

**SCHEDULE OF WORK FOR PERIODICAL MAINTENANCE  
OF HT & LT SWITCHGEAR PANELS AT VARIOUS SUB-STATIONS IN THE FACTORY**

S.NO	DESCRIPTION OF WORK	QTY	UNIT
1	<p>Preventive / Schedule / Breakdown maintenance of all HT 11/6.6KV HT Switchgear panels as per following works to be carried out Total - 214 Nos (all BHEL Bhopal make)</p> <p>a) Opening of all doors, side covers, drawl of breaker from the unit and cleaning &amp; dusting of the equipment with cora cloth and vaccum cleaner. Contractor shall provide all cleaning agents and equipments for the above activity.</p> <p>b) Checking and tightening of the contacts and contact assembly for any pitting, hot spots or any abnormal conditions and replacing damaged contacts with new spares.</p> <p>c) Cleaning the operation mechanism including spring mechanison/motor operation, limit switches etc., of the Breaker.</p> <p>d) Checking and correction of the internal wiring of the unit, testing of the wiring by simulation and submission of the report basing on the status.</p> <p>e) Oiling of the moving mechanision and check for proper operation.</p> <p>f) Checking and replacing the magnetic coils used for the closing and tripping operations.</p> <p>g) Checking the total interlocking by simulation.</p> <p>h) Checking, cleaning including replacement of the damaged bushings/Insulators/Spouts.</p> <p>i) Checking the healthyness of the CTs &amp; PTs and also replacing the defective items.</p> <p>j) Checking the internal wiring of the unit includes metering, indication lamps, switches and replacing the defective items.</p> <p>k) Checking the wiring of the protective relays, simulation of condition and testing of relays for its healthyness.</p> <p>l) Checking and cleaning the vaccum interruptors and replacement of defective units.</p> <p>m) Checking the condition of the insulating oil if required removal of the old oil and filling of the filtered oil. (Drawl and shifting of new oil and filtering the same and shifting the old/removed oil to stores is in the scope of the contractor.</p>	214	sets

S.NO	DESCRIPTION OF WORK	QTY	UNIT
n) o) p) q) r) s)	<p>Checking and tightening of all busbars of switchgear CTs, PTs terminal blocks and checking for any hotspots.</p> <p>Checking of total earth continuity for non conducting items of the switchgear panels.</p> <p>Replacement of damaged gaskets for prevention of dust and entry of insects.Cleaning and closing of any openings at the bottom/side for prevention of entry of rats.</p> <p>Checking the alignment of panels and if required correcting the same.</p> <p>Checking and connecting the external earth flat to meet safety and statutory norms.(concerned earth pit values are to be recorded)</p> <p>Record and submission of IR values of each panel and combination of the panels.</p>		
2	<p>Preventive / Schedule / Breakdown maintenance of all LT switchgear panels as per following works to be carriedout.</p> <p>L.T incoming and outgoing ACB panels of L&amp;T, Marine and JG stator makes of various capacities such as 3200A,2000A,1600A,1250A,1000A and 800Amps etc.,</p> <p>Total --- 350 sets</p> <p>Same as item no (1) of (A) to (S) except (L),(M) activities.</p>	350	sets
3	<p>HT Capacitor Banks (out door)</p> <p>(i) 2016 KVAR --2 sets(each set consists of 24 Nos 84/168 KVAR units)</p> <p>(ii) 1008 KVAR --2 sets(each set consists of 12 Nos 84/168 KVAR units)</p> <p>a) Cleaning &amp; checking of all fixed and movable parts including applying CTC/Grease.</p> <p>b) Checking of limit switch operations for entry and closing door.</p> <p>c) Cleaning and tightening MS and Brass fasteneres including strenthening the same.</p> <p>d) Checking and operation of outdoor AB switches and if requires rectification of same.</p> <p>e) Checking and replacing the HT fuse wires where ever required.</p>	4	sets

S.NO	DESCRIPTION OF WORK	QTY	UNIT
f)	Checking the IR values of Residual Voltage Transformers and capacitor units of 84/168 KVAR. and record.		
g)	Checking and replacement of faulty capacitor units for item III(i&ii)		
h)	Checking and testing of IR values & earth continuity for the entire equipment before and after switching ON & OFF and record the same.		
l)	Periodical cleaning of the floor area and equipment with cora cloth/vaccum cleaner and water.		
j)	Replacement of defective RVTs if required for the available four sets.		
k)	Lugging and crimping with solderless copper lugs for interconnection of capacitor units, RVTs, earth and neutral points wherever required.		
4	<p>LT Capacitor banks (Indoor):-</p> <p>(I) LT capacitor banks of 50 KVAR</p> <p>(ii) LTTSC Banks of 200 KVAR</p> <p>(BHEL, BHOPAL &amp; BANGALORE make)</p> <p>a) Cleaning and checking of the capacitor units for proper operation.</p> <p>b) Dismantelling and shifting of 50KVAR capacitor units which are faulty from existing location to stores.</p> <p>c) Replacement of faulty LT control gear with damaged contactors etc, and fixing new control gears for 50 KVAR units.</p> <p>d) Cleaning and checking of 200 Amps CFS units for 50 KVAR units.</p> <p>e) Replacement of defective 200Amps CFS units for 50 KVAR units.</p> <p>f) Checking and meggering of LT cables from 50KVAR units to control gear and LT ACB panels.</p> <p>g) Replacement of damaged LT cable of 3 1/2 X 95/70 sqmm Al. PVC Insulated with new cable and making its end terminations at both side (Approx lenth 5 mtrs per 50 KVAR units)</p> <p>h) Routine checking, cleaning and functioning LTTSC units.</p> <p>l) Checking of IR values and earth continuity from ACB panel to LTTSC unit.</p>	30	sets

S.NO	DESCRIPTION OF WORK	QTY	UNIT
5	DC Tripping units and its chargers i) 30V,40AH MF batteries and 30V,4A chargers ii) 30V,160AH MF batteries and 30V,20A chargers a) Checking and cleaning of batteries and chargers and apply battery terminal coating wherever required. b) Checking the condition of cells and chargers c) Replacement of damaged MF batteries, PCBs and other defective items with new ones. d) Recording the charging and discharging currents of batteries and submission of same.	50	sets
6	Dusting and cleaning of HT&LT Sub-stations consisting of a total of 267 Nos HT Breaker panels, 531 Nos LT Breaker Panels, 4 sets HT Capacitor Banks, 36 Nos LT Capacitor Banks, 58 Sets Battery Chargers & Tripping units, 85 Nos Transformers located at various Sub-stations inside the plant regularly. The scope of the work includes the following activities (1 operation = 1 USW). a) Lifting the rolling shutters, opening the collapsible doors and dusting the various equipments in the sub-station regularly. The shutter/doors shall be closed after cleaning the Sub-station. b) Cleaning the cobwebs inside the control room and transformer room. c) Cleaning the Cable trenches inside the Sub-stations. d) Party shall arrange coconut brooms, soft brooms etc., for cleaning the Sub-stations.	350	Operations

**NOTE :**

- 1) The HT&LT breakers are located at various sub-stations inside the factory premises. The contractor has to arrange to shift all his testing equipment, tools to various locations to repair, check and test the Breakers as per the instructions of the site engineer.
- 2) The plant will be operating in all the three shifts and necessary shutdowns are to be requested by the contractor and suitably plan his activities as per the availability of the shutdown.
- 3) The contractor shall arrange and organise skilled ITI (Electricians & Elect fitters) manpower to attend the activities.
- 4) No manpower will be supplied by BHEL to handle the equipment.
- 5) All necessary tools and tackles, necessary equipment to attend the activities has to be arranged by the contractor.

- 6) Removal of the CTs, PTs, relays, meters and other auxiliaries is in the scope of contractor.
- 7) Cable lugs, Cable end termination kits will be supplied by BHEL . Contractor has to arrange hydraulic crimping tool for crimping the lugs.
- 8) All safety and protective devices are to be arranged by the contractor.
- 9) The priorities will be decided by BHEL. If necessary contractor shall shift his man power from place to place to meet the emergencies. No extra charges will be paid for such changes.
- 10) All jobs required to make the HT & LT switchgear functional is deemed and have been included in the scope of work.
- 11) Contractor should have valid Grade A 11KV or above Electrical licence issued by CEIG.
- 12) Skilled technicians are required to have work permits of wireman/supervisory licence issued by CEIG.
- 13) Contractor has to depute workers specifically for this job inside BHEL factory premises during BHEL's first shift (0645 hrs to 1515 hrs) and during emergency breakdowns during rest of the day for immediate clearance of breakdowns. The number of labour can be decided by the contractor keeping in view of the Breakdown uptime criteria and penalty clause.
14. Preventive maintenance of the HT/LT Breakers - as per the schedule given by Engineer Incharge. The schedule will be tentative - depending on the availability of the Breakers. Payment will be based on preventive maintenance of actual number of HT/LT breakers.

### Breakdown Maintenance

1. Breakdown Maintenance of HT & LT S/S will be intimated to the contractor same will be noted down in the register. Attending to breakdown maintenance calls in such a way that the Substation HT/LT is put back into operation in best possible minimal time.
2. In case of urgent breakdown, the contractor shall have to retain his staff on working days, and call back on Sundays and holidays as per requirement and as and when instructed by the Engineer In-charge, for completion of urgent breakdowns. However any compensation on this account shall not be paid by BHEL outside the conditions specified in the payment terms.
3. When repair/ maintenance/ modification work gets completed, the actual time (in hours), material consumed, total down time and other information shall be reported to the Engineer Incharge and same will be written in the Register.

### Penalty Clause

S No	Description	Criteria	Penalty
1	<b>Breakdown Maintenance:</b> Breakdown of HT Breakers Breakdown of LT Breakers	Down time of each equipment Should be less than 2% in an year for both HT and LT Breakers. Which means down time should be less than 7 days in an year for every equipment in total.	If down time exceeds 7 days, 0.5% of contract value will be deducted as penalty per day and maximum penalty upto 10% of contract value.