

TENDER SPECIFICATION BHEL: PSSR: SCT: 1914

FOR

Package-A (Unit-3) and Package-B (Unit-4) for Erection of Piping and associated equipment that includes Handling, transportation, fabrication, assembly, erection, welding, NDT, inspection & testing of piping and erection of associated equipment along with accessories, structures, insulation for Nuclear and Nuclear auxiliary systems in reactor auxiliary buildings, safety system building, solid radioactive waste reprocessing & storage building and new fuel storage building at 2x 1000 MWe Kudankulam Nuclear Power Project.

VOLUME-II

PRICE BID



BHARAT HEAVY ELECTRICALS LIMITED

(A Government of India Undertaking)

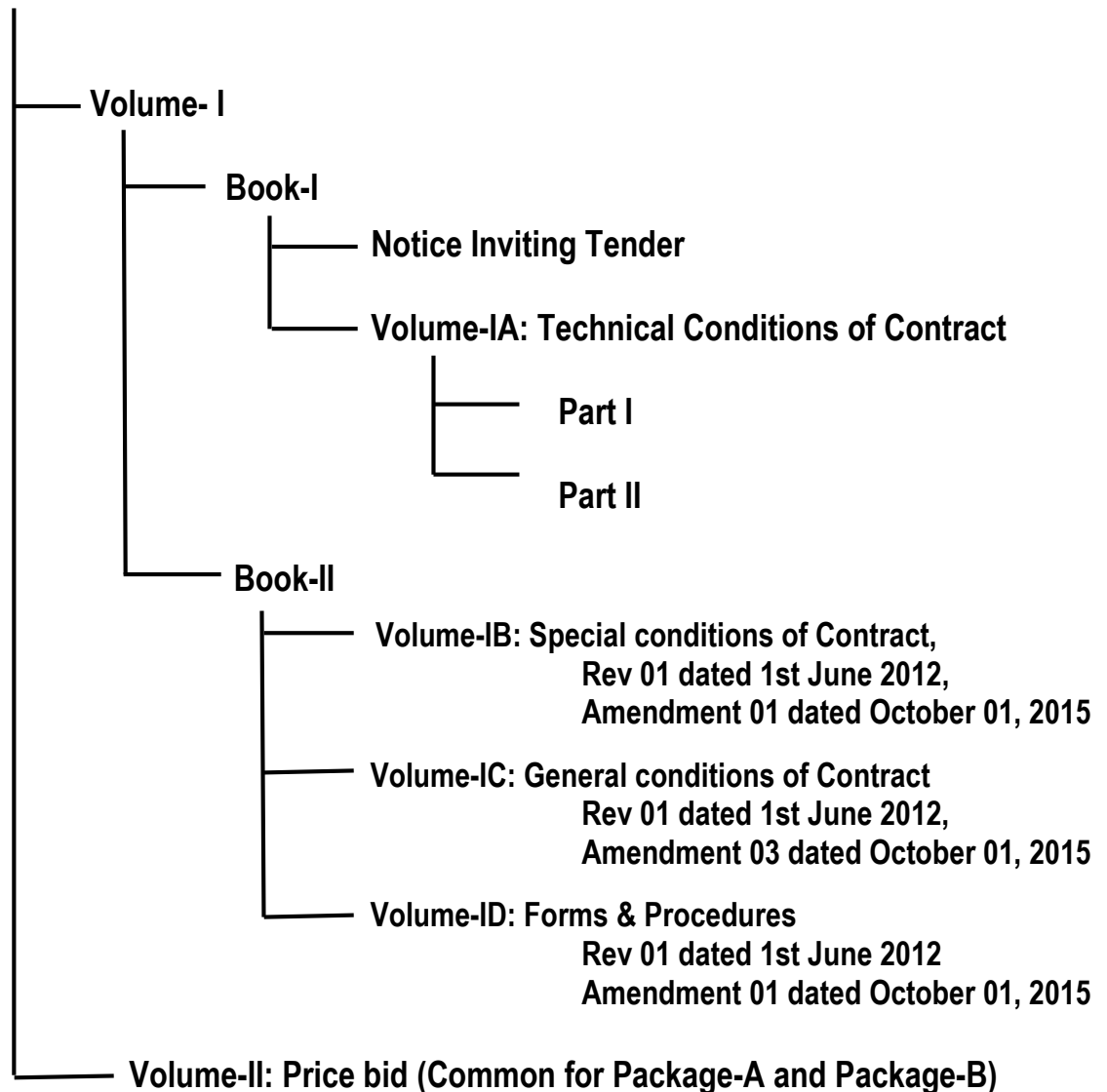
Power Sector – Southern Region

690, Anna Salai, Nandanam, Chennai – 600 035.

PRICE BID

TENDER SPECIFICATION CONSISTS OF

Techno-Commercial Bid



PRICE BID

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PRICE BID

PART-A-INSTRUCTIONS TO BIDDERS:

1. The 'Price bid contains the consolidated list of BOQ with brief description of items. The quantity indicated in the BOQ / Price bid is approximate only and is liable for variation. Payment will be as per actual quantity executed as certified by BHEL Engineer.
2. BOQ enclosed in this tender is for one package (Package A – Unit 3), and the quantity of the second package (Package B – Unit 4) is same as that of Package-A.
3. Before filling the Rates in the Price bid, the bidder shall go through the detailed specification of all items of BOQ as well as Scope of Work as specified in relevant Clause of this document
4. Bidders shall quote 'Total Amount' in the format for Price Bid available in the e procurement portal.
Any other entry elsewhere in the price bid shall be treated as Null and Void.
5. The above mentioned 'Total amount' is for the entire Bill of Quantity (BOQ) given in Part -C of the Price Bid.
6. BHEL has pre-fixed the weightages for the amount of individual items of Bill of Quantity with respect to the 'Total Amount' in Part-C.
7. Based on the pre-fixed weightages, the amount for the individual items of the Bill of Quantity shall be arrived at. This amount shall be rounded off to the nearest rupee.
8. Based on the quantities of individual item and the amount arrived in SI No: 7 above, unit rate of individual items shall be derived. This unit rate shall be rounded off to four decimal places.
9. 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 SI No.8 above.

Part B: Format

**Tender Specification BHEL:PSSR:SCT:1914 for ERECTION, WELDING & NDT OF EQUIPMENTS, PIPING IN
NUCLEAR REACTOR AUXILIARY BUILDINGS OF KUDANKULAM NPP UNIT 3**

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

Total Amount for the entire Bill of Quantities(BOQ) given in Part C
(Please tick)

Quoted

Not Quoted

Date

SIGNATURE OF BIDDER WITH SEAL

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
1.0	Erection of equipments in auxiliary buildings	--		
1.1	Erection of Static equipment: Receipt of free issue materials, handling, transportation, uncrating, preparation of IMIR , de-preservation, shifting, lowering & installation in design position, erection including accessories, alignment, fit up, welding using GTAW / SMAW process using filler wire and welding electrode issued on free issue basis and inspection as per drawings and technical specifications. This work also includes cleaning of embedded parts, survey for elevation and horizontality of embedded parts & equipments using optical instruments, verifying nozzle orientation, fastening foundation bolts, nuts, washers to required torque using torque wrench, providing shim plates, painting of welded area of equipment, providing scaffolding, man power, machineries, consumables such as high quality Kerosene/ acetone and other cleaning aids, preparation of reports and submission for acceptance.	MT	350.5	.0117472
1.2	Dismantling, shifting, re-assembly and erection of plate type heat exchangers: Receipt of materials, handling, transportation to contractor shop, uncrating, preparation of IMIR (incoming material inspection report), de-preservation, site survey, verification of equipment dimensions with respect to dimensions of erection openings, dismantling of equipment in clean room condition, locking with temporary fixtures, covering, lifting, shifting of equipment & its accessories to erection location, positioning of equipment , reassembling, erection & alignment of plate type heat exchangers as per drawings and technical specification. This work also includes providing manpower, tools & tackles, fastening of nuts, washers and bolts to required torque using torque wrench, consumables, preparation of reports and submission for BHEL/NPCIL acceptance.	MT	53	.0024061

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
1.3	Erection of rotary equipment: Receipt of free issue materials, handling, transportation, uncrating, preparation of IMIR , de-preservation, shifting, lowering & installation in design position, erection including accessories, alignment, fit up, alignment of rotary equipment, welding using GTAW / SMAW process using filler wire and welding electrode issued on free issue basis and inspection as per drawings and technical specifications. This work also includes cleaning of embedded parts, survey for elevation and horizontality of embedded parts & equipments using optical instruments, verifying nozzle orientation, fastening foundation bolts, nuts, washers to required torque using torque wrench, providing shim plates, painting of welded area of equipment, pump alignment , providing scaffolding, man power, machineries, consumables such as high quality Kerosene/ acetone and other cleaning aids, preparation of reports and submission for acceptance.	MT	88.526	.0037163
1.4	Dismantling, shifting, re-assembly and erection of Rotary Equipment : Receipt of materials, handling, transportation to contractor shop, uncrating, preparation of IMIR (incoming material inspection report), de-preservation, verification of equipment dimensions with respect to dimensions of erection openings, dismantling of equipment in clean room condition, locking with temporary fixtures, lifting , shifting of Equipment & its accessories to erection location, positioning of equipment, reassembling, erection and alignment of pumps as per drawings and technical specification. This work also includes providing manpower, tools & tackles, fastening of nuts , washers and bolts to required torque using torque wrench, cleaning, consumables, preparation of reports and submission for BHEL/NPCIL acceptance.	MT	200	.0194362
--	PIPING	--		
2.0	Erection of Pipe Lines	--		

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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
2.1	Cutting and Edge preparation (J-groove/ V-Groove) by using beveling machine for modification of field joints : Identification of joint, Shifting of pipe beveling machine, setting up for the required configuration, parting off pipe and machining J-Groove/V-groove on one end of pipe and inspection as per drawings & technical specification. This work also includes providing beveling machine, scaffolding , removing debris & post cleaning , manpower, cutting tools with required profile, tools & tackles, consumables, cleaning aids , cooling agents, preparation of reports and submission for acceptance.	--		
2.1.1	Pipe size above 80 NB to 300 NB	Inch Dia	4,625	.0016476
2.1.2	Pipe size greather than 300 NB	Inch Dia	1,600	.0007005
2.2	Erection of Carbon steel and stainless steel pipe lines : Receipt of free issue materials, handling, transportation, uncrating, preparation of IMIR , de-preservation, study of isometric drawings, cleaning of pipe with oil free compressed air, erection of carbon steel and stainless steel pipelines on permanent supports at various levels and locations, inspection and hydro testing as per drawings and technical specifications. This work also includes identification & marking circuits / loops for hydro testing , preparation of circuit release report, covering pipeline during erection using caps, providing testing arrangements such as headers, hydro testing pumps, SRV, PG, scaffolding, manpower, tools & tackles,consumables, draining and drying of pipelines post hydro test, preparation of reports & as built details and submission for acceptance.	--		
2.2.1	Pipe of size upto and including 80NB	inch meter	145,400	.0653487
2.2.2	Pipe size greater than 80NB up to and including 300NB	MT	252.5	.0360478
2.2.3	Pipeline of size greater than 300NB	MT	149.5	.0184161

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at 2 X 1000 MWe Kudankulam Nuclear Power Plant Unit # 3 & 4 - NIEP 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
2.3	Welding of SS pipelines dia up to and including 80NB : Identification of joints, marking, cutting & edge preparation, cleaning of pipe using oil free compressed air, purging, fit up, welding of Stainless steel pipes of size upto and including 80NB of various thickness using GTAW process using filler wire issued on free issue basis for butt, fillet and nozzle joints, cleaning the welded joint, visual inspection, as per drawings and technical specifications. This work also includes hydro testing, checking of erected pipe line using video boroscope of 30m length to remove FME, providing scaffolding, boroscope, man power, tools & tackles, consumables like cleaning consumables , argon gas, preparation of reports & as built drawings and submission for acceptance.	Inch dia	152,875	.3239105
2.4	Fit up and welding of SS pipelines size greater than 80NB : Identification of joints, marking, cleaning of pipe using oil free compressed air, fit up, purging, welding of Stainless steel pipes of various thickness of V - groove / J- groove joint configuration using GTAW and/ SMAW process using filler wire & welding electrode issued on free issue basis , cleaning the weld joint, carrying out visual inspection, preparation of reports & as built and submission for acceptance. This work also includes hydrotesting, checking of erected pipe line using video boroscope of 30m length to ensure any FME before valve erection, orifice erection, where ever the direction of pipe changes, providing scaffolding, man power, tools & tackles, cleaning, consumables, argon gas.	--		
2.4.1	Welding of SS pipe size greater than 80NB up to and including 300NB with wall thickness upto 12mm included	Inch dia	34,700	.0646104
2.4.2	Welding of SS pipe size greater than 80NB up to and including 300NB with wall thickness greater than 12mm up to 20mm	Inch dia	1,500	.0035691
2.4.3	Welding of SS / SS cladded pipe sizes greater than 300NB with thickness upto 16 mm included	Inch dia	14,000	.0333115
2.4.4	Welding of SS / SS cladded pipe sizes greater than 300NB with thickness greater than 16mm	Inch dia	50	.0001768

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2.5	Welding of CS pipelines dia up to and including 80NB : Identification of joints, marking, cutting & edge preparation, cleaning of pipe using oil free compressed air, fit up , welding of Carbon steel pipes of various thickness using GTAW process using filler wire issued on free issue basis including flange & nozzle weld, cleaning the welded joint, visual inspection, as per drawings & technical specifications, preparation of reports and submission for acceptance. This work also includes hydro testing, checking of erected pipe line using video boroscope of 30m length to ensure any FME before valve erection, orifice erection, where ever the direction of pipe changes, providing scaffolding, boroscope, man power, tools & tackles, consumables like cleaning consumables , argon gas, preparation of reports & as built drawings and submission for acceptance.	Inch dia	24,250	.0404818
2.6	Welding of CS pipelines size greater than 80NB : Identification of joints, marking, cleaning of pipe using oil free compressed air, joint area , fit up ,welding of Carbon steel pipes of various thickness of V - groove / J-groove joint configuration using GTAW and SMAW process using filler wire & welding electrode issued on free issue basis , cleaning the welded joint, inspection as per drawings and technical specifications, preparation of reports and submission for acceptance. This work also includes hydrotesting, checking of erected pipe line using video boroscope of 30m length to ensure any FME before valve erection, orifice erection, where ever the direction of pipe changes, providing scaffolding, boroscope, man power, tools & tackles, cleaning consumables, argon gas.	--		
2.6.1	welding of CS pipe size greater than 80NB to 300 NB with thickness maximum upto 12mm included	Inch dia	8,575	.0148653
2.6.2	welding of CS pipe size greater than 80NB to 300 NB with thickness greater than 12mm	Inch dia	50	.0000884
2.6.3	welding of CS pipe size greater than 300 NB with thickness upto 16 mm included	Inch dia	2,700	.0055066
2.6.4	welding of CS pipe size greater than 300 NB with thickness greater than 16 mm included	Inch dia	100	.0002311

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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
3.0	NDE	--		
3.1	Radiographic Testing of weld joints: Development of procedure & technique sheets, identification of weld joints, providing & cutting the films to the required dimensions, providing & shifting of radiographic cameras, films, & its accessories to location, placing the joint identification markings on the film cassette, carrying out radiographic examination of the weld joint as per applicable RF codes & standards, drawings and technical specification, processing the films, interpretation of results, preparation of reports and submission for acceptance. This work also includes scanning & digitizing the RT films, uploading the scanned images, providing required software for viewing the images, providing radiography cameras, radiographic sources, establishing storage facilities for RT sources as per AERB guide lines, dark room facility & other processing facilities for processing films, RT film digitizer, RT film storage racks, ISNT/ ASNT level-II qualified personnel, manpower, tools & tackles, consumables as required for the work.	Inch dia	47,587.5	.0647025
3.2	Ultrasonic examination of weld joints : Development of procedure and technique sheets, identification of the joints, shifting the ultra sonic testing machine to the location, flush grinding the weld joint to meet the requirement, cleaning the weld joints, carrying out ultra sonic examination of weld joint by ISNT/ASNT level -II qualified personnel as per the requirements, technique sheet, drawing and technical specification, interpretation, post test cleaning, preparation and submission of reports for NPCIL acceptance. This work also includes erection of scaffolding, arranging man power, tools and tackles, calibrated UT testing machine, probes of various configuration, couplants, cleaning consumables like acetone.	Inch dia	100	.000025
3.3	Dye penetrant examination : Development of procedure , identification of joints , cleaning , carrying out Dye penetrate testing as per the procedure , drawing and technical specification by ISNT/ ASNT level-II qualified personnel, , preparation of reports & submission for acceptance, post test cleaning . This work includes providing scaffolding, arranging manpower, tools, tackles, all the DPT consumables of NPCIL approved brands, cleaning consumables.	--		

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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
3.3.1	DPT on pipe & pipe fittings weld joints	Inch dia	3,525	.0007189
3.3.2	DPT of support & structural welding.	RM	75	.0001224
3.4	Vacuum box testing of the welding joints of various configurations: Development of procedure , provide vacuum box of various sizes and profiles, identification of the test joints, pre-cleaning , carryout vacuum box testing on weld joints at various locations and elevations by ISNT/ ASNT level-II qualified personnel as per drawing and technical specification, preparation of reports and submission for NPCIL acceptance. This work also includes arranging necessary manpower, erection of scaffolding, vacuum pump, calibrated vacuum gauge , tools tackles & consumables such as cleaning agents.	RM	50	.000068
4.0	Erection of Valves and Erection of Orifices	--		
4.1	Handling, shifting and erection of valves: Receipt of free issue material, handling, transportation, uncrating, segregation of valves, preparation of IMIR, de-preservation of valves, shifting to the required location, cleaning and visual inspection, erection of carbon steel and stainless steel valves of various diameters at various level, elevation & orientation as per drawings and technical specifications. This work also includes providing qualified man power, tools, tackles, erection of scaffolding, cleaning aids such as acetone, preparation reports and submission for BHEL/NPCIL acceptance.	--		
4.1.1	Handling, shifting, erection of valves (up to & including 50NB)	MT	70.875	.006071
4.1.2	Handling, shifting, erection of valves (above 50 to 200NB inclusive)	MT	112.5	.0069138
4.1.3	Handling, shifting, erection of valves (above 200NB)	MT	80.5	.002791

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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
4.2	Handling, shifting and Installation of Remote Drive Assemblies (universal coupling arrangement) of Valve : Receipt of material, handling, transportation of remote drive assemblies such as rods, universal coupler, reduction gear, valve position indicator, hand wheel, nuts, bolts, washer, gasket from NPCIL stores to contractor store, uncrating, preparation of IMIR , de-preservation, shifting to location, cleaning of embedded part for assembly and installation, welding, inspection of remote drive assemblies, pneumatic testing of annular gap between rod penetration and embedded part, testing for remote drive operation, lubricating and fastening of nuts with required torque, inspection as per drawings and technical specification , preparation of reports and submission for acceptance. This work also includes providing manpower, scaffolding, machinaries, consumables, tools and tackles, cleaning aids.	Nos	661	.0035949
4.3	Erection and welding of Stainless steel valves in Embedded floor Trap: Receipt of free issue material, handling, transportation, uncrating, preparation of IMIR , de-preservation of valves, storage, shifting , cleaning of embedded traps, cutting & removal of temporary sheet welded in valve location, erection, fitup and welding to the trap body as per drawings & technical specifications, preparation of reports and submission for acceptance. This work also includes providing man power, tools & tackles, arranging cleaning aids such as acetone.	Nos	320	.0021754
4.4	Handling shifting and erection of Orifices: Receipt of free issue material, handling, transportation , uncrating, preparation of IMIR , de-preservation, shifting, cleaning and visual inspection, erection of carbon steel and stainless steel orifice of various diameters in the desired position, elevation & orientation as per drawings and technical specification, preparation of reports and submission for acceptance. This work also includes providing qualified man power, tools & tackles, scaffolding, cleaning consumables.	KG	7,600	.000806
5.0	PIPE SUPPORTS	--		

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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
5.1	Handling, fabrication and erection of pipe supports : Receipt of free issue material , handling, transportation, uncrating, preparation of IMIR, de-preservation, storage , segregation and pre assembly of pipe support members of individual supports such as body of supports, spring assemblies, saddles, guides, hanger rods, prefabrication of structural members, grit blasting , supply & application of inorganic zinc silicate primer of thickness of 75 microns DFT, shifting to location, erection, fit up, welding from filler wire and electrode supplied as free issue basis , carrying out visual inspection as per drawings and technical specifications for different sizes of pipes shown below. This work also includes erection of scaffolding, providing manpower, tools & tackles, assembling of spring components, pre setting of springs & locking, correction of springs for final setting before release for commissioning, supply and application of graphite powder between sliding surfaces, arranging cleaning aids such as high quality kerosene / acetone, inspection, preparation of reports and submission for BHEL/NPCIL acceptance.	--		
5.1.1	Fabrication & erection of small bore pipe supports (10NB to 80NB)	MT	193.875	.0353521
5.1.2	Fabrication & erection of pipeline supports for pipe size 80NB to 300NB	MT	64.75	.0106085
5.1.3	Fabrication & erection of pipeline supports for pipe size DN>=300NB	MT	45.5	.006638
5.2	Supply, fabrication, welding and erection of pipe supports : Supply of Carbon steel structures such as angle/ flats, beams, channels, plates, box sections, rods of various sizes as per IS 808 and material grade as per IS 2062-2011 Grade E-250 Quality-BR, marking, cutting, grinding, shop welding, grit blasting , supply & application of inorganic zinc silicate primer to required thickness of 75 microns DFT, shifting, erection, fit up, welding, including supply of welding filler wire and electrode , inspection as per drawings and technical specifications. This work also includes providing scaffolding, manpower, tools & tackles, arranging cleaning aids , inspection, preparation of reports and submission for BHEL/NPCIL acceptance.	--		
5.2.1	Supports for pipes 10NB to 80NB (inclusive)	MT	20	.0066623

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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
5.2.2	Supports for pipes 100NB to 300NB	MT	7	.001737
5.2.3	Supports for pipes size DN>=300NB	MT	6	.0013216
6.0	PAINT	--		
6.1	Supply and application of epoxy paint on pipe support structures: Supply of epoxy paint such as Apcodur 641 or Apcodur 641CS of Asian paints or protectomastic of Berger paints or other equivalent paint with prior approval from NPCIL for pipe support structures. This work includes storage, preparation & submission of IMIR for acceptance, cleaning the surface of the pipe support structure, application of two coats of paint using brush over already primed surface of total thickness of 240 - 260 microns (including thickness of primer) at various elevations & locations as per drawings and technical specification. This work also includes providing scaffolding, manpower, necessary tools, tackles, aluminum ladders, cleaning aids, cotton waste, and preparation of report & submission for BHEL/NPCIL acceptance.	MT	335.125	.0083157
7.0	INSULATION	--		
7.1	Supply and application of thermal Insulation of equipment and piping: Supply of Ceramic fibre insulation blanket mats confirming to IS 15402-2003, Gr. 96, glass fabric of 600 GSM of thickness 0.5 to 0.6 mm, fibre glass thread, Aluminum foil of 0.1 mm thick conforming to IS 737 of designation 19000, H2, aluminium cladding sheets of 0.8mm thick, transportation, storage, pre fabrication of insulation mats wrapped in glass fabrics with stitching as per the sizes, cleaning the surface, wrapping of pre fabricated insulation over the surface at all building, location and elevations as per drawings and technical specifications. This work also includes fixing the spacer / wrapping with SS binding wire, cutting, forming, erection of aluminum cladding, inspection, supply of all ancillaries like bolt, nut washers screws, arranging tools & tackles, scaffolding, manpower, cleaning consumables such as acetone and preparation of reports and submission for acceptance .	--		
7.1.1	Fixed type insulation	--		

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
7.1.1.1	Supply and application of ceramic insulation with aluminium cladding for thickness upto 50 MM	SqM	16,900	.0753683
7.1.1.2	Supply and application of ceramic insulation (in two layer each layer encased in glass cloth) with aluminium cladding for thickness greater than 50 MM and upto 100mm inclusive	SqM	2,800	.0186544
7.1.1.3	Supply and application of ceramic insulation (in three layer each layer encased in glass cloth) with aluminium cladding for thickness greater than 100 MM and upto 160mm inclusive	SqM	500	.0042829
7.1.2	Removable type insulation	--		
7.1.2.1	Supply and application of ceramic insulation with aluminium cladding for thickness upto 50 MM	SqM	1,690	.012638
7.1.2.2	Supply and application of ceramic insulation (in two layer each layer encased in glass cloth) with aluminium cladding for thickness greater than 50 MM and upto 100mm inclusive	SqM	280	.0028743
7.1.2.3	Supply and application of ceramic insulation (in three layer each layer encased in glass cloth) with aluminium cladding for thickness greater than 100 MM and upto 160mm inclusive	SqM	50	.0006662
7.1.3	Supply and application of aluminium foil	SqM	20,200	.0056303

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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
7.2	Aluminium cladding: Supply of aluminium cladding sheets of 0.8 mm thick conforming to IS 737 of designation 19000, H2, marking, cutting, fabrication and application of cladding over identified pipelines and equipments which are already applied with insulation matts as per requirements and technical specification. This work also includes supply of all ancillaries like bolt, nut washers screws, arranging tools & tackles, scaffolding, manpower , other cleaning consumables and preparation of reports and submission for acceptance. Note: This item will operated on the instruction of engineer for the work such as modification / rectification only.	SqM	1,650	.0035895
7.3	Handling, erection of Refractory Insulation: Receipt of free issue material, handling, transportation, preparation of IMIR, storage, shifting, taking measurements, preparation of layout & trial assembly of bricks, cutting bricks to dimensions as per layout, erection of refractory bricks, filling gaps with the ceramic insulation, kawool paper, cera boards, mixing and application of mortar to required thickness and inspection as per drawing & specification , preparation and submission of reports for acceptance for incinerator in UKS building . This work also includes providing manpower, scaffolding, tools & tackles, machinery, cleaning agents, ventilation arrangement.	MT	13.5	.0018355

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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
7.4	Cold Insulation of Pipeline and equipment: Supply and application of external Thermal Insulation on Chilled Water Piping with Closed Cell Class O Nitrile Rubber / EPDM Elastomeric Insulation of 50mm thick, Density 40 - 55 Kg/m ³ , Thermal Conductivity of 0.037 W/mk at 20 deg Celcius Mean Temp & permeability greater than or equal to 7000 using manufacturer's recommended Rubber based Adhesive in a blend of solvents, cladding of Class B (GB 8624), Class 0 (BS 476) having a Flammability Index less than or equal to 5 (AS1530.2) of 350 microns in thickness with a total weight greater than or equal to 500 g/m ² made from a 3-layer composite film of metallic appearance with aluminium intermediate layer and UV protection and having a permanent curl to be applied with 30-50mm overlap using plastic rivets and manufacturer's recommended 50mm PSA Tapes complete as per Specifications. All bends, T-sections and end caps shall be cladded with thermoformed fittings of the same composite covering system.	--		
7.4.1	Thickness upto 32mm	SqM	500	.0018355
7.4.2	Thickness greater than 32mm and upto 38mm	SqM	500	.0019715
7.4.3	Thickness greater than 38mm and upto 44mm	SqM	500	.0019035
7.4.4	Thickness greater than 44mm	SqM	500	.0020395
8.0	Erection of stainless steel temporary piping for flushing arrangement & dismantling: Identification of temporary loop requirements, study of field routing, Identification of material required, collection of material from NPCIL stores, handling, transportation, marking, cutting, edge preparation, fit up, welding and pre fabrication of temporary spools, shifting, erection, fit up and welding (including supply of welding filler wire and electrodes) and inspection as per specification and flushing scheme. This work also includes providing scaffolding, man power, tools, tackles, consumables like argon gas, obtaining clearance from NPCIL for cutting the erected spool after completion of flushing requirement, shifting the spool outside the building, handling & transporting back to NPCIL store, generating reports and submission for BHEL & NPCIL acceptance.	Inch dia	2,300	.0050973

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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
9.0	Erection and welding of O-let/ thermo well lug: Identification of pipe spools and O-lets, handling, shifting to contractor's machine shop, marking position & orientation of O-let, pilot hole drilling, fit-up of O-let, welding using GTAW process, carrying out visual inspection and carrying out final drilling of O-lets of various sizes ranging from 10NB to 150NB (NB is the branch pipe size connecting to O-let) as per drawings and technical specification. This work also includes arranging necessary manpower, tools, tackles, drilling machine, cleaning agents like acetone, clearing off burrs & foreign material, preparation of reports and submission for acceptance.	Inch dia	910	.0030932
10.0	Structural Works	--		
10.1	Supply, fabrication and erection of carbon steel Metal structures : Supply of structural steel material conforming to IS 2062, E250, Quality BR consisting plates/ sheets/ angle/ channel/ beam and various profile as per IS 808, metal gratings, fasteners as per IS 1363 grade 5.6 and grade 8.8, transportation, storage, handling, fabrication, fitup & welding, shifting, erection, site welding, inspection as per drawing and technical specification. This work also includes surface preparation by grit blasting, supply & application of zinc based primer and top coat with epoxy as per approved painting system for a total DFT of 240-260 microns, providing scaffolding / temporary platforms, wire cutting/machining of seismic stopper plates, man power, tools, tackles, plant and machineries, welding electrodes , other consumables and preparation of reports and submission for acceptance.	--		
10.1.1	Supply, fabrication, erection and painting of metal structure	MT	25	.0062884
10.1.2	Supply, fabrication, erection and painting of metal gratings	MT	3	.0009463
10.2	Stainless steel structural works	--		

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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
10.2.1	Frabrication and erection of stainless steel structural work: Receipt of free issue material, handling, shifting, marking , cutting, forming, fabrication of light duty stainless steel structure, erection, fitup, welding using GTAW / SMAW, inspection as per drawings & technical specification. This work also includes providing manpower, tools & tackles, cleaning agents, welding electrode & filler wire, cleaning consumables and preparation of reports and submission for acceptance.	KG	11,050	.0041316
10.2.2	Supply, frabrication and erection of stainless steel structural work : Supply of stainless steel sheets of 3mm and 5mm thick conforming to ASTM A 240-02a TYPE -321, No 2B finish with IGC tested as per ASTM 262 A - Practice - E , handling, shifting, marking , cutting, forming, fabrication stainless steel structure such as drain collection trays, hand rails, toe gaurds , erection , fitup, welding using GTAW / SMAW, inspection as per drawings & technical specification. This work also includes arranging manpower, tools, tackles, cleaning agents, welding filler wire & electrode, scaffolding and other consumables preparation of reports and submission for acceptance.	KG	2,000	.0016316
10.3	Dismantling of metal structure and metal platforms: Identification of structural platform to be dismantled, carrying out dismantling of the portion of platform / temporary structure by gas cutting / grinding with adequate safety precaution, shifting of dismantled material outside the building, handling, transportation of material to NPCIL stores. This work also includes cleaning the debris, providing man power, tools, tackles, material handling equipments & other consumables, preparation and submission of reports for acceptance.	MT	12.5	.0005099
11.0	Fixing of anchor fasteners	--		

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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
11.1	Fixing of hilti anchor fasteners using hammer drilling: Drilling, cleaning and fixing of Hilti anchor fasteners using hammer drilling in various buildings, locations & positions as per drawings and technical specification. This work includes identification, marking, providing hilti machine of various type & capacities, shifting & positioning, tools, tackles, performing drilling using hammer drilling on reinforced concrete by qualified operators, cleaning , torqueing with wrenches, cleaning the area, providing manpower, cleaning aids, preparation of reports and submission for acceptance,	--		
11.1.1	HSL-3G size upto M12	Nos	30,243	.0074016
11.1.2	HSL-3G size above M12 to M20	Nos	1,575	.0004818
11.1.3	H DA-T size upto M12	Nos	825	.0003029
11.2	Fixing of hilti anchor fasteners using diamond core cutting : Core Drilling, cleaning and fixing of Hilti anchor fasteners using diamond core drilling in various buildings, location & positions as per drawings and technical specification. This work includes identification, marking, providing hilti machine of various type & capacities, shifting & positioning, tools, tackles, performing core drilling using diamond core drill bit in reinforced concrete by qualified operators, cleaning, torqueing with wrenches, cleaning the area, providing manpower, cleaning aids, preparation of reports and submission for acceptance.	--		
11.2.1	HSL-3G size upto M20	Nos	700	.0009518
11.2.2	H DA-T size upto M12	Nos	400	.0004161
11.2.3	H DA-T size above M12 and tupto M20	Nos	305	.0006594

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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
11.3	Sealing of anchor fasteners erected on steel lined areas : Identification of location where hilti anchor fasteners are fixed over liner plates, supply of carbon steel sleeve, erection of sleeve, fit up, welding using GTAW/SMAW, inspection, supply and application of hilti sealing compound C601S as per as per drawings and technical specification. This work also includes cleaning, providing tools, tackles, machinery, welding consumables like argon gas, filler wire, manpower. preparation of reports and submission for acceptance.	--		
11.3.1	Sleeve dia Up to 1 inch	Inch dia	250	.0004419
11.3.2	Sleeve dia above 1 inch	Inch dia	100	.0002379
11.4	Marking and diamond core cutting : Core cutting on reinforced concrete wall/floor using diamond core bits in various buildings, location & positions by qualified operators . This work includes identification, marking, providing man power, necessary tools & tackles, machinery, water supply arrangement, shifting material to required location, drilling mounting hole, setting up machines, performing core drilling using diamond core bits in reinforced concrete, cleaning the area, disposal of debris to identified location, inspection as per drawings & technical specification, preparation of reports and submission for acceptance.	--		
11.4.1	Core drilling for dia less than or equal to 200mm	mm-meter	500	.000136
11.4.2	Core drilling for dia greater than 200mm	mm-meter	500	.0002039
12.0	Miscellaneous works	--		

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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
12.2	Handling & transportation of material within plant site (For materials / items other than those specified in other BOQ items) : Identification of material to be shifted, handling, loading material on to the truck/trailer, shifting the material to the required location as per instruction, unloading the material in desired position & location, preparation and submission of report. This work also includes providing tools and tackles, plant and machinery and man power, consumables as per tender specification.	MT	100	.0006798
12.3	Passivation of stainless steel pipe & pipe fittings and SS liner: Identification, obtaining clearance for passivation from NPCIL, handling, shifting, carrying out pickling, passivation, inspection as per drawings and technical specification, preparation of reports and submission for acceptance including passivation of erected piping and liners. This work also includes supply of chemicals & passivation tanks, cleaning agents, inspection chemicals, manpower. Note: DM water will be issued on free of charge basis based on the request from contractor	--		
12.3.1	Passivation at contractor shop	inch-meter	1,200	.0001632
12.3.2	Passivation in-situ	inch-meter	1,200	.0002447
12.3.3	Passivation of fuel pool, reactor cavity, inspection well floor and wall liners including floor stainless steel liner at other elevations.	SqM	1,100	.0029912
12.4	Re-orientation of equipment for flushing works: Identification of equipment for re-orientation for providing flushing arrangements, dismantling the equipment connections, handling, re-orienting the equipment, release for flushing, obtaining clearance for normalizing, normalizing the equipment, alignment as per the original position, marking, cutting & placing gaskets in position, fastening to required torque using torque wrench, inspection as per drawings and technical specification. This work also includes providing man power, hand tools, tackles, cleaning agents as required for work.	MT	69	.0010085

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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
12.5	Nickel gasket replacement and loading of sorbent in filters: Clearing the recesses, lifting the hatch, chipping of concrete if required for clearing the recesses, smoothening the surface after chipping, unscrewing the bolts using hydraulic torque wrench, opening the filter cover, receipt of material such as sorbent & Nickel gasket from NPCIL stores, sieving the sorbent to the required size, shifting the sorbent to the location, loading the sorbent into the filter, replacing Nickel gasket, closing the filter cover, tightening of bolts upto required stud elongation by using the hydraulic torque wrench as drawings and technical specification, preparation of reports and submission for acceptance. This work also includes providing manpower, tools & tackles, hydraulic power pack, cleaning and other consumables.	Nos	16	.0005439
12.6	Charcoal Loading and sealing in Gaseous filters: Receipt of free issue material (charcoal bags), obtaining clearance from NPCIL, handling filters (Weight of filter casing will be measured in relevant BOQ item), cleaning, drying, inspection, loading of charcoal in sequence to achieve required compactness, inspection, sealing by welding as per the working drawings and technical specification, preparation of reports and submission for acceptance. This work also includes providing necessary qualified manpower, material handling equipment, scaffolding other tools & tackles.	KG	22,320	.0003035
12.7	Protection of stainless steel liner surfaces: Supply of natural rubber of various thickness, taking the field measurements, cutting to required dimensions & profile, shifting the material to the required location, laying on the stainless steel liner surfaces in Reactor building and Reactor auxiliary buildings, inspection as per technical specifications and drawings. This work also includes providing manpower, tools , tackles, adhesive materials, preparation reports and submission for acceptance.	--		
12.7.1	Natural / SBR sheets of 10mm thick	SqM	600	.0014276
12.7.2	Natural / SBR sheets of 6mm thick	SqM	300	.0004079
12.7.3	Natural / SBR sheets of 3mm thick	SqM	300	.0002447

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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
12.9	Machining of various components : Collection of material, handling, transportation to machine shop, machining the job as per requirements, drawings and technical specification, inspection, shifting back the job to the site, preparation and submission of reports for acceptance. This work also includes supply of stainless steel & carbon steel rods / bars , arrangement of required man power , machines, tools , tackles, transport equipment, consumables such as cooling agents, cleaning agents. Note: If the machining process involved multiple operations such as turning, drilling and milling , CC in each process will be calculated individually and cumulative value will be paid	--		
12.9.1	Supply of stainless steel SA 276 - SS 321 Round bars/ Flat bars of various sizes and profiles	KG	2,500	.0006798
12.9.2	Supply of carbon steel SA 105 Round bars/ Flat bars of various sizes and profiles	KG	1,250	.000153
12.9.3	Turning on lathe upto Dia 500mm & weight not more than 250Kg) (Rate per CC of material removed)	CC	500,000	.0023794
12.9.4	Turning operation on lathe (Dia greater than 500mm or weight more than 250Kg) (Rate per CC of material removed)	CC	400,000	.0016316
12.9.5	Drilling (Rate per CC of material removed)	CC	350,000	.0014276
12.9.6	Milling (Rate per CC of material removed)	CC	250,000	.0011897
12.9.7	Internal and external threading on various components (MM (DIA) - MM (LENGTH))	MM-MM	250,000	.0010197
14.0	Special upkeeping	--		
14.1	Carrying out miscellaneous activities , segregating the debris within the building and premises of buildings, shifting the debris to the collection point for upkeeping the areas as instructed by Engineer during special occasions. One unskilled helper, performing such activity for 9 hrs a day (including lunch hour) is considered as one operation	Operation	1,500	.0020395

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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
14.2	Collection of debris from outside of various buildings, loading the debris on the tractor trailer, carrying to the dumping yard, unloading the debris as instructed by Engineer during special occasions, preparation of report and submission for acceptance. This work includes providing tractor trailer of minimum 6T capacity, adequate manpower, hand tools & tackles .	Trip	450	.0030592
15.0	System handing over checks: Obtaining clearances & carrying out activities like opening & tightening of flanges, replacing gaskets, gaskets of thermowells, removing, cleaning & re-assembling of mechanical strainers and other miscellaneous works as per the NPCIL requirements, preparation of reports and submission for acceptance. This work includes arranging necessary manpower, tools & tackles, scaffolding, cleaning consumables.	--		
15.1	Providing of one skilled fitter/one skilled grinder/one rigger for carrying out works of hand over checks for 9hrs a day is considered as one operation	Operation	2,000	.0032632
15.2	Providing of one unskilled helper carrying out works as a part of hand over checks for 9hrs a day is considered as one operation	Operation	1,500	.0020395
15.3	Providing of one supervisor, supervising the works as a part of hand over checks, preparation of drawings, reports and records for 9hrs a day is considered as one operation	Operation	750	.0020395
TOTAL Weightage				1.0