Gauge plate, as applicable	Visual & Dimensions, Orientation markings	100%	Inspection report	-	H	H
6.0	**Painting**						
6.1	Final painting (As applicable)	Visual inspection (after surface preparation and final painting for workmanship, uniformity) DFT check	100%	Inspection report	-	H	-
7.0	**Documentation and IC**						
7.1	Final stamping, review of inspection documents and issue of IC	Verifying stamping details and review of inspection documents	100%	IC / Inspection reports	-	H	H

SL NO.	STAGE/ ACTIVITY	CHARACTERISTICS	QUANTUM OF CHECK	RECORD	SCOPE OF INSPECTION		
					SUB SUPPLIER	SUPPLIER	EIL/TPIA
7.2	Final documents as per PR	Verification & compilation of inspection & test records for submission to customer	100%	Final dossier	-	H	H

Legend: A-Approval, H- Hold (Do not proceed without approval), P-Perform, RW - Random Witness (As specified or 10% (min.1 no. of each size and type of Bulk item)), R-Review, W-Witness (Give due notice, work may proceed after scheduled date).

NOTES (As applicable):

1. This document describes the generic test requirements. Any additional test or Inspection scope if specified in contract documents shall also be applicable. (Unless otherwise agreed upon)
2. Acceptance Norms for all the activities shall be as per PO/PR/STANDARDS referred there in /Job Specification /Approved Documents.
3. Third Party Certifications shall be as per EN 10204 Type 3.2 for Clad Plates, Forgings, Fittings and Expansion Bellows; and TPIA shall be arranged by supplier. Certifications shall be as per EN 10204 Type 3.1 for Pipes, CS Plates, Gaskets and Fasteners.
4. Inspection of Internals shall be as per relevant EIL Std ITP's attached with PR; if not attached with PR, separate ITP's shall be submitted for EIL approval.
5. For EPC jobs, all inspection shall be carried out by TPIA, unless notified otherwise.