

**BHE/PW/PUR/BHFGD-CHIMNEY-PKG-A-U-1/2408**

**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: CIVIL, STRUCTURAL & ARCHITECTURAL WORKS OF 1 NO. CHIMNEY OF 150M OF UNIT-1 AT 2X250MW NSPCL BHILAI FGD PROJECT, BHILAI, DIST - DURG, CHHATTISGARH**

**This BOQ & % Weightages is for 'Package-A (Unit#1)' only. The BOQ & % Weightages for 'Package-B (Unit#2)' is exactly same as that for 'Package-A (Unit#1)'.**

SL No.	Section A: Civil Works	Unit	For Unit#1 chimney (One no. 150 m high single flue chimney) PKG-A (Quantity)	Weightage%
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	<b>2050</b>	0.1426160
b	Depth exceeding 2 m but not exceeding 4 m	cum	<b>2010</b>	0.1743600
c	Depth exceeding 4 m but not exceeding 6 m	cum	<b>1970</b>	0.2131900
d	Depth exceeding 6 m but not exceeding 8 m	cum	<b>1210</b>	0.1642000
e	Depth exceeding 8 m but not exceeding 10 m	cum	<b>200</b>	0.0326370
3	Earth work in excavation in soft rock (rock without any recovery of excavated materials in the form of hard stone/boulder) including weathered rock which can be excavated by means of crow bar, pick axe, pneumatic rock breaker attachment with excavator machine etc but does not require chiselling or blasting including setting out, levelling, dewatering (wherever required), shoring & strutting (wherever required), dressing the sides & bottom, all lifts, ramming/compacting the excavated bottom, stacking, disposal of surplus excavated materials within a lead upto 1 km, spreading / levelling of disposed materials etc all complete for following depths below ground level including necessary men/women, materials, equipment, loading, transportation, unloading etc as per specification, drawing and as directed by engineer- in-charge.			0.0000000
b	Depth exceeding 2 m but not exceeding 4 m	cum	<b>50</b>	0.0061830
c	Depth exceeding 4 m but not exceeding 6 m	cum	<b>100</b>	0.0148410
d	Depth exceeding 6 m but not exceeding 8 m	cum	<b>100</b>	0.0178090
e	Depth exceeding 8 m but not exceeding 10 m	cum	<b>200</b>	0.0409610

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7	Back filling upto any depth below ground level around foundations, plinths, trenches, drains etc to proper grade and level in layers not exceeding 300 mm compacted 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.			0.0000000
b	Each layer compacted so as to achieve at least 90% maximum dry density as per IS-2720 (Part-VII)	cum	3400	0.2452950
8	Back filling upto any depth below ground level around foundations, plinths, trenches, drains etc to proper grade and level in layers not exceeding 300 mm compacted 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.			0.0000000
b	Each layer compacted so as to achieve at least 90% maximum dry density as per IS-2720 (Part-VII)	cum	350	0.0138270
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	3600	0.0216430
11	Supplying and filling sand upto any depth below grade slab, around foundations, etc. in layers not exceeding 300 mm compacted 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	325	0.3249130
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	475	0.4251010

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13	Concrete laying of Nominal Mix plain cement concrete (M 7.5) with graded aggregate (with maximum size of coarse aggregate not exceeding 40 mm) as per Scope Matrix at all levels for all kinds of work like mass concrete, lean concrete, mudmat, filling etc. including labour, handling, curing etc. all complete as per specifications, drawings and instructions of the Engineer. <b>(BHEL will provide RMC free of cost as per TCC)</b>	cum	<b>90</b>	0.0264950
14	Concrete laying of design mix cement concrete with graded aggregate (maximum size of coarse aggregate not exceeding 20 mm) as per Scope Matrix for reinforced concrete work at all levels for all kinds of work, including labour, handling, placing, levelling, compacting, curing, 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: <b>(BHEL will provide RMC free of cost as per TCC)</b>			0.0000000
i	For all works below ground level (except chimney shell)			0.0000000
b	Grade M-30 (foundations, etc)	cum	<b>2500</b>	0.7359850
ii	For all other works			0.0000000
a	Grade M-25 grade level slab, pit, trenches, drain etc.	cum	<b>55</b>	0.0161910
c	Grade M-35 for chimney shell, corbels and external platforms, roof slab and other shell attachments.	cum	<b>3500</b>	5.1962250
15	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	<b>1650</b>	0.2867170
16	Providing and placing steel reinforcements of High yield strength deformed TMT steel bars of grade Fe-500 having minimum elongation of 14.5 % or Fe-500D, and conforming to other requirements of IS 1786, 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.			0.0000000
i	For all works below ground level (except chimney shell)			0.0000000
a	High strength deformed bars ( <b>TMT shall be supplied by BHEL free of Cost</b> )	Mt	<b>275</b>	2.4095210
ii	For all other works			0.0000000
a	Mild steel reinforcement bars ( <b>Supply of Mild steel reinforcement by Contractor</b> )	Mt	<b>5</b>	0.2973530

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b	High strength deformed bars (TMT shall be supplied by BHEL free of Cost)	Mt	<b>385</b>	3.6183900
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, tieing, nailing, caulking, bolting etc. and removal of form work and staging etc. all complete as per specifications, drawings and instructions of the Engineer.			0.0000000
i	For all works below ground level (except chimney shell)	Sqm	<b>700</b>	0.2957910
ii	For all other works			0.0000000
a	Inner and outer faces of wind shield with slip form shuttering	Sqm	<b>13500</b>	16.4866040
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	<b>350</b>	0.5009340
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	<b>100</b>	0.1431240
19	Providing and placing in position at all levels, building paper (kraft paper), as per IS:1397, between concrete surfaces incluing the cost of labour, material, etc. complete as per drawings and instruction of the Engineer.	Sqm	<b>50</b>	0.0026320
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	<b>25</b>	0.0178430
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	<b>350</b>	0.0673780
22	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.	Mt	<b>2</b>	0.1399330

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B23	Transportation from store and erection of structural steel of grade E 250 in rolled/ built up section (rolled sections shall be of grade designation E250, Quality A/BR, Semi-killed/ killed conforming to IS 2062. All steel plates shall be of Grade designation E250, Quality BR (fully killed), conforming to IS 2062 and shall be tested for impact resistance at room temperature. Plates beyond 12mm thickness and up to 40mm thickness shall be normalized rolled. Plates beyond 40mm thickness shall be vacuum degassed & furnace normalised and shall also be 100% ultrasonically tested as per ASTM -A578 level B-S2.), 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 C23, D23 & E23), connection design, preparation of fabrication drgs and appointment of a seperate 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 as per drawing and specifications. <b>(Shop fabricated steel structure shall be provided by BHEL free of Cost)</b>	Mt	<b>156</b>	1.8416200
A24	Transportation from store ,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 fixing clamps, fittings, fixtures, all taxes, duties, packing, grinding, drilling, welding, edge preparation, etc. all complete as per drawing and specifications. <b>( Structure steel including Chequered plate shall be supplied by BHEL free of Cost)</b>	Mt	<b>47</b>	1.3634340

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25	Providing and fixing in positing of high strength structural <b>bolts</b> (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 1500 mm long for structural steel work etc all complete.	Quintal	<b>75</b>	1.3283690
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: <b>(All material supply including structural steel is in the scope of Contractor)</b>		<b>0</b>	0.0000000
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	<b>9</b>	0.8357990
b	32/40 mm nominal bore medium class tubular hand railing for stair case and internal and external platforms.	Mt	<b>13</b>	1.1193960
c	Providing minimum 275 gsm Hot dipped galvanisation on mild steel parts as per specification.	Mt	<b>0</b>	0.0000000
d	Providing minimum 610 gsm Hot dipped galvanisation on mild steel parts as per specification.	Mt	<b>22</b>	1.0990870
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 316Land 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. <b>(Material supply including stainless steel is in the scope of Contractor)</b>			0.0000000
a	Stainless steel components.	kg	<b>120</b>	0.0305320
b	Lead Sheets.	Kg	<b>40</b>	0.0158600

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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	50	0.0184860
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 epoxy phenolic 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% $\pm 2\%$ ) 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% $\pm 2\%$ ) 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 $\Delta E$ ) 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	7000	3.3889860

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58	<p>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 epoxy phenolic coating system shall be as follows:-</p> <p>All concrete surfaces shall be provided with two component transparent polyamide cured epoxy sealer coating (having solid by volume minimum 40% <math>\pm 2\%</math>) 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% <math>\pm 2\%</math>) 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 <math>\Delta E</math>) 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.</p>	Sqm	200	0.0950530
59	Providing 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	80	0.2476030
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 equipment, transporting, lifting, setting in place, painting, etc. complete as per drawing and specifications.	Each	8	0.1002690

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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 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:			0.0000000
a	150 mm nominal bore cast iron pipes.	Rm	32	0.0768660
b	150 mm nominal bore medium class galvanised mild steel pipes.	Rm	300	0.8723010
62	Providing and laying 50 mm thick cement concrete flooring (comprising of 12 mm thick metallic 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.	Sqm	270	0.1136240
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, 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.	Sqm	46	11.8663260
64	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.	Each	1	0.0282200
67	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.			0.0000000
a	Hood Access Hatch (approx 750mmx750mm size)	Each	1	0.0230630
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	0.2174970

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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 Combextra 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	<b>0.25</b>	0.0138560
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 and cleaning the pocket by compressed air shall be in the scope of the contractor).	CUM	<b>0.25</b>	0.0033720
72	Supplying and erecting after approval by Engineer a rack and pinion type Elevator of min 400 kg load carrying capacity of cabin floor size of 1100 mm x 1000 mm (min.) , from ground upto top of chimney with landing at various platform level, including all fixtures and accessories complete as per spec. and drawings.	Lumpsum	<b>1</b>	5.3764090
<hr/>				
<b>S.NO</b>	<b>DESCRIPTION</b>			
	<b>Section B: ELECTRICAL WORKS (Design, Engineering, Supply, Installation, testing &amp; commissioning of following items as per specification)</b>			0.0000000
1	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%, ±2x2.5% off ckt. Tap) complete in all respects	No.	1	0.5101640
2	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 MCCB (TPN) incomers with auto changeover facility using contactors and 8 nos. 100A MCCB (TPN) outgoings complete in all respects.	No.	1	0.7398060
3	Normal AC lighting panel outdoor type with degree of protection IP 55 with one no. 100A MCCB (TPN) Incomer.			0.0000000
a	18 outgoing (16A SP MCBS)	No.	2	0.2182700
b	12 outgoing (16A SP MCBS)	No.	1	0.0947360
4	Emergency lighting panel outdoor type with degree of protection IP 55 with One no. of 100A TPN/MCCB incomer and 12 outgoings (16A, SP MCBS)	No.	2	0.2169240

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**Scope of Work: PACKAGE-A: CIVIL, STRUCTURAL & ARCHITECTURAL WORKS OF 1 NO. CHIMNEY OF 150M OF UNIT-1 AT 2X250MW NSPCL BHILAI FGD PROJECT, BHILAI, DIST - DURG, CHHATTISGARH**

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5	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	0.1455080
6	Aviation obstruction lights : High intensity Type-A flashing white light having minimum intensity of 200,000 candela . With intergral flasher & intensit control and lateched lid for easy flashtube replacemnet. The same shall have three auto switched intensities-day/twilight and night.	No.	12	0.0000000
7	Following type of fixtures will be used: a) 70W LED well glass fixture (for platforms) b) 30W LED Energy efficient lamp fixture (for staircase) c) 120W Street light type fixture ( for area illumination, illumination at 0.0 level etc.)	No.	20	0.1800490
8	63Amp welding switch socket with plug & other Mounting accessories with degree of protection IP 55.	No.	4	0.0636780
9	3 pin, 1 ph, 240V,20 Amp. Power sockets complete with plug Switches etc with degree of protection IP 55 .	No.	8	0.0424120
10	Al conductor, XLPE insulated, Armoured, , PVC outer sheath, FRLS type 1100V grade conforming to IS-1554 Part-I a. 3½ C x95mm <sup>2</sup> AL XLPE for connection between ACDB/ELDB/ welding sockets b. 3½ Cx35mm <sup>2</sup> Al XLPE for Lighting panel incoming supply c. 4Cx16mm <sup>2</sup> Al conductor, XLPE insulated, for Incoming supply to Aviation Distribution Board	Mtrs.	1000	0.8253470
12	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) 4CX2.5 mm <sup>2</sup>	Mtrs.	800	0.3384660
12	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) 4CX2.5 mm <sup>2</sup>	Mtrs.	1000	0.4657170
12	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) 4CX2.5 mm <sup>2</sup>	Mtrs.	500	0.0341010
13	PVC insulated 650/1100V grade stranded Cu Conductor lighting wires conforming to IS-1554 Part-I a. From Lighting panels to junction boxes : 4 SQ.mm b. From junction boxes to lighting fixtures (Number of wires per lead as required) : 2.5 SQ.mm c. From Lighting panels to receptacles (15A) : 4 SQ.mm	Mtrs.	4000	0.0000000
15	GI conduit with minimum 19 mm dia with junction Boxes,Pull boxes & accessories	Mtrs.	2000	0.3171320
16	Electro galvanise felxible steel conduit with minimum 19 mm dia with accessories.	Mtrs.	1000	0.1046800
17	Lightning protection Air terminal 20mm dia solid copper rod with top with lead coating(2mm tk.) and will have spikes on solid sphere on top.	Mtrs.	18	0.0792830
18	50X6 mm around the top of each of the flue duct, roof top level around outer concrete shell and mid height around concrete shell for a coronal band of lead coated copper strip of size	Mtrs.	150	0.2837830
				0.0669190

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19	Earthing materials/ Down conductors			0.0000000
i)	50 mm x 6 mm GI Flat	Mtrs.	1000	0.3936230
ii)	25 mm x 6 mm GI Flat	Mtrs.	50	0.0098400
iii)	25 mm x 3 mm GI Flat	Mtrs.	200	0.0262240
iv)	14 SWG GI wire	Mtrs.	3800	0.1358460
v)	8 SWG GI wire	Mtrs.	200	0.0125120
vi)	TEST LINK BOX 200X200X100MM	No.	4	0.0358800
vii)	40mm dia MS rod for earthing of down conductor(BHEL will provide Earthing Rod free of Cost)	Mtrs.	200	0.0590680
20	Telephone Socket with junction box	No.	5	0.0230080
21	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 relevant ITD ( Indian telephone department) specification.			0.0000000
	20 Pair	Mtrs.	350	0.1114800
	2 Pair	Mtrs.	100	0.0056960
22	Telephone set	No.	5	0.0118320
23	20 pair crown type junction box	No.	5	0.0632210
24	GS cable trays. Cable trays shall be of ladder type constructed of minimum 2 mm thick mild steel hot dip galvanised.			0.0000000
	600 mm wide	Mtrs.	100	0.1108470
	300 mm wide	Mtrs.	100	0.0835070
	150 mm wide	Mtrs.	300	0.2211130
25	Aviation distribution board (ADB) with one 32A MCCB(TPN) incomer and 6 nos. SP 20A MCB. Construction is same as LP	No.	3	0.1518180
1	A list of Mandatory Spares parts for Aviation Obstruction Lighting System is described below:			0.0000000
i)	Power Supply Card	Nos.	3	0.1272880
ii)	Electronic Flasher Card	Nos	2	0.0741530
iii)	Photocell Control Unit - 3 sets	Sets	2	0.0391650
iv)	Spare lamp/tube with holder for Aviation Obstruction Lighting fixture	Nos.	6	0.1879950
	<b>Sub Total Part- (A+B)</b>			<b>73.4258060</b>
	<b>Section C: Flue Works</b>			

**BHE/PW/PUR/BHFGD-CHIMNEY-PKG-A-U-1/2408**

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C4000	Flue works: Including all labour, material (unless otherwise specified in BOQ/contract specification), equipments unless otherwise specified, transportation, handling etc. at all level as per specification, drawings and as directed by engineer - in - charge for the following:			
C4001	Providing, fabricating and erecting at all levels, <b>flues</b> complete with all bends, flanges, stiffeners, all other flue attachments, support system, staying system, collars, cap, access manholes and gas sampling ports alongwith gaskets, cover plates, pipes, bends, fittings, condensate collection and withdrawal arrangement in line with gas-flow-model study report and any other appurtenances as required including material, equipment, transporting, lifting to all heights, setting in place, cutting, grinding, rolling, edge preparation, drilling, bending, electrodes and other consumables, alignment, erection bolts and bolting, welding, preheating and post-heating for welding, testing, etc. and other required accessories, 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.			
i)	Components made of structural steel of grade E250 conforming to IS:2062 ( <b>Structural Steel shall be Provided by BHEL Free of Cost as per TCC</b> )	MT	195	7.416824
v)	Components made of titanium (Grade 2 as per ASME B265). ( <b>BHEL will provide Titanium plate free of cost</b> )	MT	7	2.184972
vi)	Components made of C276.	KG	1500	3.787638
vii)	Components made of SS of grade A316L.	KG	50	0.012721
viii)	Components made of acid resistant FRP	KG	300	0.101272
C4002	Supply & application including blast cleaning of outer surface of steel flue and stiffner 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 per ASTM D520-00. Primer coat shall be applied immediately after blast cleaning by airless spray technique.	SQM	1950	0.385382
C4003	Providing and applying (by airless spray technique) on outer surface of steel flue and stiffner, 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	1950	0.332592

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C4004	Providing and applying on outer surface of steel flue and stiffner, 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	1950	0.332592
C4005	Transportation from store, installation of borosilicate glass block lining system at all elevations, on ground or in erected position, with minimum 38 mm thick closed cell borosilicate glass block and two component adhesive membrane having a minimum thickness of 3 mm including preparation, 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 and application of suitable primer, testing, installation procedure from BHEL/owner 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 glass block lining shall be done in supervision and as directed by and satisfaction of borosilicate glass block manufacturer 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. <b>(Borosilicate Glass Blocks, Primer, Adhesive and onsite supervision of borosilicate glass block supplier shall be provided by BHEL Free of Cost)</b>	SQM	1950	10.556157
C4008	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 /owner	SQM	30	1.060486
C4009	Supply of fabricated ready to install expansion compensator in line with item no C4008 as spare including nuts, bolts, washers, screws and any other accessories as required for successful installation.	SQM	10	0.260111
C4013	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	10	0.109471
C4014	Providing, and fixing asbestos ropes at expansion joints at all elevation for packing/sealing etc all complete as per specification, drawing and as directed by the Engineer-in-charge for the following.			0
b	12 mm diameter	Rm	210	0.033921
<b>Sub total Part-C</b>				<b>26.574139</b>