

TENDER SPECIFICATION

BHEL: PSSR: SCT: 1980

FOR

Erection, alignment, welding, NDT, fixing of hangers & supports, flushing, hydro testing, fabrication of structural steel, pipe supports, metal structures & platforms including supply of structural steel, supply & application of primer & finish paints as per requirement of Secondary cycle piping system and all associated Piping including handling at site stores / storage yard, transporting to site at Unit 3 & Unit 4 of Kudankulam Nuclear Power Project (KKNPP), Radhapuram Taluk, Thirunelveli District, Tamil Nadu

VOLUME -II PRICE BID

TECHNOCOMMERCIAL BID - Consists of Book- I & Book- II

Book- I Consists of

- Notice Inviting Tender**
- Volume-IA: Technical Conditions of Contract**

Book-II consists of

- Volume-IB: Special conditions of Contract,
Rev 01 dated 1st June 2012
Amendment 01 dated 1st October, 2015**
- Volume-IC: General conditions of Contract
PS:MSX:GCC Rev 02 dated June 16, 2021**
- Volume-ID: Forms & Procedures
Rev 01 dated 1st June 2012
Amendment 01 dt 1st October, 2015**



BHARAT HEAVY ELECTRICALS LIMITED

(A Government of India Undertaking)

Power Sector – Southern Region

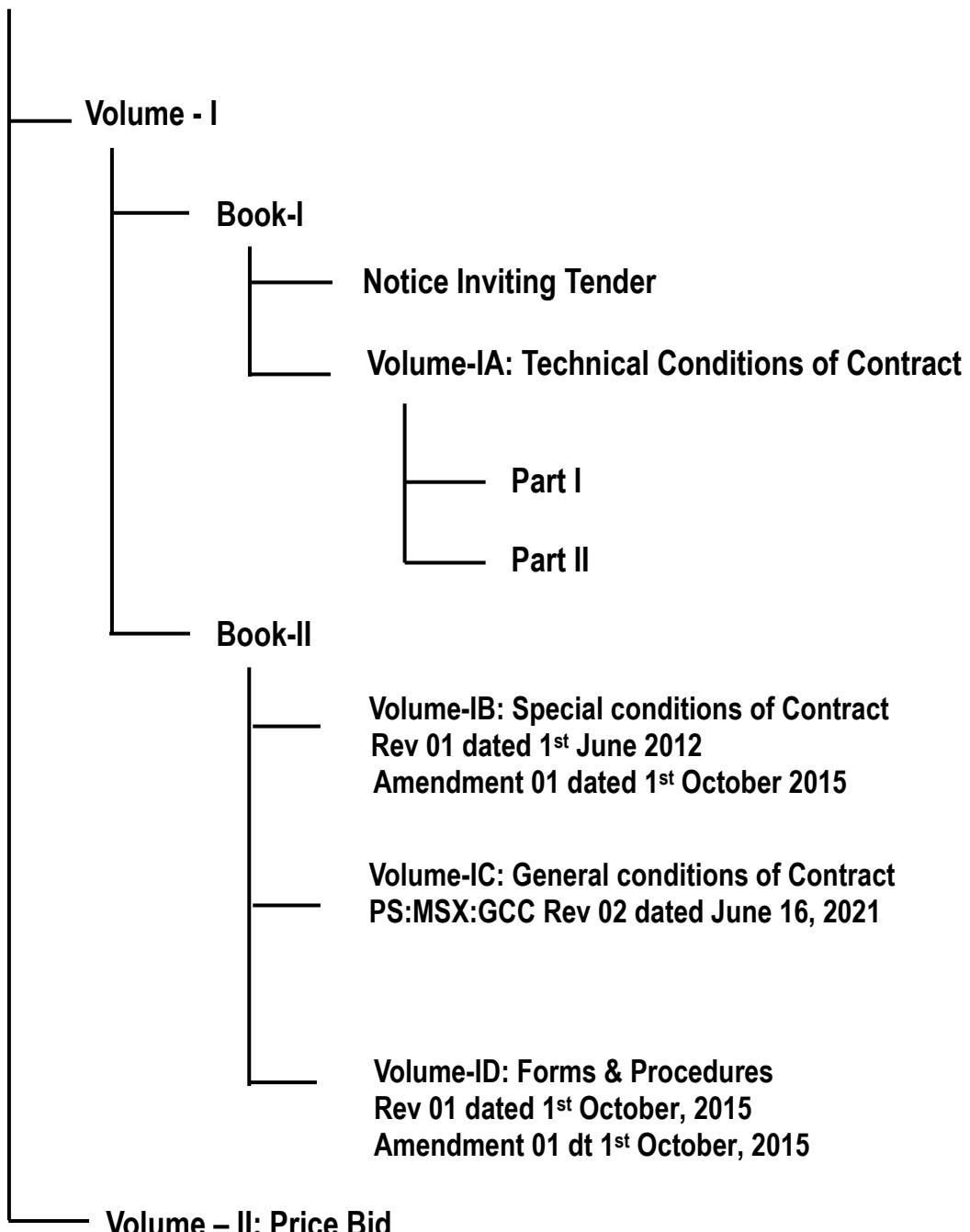
Tek Towers, No. 11, Old Mahabalipuram Road

Okkiyam Thoraipakkam, Chennai - 600097

PRICE BID

TENDER SPECIFICATION CONSISTS OF

Tender Specification



PRICE BID

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Part B: Format for total amount (Enclosed as a separate Excel File in e-Procurement portal for the subject tender)	(separate Excel File)
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PRICE BID

PART-A-INSTRUCTIONS TO BIDDERS:

1. The quantity indicated in the BOQ in Part C of Price Bid is approximate only and is liable for variation. Payment will be as per actual quantity executed and as certified by BHEL Engineer.
2. Tenderers are requested to affix their company seal and authorized signature in all pages.
3. Bidders shall quote 'Total Amount' in the format enclosed as a separate Excel File in BHEL NIC e-Procurement portal for the subject tender and upload the same under 'Packet details - > Tender covers -> Finance '(Cover Type Description – Price Bid)" and same shall be taken into account for evaluation and awarding and hence, shall be complete in all respect for the full scope of work defined in specification and in accordance with terms & conditions of the tender. Any other entry elsewhere in the price bid shall be treated as Null and Void. Quoting of rates in any other form/formats will not be entertained.
4. The above mentioned 'Total amount' is for the entire Bill of Quantity (BOQ) given in Part -C of the Price Bid.
5. Based on the quantities of individual item and the 'Total amount' as mentioned above, unit rate of individual item shall be derived. This unit rate shall be rounded off to four decimal places.
6. Bidders to note that this is an item rate contract. Payment shall be made for the actual quantities of work executed at the unit rate arrived at as per Sl No.5 above.

Part C : Bill of Quantities

Tender Specification BHEL:PSSR:SCT:1980 for Secondary Cycle Piping Package of Unit 3 & 4

at 2 X 1000 MWe Kudankulam Nuclear Power Plant Unit # 3 & 4 - TG & SWS Package

Ref.No.	Description	Unit of Measurement	Qty.	Weightage for amount of each item (Nearest to the 7 decimal points) w.r.t the total amount
--	(Welding, Erection, NDT, Flushing and Testing of Pipelines) - Material Supply by NPCIL	--	--	
F.1	<p>Welding of CS pipe, Type-Butt Weld : Handling, cutting, edge correction (for pipe spools issued with prepared edges), removal of paint from the joint area, cleaning, fit up, welding using GTAW/ SMAW process including hookup joints, mechanical cleaning of weld joint, visual inspection, repair of welding if any, FME inspection as per manufacturer drawings, documents and specifications.</p> <p>The scope includes joint identification & marking by engraving, preparation of welding inspection report (WIR), QAP, WPS, PQR, JHA, scaffolding & platforms, man power, welder qualification, P&M, tools & tackles, all consumables (excluding welding filler wire & electrode) etc</p> <p>Note:</p> <p>1. Incase any temporary structures required, contractor shall supply all the materials including welding electrodes and consumables.</p>	--	--	
F.1.1	Size 108 mm OD to 325 mm OD, thickness upto 12 mm	Inch Dia	50,000	.0325626
F.1.2	Size 108 mm OD to 325 mm OD, thickness above 12 mm and upto19mm	Inch Dia	15,000	.0125485
F.1.3	Size above 325 mm OD to 630 mm OD, thickness upto 16mm	Inch Dia	62,000	.0493817
F.1.4	Size above 325 mm OD to 630 mm OD, thickness above 16mm	Inch Dia	20,000	.0169507
F.1.5	Size above 630 mm OD , thickness upto 16mm	Inch Dia	43,000	.0354683
F.1.6	Size above 630 mm OD , thickness above 16mm	Inch Dia	3,500	.0030524

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Ref.No.	Description	Unit of Measurement	Qty.	Weightage for amount of each item (Nearest to the 7 decimal points) w.r.t the total amount
F.2	<p>Welding of small bore CS piping :</p> <p>Type-Butt Weld: Handling of pipe size ranging from 10 NB to 80 NB mm or 14 mm OD to 89 mm OD, cutting, removal of paint from the joint area, edge preparation, cleaning, fit up, welding using GTAW/ SMAW process including hookup joints, mechanical cleaning of weld joint, visual inspection, repair of welding if any, FME inspection as per manufacturer drawings, documents and specifications.</p> <p>The scope includes site survey, joint identification & marking by engraving, preparation of welding inspection report (WIR), QAP, WPS, PQR, JHA scaffolding & platforms, man power, welder qualification, scaffolding & platforms, man power, P&M, tools & tackles, all consumables (excluding welding filler wire & electrode) etc .</p> <p>Note:1. Incase any temporary structures required, contractor shall supply all the materials including welding electrodes and consumables.</p>	Inch Dia	50,000	.0411476
F.3	<p>Welding of SS pipe, Type-Butt Weld :</p> <p>Handling, cutting, edge correction (for pipe spools issued with prepared edges), cleaning, fit up, purging-dam fixing, purging, welding using GTAW/SMAW process including hookup joints, mechanical cleaning of weld joint, visual inspection, repair of welding if any, FME inspection as per manufacturer drawings, documents and specifications.</p> <p>The scope includes joint identification & marking by engraving, preparation of welding inspection report (WIR), QAP, WPS, PQR, JHA, purging dam log sheet, scaffolding & platforms, man power, welder qualification, P&M, tools & tackles, all consumables (excluding welding filler wire & electrode except for temporary arrangements) etc</p>	--		
F.3.1	Size 108 mm OD to 325 mm OD, thickness upto 12 mm	Inch Dia	28,000	.0327744
F.3.2	Size above 325 mm OD to 630 mm OD, thickness upto 16mm	Inch Dia	6,000	.0076948
F.3.3	Size above 630 mm OD , thickness upto 16mm	Inch Dia	4,800	.0065552

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Ref.No.	Description	Unit of Measurement	Qty.	Weightage for amount of each item (Nearest to the 7 decimal points) w.r.t the total amount
F.4	<p>Welding of small bore SS piping Type-Butt Weld:</p> <p>Handling of pipe size ranging from 4 NB to 80 NB mm or 6 mm OD to 89 mm OD, cutting, removal of paint from the joint area, edge preparation, cleaning, fit up, welding using GTAW/ SMAW process including hookup joints, mechanical cleaning of weld joint, visual inspection, repair of welding if any, FME inspection as per manufacturer drawings, documents and specifications.</p> <p>The scope includes site survey, joint identification & marking by engraving, preparation of welding inspection report (WIR), QAP, WPS, PQR, JHA, scaffolding & platforms, man power, welder qualification, P&M, tools & tackles, all consumables (excluding welding filler wire & electrode) etc</p> <p>Note:</p> <p>1. Incase any temporary structures required, contractor shall supply all the materials including welding electrodes and consumables.</p>	Inch Dia	25,000	.0322884
F.5	<p>Welding of Titanium tube, Type-Butt Weld- Size upto 159 mm OD :</p> <p>Handling, cutting, edge correction (for pipe spools issued with prepared edges), cleaning, fit up, purging-dam fixing, purging, welding using GTAW process including hookup joints, mechanical cleaning of weld joint, FME inspection as per manufacturer drawings, documents and specifications with acceptance of EIC.</p> <p>The scope includes joint identification & marking by engraving, preparation of welding inspection report (WIR), QAP, WPS, PQR, JHA, purging dam logsheet, scaffolding & platforms, man power, welder qualification, P&M, tools & tackles, all consumables (excluding welding filler wire & electrode) etc</p> <p>Note:</p> <p>1. Incase any temporary structures required, contractor shall supply all the materials including welding electrodes and consumables.</p>	Inch Dia	300	.0005531
F.7	Preparation of Weld edge (CS/SS) :	--		

Part C : Bill of Quantities

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Ref.No.	Description	Unit of Measurement	Qty.	Weightage for amount of each item (Nearest to the 7 decimal points) w.r.t the total amount
F.7.1	Preparation of Weld edge (CS/SS) by bevelling machine-J/V- groove for pipe: Identification of pipe spool, marking, setting up of pipe bevelling machine, performing V or J- groove preparation, removing out all the debris, cleaning, visual inspection, preparation of reports, arrangement of necessary manpower, tools, tackles, scaffolding & platforms, consumables etc and work completion as per drawings, documents and specifications with acceptance of EIC.	Inch Dia	6,000	.0041322
F.7.2	Preparation of Pipe Weld Edge (CS/SS) by cutting and grinding operation : Identification of pipe spool, marking, cutting, grinding, preparing edge (v-groove), cleaning, visual inspection, preparation of reports, arrangement of necessary manpower, tools, tackles, scaffolding & platforms, consumables etc and work completion as per drawings, documents and specifications with acceptance of EIC.	Inch Dia	15,000	.0055595
F.8	Erection of CS, SS and Ti piping systems of all sizes: Identification of pipe spool, handling, cutting, erection and alignment of CS, SS & Ti piping along with accessories, at various elevations and locations, FME inspection, preparation of erection reports, asbuilt drawings and work completion as per manufacturer drawings, documents and specifications with acceptance of EIC. The scope includes providing temporary support arrangements, SS shims, scaffolding & platforms, man power, P&M, tools & tackles, all consumables(excluding welding filler wire & electrode) etc. Note: 1. Incase any temporary structures required, contractor shall supply all the materials including welding electrodes and consumables.	Inch-Meter	580,000	.1849147
F.11	Cold bending of pipes : Fabrication of bends for pipes of diameter upto 50 mm using bending machine with dyes with internal mandrels, visual inspection, DPT, preparation of reports, arrangement of man power, tools & tackles, plant & machinery, consumables, scaffolding & platforms, cleaning aids etc as per drawings, documents and specifications with acceptance of EIC. Note : 1) DPT is in scope of work and no separate payment shall be made. 2) Sample bends for each pipe size shall be prepared and examined after sectioning for conformance with thickness and ovality acceptance as per standards.	Nos	1,100	.0004722

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Ref.No.	Description	Unit of Measurement	Qty.	Weightage for amount of each item (Nearest to the 7 decimal points) w.r.t the total amount
F.12	Assembly of Flanged joints : Identification of joints, handling, cleaning of gasket seating area, preparation of gasket for required flange size, placement of gasket, installation of fasteners, alignment, lubrication, sequential tightening by torque wrench, providing leak tight joint, preparation of flange alignment report, arrangement of man power, tools & tackles, plant & machinery, scaffolding & platforms, cleaning aids etc and work completion as per manufacturer drawings, documents and specifications with acceptance of EIC.	--		
F.12.1	Size upto 80 NB OD	SET	3,000	.0013377
F.12.2	Size from 100 NB OD -300 NB OD	SET	2,000	.0020377
F.12.3	Size above 300 NB OD	SET	900	.0032366
F.13	Valve Testing (CS/SS/Ti): Identification, de-preservation, handling, shifting of valves from stores/erection site to valve testing facility, installation of valve on test bench, testing of valves, removal & shifting of valve to erection site after testing, preparation of reports, man power, P&M, scaffolding & platforms, tools & tackles with acceptance of EIC	--		
F.13.1	Depreserving ,testing & represerving of valves (up to 50 NB (including))	MT	50	.0010778
F.13.2	Depreserving ,testing & represerving of valves (above 50 to 200 NB(including))	MT	150	.0019997
F.13.3	Depreserving ,testing & represerving of valves (above 200 NB)	MT	700	.0095702
F.14	Erection of Valves (CS/SS/Ti) : Handling, de-preservation, identification, pre-assembly, installation in design position , erection of manual and electric operated valves, FME, boxup, preservation, preparation of reports and carrying out all works as per manufacturer drawings, documents and specifications including temporary support arrangements, scaffolding & platforms, man power, P&M, tools & tackles, all consumables etc with acceptance of EIC.	--		
F.14.1	Shifting, handling and erection SS & CS valves (DN 15 TO 50 (including))	MT	50	.0014495

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Ref.No.	Description	Unit of Measurement	Qty.	Weightage for amount of each item (Nearest to the 7 decimal points) w.r.t the total amount
F.14.2	Shifting, handling and erection SS & CS valves (DN above 50 TO 200 (including)	MT	150	.0047551
F.14.3	Shifting, handling and erection SS & CS valves (DN above 200)	MT	700	.0259836
F.15	Fabrication and erection of supports	--		
F.15.1	<p>Fabrication and erection of spring supports (Type 1): Identification and handling of various components of pipe supports, cutting, straightening, grinding, fabrication, fit up, welding with SMAW process, weld visual of joints and bolting. Shifting of pipe supports to the location, assembly, alignment, pad welding by GTAW, tacking in position, welding of pipe support saddle and its support metal structure. Spring height adjustment to the required value in cold condition, spring unit locking, pre-assembly of spring units, hangers, installation in design position, inspection/checking of elevation, spring unit lock release after hydro test, preparation of reports and work completion as per manufacturer drawings, documents and specifications with acceptance of EIC. The scope includes arrangement of SS shims, man power, temporary support arrangements, scaffolding & platforms, tools & tackles, P&M, consumables (excluding welding filler wire & electrode), cleaning aids etc as with acceptance of EIC. Note: 1.Incase any temporary structures required, contractor shall supply all the materials including welding electrodes and consumables.</p>	--		
F.15.1 .1	Pipe supports for piping size from 14 mm OD to 89 mm OD	MT	25	.0012317
F.15.1 .2	Pipe supports for piping size from 108 mm OD to 325 mm OD	MT	75	.0034825
F.15.1 .3	Pipe supports for piping size above 325 mm OD	MT	250	.0108991

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Ref.No.	Description	Unit of Measurement	Qty.	Weightage for amount of each item (Nearest to the 7 decimal points) w.r.t the total amount
F.15.2	<p>Fabrication and erection of rigid hanger supports (Type 2): Identification and handling of various components of pipe supports, cutting, straightening, grinding, fabrication, fit up, welding with SMAW process, weld visual of joints and bolting. Shifting of pipe supports to the location, assembly, alignment, pad welding by GTAW, tacking in position, welding of pipe support saddle and its support metal structures, clamps, hangers, installation in design position, inspection/checking of elevation, preparation of reports and work completion as per manufacturer drawings, documents and specifications with acceptance of EIC. The scope includes arrangement of SS shims, man power, temporary support arrangements, scaffolding & platforms, tools & tackles, P&M, consumables (excluding welding filler wire & electrode), cleaning aids etc with acceptance of EIC.</p> <p>Note:</p> <p>1. Incase any temporary structures required, contractor shall supply all the materials including welding electrodes and consumables.</p>	--		
F.15.2.1	Pipe supports for piping size from 14 mm OD to 89 mm OD	MT	15	.000739
F.15.2.2	Pipe supports for piping size from 108 mm OD to 325 mm OD	MT	25	.0008913
F.15.2.3	Pipe supports for piping size above 325 mm OD	MT	35	.0013273

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Ref.No.	Description	Unit of Measurement	Qty.	Weightage for amount of each item (Nearest to the 7 decimal points) w.r.t the total amount
F.15.3	<p>Fabrication and erection of fixed/sliding/guide sliding/damper supports (Type 3): Identification and handling of various components of pipe supports, cutting, grinding, fabrication, fit up, welding with SMAW process, weld visual of joints, bolting with required torque value and application of dry graphite powder.</p> <p>Shifting of pipe supports to the location, assembly, alignment, pad welding by GTAW, tacking in position, welding of pipe support saddle and its support metal structures, clamp, installation in design position, inspection/checking of elevation, preparation of reports and work completion as per manufacturer drawings, documents and specifications with acceptance of EIC.</p> <p>The scope includes arrangement of SS shims, graphite powder, man power, temporary support arrangements, scaffolding & platforms, tools & tackles, P&M, consumables (excluding welding filler wire & electrode), cleaning aids etc with acceptance of EIC.</p> <p>Note:</p> <p>1.Incase any temporary structures required, contractor shall supply all the materials including welding electrodes and consumables.</p>	--		
F.15.3 .1	Pipe supports for piping size from 14 mm OD to 89 mm OD	MT	100	.0049792
F.15.3 .2	Pipe supports for piping size from 108 mm OD to 325 mm OD	MT	125	.0064012
F.15.3 .3	Pipe supports for piping size above 325 mm OD	MT	200	.0105257
F.17	<p>Machining of components from FIM:</p> <p>Development of drawings/sketches from sample component, handling and cutting of plates & bars as per cutting plan, shifting of material and machining of various components as listed in sub-items by suitable machining operations as per drawings/sketches, obtaining necessary passes, identification of components, preparation of reports and work completion with acceptance of EIC.</p> <p>Note : NPCIL will issue required drawings/sketches/sample pieces for executing the work.</p>	--		

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Ref.No.	Description	Unit of Measurement	Qty.	Weightage for amount of each item (Nearest to the 7 decimal points) w.r.t the total amount
F.17.1	Threaded Tie Rod (both end 100mm) d less than or equal to 32mm	Nos	250	.0001614
F.17.2	Threaded Tie Rod (both end 200mm) d less than or equal to 32mm	Nos	250	.0002114
F.17.3	Threaded Tie Rod (both end 200mm) d greater than 32 mm and less than or equal to 60mm	Nos	100	.0001836
F.18	Stub/O-let drilling- Handling, shifting of pipe spools, marking of position and orientation, drilling of holes (primary and secondary)on pipe bosses/equipments/ pipe lines of carbon steel /stainless steel in shop/In-situ for sizes upto 65 mm diameter and depth upto 120 mm using portable drilling machines with special jigs, fixtures and arrestors along with drill bits/end mill cutter/ special cutting tools, FME inspection, preparation of reports, arrangement of man power, tools & tackles, plant & machinery, consumables, scaffolding & platforms, cleaning aids etc, as per drawings, documents and specifications and work completion with acceptance of EIC. Note : 1) Stub/O-let drilling is inclusive of both primary & secondary drilling and drilling in number of stages. 2) The drilling machine used shall have drill bit locking provision so as to prevent falling of drill bits inside the pipes/equipments	Cubic-Cm	70,000	.0027798
F.19	Weld Joint Inspection by RT (Gamma Ray) : Identification of the weld joints, marking, radiographic examination of the weld joint including intersections by ISNT/ ASNT RT qualified personnel, developing of films, preparation of reports and submission to NPCIL for acceptance along with RT film, arrangement of man power, tools & tackles, plant & machinery, consumables, scaffolding & platforms, cleaning aids, storage of source etc, as per drawings, documents and specifications with acceptance of EIC.	Inch Dia	85,000	.0259745

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Ref.No.	Description	Unit of Measurement	Qty.	Weightage for amount of each item (Nearest to the 7 decimal points) w.r.t the total amount
F.20	Weld Joint Inspection by RT (X-ray) for Titanium piping: Identification, radiographic testing of the weld joints by ISNT/ ASNT RT qualified personnel, developing of films, interpretation, preparation of reports and submission to NPCIL for acceptance along with RT film, arrangement of man power, equipments, tools & tackles, consumables, cleaning aids, scaffoldings, platforms, handling safety arrangements and work completion as per drawings, documents and specifications as with acceptance of EIC.	Inch Dia	300	.0001993
F.21	Weld Joint Inspection by UT (Ultrasonic Test): Identification of the weld joints, marking, pre-cleaning, ultrasonic examination of the weld joint including intersections by ISNT/ ASNT UT qualified personnel, post cleaning, preparation of reports and submission to NPCIL for acceptance including arrangement of man power, tools & tackles, plant & machinery, consumables, scaffolding & platforms, cleaning aids etc, as per drawings, documents and specifications with acceptance of EIC.	Inch Dia	68,000	.02528
F.22	Weld Joint Inspection by DPT (Dye Penetrant Test): Identification of the weld joints, marking, pre-cleaning, dye penetrant examination of the weld joint by ISNT/ ASNT PT qualified personnel, post cleaning, preparation of reports and submission to NPCIL for acceptance including, arrangement of man power, tools & tackles, plant & machinery, consumables, scaffolding & platforms, cleaning aids etc, as per drawings, documents and specifications with acceptance of EIC.	Running Meter	4,000	.0023342

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Ref.No.	Description	Unit of Measurement	Qty.	Weightage for amount of each item (Nearest to the 7 decimal points) w.r.t the total amount
F.23	<p>Hydro/Pneumatic test of Piping System :</p> <p>Making required arrangement on the erected pipelines for carrying out hydro/pneumatic testing, blanking, filling of pipeline, venting, pressurising, holding for required time, draining, drying, de-watering, cleaning, providing all required tools and tackles, blanks, hoses, clamps, calibrated PG, SRVs etc, preparation of as-built drawings, hydro-test scheme, CRR, test reports, arrangement of man power, tools & tackles, P&M, scaffolding & platforms, consumables(except welding electrode & filler wire), cleaning aids etc, as per drawings, documents, specifications and work completion as with acceptance of EIC.</p> <p>Note:</p> <ol style="list-style-type: none"> 1. During testing of circuits, if leaks are observed, such circuits may need pressurization and testing more than once. Such re-testing and pressurization will be in the scope of the Contractor without any extra claim. 2. Incase any temporary structures required, contractor shall supply all the materials including welding electrodes and consumables. 	Inch-Meter	580,000	.0256643
F.24	<p>Preparation of isometric drawings for piping systems, its submission and approval:</p> <p>The work includes study of layout drawing, site survey, identification of pipe routing, support location based upon site constraints, identification of support types(fixed, sliding), span, numbers, support design, preparation of isometric drawing with details of supports, weld joints, bill of material and submission of drawing for NPCIL approval.</p> <p>Note: The item will be measured in running meter of piping for which isometric drawings is submitted and approved by NPCIL.</p>	Running Meter	12,000	.0076653

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Ref.No.	Description	Unit of Measurement	Qty.	Weightage for amount of each item (Nearest to the 7 decimal points) w.r.t the total amount
F.25	Fabrication & erection of Composite Pipe and pipe fittings: (Material Supply by BHEL) Handling, fabrication, joining, erection and hydrotesting of polyethylene-Aluminum-polyethylene (PE-AL-PE) composite pipes, fitting like elbow, tee, reducers, UV stabilized with carbon black confirming to IS-15450-2004 and manufacturer standard, clamps, preparation of procedures, QAP, JHA, reports, inspection, testing and work completion as per the drawings, documents and specification with acceptance of EIC. The scope includes qualification of procedures, shifting, cutting, laying of pipes and pipe fittings, joining, inspection, preparation of asbuilt drawings, draining, drying, dewatering, arrangement of man power, scaffolding and platforms, tools & tackles, P&M, consumables.	--		
F.25.1	Dia 25-32mm (ID-OD)	Running Meter	35	.0000108
F.25.2	Dia 40-50 mm (ID-OD)	Running Meter	70	.0000302
F.25.3	Dia 63-75mm (ID-OD)	Running Meter	650	.0004001
F.27	Supply of Electrodes and Filler wires: Supply of NPCIL approved brands of SS & CS electrodes and fillerwires as specified below in subitems including procurement with material test certificate, transportation, delivery at site, handling, inspection at contractor's store, preparation of IMIR (incoming material inspection report), storage, arrangement of man power, tools & tackles, P&M with acceptance of EIC.	--		
F.27.1	E7018 welding electrode (4 mm dia)	Kg	6,000	.0018948
F.27.2	E7018 welding electrode (3.15 mm dia)	Kg	25,000	.0072708
F.27.3	E7018 welding electrode (2.5 mm dia)	Kg	2,000	.0006021
F.27.4	ER 70S2 filler wire (2 mm dia)	Kg	2,500	.0010816
F.27.5	ER 70S2 filler wire (1.6 mm dia)	Kg	100	.0000454
F.27.6	ER 347 filler wire (1.6 mm dia)	Kg	100	.0000998

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F.27.7	ER 347 filler wire (2 mm dia)	Kg	100	.0000994
F.27.8	E347 -16 (3.15 mm dia)	Kg	3,000	.003043
F.27.9	E347 - 16 (4 mm dia)	Kg	1,500	.0015215
F.27.10	ER 309L filler wire (1.6 mm dia)	Kg	100	.0001514
F.29.6	Fabrication and Erection of CS piping loop for flushing of piping systems : (Material supply by BHEL) Preparation of flushing drawings based on the NPCIL's flushing schemes and submission for approval, fabrication of mitre bend, reducer, Tee, blanks, flanges & spectacle flanges, erection and welding of temporary piping loop (CS) and supports, valves, strainers, gaskets and fasteners, submission of as built drawing of flushing arrangement, dismantling of temporary arrangement after flushing completion, depositing all materials to NPCIL's stores, preparation of reports, arrangement of man power, scaffolding & platforms, tools & tackles, P&M, consumables including welding filler wires / electrodes, cleaning aids etc, as per drawings, documents and specifications with acceptance of EIC.	MT	200	.0098997
F.29.7	Fabrication and Erection of SS piping loop for flushing of piping systems : (Material supply by BHEL) Preparation of flushing drawings based on the NPCIL's flushing schemes and submission for approval, fabrication of mitre bend, reducer, Tee, blanks, flanges & spectacle flanges, erection and welding of temporary piping loop (SS) and supports, valves, strainers, gaskets and fasteners, purging-dam fixing, purging, submission of as built drawing of flushing arrangement, dismantling of temporary arrangement after flushing completion, depositing all materials to NPCIL's stores, preparation of reports, arrangement of man power, scaffolding & platforms, tools & tackles, P&M, consumables including welding filler wires / electrodes, cleaning aids etc, as per drawings, documents and specifications with acceptance of EIC.	MT	7	.0004702

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at 2 X 1000 MWe Kudankulam Nuclear Power Plant Unit # 3 & 4 - TG & SWS Package

Ref.No.	Description	Unit of Measurement	Qty.	Weightage for amount of each item (Nearest to the 7 decimal points) w.r.t the total amount
F.29.8	Flushing of piping systems (water/steam/air) : Planning the flushing sequence, identification & marking of flushing loops, operating the valves , filling and venting the piping systems, operating pumps / compressors, open loop and closed loop flushing (loop by loop), flushing in number of stages in repetitive manner till acceptance by EIC, change over from one flushing loop to another, draining , drying of pipelines, dewatering of the sump, preparation of reports and work completion including arrangement of man power, scaffolding & platforms, tools & tackles, P&M, pumps & compressors, cleaning aids etc as per procedures with acceptance of EIC.	Inch-Meter	500,000	.0181534
F.30	Sealing of pipe penetrations: Cleaning of pipe surface & penetration, application of bitumen coating on pipe and penetration surface, filling up of the annular space with manila rope dipped in bitumen, finishing of pipe penetration ends with polysulphide and cement mortar, preparation of reports and work completion with acceptance of EIC. Scope includes assessment of material requirement, procurement of sealing materials, inspection at contractor's store, preparation of IMIR (incoming material inspection report), arrangement of man power, tools & tackles, P&M, scaffolding & platforms, consumables, cleaning aids etc	Cubic Meter	70	.0021444
F.31	Digitization of RT films : Collection of RT films of various sizes, scanning and digitizing the films, converting to soft form in NPCIL acceptable formats, submitting the soft copies along with proper indexing for easy identification and retrieval, preparation of reports and completion of work with acceptance of EIC. Scope includes arranging all necessary plant & machinery, manpower, tools & tackles, consumables etc.	Inch-film	400,000	.008169
.	(Structural steel works)	--		
H.2	Metal structures:(Structural steel will be issued by BHEL as Free issue)	--		

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Ref.No.	Description	Unit of Measurement	Qty.	Weightage for amount of each item (Nearest to the 7 decimal points) w.r.t the total amount
H.2.1	<p>Fabrication of Metal structures:</p> <p>Handling, fabrication of metal structure platforms, handrail, ladders, gratings, anchor plates, pipe support structures, saddles and clamps, staircase, safety cover plates, equipment support structures, support brackets for material handling equipments etc and work completion as per manufacturer drawings, documents and specifications with acceptance of EIC.</p> <p>The scope includes study of drawings, development of detailed metal structure drawing (DMS) for approval, handling, cutting, grinding, drilling, fabrication, welding, inspection, testing, preparation of fabrication procedures, QAP & reports, NDE, arrangement of man power, tools & tackles, plant & machinery, consumables including welding electrodes and filler wires, cleaning aids etc</p> <p>Note: NDE shall be paid in respective BOQ</p>	MT	2,000	.0715273
H.2.2	<p>Erection of metal structures:</p> <p>Handling, erection of metal structure such as platforms, pipe support structures, equipment support structures, handrails, anchor plates, safety cover plates, ladders, gratings (including hardwares) at various elevations and locations and work completion as per manufacturer drawings, documents and specifications with acceptance of EIC.</p> <p>Including supply & fixing of required hardwares like bolt, nuts, washer to the material strength class of 5.6, 6.6, 8.8 and 10.8 as per IS 1367 or equivalent, self tapping screws of Hilti.</p> <p>The scope includes transportation to site from fabrication yard, floor chipping, cutting, grinding, welding, touchup primer painting, torque tightening of fasteners, inspection, testing, preparation of procedures, QAP & reports, NDE, arrangement of man power, temporary support arrangements, scaffolding & platforms, tools & tackles, plant & machinery, consumables including welding electrodes and filler wires, cleaning aids etc</p> <p>Note: 1) Weight of temporary fabrication, erection bolts will not be considered for payment.</p> <p>2) NDE shall be paid in respective BOQ</p>	MT	2,000	.0623803

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Ref.No.	Description	Unit of Measurement	Qty.	Weightage for amount of each item (Nearest to the 7 decimal points) w.r.t the total amount
H.5	<p>Fixing of Hilti anchor fasteners by normal drilling (Hilti Anchor Fasteners will be issued by BHEL at free of cost):</p> <p>Drilling using hammer drilling machine, cleaning, handling and fixing of Hilti anchor fasteners of various sizes in HST, HSL, HDA, HAS/HVU (chemical anchor) series, tightening to the required torque value at various locations & positions, preparation of reports and work completion as per drawings, documents and specifications</p> <p>The scope includes assessment of type, size and quantity of Hilti anchor fastener, shifting to various locations, marking, floor chipping to the correct level and elevation, arrangement of man power, disposal of debris, tools & tackles, plant & machinery, scaffolding & platforms, consumables, cleaning aids etc with acceptance of EIC.</p> <p>(The sub-item are categorized as per size and type)</p> <p>Note : Extra holes have to be drilled if any obstruction of reinforcement rods occurs in the location and unused holes shall be filled with dry pack material without any extra payment.</p>	--		
H.5.1	Fixing of Hilti anchor fasteners of sizes from M 08 to M 12 in HST & HSL	Nos	32,000	.0122232
H.5.2	Fixing of Hilti anchor fasteners of sizes from M 16 to M 24 in HST & HSL	Nos	5,000	.0022787
H.5.3	Fixing of Hilti anchor fasteners up to M 12 in HDA-T series	Nos	150	.0000644
H.5.4	Fixing of Hilti anchor fasteners from M 16 to M20 in HDA-T series	Nos	800	.0003846
H.5.5	Fixing of Hilti anchor fasteners of from M8 to M12 in HAS/ HVU series	Nos	500	.0002519
H.5.6	Fixing of Hilti anchor fasteners of from M16 to M33 in HAS/HVU series	Nos	500	.0003039
H.6	<p>Core drilling for fixing of Hilti bolt (Hilti Anchor Fasteners will be issued by BHEL at free of cost):</p> <p>Identification, marking, mounting & setting up of drilling machine, drilling in reinforced concrete using diamond core drill bit on wall/floor/ceiling, disposal of debris, preparation of reports, arrangement of man power, diamond core drill bits, tools & tackles, P&M, scaffolding & platforms, consumables, cleaning aids etc as per the requirement with acceptance of EIC.</p>	Nos	6,000	.0026436

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Ref.No.	Description	Unit of Measurement	Qty.	Weightage for amount of each item (Nearest to the 7 decimal points) w.r.t the total amount
H.9	<p>Removal of erected material : Identification of material to be removed, cutting, grinding, dismantling, removal of erected material, handling, transportation and storage at identified location, cleaning, preparation of reports and completion of work with acceptance of EIC. Scope includes arranging all necessary P&M, manpower, tools & tackles, consumables, scaffolding & platforms, return of removed material to NPCIL store and preparation of its reports etc and work completion</p>	MT	100	.0030708
.	(Grit Blasting and Painting Works)	--		
I.1	<p>Grit blasting and primer application including supply : Handling of CS pipes and fittings, supports, metal structure, shifting to blasting area, grit blasting using steel grits/shot, product qualification, supply & application of Inorganic Zinc Silicate primer with minimum thickness(DFT) of 70 microns as per technical specification I02.KK34.0.0.TH.TS.PR017 (R01), inspection, testing, preparation of reports and work completion as per drawings, documents and specifications The scope includes assessment of material requirement, procurement of grit/shot, primer with material test certificate, inspection at contractor's store, preparation of IMIR (incoming material inspection report), qualification of procedures, arrangement of man power, tools & tackles, P&M, consumables, cleaning aids etc with acceptance of EIC. Note : Work includes application of primer on field weld joints for pipes after Hydrotest and for metal structures after welding.</p>	Square Meter	90,000	.0397899

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Ref.No.	Description	Unit of Measurement	Qty.	Weightage for amount of each item (Nearest to the 7 decimal points) w.r.t the total amount
I.2	<p>Supply & Application of intermediate & finish paint coats on pipes: Identification of pipelines, equipments, metal structures, surface cleaning, product qualification, supply and application of intermediate & finish paint as per technical specification I02.KK34.0.0.TH.TS.PR017 (R01) on outside surface with required thickness as categorized in sub items, inspection, preparation of reports, testing and work completion as per the drawings, documents and specification with acceptance of EIC.</p> <p>The work scope includes assessment of material requirement, procurement with material test certificate, handling, inspection at contractor's store, preparation of IMIR (incoming material inspection report), application, arrangement of man power, qualification of procedures, scaffolding and platforms, tools & tackles, P&M, consumables</p> <p>Note: Scope includes painting on already erected pipes & equipments by other agency in Turbine & associated buildings.</p>	--		
I.2.1	Intermediate coat for Low temperature application (Temperature less than or equal to 50 deg celcius): using Epoxy MIO of minimum 100 microns DFT in single coat.	Square Meter	60,000	.0203317
I.2.2	Finish coat for Low temperature application (Temperature less than or equal to 50 deg celcius): using Aliphatic Polyurethane of minimum 60 microns DFT (2 coats each 30 micron).	Square Meter	60,000	.0212621

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Ref.No.	Description	Unit of Measurement	Qty.	Weightage for amount of each item (Nearest to the 7 decimal points) w.r.t the total amount
I.3	<p>Supply & Application of Medium Temperature paint (Temperature greater than 50 deg celcius and less than or equal to 150 degree celcius):</p> <p>Identification of pipelines, equipments, supports, surface cleaning, product qualification, supply and application of finish paint of High temperature resistance silicone based ambient curing coating of 50 micron DFT (2 coats each 25 micron) as per technical specification I02.KK34.0.0.TH.TS.PR017 (R01) preparation of reports, inspection, testing and work completion as per the drawings, documents and specification with acceptance of EIC.</p> <p>The work scope includes assessment of material requirement, procurement with material test certificate, handling, inspection at contractor's store, preparation of IMIR (incoming material inspection report), application, arrangement of man power, qualification of procedures, scaffolding and platforms, tools & tackles, P&M, consumables</p> <p>Note: Scope includes painting on already erected pipes & equipments by other agency in Turbine & associated buildings.</p>	Square Meter	10,000	.0052494
I.4	<p>Supply & Application of High Temperature paint (Temperature greater than 150 degree celcius and less than 350 degree celcius):</p> <p>Identification of pipelines, equipments, supports, surface cleaning, product qualification, supply and application of finish paint of High temperature resistance silicone based ambient curing coating of 50 micron DFT (2 coats each 25 micron) as per technical specification I02.KK34.0.0.TH.TS.PR017 (R01) preparation of reports, inspection, testing and work completion as per the drawings, documents and specification with acceptance of EIC.</p> <p>The work scope includes assessment of material requirement, procurement with material test certificate, handling, inspection at contractor's store, preparation of IMIR (incoming material inspection report), application, arrangement of man power, qualification of procedures, scaffolding and platforms, tools & tackles, P&M, consumables</p> <p>Note: Scope includes painting on already erected pipes & equipments by other agency in Turbine & associated buildings.</p>	Square Meter	25,000	.0121873

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Ref.No.	Description	Unit of Measurement	Qty.	Weightage for amount of each item (Nearest to the 7 decimal points) w.r.t the total amount
I.5	Removal of existing paint: Supply and application of NPCIL approved paint remover/disbonder for removal of existing paint from pipelines, equipments, valves including wet cleaning for neutralizing and drying of the surface, preparation of reports, inspection, testing and work completion as per the drawings, documents and specification with acceptance of EIC. The prepared surface shall be suitable for application of paint, as per paint manufacturer's requirement and with acceptance of EIC. The work scope includes assessment of material requirement, procurement with material test certificate, handling, inspection at contractor's store, preparation of IMIR (incoming material inspection report), application, arrangement of man power, qualification of procedures, scaffolding and platforms, tools & tackles, P&M, consumables.	Square Meter	5,000	.0014939
.	(Miscellaneous Works)	--		
L.2	Chipping of concrete : Identification, marking, mounting & setting up of machine for chipping of concrete as required, disposal of debris, preparation of reports, arrangement of man power, tools & tackles, P&M, scaffolding & platforms, consumables, cleaning aids etc, as per drawings, documents and specifications with acceptance of EIC.	Cubic Meter	5	.000248
L.7	Core cutting on reinforced concrete wall/floor : Identification, marking, mounting & setting up of machine, core cutting in reinforced concrete using diamond core drilling for various piping penetrations on wall/ floor, disposal of debris, preparation of reports, arrangement of man power, drill bits/core cutter, tools & tackles, scaffolding & platforms, plant & machinery, consumables, cleaning aids etc, as per drawings, documents and specifications with acceptance of EIC.	--		
L.7.1	Concrete Core cutting by drilling - size upto Dia 200mm	MM-Meter	1,500	.0017138
L.7.2	Concrete Core cutting by drilling - size above Dia 200mm	MM-Meter	2,000	.003406
L.8	Repair, Re-preservation and System Pre-handing over checks:	--		

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Ref.No.	Description	Unit of Measurement	Qty.	Weightage for amount of each item (Nearest to the 7 decimal points) w.r.t the total amount
L.8.1	<p>Manpower assistance for repair : Providing manpower assistance along with tools and tackles and general consumables for repair of deformed structure/components and restoring to original shape by bend removal, straightening (with or without the application of heat), deformation correction etc., preparation of reports and work completion and as per the instructions of the EIC.</p> <p>Note: Carrying out such repair activities by the one labour in a day (8 hrs.) along with general consumables like wire brush, lint free cloth, emery etc and P&M for heating and bend removal, general tool kit will be treated as one operation day for each sub-item for the above works based on the instruction from EIC.</p>	--		
L.8.1.1	Skilled man power operation	Operation-day	150	.0002298
L.8.1.2	Semi-Skilled man power operation	Operation-day	200	.0002859
L.8.1.3	Un-Skilled man power operation	Operation-day	300	.0003914

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Ref.No.	Description	Unit of Measurement	Qty.	Weightage for amount of each item (Nearest to the 7 decimal points) w.r.t the total amount
L.8.2	<p>Manpower assistance for re-preservation of Equipment & Piping : Providing manpower assistance along with tools and tackles and general consumables for internal and external preservation work on static & rotary equipments as per the preservation document and technical specification of NPCIL involving activities such as handling, cleaning, painting (including peel-off paint), greasing on machined surfaces & fasteners, temporary blanking of the openings, covering of the equipments etc, adding and removal of silica gel, regeneration of silica gel, N2 purging & boost-up for static equipments, measurement of N2 parameters such as N2 pressure, purity & dew point, opening and closing of the manhole covers/inspection flanges, opening & closing of metallic cap and PVC cap, general cleaning of equipments, disassembly of equipment, complete overhauling, draining/filling of oil and assembly of the equipment, pump rotation, return of excess/unused materials to NPCIL stores, along with the necessary machinery, tools & tackles, lighting arrangements, cables, extension boards and applicable PPEs required for the completion of work including documentation work and as per the instructions of the EIC.</p> <p>Note: Carrying out such preservation activities by the one labour in a day (8 hrs.) along with general consumables like wire brush, lint free cloth, emery etc and general tool kit will be treated as one operation day for each sub-item.</p>	--		
L.8.2.1	Skilled man power operation	Operation-day	250	.0003829
L.8.2.2	Semi-Skilled man power operation	Operation-day	450	.0006433
L.8.2.3	Un-Skilled man power operation	Operation-day	400	.0005219

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Ref.No.	Description	Unit of Measurement	Qty.	Weightage for amount of each item (Nearest to the 7 decimal points) w.r.t the total amount
L.8.3	Supply of Consumables for Re-preservation works of Equipment & Piping : Supply of consumable materials like silica gel, emery paper, SS scraper, SS wire brush, acetone, white spirit, oil, grease, lint-free cloth, cotton cloth, paint remover, polythene, nylon ropes for covering, heating oven for regeneration of Silica gel, gasket material for manhole flanges, associated fittings and regulator etc required during Nitrogen filling and all other consumables which may be deemed necessary from time to time as per the manufacturer documents, preservation requirements and as per the instructions of Engineer Incharge. The work scope includes assessment of material requirement, procurement with material test certificate & invoices, handling, inspection at contractor's store, preparation of IMIR (incoming material inspection report), storage, preparation of reports, arrangement of man power, tools & tackles, P&M with acceptance of EIC.	--		
L.8.3.1	Silica gel - Indicative and Regenerative Type	Kg	1,400	.0008631
L.8.3.2	Silica gel- Non Indicative and Regenerative Type	Kg	1,400	.0010039
L.8.3.3	Polythene sheets -Size 36 inch width X 2 fold in LDPE	Kg	1,200	.0004391
L.8.3.6	Peel off paint-clear Lacquer	Litre	50	.0000684
L.8.3.7	Standard Epoxy Adhesive	Kg	20	.0000311
L.8.3.9	Acetone	Litre	100	.0000175
L.8.3.10	Nylon ropes	Kg	400	.00016

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Ref.No.	Description	Unit of Measurement	Qty.	Weightage for amount of each item (Nearest to the 7 decimal points) w.r.t the total amount
L.8.3.11	Paint Remover	Kg	20	.0000129
L.8.4	<p>Man power assistance for System Pre-handing over checks: Providing manpower assistance along with tools and tackles and general consumables for pre-handing over checks for activities such as cleaning and box-up of equipments, shifting of materials for supporting pre-handing over activities, bolt tightening, strainer/filter cleaning, valve opening/closing, gasket replacement, greasing, support spring measurements & adjustment of charged and hot systems etc preparation of reports and work completion and as per the instructions of the EIC.</p> <p>Note: Carrying out such pre-handing activities by the one labour in a day (8 hrs.) along with general consumables like wire brush, lint free cloth, emery etc and general tool kit will be treated as one operation day for each sub-item for the above works based on the instruction from EIC.</p>	--		
L.8.4.1	Skilled man power operation	Operation-day	250	.0003829
L.8.4.2	Semi-Skilled man power operation	Operation-day	450	.0006433
L.8.4.3	Un-Skilled man power operation	Operation-day	700	.0009134

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Ref.No.	Description	Unit of Measurement	Qty.	Weightage for amount of each item (Nearest to the 7 decimal points) w.r.t the total amount
L.8.5	<p>Scaffolding works :</p> <p>Erection of scaffolding for making approach/working platforms to carry out preservation, inspection & prehanding over check activities and removal of the scaffolding after the completion of the work as directed by EIC. The work includes handling, arrangement of manpower and material supply required for scaffolding like MS pipes, clamps and base plates, platforms, ladders, transportation, tool and tackles etc, preparation of reports with acceptance of EIC.</p> <p>Note: The base size (plan) & height of the scaffolding erected shall be considered for the measurement . No Inclined supports, lateral support bracing etc projected beyond base size shall be considered in measurement for payment.</p>	--		
L.8.5.1	Erection and dismantling of Scaffolding	Cubic Meter	7,000	.0040425
L.8.5.2	Hire charge for scaffolding erected as per the above item, number of days for rent will be considered from the next day of completion of erection and clearance by NPCIL safety department and up to date clearance (inclusive) from engineer for dismantling.	Cubic Meter Day	25,000	.0017208
L.9	Insitu Modification works:	--		
L.9.1	<p>Cutting by oxy acetylene up to 12mm:</p> <p>Identification, marking, handling, carrying out cutting and edge preparation of carbon steel plates of thickness up to 12mm using oxy acetylene flame and grinding machine, preparation of reports, including arrangement of manpower, P&M, scaffolding & platforms, tools & tackles and consumables etc and completion of work as per the instructions of EIC.</p>	Running Meter	170	.0006307
L.9.2	<p>Cutting by oxy acetylene above 12mm:</p> <p>Identification, marking, handling, carrying out cutting and edge preparation of carbon steel plates of thickness above 12mm using oxy acetylene and grinding machine, preparation of reports, including arrangement of manpower, P&M, scaffolding & platforms, tools & tackles and consumables etc and completion of work as per the instructions of EIC.</p>	Running Meter	80	.0003716

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Ref.No.	Description	Unit of Measurement	Qty.	Weightage for amount of each item (Nearest to the 7 decimal points) w.r.t the total amount
L.9.3	Longitudinal seam Welding (Butt/groove) of carbon steel, low alloy steel, stainless steel components using SMAW process: The work includes Butt/groove welding of components including fit-up using SMAW process, grinding, cleaning, visual inspection, including arranging required manpower, plant & machinery, scaffolding & platforms, consumables (excluding electrode), tools & tackles etc, preparation of reports and completion of work as per drawings and specification with acceptance of EIC. Scope includes similar and dissimilar welding of Butt/groove joint configuration of various weld sizes.	Cubic-Cm	60,000	.0153169
L.10	Unloading & Handling of BHEL supplied material:	--		
L10.1	Receipt, Unloading & Handling of material (Pipes, Fittings, Valves, fastners, Steel items, T&P's, Misc items etc.) from Trucks / Trailers / Transport carriers at site stores & storage yard, verification, stacking, uncrating, checking the completeness of items/physical damage(if any), preparation and submission of incoming material inspection report (IMIR), documentation / updating MM package in computer systems.	MT	3,300	.0065934
TOTAL Weightage				0.9999999