

ADDENDUM TO BASIC SCHEDULE OF RATES (BSR)-2018

FOR

MAINTENANCE WORKS OF EHV SUBSTATIONS

Preamble:

The maintenance works of the EHV substations is essential to meet the reliability of the power supply and maintaining various key performance indicators prescribed by the regulator. The existing BSR have been updated for new items and have made more granular for various maintenance activities. The switchyard items/ equipments have been categorized in this BSR as per voltage level i.e. 765 kV, 400 kV, 220 kV, 132 kV & 33 or 11 kV are coded with E, A, B, C & D type respectively. The maintenance activities/ works for Control Room, General Maintenance, Assistance Support and Testing have been grouped under CR, G, AS & T classifications respectively for more clarity and access.

General Terms & Conditions

1. The BSR items, unit rates, unit of measurement (UOM) are appended at **Annexure-A (Addendum)**
2. For each BSR item, maintenance specification/ technical requirements and actions to be taken by contractor, consumables to be used, testing and measuring instruments/ equipments, if any to be used is appended at **Annexure-B (Addendum)**. The deliverables for payments shall be the verified formats appended at **Annexure-C (Addendum)**.
3. The minimum manpower requirements classified as Skilled, Semi-Skilled and Un-Skilled have been prescribed for various maintenance works wherever required. The qualifications for the Skilled. Semi-Skilled shall be as under:

S. No.	Type of Manpower	Qualification and Experience
1	Skilled	Degree in Electrical Engineering with at-least one year experience in EHV substation maintenance/ construction. or Diploma in Electrical Engineering with at-least two years of experience in EHV substation maintenance/ construction.
2	Semi-Skilled	ITI with the Electrical/ Wiremen/ Fitter trade as per requirement of various maintenance activities.

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4. The rates of the BSR do not include any spares (including of silica gel) and water to be utilized for the maintenance works at EHV substations.
5. The BSR rate includes labour charges and their associated expenditures including statutory liabilities, logistics, transportation and accommodation etc. for accomplishment of EHV substation maintenance works.
6. The BSR rate do not include Goods & Service Tax (GST).
7. The BSR rates include arranging and utilizing of generally required tools and tackles by contractor for EHV substation maintenance works.
8. The BSR rates include arranging and utilizing of consumables by contractor for EHV substation maintenance works.
9. The BSR rates include arranging and utilizing of testing and measuring instruments/ equipments by contractor for testing and measurements at EHV substation during maintenance works. The testing and measuring instruments/ equipments to be used by the contractor shall be of reputed make shall at all times during the measurement/ testing shall have valid calibration certificate from NABL accredited laboratory.
10. The service provider/ contractor shall comply with all the safety norms during the maintenance work at EHV substation. The contractor/ service provider shall maintain and ensure use of safety gears by their deployed manpower. Obtaining of proper shutdown, demarcation of work area under shutdown, precautions for working in live yard, earthing of equipment/ items under shutdown etc. shall be ensured by the contractor during maintenance work at substation.

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WORKSHEET FOR ASSESMENT OF RATES FOR VARIOUS MAINTENANCE WORKS OF 765 kV EQUIPMENT & SERVICES (ADDENDUM OF BSR-2018)

BSR ITEM NO.	ITEM	UOM	Qty	Manpower Required			Time Required to complete the work (in hours)	Total Mandays Required (1 Manday is total 8 working hours per day)			Market Rate of Manpower			Labour Charges for the work			Total Labour Charges	Logistic (@2%)	T&P & Consumables (@ 5%)/ Testing Equipment (per measurement cost basis)	Administrative Expenditure on Total Labour Charges (@15%)	Rate of the Work (in Rs.)	Unit Rate (in Rs.)
				Skilled	Semi Skilled	Un-Skilled		Skilled	Semi Skilled	Un-Skilled	Skilled	Semi Skilled	Un-Skilled	Skilled	Semi Skilled	Un-Skilled						
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
E001	Preventive/ Periodic Maintenance of 1-Phase 765 kV Auto Transformer	Number	1	2	2	6	16.00	4.00	4.00	12.00	500	400	300	2000	1600	3600	7200	144	360	1156	8860	8860
E002	Preventive/ Periodic Maintenance of 1-Phase 765 kV Shunt Reactors (all ratings) with NGR	Number	1	2	2	5	12.00	3.00	3.00	7.50	500	400	300	1500	1200	2250	4950	99	248	794	6091	6091
E003	Preventive/ Periodic Maintenance of 3-Phase 765 kV Class Circuit Breakers	Number	1	2	2	4	8.00	2.00	2.00	4.00	500	400	300	1000	800	1200	3000	60	150	482	3692	3692
E004	Preventive/ Periodic Maintenance of 765 kV Class CT	Number	1	2	2	3	4.00	1.00	1.00	1.50	500	400	300	500	400	450	1350	27	68	217	1661	1661
E005	Preventive/ Periodic Maintenance of 765 kV Class CVT	Number	1	2	2	3	4.00	1.00	1.00	1.50	500	400	300	500	400	450	1350	27	68	217	1661	1661
E006	Preventive/ Periodic Maintenance of 624 kV 1-Phase Surge Arrestor (All rating)	Number	1	2	2	3	4.00	1.00	1.00	1.50	500	400	300	500	400	450	1350	27	68	217	1661	1661
E007	Preventive/ Periodic Maintenance of 3- phase 765 kV motorized Isolators with One Earth Switch (All rating)	Number	1	2	2	5	8.00	2.00	2.00	5.00	500	400	300	1000	800	1500	3300	66	165	530	4061	4061
E008	Preventive/ Periodic Maintenance of 3- phase 765 kV motorized Isolators with Two Earth Switch (All rating)	Number	1	2	2	7	8.00	2.00	2.00	7.00	500	400	300	1000	800	2100	3900	78	195	626	4799	4799
E009	Preventive/ Periodic Maintenance of 1- phase 765 kV motorized Isolators with One Earth Switch (All rating)	Number	1	2	1	4	8.00	2.00	1.00	4.00	500	400	300	1000	400	1200	2600	52	130	417	3199	3199
E010	Preventive/ Periodic Maintenance of 1- phase 765 kV motorized Isolators with out Earth Switch (All rating)	Number	1	2	1	3	8.00	2.00	1.00	3.00	500	400	300	1000	400	900	2300	46	115	369	2830	2830
E011	765 kV Main bus-bar Maintenance (Rigid Type) [3-Phase Bus Section for a 765 kV Diameter]	Number	1	2	2	5	8.00	2.00	2.00	5.00	500	400	300	1000	800	1500	3300	66	165	530	4061	4061

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BSR ITEM NO.	ITEM	UOM	Qty	Manpower Required			Time Required to complete the work (in hours)	Total Mandays Required (1 Manday is total 8 working hours per day)			Market Rate of Manpower			Labour Charges for the work			Total Labour Charges	Logistic (@2%)	T&P & Consumables (@ 5%)/ Testing Equipment (per measurement cost basis)	Administrative Expenditure on Total Labour Charges (@15%)	Rate of the Work (in Rs.)	Unit Rate (in Rs.)
				Skilled	Semi Skilled	Un- Skilled		Skilled	Semi Skilled	Un- Skilled	Skilled	Semi Skilled	Un- Skilled	Skilled	Semi Skilled	Un- Skilled						
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
E012	765 kV Main/ Jack (cross) Bus-bar Maintenance (Strung Type) [3-Phase Bus Section Insulator String to String]	Number	1	2	2	5	8.00	2.00	2.00	5.00	500	400	300	1000	800	1500	3300	66	165	530	4061	4061
E013	765 kV Jumpers [Main/ Jack Bus/ Line to Equipment (Supporting Post Insulator if any included)]	Number	1	2	2	4	4.00	1.00	1.00	2.00	500	400	300	500	400	600	1500	30	75	241	1846	1846
E014	765 kV Interconnections [Equipment to Equipment (Supporting Post Insulator if any included)]- Rigid/Pipe Type	Number	1	1	1	4	2.00	0.25	0.25	1.00	500	400	300	125	100	300	525	11	26	84	646	646
E015	Maintenance of Earth wire- 765 kV Switchyard (Peak to Peak Section)	Number	1	1	1	6	3.00	0.38	0.38	2.25	500	400	300	188	150	675	1013	20	51	163	1246	1246
E016	Maintenance of Structures- 765 kV Switchyard- All Column and Gantry	Set	1	0	1	4	24.00	0.00	3.00	12.00	500	400	300	0	1200	3600	4800	96	240	770	5906	5906
E017	Maintenance of 765 kV Substation Earthing- Complete Substation Earthing	Set	1	0	2	6	24.00	0.00	6.00	18.00	500	400	300	0	2400	5400	7800	156	390	1252	9598	9598
S001	Services of Hydraulic Lifter (Hydra) for 4 hours. Within 5 KM.	Number	1	0	0	0	4.00	0.00	0.00	0.00	0	0	0	0	0	0	3000	60	150	482	3692	3692
S002	Services of Hydraulic Man Lifter (Hydra) for 4 hours. (with 360 degree rotation) within 5 KM.	Number	1	0	0	0	4.00	0.00	0.00	0.00	0	0	0	0	0	0	4000	80	200	642	4922	4922
S003	Services of To and Fro of Hydraulic Lifter (Hydra) & Hydraulic Man Lifter (Hydra) upto destination (in multiple of 05 KM. and upto 25 km Peripheri start with 06 KM)	(Rate per 5 km.)	1	0	0	0	0.00	0.00	0.00	0.00	0	0	0	0	0	0	406	8	20	65	500	500
S004	Services for loading or unloading on platform of transformer upto 50 MVA.	Job	1	0	0	0	0.00	0.00	0.00	0.00	0	0	0	0	0	0	21000	420	1050	3371	25841	25841
S005	Services for loading or unloading on platform of transformer 100 MVA and 160 MVA.	Job	1	0	0	0	0.00	0.00	0.00	0.00	0	0	0	0	0	0	31500	630	1575	5056	38761	38761
S006	Services for loading or unloading on platform of transformer 315 MVA and 500 MVA.	Job	1	0	0	0	0.00	0.00	0.00	0.00	0	0	0	0	0	0	66150	1323	3308	10617	81398	81398

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BSR ITEM NO.	ITEM	UOM	Qty	Manpower Required			Time Required to complete the work (in hours)	Total Mandays Required (1 Manday is total 8 working hours per day)			Market Rate of Manpower			Labour Charges for the work			Total Labour Charges	Logistic (@2%)	T&P & Consumables (@ 5%)/ Testing Equipment (per measurment cost basis)	Administrative Expenditure on Total Labour Charges (@15%)	Rate of the Work (in Rs.)	Unit Rate (in Rs.)
				Skilled	Semi Skilled	Un- Skilled		Skilled	Semi Skilled	Un- Skilled	Skilled	Semi Skilled	Un- Skilled	Skilled	Semi Skilled	Un- Skilled						
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
S007	Services for transportation of transformer upto 50 MVA from 0-50 kMS.	Rs/Km	1	0	0	0	0.00	0.00	0.00	0.00	0	0	0	0	0	0	870	17	44	140	1071	1071
S008	Services for transportation of transformer upto 50 MVA above 50 kMS.	Rs/Km	1	0	0	0	0.00	0.00	0.00	0.00	0	0	0	0	0	0	783	16	39	126	963	963
S009	Services for transportation of transformer 100 MVA and 160 MVA from 0-50kms.	Rs/Km	1	0	0	0	0.00	0.00	0.00	0.00	0	0	0	0	0	0	1340	27	67	215	1649	1649
S010	Services for transportation of transformer 100 MVA and 160 MVA above 50 kms.	Rs/Km	1	0	0	0	0.00	0.00	0.00	0.00	0	0	0	0	0	0	1206	24	60	194	1484	1484
S011	Services for transportation of transformer 315 MVA and 500 MVA from 0-50 Kms.	Rs/Km	1	0	0	0	0.00	0.00	0.00	0.00	0	0	0	0	0	0	2814	56	141	452	3463	3463
S012	Services for transportation of transformer 315 MVA and 500 MVA above 50 Kms.	Rs/Km	1	0	0	0	0.00	0.00	0.00	0.00	0	0	0	0	0	0	2533	51	127	407	3117	3117
S013	Services for transportation of equipment / instrument in multiple of 7 Tonne above 50 KMS. (Fix Rs.3000+Rs.20 per Km)	Rs/Km	1	0	0	0	0.00	0.00	0.00	0.00	0	0	0	0	0	0	3000	60	150	482	3692	3692

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TECHNICAL SPECIFICATIONS/ REQUIREMENTS FOR VARIOUS BSR ITEMS FOR EHV SUBSTATION MAINTENANCE WORKS

BSR ITEM NO.	ITEM	MAINTENANCE SPECIFICATION/ TECHNICAL REQUIREMENTS	ACTION/ WORKS TO BE CARRIED OUT BY CONTRACTOR/ SERVICE PROVIDER
E001	Preventive/ Periodic Maintenance of 1-Phase 765 kV Class Power Transformer	<ul style="list-style-type: none"> i) Visual Checking of dirt/pollutant deposition on Insulators, crack & chip off in insulators ii) Visual Checking of Oil, Dirt & Pollutant Deposit on Transformer Body, Meter/ Indicator glasses iii) Visual Verification of Oil Level/ gauges in the Bushing, Main Conservator and OLTC Conservator iv) Checking of Leakage of Oil in Main Transformer body and Radiators v) Checking of Tightness of Terminal Connector of HV, MV & LV vi) Checking of Breathers for adequate Silica Gel & its condition vii) Verification of OLTC Operation from Remote/ Local for all tap positions viii) Checking of Cleanliness of Cooler Cabinet, Marshalling Boxes ix) Tightness of Cable Terminations at MK/ Cooler Cabinet and Transformer End x) Checking operation of Temperature Indicators (Local/ Remote) xi) Checking healthiness of Buchholz Relays xii) Checking of PRD Device healthiness xiii) Checking of Operation of Oil Pumps and Cooling fans xiv) Checking of Earthing Leads of Transformer Body/ Neutral 	<p>Action/ Work Requirements:</p> <ul style="list-style-type: none"> i) Cleaning of Insulator Bushings for removal of dirt and pollutants ii) Tightening of all terminal connectors on HV, MV & LV Bushings iii) Operational Healthiness of Buchholz Relays by cleaning of contacts and ensuring healthiness of tripping circuit iv) Operational healthiness of OLTC Operation by Operating from Local/ Remote and remove the difficulty, if due to external circuit faulty. v) Operational healthiness of all the Transformer auxiliary protection operations such as Temperature, PRD, Pump & cooling fan Operations etc. by cleaning contacts and ensuring healthiness of trip/ annunciation circuits vi) Operational healthiness of Breather mechanism by ensuring healthiness of drying medium and proper breathing of transformer to obstruct entering of external moisture inside transformer. vii) Cleaning of Transformer Body and Radiators for dirt and removal of oil stains. viii) Cleaning of Cooler Cabinet/MK for any dirt and spider's web, lizard/ reptile droppings etc. ix) Tightening Cable Terminations in MK/ Cooler Cabinet and transformer end for ensuring proper connectivity.

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			<p>x) Cleaning and tightening of earthing leads of transformer body, neutral, MK/ Cooler cabinet to substation earthmat/ earth-pit.</p> <p>xi) Ensuring swift movement of all moving parts and lubricating the same as required.</p> <p>Minimum Manpower Requirements:</p> <p>i) Skilled: 02 Nos. ii) Semi Skilled: 02 Nos. iii) Un-Skilled: 06 Nos.</p> <p>Consumables to be Used:</p> <p>i) Grease (Grease-G, Tectyl 506) ii) Lubrication oil iii) Emery & Sand Papers iv) Cleaning Solvents (Trichloroethane, Acetone) v) Vaseline vi) Detergent vii) Cotton/ Cloth Pieces</p> <p>Deliverable for Payments:</p> <p>i) Report as per Annexure-C</p>
E002	Preventive/ Periodic Maintenance of 1-Phase 765 kV Class Shunt Reactor (all ratings) with NGR	<p>i) Visual Checking of dirt/pollutant deposition on Insulators, crack & chip off in insulators</p> <p>ii) Visual Checking of Oil, Dirt & Pollutant Deposit on Reactor Body, Meter/ Indicator glasses</p> <p>iii) Visual Verification of Oil Level/ gauges in the Bushing and Main Conservator</p> <p>iv) Checking of Leakage of Oil in Main Reactor body and Radiators</p> <p>v) Checking of Tightness of Terminal Connector of HV & Neutral</p> <p>vi) Checking of Breathers for adequate Silica Gel & its condition</p>	<p>Action/ Work Requirements:</p> <p>i) Cleaning of Insulator Bushings for removal of dirt and pollutants</p> <p>ii) Tightening of all terminal connectors on HV & Neutral Bushings</p> <p>iii) Operational Healthiness of Buchholz Relays by cleaning of contacts and ensuring healthiness of tripping circuit</p> <p>iv) Operational healthiness of all the Reactor auxiliary protection operations such as Temperature, PRD, etc. by cleaning contacts and ensuring healthiness of trip/ annunciation circuits</p>

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		<ul style="list-style-type: none"> vii) Checking of Cleanliness of Marshalling Boxes viii) Tightness of Cable Terminations at MK and Reactor End ix) Checking operation of Temperature Indicators (Local/ Remote) x) Checking healthiness of Buchholz Relays xi) Checking of PRD Device healthiness xii) Checking of Earthing Leads of Transformer Body/ Neutral 	<ul style="list-style-type: none"> v) Operational healthiness of Breather mechanism by ensuring healthiness of drying medium and proper breathing of reactor to obstruct entering of external moisture inside Reactor. vi) Cleaning of Reactor Body and Radiators for dirt and removal of oil stains. vii) Cleaning of MK for any dirt and spider's web, lizard/ reptile droppings etc. viii) Tightening Cable Terminations in MK and reactor end for ensuring proper connectivity. ix) Cleaning and tightening of earthing leads of reactor body, MK to substation earthmat/ earth-pit. x) Ensuring swift movement of all moving parts and lubricating the same as required. <p>Minimum Manpower Requirements:</p> <ul style="list-style-type: none"> i) Skilled: 02 Nos. ii) Semi Skilled: 02 Nos. iii) Un-Skilled: 05 Nos. <p>Consumables to be Used:</p> <ul style="list-style-type: none"> i) Grease (Grease-G, Tectyl 506) ii) Lubrication oil iii) Emery & Sand Papers iv) Cleaning Solvents (Trichloroethane, Acetone) v) Vaseline vi) Detergent vii) Cotton/ Cloth Pieces <p>Deliverable for Payments:</p> <ul style="list-style-type: none"> i) Report as per Annexure-C
E003	Preventive/ Periodic Maintenance of 3-	<ul style="list-style-type: none"> i) Visual Checking of dirt/pollutant deposition on Insulators, crack & chip off in insulators ii) Visual Checking of Dirt & Pollutant Deposit on Circuit 	<p>Action/ Work Requirements:</p> <ul style="list-style-type: none"> i) Cleaning of Insulator for removal of dirt and

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	Phase 765 kV Class Circuit Breaker	Breaker Body iii) Visual Verification & checking of air & gas Pressure gauges & switches iv) Checking of Tightness of Terminal Connectors v) Checking of Breaker Operation (Remote/ Local) vi) Functional Checking of Trip and annunciation Circuits vii) Checking functioning of Operation Counter viii) Checking of Cleanliness of Marshalling & Control Boxes ix) Tightness of Cable Terminations at MK and Control Boxes x) Checking Operation of motor control and other circuits xi) Checking contactors, space heater & illumination of control boxes and MK xii) Checking of interlocks for healthiness xiii) Checking of air drying and air filter for proper operation xiv) Checking of Earthing Leads	pollutants ii) Tightening of all terminal connectors on HV and LV side iii) Operational Healthiness of trip, annunciation, pole discrepancy and lock-out circuits by cleaning of contacts, proper adjustment of pressure gauges setting, control & selector switches. iv) Healthiness of connections by checking continuity and insulation for trip and close coils v) Auto-start operations of motors/ pumps by checking/ rectifying defects of circuits for healthiness vi) Operational healthiness of drying system, air filters for proper cleaning and adjustments. vii) Cleaning of MK for any dirt and spider's web, lizard/ reptile droppings etc. viii) Tightening Cable Terminations in MK and CB end for ensuring proper connectivity. ix) Cleaning and tightening of earthing leads to substation earthmat/ earth-pit. x) Ensuring swift movement of all moving parts and lubricating the same as required. Minimum Manpower Requirements: i) Skilled: 02 Nos. ii) Semi Skilled: 02 Nos. iii) Un-Skilled: 04 Nos. Consumables to be Used: i) Grease (Grease-G, Tectyl 506) ii) Lubrication oil iii) Emery & Sand Papers iv) Cleaning Solvents (Trichloroethane, Acetone) v) Vaseline vi) Detergent vii) Cotton/ Cloth Pieces
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			Deliverable for Payments: i) Report as per Annexure-C
E004	Preventive/ Periodic Maintenance of 765 kV Class CT	i) Visual Checking of dirt/pollutant deposition on Insulators, crack & chip off in insulators ii) Visual Checking of Dirt & Pollutant Deposit on CT Body iii) Checking of Tightness of Terminal Connectors iv) Checking of Oil Leakage and level v) Checking of Cleanliness of Marshalling & Junction Boxes vi) Tightness of Cable Terminations at MK and Junction Boxes vii) Checking of Earthing Leads	Action/ Work Requirements: i) Cleaning of Insulator for removal of dirt and pollutants ii) Tightening of all terminal connectors. iii) Healthiness of connections by cleaning and checking continuity of secondary wiring iv) Cleaning of MK & Junction Box for any dirt and spider's web, lizard/ reptile droppings etc. v) Tightening Cable Terminations in MK/ Junction Box and CT end for ensuring proper connectivity. vi) Cleaning and tightening of earthing leads to substation earthmat/ earth-pit. Minimum Manpower Requirements: i) Skilled: 02 Nos. ii) Semi Skilled: 02 Nos. iii) Un-Skilled: 03 Nos. Consumables to be Used: i) Grease (Grease-G, Tectyl 506) ii) Emery & Sand Papers iii) Cleaning Solvents (Trichloroethane, Acetone) iv) Vaseline v) Detergent vi) Cotton/ Cloth Pieces Deliverable for Payments: i) Checking & Observation Report ii) Action Taken Report
E005	Preventive/	i) Visual Checking of dirt/pollutant deposition on	Action/ Work Requirements:

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	Periodic Maintenance of 765 kV Class CVT	<ul style="list-style-type: none"> ii) Insulators, crack & chip off in insulators Visual Checking of Dirt & Pollutant Deposit on CVT Body iii) Checking of Tightness of Terminal Connectors iv) Checking of Oil Leakage and level v) Checking of Cleanliness of Marshalling & Junction Boxes vi) Tightness of Cable Terminations at MK and Junction Boxes vii) Checking of HF Point earthing and Earthing Leads 	<ul style="list-style-type: none"> i) Cleaning of Insulator for removal of dirt and pollutants ii) Tightening of all terminal connectors. iii) Healthiness of connections by cleaning and checking continuity of secondary circuits at CVT Terminals and Metering Points iv) Cleaning of MK & Junction Box for any dirt and spider's web, lizard/ reptile droppings etc. v) Tightening Cable Terminations in MK/ Junction Box and CVT end for ensuring proper connectivity. vi) Cleaning and tightening of earthing leads to substation earthmat/ earth-pit. <p>Minimum Manpower Requirements:</p> <ul style="list-style-type: none"> i) Skilled: 02 Nos. ii) Semi Skilled: 02 Nos. iii) Un-Skilled: 03 Nos. <p>Consumables to be Used:</p> <ul style="list-style-type: none"> i) Grease (Grease-G, Tectyl 506) ii) Emery & Sand Papers iii) Cleaning Solvents (Trichloroethane, Acetone) iv) Vaseline v) Detergent vi) Cotton/ Cloth Pieces <p>Deliverable for Payments:</p> <ul style="list-style-type: none"> i) Report as per Annexure-C
E006	Preventive/ Periodic Maintenance of 624 kV 1-Phase Class Surge Arrester	<ul style="list-style-type: none"> i) Visual Checking of dirt/pollutant deposition on Insulators, crack & chip off in insulators ii) Checking of Tightness of Terminal Connectors iii) Checking of Surge Counter iv) Checking of Earthing Leads 	<p>Action/ Work Requirements:</p> <ul style="list-style-type: none"> i) Cleaning of Insulator for removal of dirt and pollutants ii) Tightening of all terminal connectors. iii) Healthiness of Surge Counter by cleaning and

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			<p>iv) checking wiring Cleaning and tightening of earthing leads to substation earthmat/ earth-pit.</p> <p>Minimum Manpower Requirements:</p> <p>i) Skilled: 02 Nos. ii) Semi Skilled: 02 Nos . iii) Un-Skilled: 03 Nos.</p> <p>Consumables to be Used:</p> <p>i) Grease (Grease-G, Tectyl 506) ii) Emery & Sand Papers iii) Cleaning Solvents (Trichloroethane, Acetone) iv) Vaseline v) Detergent vi) Cotton/ Cloth Pieces</p> <p>Deliverable for Payments:</p> <p>i) Report as per Annexure-C</p>
E007	Preventive/ Periodic Maintenance of 3-phase 765 kV motorized Isolator with one Earth Switch (All ratings)	<p>i) Visual Checking of dirt/pollutant deposition on Insulators, crack & chip off in insulators</p> <p>ii) Checking of Tightness of Terminal Connectors</p> <p>iii) Checking mechanical and electrical interlocks</p> <p>iv) Checking the condition of Main contacts</p> <p>v) Checking condition of Blades</p> <p>vi) Checking of Alignments of Main Isolator, Earth Switch</p> <p>vii) Checking the earth switch contacts of isolator</p> <p>viii) Checking of aluminum/ copper flexible conductor</p> <p>ix) Checking of Cleanliness of MOM Boxes, space heater, illumination etc.</p> <p>x) Tightness of Cable Terminations at MOM Boxes</p> <p>xi) Checking of the mechanism nut-bolts and pins</p> <p>xii) Checking of drive mechanism of Isolator for auto-cut and over travel</p> <p>xiii) Checking of Earthing Leads</p>	<p>Action/ Work Requirements:</p> <p>i) Cleaning of Insulator for removal of dirt and pollutants</p> <p>ii) Tightening of all terminal connectors.</p> <p>iii) Alignment of main isolator, earth switch mechanism and tightening of nut-bolts, pins etc. for smooth operation</p> <p>iv) Cleaning of main, earth switch and auxiliary contact, replace burnt/ worn out contacts</p> <p>v) Healthiness of drive mechanism for motorized operation by checking/ rectifying circuits, adjustment of limit switches, gears etc.</p> <p>vi) Ensuring swift movement of all moving parts and lubricating the same as required.</p> <p>vii) Cleaning of MOM Box for any dirt and spider's web,</p>

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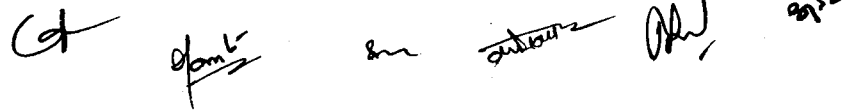
			<p>lizard/ reptile droppings etc.</p> <p>viii) Healthiness of mechanical & electrical Interlocks and MOM circuits by ensuring/ rectifying proper connectivity and tightening of terminals.</p> <p>ix) Cleaning and tightening of earthing leads to substation earthmat/ earth-pit.</p> <p>Minimum Manpower Requirements:</p> <p>i) Skilled: 02 Nos. ii) Semi Skilled: 02 Nos. iii) Un-Skilled: 05 Nos.</p> <p>Consumables to be Used:</p> <p>i) Grease (Grease-G, Tectyl 506) ii) Lubrication oil iii) Emery & Sand Papers iv) Cleaning Solvents (Trichloroethane, Acetone) v) Vaseline vi) Detergent vii) Cotton/ Cloth Pieces</p> <p>Deliverable for Payments:</p> <p>i) Report as per Annexure-C</p>
E008	Preventive/ Periodic Maintenance of 3-phase 765 kV motorized Isolator with Two Earth Switch (All ratings)	<p>i) Visual Checking of dirt/pollutant deposition on Insulators, crack & chip off in insulators</p> <p>ii) Checking of Tightness of Terminal Connectors</p> <p>iii) Checking mechanical and electrical interlocks</p> <p>iv) Checking the condition of Main contacts</p> <p>v) Checking condition of Blades</p> <p>vi) Checking of Alignments of Main Isolator, Earth Switch</p> <p>vii) Checking the earth switch contacts of isolator</p> <p>viii) Checking of aluminum/ copper flexible conductor</p> <p>ix) Checking of Cleanliness of MOM Boxes, space heater, illumination etc.</p> <p>x) Tightness of Cable Terminations at MOM Boxes</p>	<p>Action/ Work Requirements:</p> <p>i) Cleaning of Insulator for removal of dirt and pollutants</p> <p>ii) Tightening of all terminal connectors.</p> <p>iii) Alignment of main isolator, earth switch mechanism and tightening of nut-bolts, pins etc. for smooth operation</p> <p>iv) Cleaning of main, earth switch and auxiliary contact, replace burnt/ worn out contacts</p> <p>v) Healthiness of drive mechanism for motorized operation by checking/ rectifying circuits,</p>



		<ul style="list-style-type: none"> xi) Checking of the mechanism nut-bolts and pins xii) Checking of drive mechanism of Isolator for auto-cut and over travel xiii) Checking of Earthing Leads 	<ul style="list-style-type: none"> vi) adjustment of limit switches, gears etc. Ensuring swift movement of all moving parts and lubricating the same as required. vii) Cleaning of MOM Box for any dirt and spider's web, lizard/ reptile droppings etc. viii) Healthiness of mechanical & electrical interlocks and MOM circuits by ensuring/ rectifying proper connectivity and tightening of terminals. ix) Cleaning and tightening of earthing leads to substation earthmat/ earth-pit. <p>Minimum Manpower Requirements:</p> <ul style="list-style-type: none"> iv) Skilled: 02 Nos. v) Semi Skilled: 02 Nos. vi) Un-Skilled: 07 Nos. <p>Consumables to be Used:</p> <ul style="list-style-type: none"> viii) Grease (Grease-G, Tectyl 506) ix) Lubrication oil x) Emery & Sand Papers xi) Cleaning Solvents (Trichloroethane, Acetone) xii) Vaseline xiii) Detergent xiv) Cotton/ Cloth Pieces <p>Deliverable for Payments:</p> <ul style="list-style-type: none"> ii) Report as per Annexure-C
E009	Preventive/ Periodic Maintenance of 1-phase 765 kV motorized Isolator with one Earth Switch (All ratings)	<ul style="list-style-type: none"> i) Visual Checking of dirt/pollutant deposition on Insulators, crack & chip off in insulators ii) Checking of Tightness of Terminal Connectors iii) Checking mechanical and electrical interlocks iv) Checking the condition of Main contacts v) Checking condition of Blades vi) Checking of Alignments of Main Isolator, Earth Switch vii) Checking the earth switch contacts of isolator 	<p>Action/ Work Requirements:</p> <ul style="list-style-type: none"> i) Cleaning of Insulator for removal of dirt and pollutants ii) Tightening of all terminal connectors. iii) Alignment of main isolator, earth switch mechanism and tightening of nut-bolts, pins etc. for smooth operation

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		<ul style="list-style-type: none"> viii) Checking of aluminum/ copper flexible conductor ix) Checking of Cleanliness of MOM Boxes, space heater, illumination etc. x) Tightness of Cable Terminations at MOM Boxes xi) Checking of the mechanism nut-bolts and pins xii) Checking of drive mechanism of Isolator for auto-cut and over travel xiii) Checking of Earthing Leads 	<ul style="list-style-type: none"> iv) Cleaning of main, earth switch and auxiliary contact, replace burnt/ worn out contacts v) Healthiness of drive mechanism for motorized operation by checking/ rectifying circuits, adjustment of limit switches, gears etc. vi) Ensuring swift movement of all moving parts and lubricating the same as required. vii) Cleaning of MOM Box for any dirt and spider's web, lizard/ reptile droppings etc. viii) Healthiness of mechanical & electrical Interlocks and MOM circuits by ensuring/ rectifying proper connectivity and tightening of terminals. ix) Cleaning and tightening of earthing leads to substation earthmat/ earth-pit. <p>Minimum Manpower Requirements:</p> <ul style="list-style-type: none"> vii) Skilled: 02 Nos. viii) Semi Skilled: 01 No. ix) Un-Skilled: 04 Nos. <p>Consumables to be Used:</p> <ul style="list-style-type: none"> xv) Grease (Grease-G, Tectyl 506) xvi) Lubrication oil xvii) Emery & Sand Papers xviii) Cleaning Solvents (Trichloroethane, Acetone) xix) Vaseline xx) Detergent xxi) Cotton/ Cloth Pieces <p>Deliverable for Payments:</p> <ul style="list-style-type: none"> iii) Report as per Annexure-C
E010	Preventive/ Periodic Maintenance of 1-phase 765 kV	<ul style="list-style-type: none"> i) Visual Checking of dirt/pollutant deposition on Insulators, crack & chip off in insulators ii) Checking of Tightness of Terminal Connectors iii) Checking mechanical and electrical interlocks 	<p>Action/ Work Requirements:</p> <ul style="list-style-type: none"> i) Cleaning of Insulator for removal of dirt and pollutants



	<p>motorized Isolator without Earth Switch (All ratings)</p>	<ul style="list-style-type: none"> iv) Checking the condition of Main contacts v) Checking condition of Blades vi) Checking of Alignments of Main Isolator, Earth Switch vii) Checking the earth switch contacts of isolator viii) Checking of aluminum/ copper flexible conductor ix) Checking of Cleanliness of MOM Boxes, space heater, illumination etc. x) Tightness of Cable Terminations at MOM Boxes xi) Checking of the mechanism nut-bolts and pins xii) Checking of drive mechanism of Isolator for auto-cut and over travel xiii) Checking of Earthing Leads 	<ul style="list-style-type: none"> ii) Tightening of all terminal connectors. iii) Alignment of main isolator, earth switch mechanism and tightening of nut-bolts, pins etc. for smooth operation iv) Cleaning of main, earth switch and auxiliary contact, replace burnt/ worn out contacts v) Healthiness of drive mechanism for motorized operation by checking/ rectifying circuits, adjustment of limit switches, gears etc. vi) Ensuring swift movement of all moving parts and lubricating the same as required. vii) Cleaning of MOM Box for any dirt and spider's web, lizard/ reptile droppings etc. viii) Healthiness of mechanical & electrical Interlocks and MOM circuits by ensuring/ rectifying proper connectivity and tightening of terminals. ix) Cleaning and tightening of earthing leads to substation earthmat/ earth-nit <p>Minimum Manpower Requirements:</p> <ul style="list-style-type: none"> x) Skilled: 02 Nos. xi) Semi Skilled: 01 No. xii) Un-Skilled: 03 Nos. <p>Consumables to be Used:</p> <ul style="list-style-type: none"> xxii) Grease (Grease-G, Tectyl 506) xxiii) Lubrication oil xxiv) Emery & Sand Papers xxv) Cleaning Solvents (Trichloroethane, Acetone) xxvi) Vaseline xxvii) Detergent xxviii) Cotton/ Cloth Pieces <p>Deliverable for Payments:</p> <ul style="list-style-type: none"> iv) Report as per Annexure-C
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E011	765 kV Main bus-bar Maintenance (Rigid Type) [3-Phase Bus Section for a 765 kV Diameter]	<ul style="list-style-type: none"> i) Visual Checking of dirt/pollutant deposition on Insulators, crack & chip off in Bus Post insulators ii) Visual Checking of busbar condition for all jointing points iii) Checking for Bus conductor, Connector (flexible/ rigid), Angular connectors, Corona shields etc. for defect/damage iv) Checking of earthing strips/ earth leads of Bus Post Insulator Support 	<p>Action/ Work Requirements:</p> <ul style="list-style-type: none"> i) Cleaning of Disc Insulators, Bus Post Insulators for removal of dirt and pollutants ii) Tightening of clamps and connectors for Busbar and replacement of defective/ damaged clamps/ connectors iii) Proper fixing and tightening of all flexible/ rigid joint connectors, corona shields. iv) Attending and rectifying the hot-spots identified during the thermo-vision scanning v) Cleaning and tightening of earthing strip/ leads of BPI Support to substation earthmat/ earth-pit. <p>Minimum Manpower Requirements:</p> <ul style="list-style-type: none"> i) Skilled: 02 Nos. ii) Semi Skilled: 02 Nos. iii) Un-Skilled: 05 Nos. <p>Consumables to be Used:</p> <ul style="list-style-type: none"> i) Grease (Grease-G, Tectyl 506) ii) Lubrication oil iii) Emery & Sand Papers iv) Cleaning Solvents (Trichloroethane, Acetone) v) Vaseline vi) Detergent vii) Cotton/ Cloth Pieces <p>Deliverables for Payments:</p> <ul style="list-style-type: none"> i) Report as per Annexure-C
E012	765 kV Main/ Jack (cross) Bus-bar Maintenance (Strung Type) [3-Phase Bus Section	<ul style="list-style-type: none"> i) Visual Checking of dirt/pollutant deposition on Insulators, crack & chip off in Disc/ Long Rod insulators ii) Visual Checking of busbar condition for all jointing points, loosening, spacer positioning, corona shields 	<p>Action/ Work Requirements:</p> <ul style="list-style-type: none"> i) Cleaning of Disc/ Long Rod Insulators for removal of dirt and pollutants ii) Tightening of clamps and connectors on Busbar



	Insulator String to String]	<p>etc.</p> <p>iii) Checking for Bus conductor and jumper damage</p>	<p>and replacement of defective/ damaged clamps/ connectors</p> <p>iii) Tightening and proper fixing of spacers on Busbar and replacement of defective/ damaged spacers, corona shields.</p> <p>iv) Tightening of loose bus-bar sections.</p> <p>v) Attending and rectifying the hot-spots identified during the thermo-vision scanning and loose points identified in testing/ measurements</p> <p>Minimum Manpower Requirements:</p> <p>i) Skilled: 02 Nos.</p> <p>ii) Semi Skilled: 02 Nos.</p> <p>iii) Un-Skilled: 05 Nos.</p> <p>Consumables to be Used:</p> <p>i) Grease (Grease-G, Tectyl 506)</p> <p>ii) Lubrication oil</p> <p>iii) Emery & Sand Papers</p> <p>iv) Cleaning Solvents (Trichloroethane, Acetone)</p> <p>v) Vaseline</p> <p>vi) Detergent</p> <p>vii) Cotton/ Cloth Pieces</p> <p>Deliverables for Payments:</p> <p>i) Report as per Annexure-C</p>
E013	765 kV Jumper [Main/ Jack Bus/ Line to Equipment (Supporting Post Insulator if any included)]	<p>i) Checking of conductor position</p> <p>ii) Proper catenaries and clearances of jumper</p> <p>iii) Checking of loose connections at both terminal points</p>	<p>Action/ Work Requirements:</p> <p>i) Tightening of clamps and connectors of jumpers from/ to Busbar and replacement of defective/ damaged clamps/ connectors/ conductor/spacers</p> <p>ii) Attending and rectifying the hot-spots identified during the thermo-vision scanning</p> <p>Minimum Manpower Requirements:</p>

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				<ul style="list-style-type: none"> i) Skilled: 02 Nos. ii) Semi Skilled: 02 Nos . iii) Un-Skilled: 04 Nos. <p>Consumables to be Used:</p> <ul style="list-style-type: none"> i) Grease (Grease-G, Tectyl 506) ii) Emery & Sand Papers iii) Vaseline iv) Cotton/ Cloth Pieces <p>Deliverables for Payments:</p> <ul style="list-style-type: none"> i) Report as per Annexure-C
E014	765 kV Interconnection [Equipment to Equipment (Supporting Post Insulator if any included)]- Rigid/Pipe Type	<ul style="list-style-type: none"> i) Checking of conductor position for damage ii) Proper fixing of flexible/ rigid connectors iii) Checking of loose connections at both terminal points 	<p>Action/ Work Requirements:</p> <ul style="list-style-type: none"> i) Tightening of clamps and connectors of Interconnections between equipments and replacement of defective/ damaged clamps/ connectors/ conductor/spacers ii) Attending and rectifying the hot-spots identified during the thermo-vision scanning <p>Minimum Manpower Requirements:</p> <ul style="list-style-type: none"> i) Skilled: 01 No. ii) Semi Skilled: 01 No. iii) Un-Skilled: 04 Nos. <p>Consumables to be Used:</p> <ul style="list-style-type: none"> i) Grease (Grease-G, Tectyl 506) ii) Emery & Sand Papers iii) Vaseline iv) Cotton/ Cloth Pieces 	

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			Deliverables for Payments: i) Report as per Annexure-C
E015	Maintenance of Earth wire- 765 kV Switchyard (Peak to Peak Section)	i) Check condition of earth shields for rusting, damage, loose strands, improper sag etc. ii) Check the tightness of nut bolts of strain and Suspension clamps of the earth shields. iii) Check copper bonds to tower and earth leads of earth conductor of various peaks. iv) Checking of earth strip/ leads for connecting to substation earthmat/ earth pit.	Action/ Work Requirements: i) Tightening of clamps and connectors of Earth wire ii) Checking and rectification of loose earth wire iii) Replacement of damaged/ defective clamps/ connectors iv) Checking and rectification of earth strip/ lead for proper earthing. Minimum Manpower Requirements: i) Skilled: 01 No. ii) Semi Skilled: 01 No. iii) Un-Skilled: 06 Nos. Consumables to be Used: i) Grease (Grease-G, Tectyl 506) ii) Lubrication oil iii) Emery & Sand Papers iv) Cleaning Solvents (Trichloroethane, Acetone) v) Vaseline i) Cotton/ Cloth Pieces Deliverables for Payments: i) Report as per Annexure-C
E01E	Maintenance of Structures- 765 kV Switchyard- All Column and Gantry	i) Checking condition of foundation, Rusting of Legs ii) Checking of Foundation Bolts, Nut-bolts of structures iii) Check for rusting of structure	Action/ Work Requirements: i) Tightening of Foundation Bolts ii) Tightening of Nut-Bolts of Structure iii) Cleaning for spider-webs, bird nest etc. Minimum Manpower Requirements:

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			<ul style="list-style-type: none"> i) Skilled: - 0 ii) Semi Skilled: 01 No. iii) Un-Skilled: 04 Nos. <p>Consumables to be Used:</p> <ul style="list-style-type: none"> i) Grease (Grease-G, Tectyl 506) ii) Lubrication oil iii) Emery & Sand Papers iv) Vaseline v) Cotton/ Cloth Pieces <p>Deliverables for Payments:</p> <ul style="list-style-type: none"> i) Report as per Annexure-C
E017	Maintenance of 765 kV Substation Earthing- Complete Substation Earthing	Checking for the position and connectivity of earth leads/ strips for the Towers, Fencing and Structures to Earth mat/ Earth Pits	<p>Action/ Work Requirements:</p> <ul style="list-style-type: none"> i) Tightening of loose earthing leads and strips. ii) Rectification of damaged the earth strip/ leads for continuity to earth-mat/ earth pit. <p>Minimum Manpower Requirements:</p> <ul style="list-style-type: none"> i) Skilled: - — ii) Semi Skilled: 02 No. iii) Un-Skilled: 06 No. <p>Consumables to be Used:</p> <ul style="list-style-type: none"> i) Grease (Grease-G, Tectyl 506) ii) Lubrication oil iii) Emery & Sand Papers iv) Cleaning Solvents (Trichloroethane, Acetone) v) Vaseline vi) Cotton/ Cloth Pieces <p>Deliverables for Payments:</p> <ul style="list-style-type: none"> i) Report as per Annexure-C

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FORMAT OF DELIVERABLES FOR PAYMENTS AGAINST BSR ITEM BY CONTRACTOR/ SERVICE PROVIDER

REPORT FOR PAYMENT OF VARIOUS MAINTENANCE WORK AS PER BSR- (-----)

REPORTING PERIOD: __ (Quarter/ month & Year) __

The inspection/ observation, action taken/ testing report for the various maintenance activities/ works as carried out by the service provider/ contractor for the above reporting period are as under:

S. No.	BSR Item No.	Item Description/ Location at substation	UOM	Quantity	Inspection/ Observation/ Checking/ Action taken/ Testing Report	Date & Time of making inspection & Observation/ Action Taken/ Testing	Details of Shutdown of Transmission Element (if applicable) taken for inspection & action/ testing with date & time/ duration
1		Installation & make details of Equipment with designated bay/ bus (if applicable) or other items installed/ situated at switchyard/ control room			<p>Visual Observation/ Inspection & Checking (as applicable)</p> <p>(List all the inspection/ observation points for items as defined in the BSR)</p> <p>Action Taken/ Testing</p> <p>(List all the action taken on inspection/ observation points and as defined in the BSR for various items)</p> <p>(Testing & Measurement Results/ report as defined in the BSR for various items)</p>	(to be filled)	(to be filled)

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SERVICE PROVIDER/CONTRACTOR
 REPRESENTATIVE

The above items with quantity are verified for the payment to service provider/ contractor as all the actions as required by the BSR item technical requirements have been fulfilled.

AEN/JEN (765/400/220/132 kV GSS)

RVPN, _____

(Official Seal with Signature)

SE/XEN/AEN (765/400/ 220/132 kV GSS)

RVPN, _____

(Official Seal with Signature)

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