

TENDER SPECIFICATION

BHEL PSSR SCT 2028

for

**Superstructure (Shell) Civil works,
Structural, Installation of Borosilicate
works, Supply & Installation of Electrical
works and Elevator at 2X500 MW NTPL
FGD – Additional RCC Chimney (150M
HEIGHT) at Tuticorin, Tamil Nadu**

VOLUME –II

PRICE BID



BHARAT HEAVY ELECTRICALS LIMITED

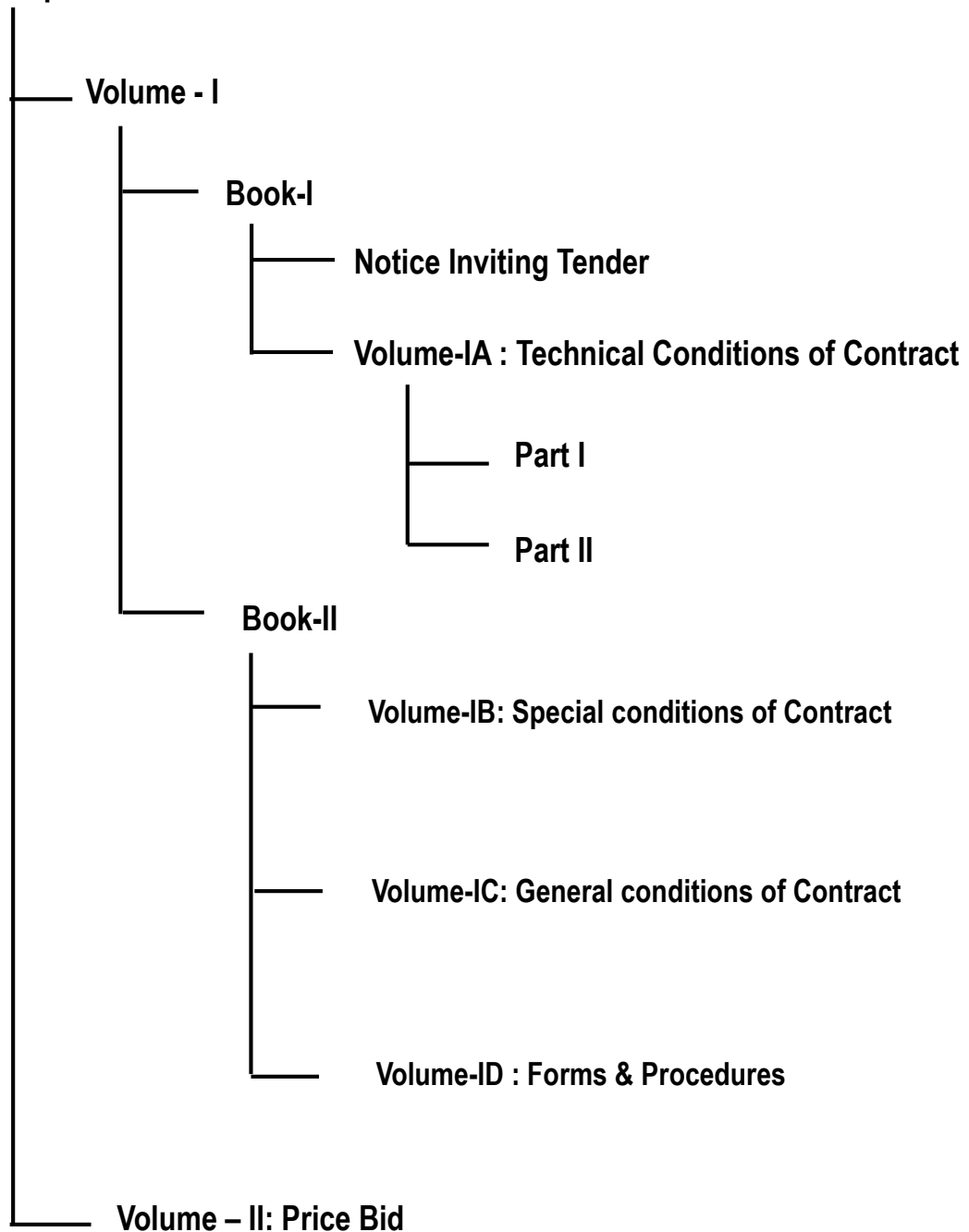
(A Government of India Undertaking)

Power Sector – Southern Region

Tek Towers, No.11, Old Mahabalipuram Road,
Okkiyam Thoraipakkam, Chennai - 600097

TENDER SPECIFICATION CONSISTS OF

Tender Specification



PRICE BID

CONTENTS	
Description	No. of pages
Part A of Price Bid: Instructions to the Bidders	01
Part B : Format for total amount (Enclosed as a separate Excel File in BHEL NIC e-Procurement portal for the subject tender)	(Separate Excel File)
Part C: Bill of quantities with weightage for amount of each items with respect to the total quoted price	23

PART A

Instruction 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. 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 of Price Bid.
6. 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.
7. Based on the quantities of individual item and the amount arrived in Sl. No: 6 above, unit rate of individual items shall be derived. This unit rate shall be rounded off to four decimal places.
8. Bidders to note that this is an item rate contract. Payment shall be made for the actual quantities of work executed as certified by BHEL Engineer.

Part C : Bill of Quantities

Tender Specification BHEL:PSSR:SCT:2028 for Superstructure (Shell) Civil works, Structural works incl. Flue Liners, Installation of Borosilicate works, Supply and Installation of Electrical works and Elevator

at NTPL Tuticorin Additional RCC Chimney

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
12.0	Supplying and laying (inside chimney in the space below the grade level slab) crushed rock range 63 mm to 45 mm in layers not exceeding 300 mm in thickness including breaking of stone boulders to required sizes, filling the interstices with selected sand and compacting to 85 % of original volume of stone stack for all lifts etc. all complete. Payment shall be made for the measurement of the volume of the compacted fill.	cum	250	.0023066
13.0	Providing and laying Nominal Mix plain cement concrete (M10) with graded aggregate (with maximum size of coarse aggregate not exceeding 40 mm) at all levels for all kinds of work like mass concrete, lean concrete, mudmat, filling etc. including labour, materials, equipments, handling, transporting, batching, curing, testing etc. all complete as per specifications, drawings and instructions of the Engineer. (Cement shall be provided by BHEL free of cost)	cum	36	.0006117
14.0	Providing and laying design mix cement concrete with graded aggregate (maximum size of coarse aggregate not exceeding 20 mm) for reinforced concrete work with minimum cement content of 400 kg/m ³ , at all levels for all kinds of work, including labour, materials, equipment, handling, transporting, batching, mixing, placing, levelling, compacting, curing, testing etc. and rendering or cleaning and finishing the exposed surface with cement mortar (1:3) to give smooth and even surface, all complete as per specifications, drawings and instructions of the Engineer, but excluding all formwork and reinforcing steel: (Cement shall be provided by BHEL free of cost)	--		
ii	For all other works	--		
a	Grade M-25 grade level slab, pit, trenches, drain etc.	cum	100	.0017863
c	Grade M-35 for chimney shell, corbels and external platforms and other shell attachments.	cum	6,000	.1431561
d	Grade M-35 for all other components of the super structure, roof slab, mini -shells, beams, columns wall etc.	cum	50	.001193

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at NTPL Tuticorin Additional RCC Chimney

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
15.0	Providing and applying two coats of bitumen grade 85/25 as per IS 702 (@ 1.7kg/sqm) with 1% antistripping compound conforming to IS 6241 in foundation, shell, pedestal, etc. on concrete surfaces exposed to soil / ash including surface preparation etc. all complete.	Sqm	150	.0000762
16.0	Placing of steel reinforcements of High yield strength deformed bars of grade Fe500 CRS conforming to IS 1786 (Grades /Fe500D CRS/Fe550D CRS may also be used), for reinforced concrete work, at all levels, for all kinds of work, including transportation from BHEL Store, cleaning, derusting, straightening, cutting, bending, binding in position with annealed wire and/or welding, providing concrete cover blocks, pins, separators, chairs, supports for reinforcement, etc. with all materials, labour, equipment, handling, testing, transportation to & from stores etc., preparation of bar bending schedules, all complete as per specifications, drawings and instructions of the Engineer. (Reinforcement steel will be provided by BHEL free of cost)	--		
ii	For all other works	--		
a	Mild steel reinforcement bars	Mt	5	.0013938
b	High strength deformed bars	Mt	610	.0338252
S402	Supply including delivery at site, steel reinforcements of TMT steel of grade Fe-500 CRS, Fe-500D CRS or 500EQR CRS as applicable conforming to IS:1786 complete all as per specifications, drawings and as directed by Engineer, from the Customer approved agencies. Note - This item shall be operated if required, at the discretion of BHEL.	MT	50	.0107342
17A	Providing and fixing formwork of approved quality for cast-in-situ, plain or reinforced concrete works of any type and section (including curved surfaces and chimney shell) for all elevations, including labour, materials, equipment, waste of forms, shoring, strutting, scaffolding, staging, tying, nailing, caulking, bolting etc. and removal of form work and staging etc. all complete as per specifications, drawings and instructions of the Engineer.	--		

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Installation of Borosilicate works, Supply and Installation of Electrical works and Elevator**

at NTPL Tuticorin Additional RCC Chimney

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
ii	For following works	--		
a	Inner and outer faces of wind shield/shell with slip form shuttering	Sqm	19,800	.0698697
AA17	Mobilisation, installation and commissioning of operation of slipform system with all materials, tools & plants, accessories, consumables, labour, etc. all complete.	Lumpsum	1	.0163824
b	All other components of the superstructure including slabs, beams, columns, walls, enclosures, mini shells, external platforms, corbels, other shell attachments, chases/recesses in shell etc.	Sqm	400	.0017929
18.0	Providing and fixing formwork in shell openings and pockets (above 0.1 sq.m surface area) including cutting, formation of shapes and all other operations required for making the required shape and size, removal of formwork, all complete as per specifications, drawings and instructions of the Engineer.	Sqm	135	.0006051
19.0	Providing and placing in position at all levels, building paper (kraft paper), as per IS:1397, between concrete surfaces including the cost of labour, material, etc. complete as per drawings and instruction of the Engineer.	Sqm	70	.0000046
20.0	Providing and installing, at all levels, bitumen impregnated fibre boards, 12 mm thick, conforming to IS:1838, as joint filler at joints in concrete, including nailing, coating of both faces with coal tar pitch/bitumen, including the cost of all labour, material and equipments etc., complete as per drawings, specifications and instructions of the Engineer.	Sqm	30	.0000549
21.0	Providing and filling, at all levels, bitumen sealing compound (hot applied type) conforming to IS:1834, for sealing gaps and joints in concrete, including cleaning, mixing, heating, pouring or injecting, application of primer, cost of all labour, material and equipments etc., complete as per drawings, specifications and instructions of the Engineer.	Kg	200	.000078

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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
22.0	Supplying, fabricating, erecting and installing miscellaneous steel parts to be embedded/cast in concrete (like staircase embedments, corbel face plates, etc) at all positions and levels including preparation of fabrication drawings, galvanization as per IS:4736 (The minimum weight for galvanizing shall be 610 g/sq.m and shall comply with relevant IS Codes), including the cost of all labour, materials and equipments for setting materials in concrete, grouting, welding, bolts & bolting, expansion anchors, drilling, cutting, etc. complete as per drawings and specification. Payment: Supply - 60% Fabrication - 25% Erection - 15%	Mt	0.2	.0000689

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at NTPL Tuticorin Additional RCC Chimney

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
B23	Preparing detailed Fabrication drawings and after approval by the Engineer, collection of structural steel from BHEL store, Fabrication and erection of structural steel of grade E 250 in rolled/ built up section at conforming to IS:2062, mild steel rounds in columns, beams, struts, monorails, stays, safety chains, ladders, MS gratings, gantry girders, roof trusses, portals, laced purlins, space frames, hangers, wall beams, sheeting runners, brackets, stiffeners, stub columns, bracings, cleats, base plates, splice plates, gussets, end plates, steel frame grid over false ceiling, walkway platforms, ladders, stairs, stringers, treads, landings, decking and seal plates, galleries etc including blast cleaning, providing & applying primer, providing and applying intermediate, final and final finish coat of paint (blast cleaning, primer and paint shall be paid separately as per item no AA23), connection design & preparation of fabrication drgs, and appointment of a separate agency for review and approval of fabrication drgs in consultation with BHEL, straightening, cutting, bending, rolling, grinding, machining, drilling, welding, electrodes and other consumables, alignment, erection bolts & nuts (weight of erection bolts and nuts not payable), assembly, edge preparation, preheating / post heating if required, testing of welders, inspection of welds, visual inspection, non destructive and special testing, rectification and correction of defective welding works, production test plate, inspection and testing, erection scheme, protection against damage in transit, stability of structures, installation of temporary structures, setting column bases, surface preparation by means of manual or mechanical power tools as per IS:1477 part 1, touch-up painting, rectification, dismantling and removal of all temporary structures (weight of temporary structures not payable), etc all complete. (Only Structural steel shall be supplied by BHEL free of cost) Payment: a. Fabrication - 60 % b. Erection in position - 40 %	Mt	347	.0492499

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Installation of Borosilicate works, Supply and Installation of Electrical works and Elevator**

at NTPL Tuticorin Additional RCC Chimney

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
S2301	Supply including delivery at site, structural steel with mild steel rolled sections, conforming to IS:2062, pipes conforming to IS:1161/ IS:1239, chequered plate conforming to IS: 3052 complete all as per specifications, drawings and as directed by Engineer, from the Customer approved agencies. Note - This item shall be operated if required, at the discretion of BHEL.	MT	50	.0113109
AA23	Extra over Item no. B23 for surface preparation of steel structures conforming to Sa 2 A½ finish and painting with 3 coats of high build heat resistant epoxy paint over one coat of epoxy primer (total DFT of 250 to 290 microns) including the cost of all labour, material, equipments, protection of surface and cleaning, scaffolding, touch-up painting etc., complete as per drawings, specifications and instructions of the Engineer.	Mt(of steel)	347	.0127667
A24	Fabrication, erection and alignment of factory made chequered plate conforming to IS 3502 (minimum 8 mm o/p) in platforms, staircases with edge binding strips and anti-skid nosing in treads etc. including fixing clamps, fittings, fixtures, grinding, drilling, welding, edge preparation, primer, finish paint etc. all complete as per drawing and specification. (Chequered plate will be provided by BHEL free of cost) Payment: Fabrication - 60% Erection - 40%	Mt	75	.0013412
25.0	Providing and fixing in positing of high strength structural bolts (of property class 8.8 and product grade 'C' as per IS: 1367) and conforming to IS: 3757 and high strength structural hardened and tempered nuts (of property class '8' as per IS:1367) conforming to IS:6623 with hardened and tempered washers as per IS:6649 etc. up to and inclusive of 39 mm diameter and upto 300 mm long for structural steel work etc all complete.	Quintal	125	.0108738

Part C : Bill of Quantities

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Installation of Borosilicate works, Supply and Installation of Electrical works and Elevator**

at NTPL Tuticorin Additional RCC Chimney

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
A26	Preparing detailed Fabrication drawings and after approval by the Engineer, collection of structural steel from BHEL store, Fabrication, erection at all levels, structural steel flues (Plates for steel flue shall be CORTEN-B Steel conforming to relevant code), complete with all bends, flanges, stiffeners, all other flue attachments, support system, collars, access manholes and gas sampling ports alongwith gaskets and other accessories, staying system, connection design & preparation of fabrication drgs, and appointment of a separate agency for review and approval of fabrication drgs in consultation with BHEL, including the cost of all labour, material and equipment, transporting, lifting to all heights, setting in place, cutting, grinding, drillings, bending, bolts and bolting, welding, preheating and post-heating for welding, testing, etc. complete as per drawings and specifications. (Structural steel shall be provided by BHEL free of cost) Payment: Fabrication - 60% Erection - 40%	Mt	455	.086359
AA26	Installation of closed cell borosilicate glass block lining system at all elevations, on ground or in erected position, with minimum 51 mm thick borosilicate glass block, adhesive membrane having a minimum thickness of 3.2 mm, grit blasted of substrate to a cleanliness of Sa 2 ½ finish and application of suitable primer, in supervision and as directed by and satisfaction of borosilicate glass block manufacturer, testing, getting approval of installation procedure from BHEL/ NLC etc all complete as per specification, drawings and as directed by the Engineer-in-charge including cost of skilled labour, material, tools & tackles, equipments etc all complete. Installation of borosilicate lining shall be done under controlled temperature and humidity conditions, as mentioned in specification, including providing all equipments required to create controlled temperature & humidity conditions inside chimney during installation, hot air blow cleaning of internal surface before application etc. all complete. (Borosilicate Glass Blocks, Adhesive Membrane, Primer and onsite supervision of borosilicate glass block lining supplier shall be provided by BHEL Free of cost).	SqM	6,450	.140304

Part C : Bill of Quantities

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Installation of Borosilicate works, Supply and Installation of Electrical works and Elevator**

at NTPL Tuticorin Additional RCC Chimney

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
26F	Supply, fabrication and erection at all levels, C276 gutters/vanes/pipes, bends & its fittings, any other appurtenance etc. complete, required for withdrawal of acid from inside of flue liner to outside as per approved drawing over Corten B steel flues. This item includes connection design & preparation of fabrication drgs, and appointment of a separate agency for review and approval of fabrication drgs in consultation with BHEL, surface preparation, weldables/consumables, equipment, material, surface finishing, sealing, testing for quality complete at all elevation as per specification. Measurement for payment shall be done for net weight of c-276 gutters/vanes/ pipes etc (weld thickness not to be considered) which is welded over flue surface. Payment: Supply - 60% Fabrication - 25% Erection - 15%	Kg	2,475	.0352673
27.0	Supply, fabrication and installation at various locations and elevations of the chimney system the following miscellaneous mild steel items complete with the cost of all labour, material and equipment, transporting, lifting, setting in place, cutting, grinding, drilling, welding, bolts and bolting, anchor fasteners and anchoring, priming, painting, grouting etc. complete as per drawings and specifications: Payment: Supply - 60% Fabrication - 25% Erection - 15%	--		
a	Mild steel ladders with cage, hood access hatch, louvers, bird screens, hood drain basin covers and other miscellaneous mild steel items not specifically mentioned.	Mt	7	.0043332
b	32/40 mm nominal bore medium class tubular hand railing for stair case and internal and external platforms.	Mt	17	.0092045
c	Providing minimum 275 gsm Hot dipped galvanisation on mild steel parts as per specification.	Mt	2	.0002851
d	Providing minimum 610 gsm Hot dipped galvanisation on mild steel parts as per specification.	Mt	22	.0055414

Part C : Bill of Quantities

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Installation of Borosilicate works, Supply and Installation of Electrical works and Elevator**

at NTPL Tuticorin Additional RCC Chimney

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29A	Supplying, Fabricating and installing in the liners, gas sampling and gas oapacity measurement ports made from C276 pipe including the cost of all labour, materials, bolts and bolting, non metallic gaskets, cover plates & all other accessories, painting etc., complete as per drawings and specifications. measurement for payment shall be done for net weight of C276 pipe including flange plate/cover plate only (weld thickness not to be considered) which is welded over liner surface. Payment: Supply - 60% Fabrication - 25% Erection - 15%	kg	200	.0033636
30.0	Supply, fabrication and erection of SS Mini Shell at chimney roof of grade AISI 316L or BS: 1449 (Grade of steel shall be equivalent to BS: 1449 (Part 2) 316 S.12.), complete with all stiffeners, attachments, fasteners, etc. including connection design & preparation of fabrication drgs and appointment of a seperate agency for review and approval of fabrication drgs in consultation with BHEL, cost of all labour, material and equipment, transporting, lifting to all heights, setting in place, cutting, grinding, drilling, bolts and bolting, welding, preheating and post heating for welding , testing etc. complete as per drawing and specifications. Payment: Supply - 60% Fabrication - 25% Erection - 15%	Mt	77	.1238232

Part C : Bill of Quantities

**Tender Specification BHEL:PSSR:SCT:2028 for Superstructure (Shell) Civil works, Structural works incl. Flue Liners,
Installation of Borosilicate works, Supply and Installation of Electrical works and Elevator**

at NTPL Tuticorin Additional RCC Chimney

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
30AA	Supply, fabrication and erection of 2 mm thick titanium sheet wrapped over chimney mini shell (as described in item no. 30 with insulation over it) external surface, including connection design & preparation of fabrication drgs and appointment of a seperate agency for review and approval of fabrication drgs in consultation with BHEL, weldables/ consumables, equipment, material, surface finishing, sealing, testing for quality complete at all elevation as per drawings and specification. Measurement for payment shall be done for net weight of titanium strip only (weld thickness not to be considered) which is welded over liner surface. Payment: Supply - 60% Fabrication - 25% Erection - 15%	Mt	4	.036955
31.0	Supply, fabrication and installation at all levels, stainless plates (including stainless steel screws and fasteners) of grade AISI 316L and lead sheets beams and over the mild steel in the platform beam bearing, flue supports bearings, flue restraints brackets/ buffers etc. including the cost of all labour material & equipment, transporting, lifting to all heights, setting in place, cutting, grinding, drilling, welding of stainless steel using compatible & approved stainless steel electrodes, testing & machining flat and polishing the contact surfaces of stainless steel, coating the polished surfaces with silicone grease, etc., complete as per drawings and specifications.	--		
a	Stainless steel components.	kg	160	.0003334
b	Lead Sheets.	Kg	60	.0001925

Part C : Bill of Quantities

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Installation of Borosilicate works, Supply and Installation of Electrical works and Elevator**

at NTPL Tuticorin Additional RCC Chimney

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
AA32	Preparing detailed Fabrication drawings and after approval by the Engineer, collection of structural steel from BHEL store, Providing, fabricating and installing expansion compensator joints in the flue liner, comprises of acid resistant elastomeric fabric, suitable for wet stack operations, shall be acid resistant to withstand acidic flue gas condensates arising out of flue gas parameters & operating conditions as per specification and shall also prevent dust accumulation including all labour, material and equipment transporting, hoisting, fixing in position, drilling, cutting, bolts and bolting, etc. along with the user handbooks (giving details of installation, dismantling and maintainance procedures for the expansion joints), testing, approval form BHEL/NLC etc complete as per drawings and specifications. Design of expansion joint shall comply EPRI guideline to avoid contact of condensate with expansion joint material and to ensure drainage of condensate. Payment: Supply - 60% Fabrication - 25% Erection - 15%	Sqm	52	.0123009
33.0	Supplying, Fabricated Ready to Install, spare expansion compensators as specified in item no. AA32 including the cost of all labour, material and equipment, accessories, transporting, proper packaging (for several years of storage), and delivery to site store complete in all respects as per drawings and specification. Payment: Supply - 90% Fabrication & handing over - 10%	Sqm	26	.0058256
37.0	Supplying, and placing in position (at the beam supports bearings) Neoprene pads between concrete surface and mild steel including the cost of all labour materials, cutting to shape, grinding, drilling etc., complete as per drawings and specifications.	Cum	0.5	.0010428
43.0	Providing, laying and packing, at all levels, asbestos ropes at expansion joints including the cost of all labour material, etc. complete as per drawing and specifications.	--		
b	12 mm (diameter) at expansion joints between lining segments.	Rm	500	.0003768

Part C : Bill of Quantities

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at NTPL Tuticorin Additional RCC Chimney

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
A47	Providing and installing, at all levels, resin bonded rock wool insulation of semi-rigid, resin bonded type, in the form of slabs and conforming to IS: 8183, consisting of 6 layers of insulation material (resin bonded rock wool) each of a minimum thickness of 25 mm with staggered joint, having a minimum density of 200 kg/cum, including the cost of all labour, material and equipment, transporting, lifting to all heights, etc., inclusive of plated or galvanised accessories such as pins/ studs/ anchors/ wire netting, speed washers, tying wires, etc. welding of pins/ studs to steel surfaces or embedding of pins/ studs/ anchors in concrete surfaces, fixing, cutting, cutting, lapping, binding, testing, etc. complete as per drawings and specifications. Blanket type insulation shall not be used. Testing of insulation material to satisfy the specific requirements and properties as outlined in this specification IS: 8183 and in the relevant drawings by the contractor shall be carried out.	Sqm	400	.0024639
A49	Providing and packing, at all levels, loose rock wool insulation to a density not less than 200 kg/cu.m between the insulated minishells and brick liners at expansion joints between the lining segments and wherever as directed by the Engineer including the cost of all labour, material and equipment, filling, ramming, testing, etc. complete as per drawings and specifications.	Cum	5	.0003712
A50	Providing and painting, at all levels, the entire inside surface of the chimney shell, horizontal surface of the shell at top, underside of roof slab, top exposed surface of external platforms etc. with acid & heat resistant black bituminous paint conforming to IS:158 (not less than four coats including one prime coat) to give a total dry film thickness (DFT) of not less than 150 micron including the cost of all labour, materials, equipment, surface preparation, primer and finish painting, protecting, cleaning etc. all complete as per drawings and specifications.	Sqm	9,900	.0394112

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A54	Providing and painting, at all levels, the external surfaces of chimney shell and wherever as directed by the Engineer, with synthetic enamel paint conforming to IS:5410 in alternate bands of 'signal red' and 'pure/bright white' colour with a total DFT of not less than 150 micron (three coats over one coat of primer) and each coloured band shall be approximately 30m wide, having acid and heat resisting properties conforming to IS-158 including the cost of all labours, material and & equipment,surface preparation, primer and finish painting, protecting, cleaning etc. complete as per drawings and specification.	Sqm	6,450	.0266068
56.0	Providing and painting, at all levels, the external surfaces of chimney shell and wherever as directed by the Engineer, with acid and heat resistant polyurethane paint in alternate bands of colours 'signal red' and 'pure/bright white' colour with a total DFT of not less than 150 micron (three coats over one coat of primer) including the cost of all labours, material and & equipment surface preparation, primer and finish painting, protecting, cleaning etc. complete as per drawings and specification.	Sqm	3,465	.0150541
A59	Providing and laying over the chimney roof, a composite acid and heat protection treatment with slope outwards for drainage of water consisting of Acid proof / chemical resistant tiles bedded on acid proof / chemical resistant mortar, intervening space between tiles filled up by acid proof / chemical resistant grouts, acid proof Potassium Silicate mortar resistant to Sulphuric Acid as per IS: 4832 Part I & IS: 4441, Tiles made of clay, feldspar or quartz and vitrified at high temperature in ceramic kiln, unglazed, free from deleterious material and shall conform to IS: 4457, Iron oxide in the raw material shall not exceed 2%, show a fine-grained homogeneous fracture when broken and shall be sound, true to shape, flat and free from flaws and other manufacturing defects, dimension of the tiles be 198.5 x 198.5 x 35 mm minimum, depth of groove on the underside shall not be more than 3 mm, Compressive and tensile strength of tiles shall not be less than 70 N/sq.mm and 3.5 N/sq.mm respectively, cleaning, finishing, etc., complete as per drawing and specifications. Payment: Supply - 60% Installation - 40%	Sqm	272	.0040318

Part C : Bill of Quantities

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Installation of Borosilicate works, Supply and Installation of Electrical works and Elevator**

at NTPL Tuticorin Additional RCC Chimney

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
60.0	Providing, fitting & fixing, outlet and overflow, cast iron roof drain heads (with gratings) in chimney roof including sockets, adapters, brackets, hangers, supports, etc., casting-in and jointing to 150 mm nominal bore rainwater pipes, grouting, etc. including the cost of all labour material and equipment, transporting, lifting, setting in place, painting, etc. complete as per drawing and specifications.	Each	8	.0002649
61.0	Providing, fitting and fixing rainwater pipes at all levels internally from the chimney roof to ground level upto the hood drain basin including shoes, bends, junctions, flanges, hoppers, sockets, adaptors, brackets, hangers, supports, anchor fasteners, spacers, pipe sleeve through shell, silicon or vulcanised butyl sealant, foam backing material, jointing, socketing, grouting, caulking, primer and finish painting etc. complete including the cost of all labour, material and equipment, complete as per drawing and specifications: Scope includes making khurras 45x45 cm with average minimum thickness of 5 cm cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate of 20 mm nominal size) over P.V.C. sheet 1 m x1 m x 400 micron, finished with 12 mm cement plaster 1:3 (1 cement : 3 coarse sand) and a coat of neat cement, rounding the edges and making and finishing the outlet complete. Payment: Supply - 60% Installation - 40%	--		
Ab	150 mm nominal bore heavy DI pipes and fittings conforming to IS: 8329	Rm	300	.0046592
62.0	Providing and laying 50 mm thick cement concrete flooring (comprising of 12 mm thick mettalic concrete hardener topping over 38 mm thick under bed of concrete) over the grade level slab inside the chimney, including the cost of all labour, material and equipment, etc. complete as required for preparation of base, laying underbed and topping, finishing, rounding of edges, corners and junctions, curing, testing, etc. complete as per drawing and specifications. (Cement will be provided by BHEL free of cost)	Sqm	545	.0011143

Part C : Bill of Quantities

**Tender Specification BHEL:PSSR:SCT:2028 for Superstructure (Shell) Civil works, Structural works incl. Flue Liners,
Installation of Borosilicate works, Supply and Installation of Electrical works and Elevator**

at NTPL Tuticorin Additional RCC Chimney

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
A63	Providing and installing an electrically operated semi grill type steel roll-up door at chimney base, with all hardware and mechanisms, fittings and fixtures, locking arrangements, frames, fasteners, gear handle arrangement for standby manual operation, all electrical accessories such as motors, control systems, cables, etc. including the cost of all labour, material and equipment, fixing in position, grouting primer and finish painting, testing, etc., complete as per drawing and specifications. Payment: Supply - 60% Installation - 40%	Sqm	28	.0024311
64.0	Providing and installing at any level and location, mild steel, double plate, personnel access doors, in shell openings of size 1.2m by 2.1m, complete with all fittings and fixtures, locking arrangements, frames, fasteners including the cost all labour, material and equipment, lifting to all heights, setting in place, grouting primer and finish painting, etc., complete as per drawing and specifications. Payment: Supply - 60% Installation - 40%	Each	5	.0004546
67.0	Supplying, fabricating and installing mild steel hatches at various locations in the chimney system complete with locking arrangements, frames, insulation, fittings and fixtures and all mechanisms and accessories reqd. for proper operation including all labour, painting etc. complete as per drawings and specifications. Payment: Supply - 60% Installation - 40%	--		
a	Hood Access Hatch	Each	1	.0001034
68.0	Conducting load testing on girders for 1.25 times the full load, on ground , including provision of test bed and jacks, dial gauges and other supplies complete as per specification and drawings and approval of engineer in-charge.	Pair	1	.0012334

Part C : Bill of Quantities

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at NTPL Tuticorin Additional RCC Chimney

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
70.0	Providing & grouting of pocket holes, pipe sleeves and under base plates of structural steel work/ machinery/ pipe supporting structures including roughening of surface, cleaning, ramming, curing etc. all complete with Conbextra GP-1 or equivalent. (Cost of all material and cleaning of the pockets by compressed air shall be in the scope of the contractor).	Cum	0.5	.0000932
71.0	Providing & grouting of pocket holes, pipe sleeves and under base plate of structural steel work/ machinery/ pipe supporting structures including roughening of surface, cleaning, ramming, curing etc. all complete with mix 1:1:2 (1 cement : 1 coarse sand : 2 aggregate of 6 mm down graded stonechips) using non shrink admixture. (Cost of all material and cleaning the pocket by compressed air shall be in the scope of the contractor). (OPC Cement shall be provided by BHEL free of cost)	CUM	0.5	.0000383
72.0	Supplying and erecting after approval by Engineer a rack and pinion type Elevator of min 400 kg load carrying capacity, from ground upto top of chimney with landing at various platform level, including all fixtures, accessories and Supply of Mandatory Spares and Special Tools & Tackles as required for the maintenance of the elevator all complete as per specifications and drawings. Payment Terms Main Supply - 70% Installation - 15% Commissioning & Handing Over - 5% Supply of Mandatoy Spares - 10%	Lumpsum	1	.0178669

Part C : Bill of Quantities

Tender Specification BHEL:PSSR:SCT:2028 for Superstructure (Shell) Civil works, Structural works incl. Flue Liners, Installation of Borosilicate works, Supply and Installation of Electrical works and Elevator

at NTPL Tuticorin Additional RCC Chimney

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
73.0	Providing (supplying), fabricating and erecting, at all levels, FRP PIPES conforming to the design guidelines of AWWA M45, outside chimney flue liner for carrying acidic condensates within the subject scope of works, based on the approved design as per gas-flow-model study, complete with all bends, flanges, lamination for connection, stiffeners, all other flue attachments, including support system, collars, connection with titanium pipes and other accessories, cost of all labour, material, equipment, surface finishing, sealing, testing for quality, transporting, lifting to all heights, setting in place, cutting, grinding, bending, curing, lamination, moulding, testing, guarantee/warranty etc. complete as per drawings, specifications, manufacturer's recommendations, relevant codes.	Kg	1,000	.0025
--	ELECTRICAL WORKS - TECHNICAL DETAILS SHALL COMPLY TO CUSTOMER SPECIFICATION. THIS BOQ IS A MINIMUM REQUIREMENT.	--		
E1	415V, 250A, 50 KA for 1 sec, 4 wire AC Distribution Board with 1No. incomer (MCCB , 12 nos. of 100A MCCB (TPN) outgoing alongwith 100KVA lighting transformer (415/433) V in Incomer, Dyn11, Z=4%, $\pm 2 \times 2.5\%$ off ckt. Tap) complete in all respects	No.	1	.0018996
E1A	a. $3\frac{1}{2}$ C x185mm ² AL XLPE for connection between Customer's LV SWGR and ACDB at Sl. No. 1 (Scope includes Laying and Termination of Cables upto Customer's LV SWGR located in FGD Control room)	Meters	600	.003515
E2	415V, 200A, 4 wire AC Emergency Lighting distribution board alongwith 50KVA lighting transformer (415/433 V, Dyn11, Z=4%, (plus or minus) $2 \times 2.5\%$ off ckt. Tap) with 2 nos. of MCCB (TPN) incomers with auto changeover facility using contactors and 8 nos. 100A MCCB (TPN) outgoings complete in all respects.	No.	1	.0018092
E2A	a. $3\frac{1}{2}$ C x185mm ² AL XLPE for connection between Customer's Emergency LV SWGR and ACDB at Sl. No. 2 (Scope includes Laying and Termination of Cables upto Customer's LV SWGR located in FGD Control room)	Meters	600	.003515
E3	Normal AC lighting panel outdoor type with degree of protection IP 55 with one no. 100A MCCB (TPN) Incomer	No.		

Part C : Bill of Quantities

Tender Specification BHEL:PSSR:SCT:2028 for Superstructure (Shell) Civil works, Structural works incl. Flue Liners, Installation of Borosilicate works, Supply and Installation of Electrical works and Elevator

at NTPL Tuticorin Additional RCC Chimney

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
a	18 outgoing (16A SP MCBs)	No.	2	.0010464
b	12 outgoing (16A SP MCBs)	No.	1	.0004347
E4	Emergency lighting panel outdoor type with degree of protection IP 55 with One no. of 100A TPN/MCCB incomer and 12 outgoing (16A, SP MCBs)	No.	2	.0008694
E5	Aviation lighting panel outdoor type with degree of protection IP 55 with one no. 100A MCCB (TPN) Incomer , 8 outgoing 32A MCCB (TPN), photodetector and timer circuit along with 100A contactor to control Aviation lighting systems	No.	1	.0006333
E6	Aviation obstruction lights :	--		
a	Medium intensity (>1600 cd) red flashing lights (20-60 flashes per minute- adjustable) above height of 61 M upto 150M. On platform @Elevation: (i) >= 1/2th of chimney height. (i.e. El. 75.6 mtr.) (ii) Top of the chimney height. (i.e. El. 142.5 mtr.)	No.	8	.0017914
b	Low intensity (>10 cd) steady lights below 61 M. On platform @Elevation: (i) >= 1/4th of chimney height. (i.e. El. 45.0 mtr.) (ii) >= 3/4th of chimney height. (i.e. El. 106.2 mtr.)	No.	8	.0010485
E7	Following type of fixtures will be used:	--		
a	70W LED well glass fixture (for platforms)	No.	24	.0004718
b	30W LED Energy efficient lamp fixture (for staircase)	No.	50	.0004096
c	120W Street light type fixture (for area illumination, illumination at 0.0 level etc.)	No.	5	.0001575
E8	63Amp welding switch socket with plug & other Mounting accessories	No.	6	.0003569

Part C : Bill of Quantities

Tender Specification BHEL:PSSR:SCT:2028 for Superstructure (Shell) Civil works, Structural works incl. Flue Liners, Installation of Borosilicate works, Supply and Installation of Electrical works and Elevator

at NTPL Tuticorin Additional RCC Chimney

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
E9	3 pin, 1 ph, 240V,15Amp. Power sockets complete with plug Switches etc.	No.	12	.0001972
E10	Al conductor, XLPE insulated, Armoured, , PVC outer sheath, FRLS type 1100V grade conforming to IS-7098 Part I.	Meters		
a	3½ C x95mm ² AL XLPE for connection between ACDB/ELDB/ welding sockets	Meters	900	.0023532
b	3½ Cx35mm ² AL XLPE for Lighting panel incoming supply	Meters	600	.0009633
c	4Cx16mm ² AL conductor, XLPE insulated, for Incoming supply to Aviation Distribution Board	Meters	900	.0010999
E12	Control cables shall have stranded annealed tinned copper conductor, 1100V grade HR PVC insulation, extruded PVC inner sheath, galvanized steel wire armoured, overall extruded PVC sheath, FRLS type	--		
a	a) 4CX2.5 mm ²	Meters	300	.0003283
E13	PVC insulated 650/1100V grade stranded Cu Conductor lighting wires conforming to IS-694.	Meters		
a	From Lighting panels to junction boxes : 6 SQ.mm	Meters	3,500	.0012614
b	From junction boxes to lighting fixtures (Number of wires per lead as required) : 2.5 SQ.mm	Meters	200	.0000655
c	From Lighting panels to receptacles (15A) : 6 SQ.mm	Meters	1,500	.0006537
E15	GI conduit 32mm dia with junction Boxes,Pull boxes & accessories	Meters	3,000	.0036664
E16	Electro galvanise flexible steel conduit 32 mm dia with accessories	Meters	150	.0001833
E17	Lightning protection Air terminal 20mm dia solid copper rod with top with lead coating and will have spikes on solid sphere on top.	Meters	6	.0001342
E18	50X6 around the top of each of the flue duct, for a coronal band of lead coated copper strip of size	Meters	150	.0012808

Part C : Bill of Quantities

Tender Specification BHEL:PSSR:SCT:2028 for Superstructure (Shell) Civil works, Structural works incl. Flue Liners, Installation of Borosilicate works, Supply and Installation of Electrical works and Elevator

at NTPL Tuticorin Additional RCC Chimney

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
E19	Earthing materials	--		
i	i) 50 mm x 6 mm GI Flat	Meters	800	.0016199
ii	ii) 25 mm x 6 mm GI Flat	Meters	100	.0001248
iii	iii) 25 mm x 3 mm GI Flat	Meters	250	.0000352
iv	iv) 8 SWG GI wire	Meters	3,500	.0004931
v	TEST LINK BOX 200X200X100MM	No.	4	.0000439
E20	Telephone Socket with junction box	No.	6	.0000499
E21	Telephone cable shall be of minimum 0.6 mm dia annealed high conductivity electro copper conductor. PVC insulated, twisted , PVC tape wrapped, screened, tip corded, PVC sheathed, conforming to relevent ITD (Indian telephone department) specification.	--		
i	20 Pair	Meters	350	.0002156
ii	2 Pair	Meters	100	.0000206
E22	TELEPHONE SET	No.	6	.000074
E23	20 PAIR CROWN TYPE JUNCTION BOX	No.	6	.0000088
E24	GS cable trays. Cable trays shall be of ladder type constructed of minimum 2 mm thick mild steel hot dip galvanised incuding Bolttable support system.	--		
i	600 mm wide	Meter	500	.0029456
ii	300 mm wide	Meter	100	.0003093

Part C : Bill of Quantities

Tender Specification BHEL:PSSR:SCT:2028 for Superstructure (Shell) Civil works, Structural works incl. Flue Liners, Installation of Borosilicate works, Supply and Installation of Electrical works and Elevator

at NTPL Tuticorin Additional RCC Chimney

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
iii	150 mm wide	Meter	200	.0005203
E24A	Supply, fabrication & erection of Cantilever Arm 650mm, Beam Clamp, Double Channel, other items for erection of trays as needed.	Lot	1	.003686
E25	Aviation distribution board (ADB) with one 32A MCCB(TPN) incomer and 6 nos. SP 20A MCB. Construction is same as LP	No.	3	.0024518
E27	40MM MS Rod For Below Ground Earthing (Connection to Main Grid at two points shall also be in Bidder's scope)	RM	300	.0009456
E28	Supply of Mandatory Spares as per Technical Specification	Lot	1	.0026212
1.0	Refer Detailed specification for items specific detailing & Mandatory spares. Scope of design of Electrical items for Chimney is in Bidder's scope.	--		
2.0	Various platforms shall be illuminated by dust tight well glass lighting fixtures. Average illuminations level of 150 lux shall be maintained on equipment and 70 lux on platforms & 100 lux on staircases (minimum 1 lighting fixture at each landing).Any additional fixture to take care of dark patches/shadows shall also be provided. Lighting system shall be controlled through MCB provided in lighting panel.	--		
3.0	A lighting and power panel each shall be located at grade level and at other in between levels as required. All distribution boards, aviation lighting controls, etc. shall be located at grade level only. At each platform, 1 No. 63A, 415V welding receptacle and 1 No. 15A, 240V receptacle shall be provided and shall be fed from power panel. Wiring installation for lighting fixture shall be of PVC insulated copper/aluminium wires through galvanised steel conduits.	--		
4.0	Aviation obstruction lighting system shall conform to the requirements of the latest rules and regulations of the International Civil Aviation Organization (ICAO), National Airports Authority (NAA) and Directorate of Air Routes and Aerodromes (DARA). Aviation obstruction lighting shall be complete with lights, photo cell, controller, special cables, etc.	--		

Part C : Bill of Quantities

Tender Specification BHEL:PSSR:SCT:2028 for Superstructure (Shell) Civil works, Structural works incl. Flue Liners, Installation of Borosilicate works, Supply and Installation of Electrical works and Elevator

at NTPL Tuticorin Additional RCC Chimney

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
5.0	Aviation Warning Lights (AWL) shall be mounted on door panel of required size (open able from interior of chimney shell) fixed to openings in the chimney shell at locations and levels specified elsewhere. Suitable provision for approach to the AWL shall be provided at the platform level. AWL shall be located at about 1-1.5 metre above the top of platform to enable easy handling for maintenance.	--		
6.0	A temporary aviation obstruction lighting system shall be provided during construction of the chimney.	--		
7.0	Cables from distribution board to lighting panels/power panels/receptacles shall be 1100V grade, XLPE insulated armoured aluminum conductor FRLS PVC sheathed with a minimum size of 4 sq.mm. cables shall be laid on galvanised sheet steel cable trays. Cables shall be terminated using double compression type cable glands and solderless crimping type tinned copper cable lugs. All equipment end Cable Lugs and Glands supplied by vendor shall be in vendor's scope.	--		
8.0	Lightning protection system shall comprise minimum 3 vertical air terminations for each flue liner, horizontal air terminations and minimum 4 Nos. of down conductors spaced 90 degrees apart routed all along chimney height on external surface and connected to the earthing system. Above ground level earthing and lightning protection system shall comprise galvanised steel strips. These materials provided at top 12 meters shall have additional coating of 2 mm thick seamless lead cover and the accessories like nuts, bolts, washers etc. shall be of stainless steel to take care of corrosion. Chimney earthing system shall be interconnected to main plant earthing system.	--		
9.0	A temporary lightning protection system shall be provided during construction of the chimney till a permanent lightning protection system is installed. In no case reinforcement bars of Shell should be used as earthing Down Conductors.	--		
10.0	Communication system comprising of telephone socket at every internal platform level and at grade level, necessary wiring installation, a telephone hand set, junction boxes etc. shall also be provided.	--		

Part C : Bill of Quantities

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Installation of Borosilicate works, Supply and Installation of Electrical works and Elevator**

at NTPL Tuticorin Additional RCC Chimney

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
11.0	415V, normal and emergency AC power supply for chimney shall be derived from main plant power supply system. Emergency supply shall feed 20% of platform lighting, 50% of staircase lighting, aviation obstruction lighting and elevator load. All other loads shall be connected on normal power supply.	--		
12.0	Ambient temperature for design of all equipment shall be considered as 55 deg. C which is likely to be encountered inside the chimney.	--		
13.0	Schedule of Equipment has been indicated for reference only. All electrical items shall be supplied on as required basis.	--		
TOTAL Weightage				1.0