

BILL OF QUANTITY AND % WEIGHTAGES FOR ITEM RATES W.R.T TOTAL LUMPSUM PRICE

E-Tender Specification No: BHE/PW/PUR/ MOFG-CVL-CHIMENY/PKG-A (U-01):2179

PART B: % weightage for amount of individual items of Schedule of quantity w.r.t. the total price (as quoted by the bidder in the E-Procurement Portal titled as "Part-C of Vol-II Price Bid".)

Scope of Work: Package- A (Unit#01): Construction of 150M height RCC Single Flue Chimney complete in all respect including pile & pilecap works, fabrication & erection of steel flue cans, installation of Borosilicate Glass Block Lining on Inner Surface of Steel Flue CAN, erection of shop fabricated structural platforms, installation of electrical items in conformity with the approved layout etc to complete the chimney in all respect as per TCC for Unit#01 Chimney at 2x500 MW NTPC Mauda Stage-I FGD Package.

This BOQ & % Weightages is for 'Package-A (Unit#01)' only. The BOQ & % Weightages for 'Package-B (Unit#02)' is exactly same as that for 'Package-A (Unit#01)'.

SL No.	Item Description	Unit	Quantity for Unit#01	Weightage for Unit#01 (%)
SECTION C: Civil Works				
1	Earth work in excavation in all types of soil including ash which can be excavated by any means including setting out, levelling, dewatering (but excluding special type of dewatering viz. well point method), shoring & strutting wherever required (but excluding Steel sheet piling), dressing the sides & bottom, all lifts, ramming/compacting the excavated bottom, stacking, disposal of surplus excavated materials within a lead up to 1 km, spreading/levelling of disposed materials etc all complete for following depths below ground level.			
a	Depth from ground level but not exceeding 2 m	cum	2250	0.15087967
b	Depth exceeding 2 m but not exceeding 4 m	cum	2250	0.18845859
c	Depth exceeding 4 m but not exceeding 6 m	cum	250	0.02595867
7	Back filling upto any depth below ground level around foundations, plinths, trenches, drains etc to proper grade and level in layers not exceeding 250 mm thickness using/with selected materials from compulsorily excavated soil available within a lead upto 1 km and compacted as specified including re-excavation of stacked earth, watering, ramming/compaction by manual/mechanical means, dressing etc all complete for the following including necessary men/women, materials, equipment, loading, transportation, unloading etc as per specification, drawing and as directed by engineer- in-charge.			
b	Each layer compacted so as to achieve at least 90% maximum dry density as per IS-2720 (Part-VII)	cum	250	0.01463794
8	Back filling upto any depth below ground level around foundations, plinths, trenches, drains etc to proper grade and level in layers not exceeding 250 mm thickness using/with selected materials directly from excavation and compacted as specified including watering, ramming/compaction by manual/mechanical means, dressing etc all complete for the following including necessary men/women, materials, equipment, loading, transportation, unloading etc as per specification, drawing and as directed by engineer- in-charge.			
b	Each layer compacted so as to achieve at least 90% maximum dry density as per IS-2720 (Part-VII)	cum	50	0.00173482
9	Extra over item No. 1 and 3 to 7 for carriage of excavated earth/selected materials for every 500 m or part thereof beyond an initial lead of 1 km.	cum	4500	0.05153002
10	Back filling upto any depth below ground level around foundations, plinths, trenches, drains etc to proper grade and level in layers not exceeding 250 mm thickness using/with approved borrowed soil (borrowed soil to be arranged by the bidder) and compacted as specified including supplying borrowed soil, royalty (if any), watering, ramming/compaction by manual/mechanical means, dressing etc all complete for the following including necessary men/women, materials, equipment, loading, transportation, unloading etc as per specification, drawing and as directed by engineer- in-charge.			
b	Each layer compacted so as to achieve at least 90% maximum dry density as per IS-2720 (Part-VII)	cum	1600	0.47070948
11	Supplying and filling sand upto any depth below grade slab, around foundations, etc. in layers not exceeding 250 mm thickness and compacted so as to achieve at least 80% relative density as per IS-2720 (Part-XIV) including spreading, watering, ramming/compaction by manual / mechanical means, dressing, royalty (if any) etc. all complete including necessary men/women, materials, equipment, loading, transportation, unloading etc as per specification, drawing and as directed by engineer- in-charge.	cum	520	0.54862061
12	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 200 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	190	0.18036979
13	Providing and laying Nominal Mix plain cement concrete (M 7.5) 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, equipment, handling, transporting, batching, curing, testing etc. all complete as per specifications, drawings and instructions of the Engineer. (Cement shall be supplied by BHEL free of cost)	cum	110	0.2342151
A13	Providing and laying Nominal Mix plain cement concrete (M 10) 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, equipment, handling, transporting, batching, curing, testing etc. all complete as per specifications, drawings and instructions of the Engineer. (Cement shall be supplied by BHEL free of cost)	cum	100	0.21292282
14	Providing and laying design mix cement concrete with graded aggregate (maximum size of coarse aggregate not exceeding 20 mm) for reinforced concrete work 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 supplied by BHEL free of cost)			
i	For all works below ground level (except chimney shell)			
b	Grade M-30 (foundations, etc)	cum	2400	5.79795874
ia	Extra over St. No. 14(i) for controlling of temperature of fresh concrete for raft/pilecap to less than 23 degree centigrade using ice, including all related arrangements for providing, storing and mixing of ice with water, cooling of aggregates etc. All complete as per specification, drawing and instruction of engineer in charge.	cum	1800	0.34398665
ii	For all other works			
a	Grade M-25 grade level slab, pit, trenches, drain etc.	cum	55	0.13213759
c	Grade M-35 for chimney shell, corbels and external platforms and other shell attachments.	cum	4470	13.90560898
d	Grade M-25 for all other components of the super structure, roof slab, mini -shells, beams, columns wall etc.	cum	20	0.04855973

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SL No.	Item Description	Unit	Quantity for Unit#01	Weightage for Unit#01 (%)
15	Providing and applying three 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	900	0.10231351
15A	Providing brick work in cement mortar 1:6 (1 part cement 6 parts coarse sand) in walls, chambers etc. in thickness varying from 230mm to 460mm at all depths, places and positions below plinth including raking out joints, curing, scaffolding etc. complete excluding plastering and painting. 'Using fly ash lime bricks confirming to IS 12894 with crushing strength of 50 kg/cm2(including cost of cement for brick making). (CEMENT FOR MORTAR FOR BRICKWORK SHALL BE SUPPLIED BY BHEL FREE OF COST)	cum	30	0.10347423
15AA	Dismantling concrete work for all types of structures at all levels including stacking of servicable material to a lead of 500 m and disposal of unservicable material upto a lead of 2 km, cutting of reinforcement, labour, equipment, safety precautions etc all complete as per drawings, specification and instructions of engineer in charge.			
a	Plain cement concrete of all grades	CUM	10	0.00467741
b	Reinforced cement concrete of all grades	CUM	25	0.01698044
16	Providing and placing steel reinforcements of TMT steel of grade Fe-500 /Fe 500D confirming to IS:1786 and having minimum elongation 14.5% , for reinforced concrete work, at all levels, for all kinds of work, including transportation, 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.			
i	For all works below ground level (except chimney shell)			
a	High strength deformed bars (TMT shall be supplied by BHEL free of cost)	Mt	353.60	2.02688396
ii	For all other works			
a	Mild steel reinforcement bars	Mt	10	0.38906483
b	High strength deformed bars (TMT shall be supplied by BHEL free of cost)	Mt	492	3.02324701
17	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.			
i	For all works below ground level (except chimney shell)	Sqm	815	0.22530363
ii	For all other works			
a	Inner and outer faces of wind shield with slip form shuttering	Sqm	16420	13.11864292
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	450	0.42135293
18	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	120	0.11236078
19	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	60	0.00206635
20	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	28	0.01307431
21	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	420	0.05289585
22	Preparing detailed fabrication drawings and after approval by the Engineer, 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 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. (Material supply including structural steel parts is in the scope of contractor)	Mt	3	0.13731987
B23	Transportation from BHEL Store/ Plant Gate, loading/unloading, storage, Erection of structural steel of grade E 250 in rolled/ built up section at shop 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, alignment, erection bolts & nuts (weight of erection bolts and nuts not payable), assembly etc all complete. (Shop fabricated steel structures shall be sprovided by BHEL Free of Cost) (Payment Break up: Erection :70% & Alignment and Welding : 30 %)	Mt	220	1.43070365
AB23	Addition to, alterations in and/or modification of "Erection Marks" including cutting of parts, gauging of welds, cutting, grinding, fabrication, welding, drilling holes, straightening, removal of bends, raising to the required level, painting, transportation, return of unutilised steel pieces to the project store, temporarily dismantling, cutting, re-welding, supporting and restoring to correct position of all the temporarily dismantled members, realignment of adjacent connected members (weight of such temporarily dismantled and adjacent members not payable) etc all complete for the following: (Shop fabricated steel structures & Structural Steel shall be issued by BHEL Free of Cost)	Mt		
a	In erected position	MT	0.5	0.00518236
b	In fabrication yard	MT	0.5	0.0043354

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AAB23	Touch painting of the erected structures	Sqm	25	0.00712397
A24	Transportation from BHEL store/ plant gate, loading/unloading, storage, fabrication, erection and alignment of factory made chequered plate with mild steel conforming to IS:2062 in platforms, staircases with edge binding strips and anti-skid nosing in treads etc. including 2 coats of redoxide zinc-chromate primer (one coat at shop and one coat after erection), fixing clamps, fittings, fixtures, all taxes, duties, packing, grinding, drilling, welding, edge preparation, etc. all complete. (Structural Steel including chequered plates shall be issued by BHEL Free of Cost)	Mt	40	0.75912801
25	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	75	0.86903583
26	Transportation from BHEL store/ plant gate, loading/unloading, storage, fabricating and erecting at all levels, structural steel flues (liners) of grade E250 conforming to IS:2062 complete with all bends, flanges, stiffeners, all other flue attachments, support system, staying system, collars, access manholes and gas sampling ports alongwith gaskets,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. and other required accessories, , including connection design & preparation of fabrication drgs and appointment of a seperate agency for review and approval of fabrication drgs in consultation with BHEL, all complete as per specifications and drawings. (Structural Steel shall be issued by BHEL as Free of Cost)	Mt	335	8.33579127
26 (i)	Supply & application including blast cleaning of outer surface of steel flue liner to near white metal surface conforming to Sa 2 ½ finish of ISO 8501-1 with surface profile 40-60 Micron and providing and applying two component moisture curing zinc (ethyl) silicate primer coat (having minimum 80% of metallic Zinc content in dry film, solid by volume minimum 60% ±2%) of minimum 70 micron DFT 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. Zinc dust composition and properties shall be Type-II as perASTM D520-00. Primer coat shall be applied in Shop immediately after blast cleaning by airless spray technique.	SqM	2650	0.34262749
26 (ii)	Providing and applying (by airless spray technique) on outer surface of steel flue liner, an intermediate coat of two component polyamide cured epoxy with MIO Content (containing lamellar MIO minimum 30% on pigment, solid by volume minimum 80% ±2%) of minimum 100 micron DFT after an interval of minimum 24 hours (from the application of primer coat) and of approved make including the cost of all labour, material, equipments, protection and cleaning, scaffolding, touch-up painting etc. all complete as per drawing and specifications.	SqM	2650	0.29569342
26 (iii)	Providing and applying on outer surface of steel flue liner, Finish coat of two-pack aliphatic Isocyanate cured acrylic finish paint (solid by volume minimum 55% ±2%) with Gloss retention (SSPC Paint Spec No 36, ASTM D 4587, D 2244, D 523) of Level 2 (after minimum 1000 hours exposure, Gloss loss less than 30 and colour change less than 2.0 ΔE) and minimum 70 micron DFT over steel sections already having intermediate coats, including the cost of all labour, material, equipments, protection and cleaning, scaffolding etc. all complete as per drawing and specifications. This coat shall be applied after an interval of minimum 24 hours (from the application of sealer coat) and within six (6) months (from the completion of Intermediate coat). Colour and shade of the coat shall be as approved by the Employer.	SqM	2650	0.29569342
B26	Installation of closed cell borosilicate glass block lining system at all elevations, on ground or in erected position, with minimum 38 mm thick borosilicate glass block, adhesive membrane having a minimum thickness of 3 mm and primer including blast cleaning of internal surface of steel flue liner to near white metal surface finish conforming to Sa 2 ½ finish as per ISO 8501-1, in supervision, and as directed by and satisfaction of borosilicate glass block manufacturer, testing, ten years full replacement guarantee including getting approval of design/drawings and installation procedure from BHEL/NTPC 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 and onsite supervision of borosilicate glass block supplier shall be provided by BHEL Free of Cost)	SqM	2650	9.38503212
26F	Providing, fabricating and erecting C276 strips, plates, gutters/vanes/pipes, bends, fittings and any other appurtenances as required at all elevation in chimney for collection and withdrawal of condensate from inside of flue liner to outside based on the approved design in line with gas-flow-model study report, sealing, testing including surface preparation, TIG or any other type of specialised welding for C276 Strips etc all complete as per specification, drawing and as directed by the Engineer-in-charge.	Kg	1560	2.51270604
27	Providing, fabricating and installing 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: (All material Spply including Structural Steel is in the scope of contractor)			
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	9	0.54679024
b	32/40 mm nominal bore medium class tubular hand railing for stair case and internal and external platforms.	Mt	13	0.73232271
c	Providing minimum 275 gsm Hot dipped galvanisation on mild steel parts as per specification.	Mt	5	0.08917576
d	Providing minimum 610 gsm Hot dipped galvanisation on mild steel parts as per specification.	Mt	17	0.55561963
29A	Supplying, fabricating and installing gas sampling and gas opacity measurement ports made of C276 pipe in chimney liners, including bolts, non metallic gaskets, cover plates and any other accessories as required, painting etc, all complete as per specification, drawing and as directed by the engineer-in-charge.	kg	100	0.04832754

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SL No.	Item Description	Unit	Quantity for Unit#01	Weightage for Unit#01 (%)
30AA	Supplying, fabricating and erecting titanium sheet (Grade 2 as per ASME B265) wrapped over insulation of chimney liner above roof level, including nuts, bolts, washers, screws and any other accessories as required for proper fixing, surface finishing, testing, preparation of detailed fabrication drawings etc all complete per specification, drawing and as directed by the Engineer-in-charge. (Material Supply including Titanium is in the scope of contractor)	kg	1425	1.50166339
31	Preparing detailed fabrication drawings and after approval by the Engineer, providing, fabricating and installing 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. (All material except SS plate to be supplied by Contractor, Stainless Steel Plate shall be supplied by BHEL Free of Cost)			
a	Stainless steel components.	kg	120	0.00517714
b	Lead Sheets.	Kg	40	0.01019242
A32	Design, supply, fabrication and installation of expansion compensator joints, comprising of non-metallic material (elastomeric) suitable for wet stack operations and 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 nuts, bolts, washers, screws and any other accessories as required, preparation of detailed fabrication drawings etc all complete as per specification, drawing and as directed by the Engineer-in-charge. Design of expansion joint shall comply EPRI guideline to avoid contact of condensate with expansion joint material and to ensure drainage of condensate and the same shall be approved by BHEL/NTPC.	Sqm	20	0.4625222
33	Supply of fabricated ready to install expansion compensator in line with item no A32 as spare including nuts, bolts, washers, screws and any other accessories as required for successful installation.	Sqm	10	0.17016781
37	Supplying, and placing in position (at the beam supports bearings) Neoperne 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	0.22128542
47	Supply and installation of resin bonded rock wool insulation having a density of not less than 100 kg/cu.m with an installed thickness of not less than 100 mm in two layers of each 50 mm thick including plated or galvanised accessories such as pins/studs/anchors/wire netting, speed washers, tying wires, etc, on the outer surface of steel flue liners/on the inside surface of concrete windshield/ inside surface of concrete minishells/ under the cast iron caps and wherever as required at all elevation, testing etc all complete as per specification, drawing and as directed by the Engineer-in-charge.	Sqm	340	0.31855739
49	Supply and packing/sealing of rock wool insulation with loose rock wool having a density not less than 100 kg/cu.m between the insulated minishells at expansion joints/ between the lining segments and wherever as required at all levels including filling, ramming, testing, etc. all complete as per specification, drawing and as directed by the Engineer-in-charge.	Cum	5	0.03580881
50	Providing and painting with acid and heat resisting black bituminous paint conforming to type I(i) of IS:158 in not less than 4 coats having a DFT of not less than 150 microns over inside surface of chimney shell/inside and outside surfaces of minishells/underside of roof slab/ other concrete components/surfaces of the existing chimney and wherever as required etc at all elevation including surface preparation, primer etc so as to give a good finish all complete as per specification, drawing and as directed by the Engineer-in-charge.	Sqm	100	0.0135329
56	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 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	100	0.0241885
57	Providing and painting, with epoxy phenolic coating system in three coats having 220 microns DFT over the external surfaces of chimney shell and wherever as required at all elevation in alternate bands of 'signal red' and 'bright white' colours including surface preparation, primer etc so as to give a good finish all complete as per drawing and specification. The coating system shall be as follows. All concrete surfaces shall be provided with two component transparent polyamide cured epoxy sealer coating (having solid by volume minimum 40% ±2%) of minimum 50 micron DFT to be applied over cleaned surface in multiple coats. Surface to be coated shall be absolutely dry, clean and dust free. Sealer coat shall be followed with the application of Intermediate coat of epoxy phenolic coating (solid by volume minimum 63%) of minimum 100 micron DFT. This coat shall be applied after an interval of minimum 24 hours (from the application of primer coat) by airless spray technique. Intermediate coat shall be followed with the application of finish coat of two-pack aliphatic Isocyanate cured acrylic finish paint (solid by volume minimum 55% ±2%) with Gloss retention (SSPC Paint Spec No 36, ASTM D 4587, D 2244, D 523) of Level 2 (after minimum 1000 hours exposure, Gloss loss less than 30 and colour change less than 2.0 ΔE) and minimum 70 micron DFT. This coat shall be applied after an interval of minimum 10 hours and within six (6) months (from the completion of Intermediate coat), Colour and shade of the coat shall be as approved by the Engineer-in charge.	Sqm	8800	2.37018054

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58	Providing and painting, with epoxy phenolic coating system in three coats having 220 microns DFT over the inside surface of chimney shell above roof/ horizontal surface of shell at top/underside of concrete roof slab and wherever as required at all elevation including surface preparation, primer etc so as to give a good finish all complete as per drawing and specification. The coating system shall be as follows. All concrete surfaces shall be provided with two component transparent polyamide cured epoxy sealer coating (having solid by volume minimum 40% ±2%) of minimum 50 micron DFT to be applied over cleaned surface in multiple coats. Surface to be coated shall be absolutely dry, clean and dust free. Sealer coat shall be followed with the application of Intermediate coat of epoxy phenolic coating (solid by volume minimum 63%) of minimum 100 micron DFT. This coat shall be applied after an interval of minimum 24 hours (from the application of primer coat) by airless spray technique. Intermediate coat shall be followed with the application of finish coat of two-pack aliphatic Isocyanate cured acrylic finish paint (solid by volume minimum 55% ±2%) with Gloss retention (SSPC Paint Spec No 36, ASTM D 4587, D 2244, D 523) of Level 2 (after minimum 1000 hours exposure, Gloss loss less than 30 and colour change less than 2.0 ΔE) and minimum 70 micron DFT. This coat shall be applied after an interval of minimum 10 hours and within six (6) months (from the completion of Intermediate coat), Colour and shade of the coat shall be as approved by the Engineer-in charge.	Sqm	300	0.07049758
59	Proving and laying over the chimney roof, a composite acid and heat protection treatment including providing of slopes for roof drainage including the cost of all labour, material and equipment, etc., complete as required for preparing the roof concrete, laying under bed of plain cement concrete screed to slopes, preparation of screed surface for painting, painting the screed surface with black bituminous paint, applying bitumenmastic in layers, laying acid resisting(A/R) mortar bed and laying 75 mm thick acid resisting(A/R) bricks with A/R mortar, curing, pointing(with phenolic based A/R cement), protection and cleaning, finishing, etc., complete as per drawing and specifications.	Sqm	170	0.34421815
60	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 equipement, transporting, lifting, setting in place, painting, etc. complete as per drawing and specifications.	Each	8	0.0655979
61	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 seaant, 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:			
a	150 mm nominal bore cast iron pipes.	Rm	32	0.05028686
b	150 mm nominal bore medium class galvanised mild steel pipes.	Rm	300	0.57067126
62	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 shall be supplied by BHEL free of cost)	Sqm	380	0.10461967
63	Providing and installing an electrically operated semi grill type steel roll-up door (with the bottom one third of the curtain in solid type) at chimney base, in opening of approx size of 85 square m, 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.	Each	1	0.16876294
64	Providing and installing at any level and location, mild steel, double plate, personnel access doors, in shell openings of size 1.1m by 2.15m, 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.	Each	1	0.01846236
a	Hood Access Hatch	Each	1	0.01508808
68	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	0.14228946
70	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	0.01812923
71	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 (except cement) and cleaning the pocket by compressed air shall be in the scope of the contractor). (Cement shall be supplied by BHEL free of cost)	CUM	0.5	0.00441241
72	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 and accessories complete as per spec. and drawings.	Lumpsum	1	3.51731301
73	Supplying, fabricating and erecting FRP Pipes with all bends, flanges, stiffeners, all other flue attachments, including support system, collars, connection with C276 pipes and any other accessories as required outside chimney flue liner at all elevation based on the approved design in line with gas-flow-model study report, including surface finishing, sealing, lamination, moulding, testing, guarantee/warranty etc. complete as per drawings, specification, manufacturer's recommendations and relevant codes.	Kg	440	0.08673693
	(Original item no MSR 2500) PILING			
	PILING WORK: Piling works including all labour, material (unless otherwise specified in BOQ/contract specification), equipment etc. as per specification, drawings and as directed by engineer - in - charge for the following:			

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BILL OF QUANTITY AND % WEIGHTAGES FOR ITEM RATES W.R.T TOTAL LUMPSUM PRICE

SL No.	Item Description	Unit	Quantity for Unit#01	Weightage for Unit#01 (%)
2501	Mobilisation of hydraulic rotary piling rigs and accessories capable of pile boring/drilling in all types of strata/ash etc., installing various size of bored cast in situ RCC piles to project site and demobilisation of the same after completion of piling works etc all complete. (Payment Beak-up: On mobilization 80% and on demobilization: 20%)	EACH	2	1.41149124
A2504	Installation of Bored cast-in-situ RCC vertical pile as per IS 2911 (Part 1 Sec 2) with diameter and length as specified (length to be measured from pile cut-off level to the bottom of pile) using cement concrete grade M30 conforming to IS:456 with 20 mm nominal size stone aggregates with a minimum cement content of 400Kg per cum of concrete including providing all materials (but excluding reinforcement steel for which measurement/payment shall be made separately), boring/drilling in all types of soil including decomposed rock, providing bentonite slurry and/or casing for stabilization of pile bore, flushing of pile bore, cleaning, providing plasticizer wherever required, breaking pile head to cut off level and exposing pile reinforcement for embedment in pile cap etc including empty boring from ground level to pile cutoff level etc all complete as per specification, drawing and as directed by the engineer-in-charge for the following. (Cement shall be supplied by BHEL free of cost)			
d	Pile with 900 mm diameter and 11 m length below cut off level	EACH	129	4.77636892
A2505	Extra over ST. No. A2504 for pile length more than the specified length of 11 m for the following. (Cement shall be supplied by BHEL free of cost)			
d	Pile with 900 mm diameter	RM	126	0.55195304
A2506	Rebate on ST.No. A2504 for pile length less than the specified length of 11 m for the following. (Cement shall be supplied by BHEL free of cost)			
d	Pile with 900 mm diameter	RM	126	-0.46160927
A2510	Extra over ST.No. A2504/A2505/A2506 for boring/drilling in rock with core recovery of at least 20% for a length not exceeding 3 times the diameter of pile, including Installation of bored cast-in-situ RCC vertical pile as per IS 2911 (Part 1 Sec 2) using cement concrete grade M30 conforming to IS:456 with 20 mm nominal size stone aggregates with a minimum cement content of 400Kg per cum of concrete including providing all materials (but excluding reinforcement steel for which easurement/payment shall be made separately), providing bentonite slurry and/or casing for stabilization of pile bore, flushing of pile bore, cleaning, providing plasticizer wherever required, etc all complete as per specification, drawing and as directed by the engineer-in-charge for the following. (Cement shall be supplied by BHEL free of cost)			
d	Pile with 900 mm diameter	RM	300	7.30641903
A2511	Conducting initial load test upto a maximum test load of 3 times the safe load capacity on single pile as specified in accordance with IS 2911 Part-4 including preparation of pile head for testing, necessary excavation including suitable dewatering (if/as required), all arrangements of loading, unloading, test equipments/ accessories, jacks, recording of results, labour, submission of test report but excluding the cost of installation of pile (installation of pile shall be paid separately) etc. all complete as per specification, drawing and as directed by engineer in - charge for the following:			
a	For vertical compression test by cyclic load method			
iii	900 mm diameter pile	EACH	1	0.08426069
b	For lateral load test			
iii	900 mm diameter pile	EACH	1	0.0440835
2512	Conducting routine load test on single job pile as specified in accordance with IS 2911 (Part-4) including preparation of pile head for testing, necessary excavation, providing all arrangements of loading, unloading, test equipments/accessories, jacks, recording of results, labour, submission of test report etc but excuding the cost of installation of job pile complete as per specification, drawing and as directed by the engineer-in-charge for the following.			
a	For vertical compression test by maintained load method			
iii	900 mm diameter pile	EACH	1	0.04888822
b	For lateral load test			
iii	900 mm diameter pile	EACH	1	0.0440835
A2513	Carrying out pile integrity test on 900mm diameter pile including all arrangements for test, equipments/ accessories, materials, labour, submission of test report etc but excluding the cost of installation of job pile all complete as per specification and as directed by the engineer-in-charge.	EACH	129	0.22021763
				92.60975495
SECTION E: ELECTRICAL WORKS (Design, Engineering, Supply, Installation, testing & commissioning of following items as per specification)				
E1	415V, 200A, 50 KA for 1 sec, 4 wire AC Distribution Board with 1No. incomer (SFU) , 12 nos. of 100A SFU (TPN) outgoing alongwith 100KVA lighting transformer (415/433) V in Incomer, Dyn11, Z=4%, ±2x2.5% off ckt. Tap) complete in all respects	no.	1	0.33375555
E2	415V, 200A, 4 wire AC Emergency Lighting distribution board alongwith 50KVA lighting transformer (415/433 V, Dyn11, Z=4%, ±2x2.5% off ckt. Tap) with 2 nos. of SFU (TPN) incomers with auto changeover facility using contactors and 8 nos. 100A SFU (TPN) outgoing complete in all respects. In case load requirement of chimney can not be met by 50 kVA lighting transformer after considering loading, 100 kVA lighting transformer shall be provided alongwith suitably rated components without any commercial implications to the purchaser..	no.	1	0.4839901
E3	Normal AC lighting panel outdoor type with degree of protection IP 55 with one no. 100A SFU (TPN) Incomer , 20 outgoing (16A SP MCBs)	no.	2	0.16792749
E4	Emergency lighting panel outdoor type with degree of protection IP 55 with One no. of 100A SFU(TPN) incomer and 12 outgoing (16A, SP MCBs)	no.	2	0.14191492
E5	Aviation lighting panel outdoor type with degree of protection IP 55 with one no. 100A SFU (TPN) Incomer , 8 outgoing 32A SFU (TPN), photodetector and timer circuit along with 100A contactor to control aviation lighting system.	no.	1	0.09519301
E6	Aviation obstruction lights (mounted on door panel openable from interior) :			

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SL No.	Item Description	Unit	Quantity for Unit#01	Weightage for Unit#01 (%)
a	High intensity flashing light Type-A (LED type)as per ICAO standard having intensity of 20,0000 candles depending upon background illuminance & flashing frequency 20-60/min with all accessories, photocell, timer etc.	no.	12	2.10996052
b	Temporary obstruction light located at diametrically opposite points at the top of chimney during period of construction with four fixture each .	no.	4	0.21365695
E7	Aviation Distribution Board (ADB) with one 32A SFU (TPN) incomer and 8 nos. SP 20A MCB. Construction is same as Lighting Panel.	no.	1	0.06758571
E8	Flood light type 120W(approx) LED luminaire with fitting (integrated /retrofitted LED lamp) having an integral driver.The luminaire efficacy shall not be less than 80 Lm/W.	no.	6	0.09210378
E9	Well glass type 30W(approx) LED luminaire with fitting (integrated /retrofitted LED lamp) having an integral driver.The luminaire efficacy shall not be less than 80 Lm/W.	no.	64	0.18364002
E10	Well glass type 70W(approx) LED luminaire with fitting (integrated /retrofitted LED lamp) having an integral driver.The luminaire efficacy shall not be less than 80 Lm/W.	no.	35	0.20613329
E11	Well glass type 50W(approx) LED luminaire with fitting (integrated /retrofitted LED lamp) having an integral driver.The luminaire efficacy shall not be less than 80 Lm/W.	no.	20	0.08758898
E12	63Amp welding switch socket with plug & other Mounting accessories	no.	6	0.06248842
E13	3 pin, 1 ph, 240V, 20Amp. Industrial Power sockets complete with plug Switches etc.	no.	6	0.02081011
E14	Al conductor, HR PVC insulated, Armoured, PVC inner sheath,PVC outer sheath, FRLS type 1100V grade conforming to IS-1554 Part I.			
a	3½ C x95mm ² Al for connection between ACDB/ELDB/ welding sockets	Mtrs.	1500	0.85681032
b	3½ Cx35mm ² Al for Lighting panel incoming supply	Mtrs.	1000	0.29039398
c	4C x16mm ² Al for connection between ALP/ADB/Aviation Lights	Mtrs.	250	0.06799018
b	4C x 2.5mm ² Cu Control cable for Aviation lighting system	Mtrs.	500	0.0963401
E15	Cu conductor, HR-PVC insulated, PVC inner sheath,PVC outer sheathed and FRLS type 1100V grade conforming to IS-1554 Part I.			
a	2.5 mm ²	Mtrs.	2000	0.08968282
b	4.0 mm ²	Mtrs.	5000	0.3247836
E16	GI pipe conduit with minimum 25 mm dia with GI junction boxes, GI pull boxes (Size 200x200x100mm of 16 SWG sheet steel for junction & pull boxes) & accessories etc. complete in all respects.	Mtrs.	2000	0.39417961
E17	PVC coated Flexible steel conduit 25mm dia with accessories	Mtrs.	100	0.00419061
E18	Lightning protection Air terminal : Lead coated copper material of 20 mm dia & 3 metre long.	no.	6	0.06188479
E19	50x6 Lead Coated GI Strip for coronal band on flue and top platform	Mtrs.	100	0.02918583
E20	Electrical equipment earthing materials including down conductors 50x6 GI Strip	Mtrs.	700	0.18025812
E21	Electrical equipment earthing materials including down conductors 25x3 GI Strip	Mtrs.	700	0.0600491
E22	8 SWG GI wire for equipment earthing	Mtrs.	2000	0.07307013
E23	Test links for 50x6 down conductors enclosed in 200mm X 200mm X 100mm GI box of 16SWG sheet steel.	no.	6	0.03484217
E24	40mm dia MS rod for earthing of down conductor (BHEL will provide Earthing rod free of cost)	Mtrs.	200	0.03449319
E25	Earthpit with earthing electrode including brick chamber with cover, accessories etc. complete in all respect.	no.	6	0.07099935
E26	Telephone socket with junction box etc. complete	no.	6	0.0211711
E27	Telephone handsets complete	no.	6	0.00829125
E28	Telephone cable of minimum 0.6 mm dia annealed high conductivity electro copper conductor, PVC insulated, twisted, PVC tape wrapped, screened, tip corded, PVC sheathed, confirming to relevant ITD (Indian Telephones department) specification			
	a) 24 pairs	Mtrs.	300	0.1229844
	b) 2 pairs	Mtrs.	100	0.00332617
E29	GS cable trays. Cable trays shall be of ladder type constructed of minimum 2 mm thick mild steel hot dip galvanise including cover, cabling material, accessories etc.			
a	150 mm wide	Mtrs.	400	0.29856939
				7.39024506
	Total % Weightage for Unit#01 only			100.000000
NOTES :				
1	Schedule of Equipment has been indicated for reference only. All electrical items/accessories required for completeness of Chimney Electrical System shall be supplied by the contractor without any additional commercial implication during contract execution.			
2	Minimum size of the power cable shall not be less than 2.5 sq.mm copper or 4 sq.mm Aluminuim. Minimum size of control cable shall not be less than 1.5 sq.mm.			
3	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). The type of aviation obstruction lighting system shall be of high intensity aviation obstruction lights having an effective intensity of 4000 to 200,000 cd (minimum) depending upon back ground illuminance. Obstacle lights shall have a day time effective intensity of minimum 200000 cd. The intensity of lights shall be 20000 cd ± 25% at twilight and shall reduce automatically to a night time intensity of 4000 cd ± 25% through the use of photocell. The obstacle lights shall flash simultaneously at a rate between 20 to 60 per minute. A minimum of three levels will be provided with aviation obstruction lights and there will be four light units per level. The lowest level should not be lower than 45 meters above the ground and vertical spacing of the intermediate levels could vary between 45 and 105 meters. The intermediate lights shall be spaced as equally as possible. Aviation obstruction lighting shall be complete with lights, photo cell, controller, special cables, etc.			
4	A temporary lightning protection & earthing system shall be provided during construction of the chimney till a permanent lightning protection & earthing system is installed. In no case reinforcement bars of Shell should be used as earthing Down Conductors.			