

Annexure II

Minimum Standards & Methodology for Detailed Electrical cum Energy and Safety Audit.

Background:

1. Energy cost is one of the significant contributors of production cost for most of the Buildings & offices. Hence, reduction in energy consumption in electrical, thermal or in any other form by efficient reliable electrical system by nullifying breakdown of system & fire hazards with least loss time injuries towards business operational & manpower cost always helps in business sustenance and growth

The need for Electrical cum energy & safety audit is gaining further importance with increasing energy. Operational manpower cost. The objective is to identify areas where excess energy consumption or wastage of energy is taking place due to insulation failure of under perform electrical gadgets, unbalance load, overloading, heating of gadgets, Distortion level of current and voltage harmonic in electrical system in order to minimize electrical fire hazard incident.

The electrical cum energy audit in branch/office building is a feasibility study to identify energy use among the various services, opportunities for energy conservation as well as technical & economic feasibility aspects. The audit will provide the data on the options available for reducing energy losses, the costs involved, energy consumption pattern, circuit breakdown and also assist with preparing an action plan based on severity of failures of equipment's.

It begins with a detailed, step-by-step analysis of the Electrical system installed in branch/office which includes electrical gadgets energy use factors and costs, such as insulation values, occupancy schedules, efficiencies, lighting levels. It gives trends to improve operations and maintenance practices of electrical gadgets under premature failures which in turn rises the incidences of fire at branches/offices on account of short circuit. The audit is mandatory once in 2 year as per bank Premises policy

2. Coverage of Electrical cum Energy & Safety Audit of Electrical System:

1. Schematic & layout plan for electrical system & Earthing system, Review of present electrical distribution like Single Line Diagram (SLD), transformer loading, cable loading, normal and emergency loads, electricity distribution in various areas/ floors etc.
2. Ensure the work of Electrical cum Energy & Safety audit must be carried out by Government certified auditor who are registered with **Bureau of Energy Efficiency** with capable team having minimum educational qualification of Electrical Engineering degree & five year experience of electrical audit work.
3. Listing out all electrical gadgets working condition & performance with remark.
4. Review of present lighting system, lighting inventories etc.
5. Estimation of lighting load at various locations like different floors, outside (campus) light, pump house and other important locations.
6. Detail lux level survey at various locations and comparison with acceptable standards.

7. Study of present lighting control system and recommend for improvement.
8. Study of Reactive Power Management and option for power factor improvement.
9. Study of power quality issues like Harmonics, current unbalance, voltage unbalance etc.
10. Review of present HVAC system like central AC. Window AC .Split AC, Package AC, Water coolers and air heaters.
11. Performance assessment of window AC. split AC and package AC system.
12. Analysis of air-conditioning system Performance like estimation of Energy Efficiency Ratio (EER i.e. KW/TR) & insulation level.
13. Area wise calculations are done based on Temperature. RH, room size. equipment load. Lighting load, occupancy and compared with details of existing Air-conditioning equipment.
14. Review of DG set operation.
15. Performance Assessment of DG sets in terms of Specific Fuel Consumption (SFC i.e. KWH/Liter.
16. Review. Performance, Safety measures assessment for UPS system & Batteries.
17. Review Or water pumping, storage and distribution systems.
18. Performance assessment of all major water pumps i.e. power consumption vs. flow delivered.
Estimation of pump efficiency etc.
19. Review of present maintenance practice, replacement policies and building safety practices as applicable to high rising buildings and recommend for Improvements.
20. Safety/statutory compliance.
21. Safety Measures for Electrical Installation.
- 22 O&M measures including housekeeping.
- 23 Detail review of present energy monitoring and accounting system in terms of metering, record keeping. data logging, periodic performance analysis etc.
24. Applicable Codal compliance such as Building Code and Energy Conservation Code.
25. Suggestions for Power Quality improvement (including Harmonics)
26. Formulation of conclusion and recommendation of Electrical cum Energy & safety audit and its Compliance for rectification by certified Electrical cum Energy Auditor.

3. Electrical Measurement:

The instrument used for measuring electrical parameter such as KVA. KV, PF, Hz, KVAr Amp and Volt which are applied online. The details are such as Voltmeter/Ammeter (Millimeter), Contact - Thermometer, Infrared Thermometer, Leak detector, Lux meter, Analyzer etc.

1. Measurement of illumination levels.
2. Measurement of Electrical Parameters for Lighting System.
3. Measurement of Electrical Parameters for Air-conditioning system (For Fans, Compressors, Total) & UPS System.

4. Measurement of Electrical Parameters such as Voltage. Current, kVA, kVA_r, THD_v, THD_i, Current harmonics for Capacitor Banks and non-linear loads such as UPS.
5. Analysis of Current Harmonics for feeders with high harmonic content.
6. Measurement of Temperature and RH.
7. Thermal imaging for identifying hot spots with possibility of safety risks, increase the losses and increase the maintenance.

Electrical cum Energy & Safety Audit Format

1. General Information.

1	Name Of Branch/Office & Zone			
2	Type of Branch/office(Metro/Urban/D Semi urban/Rural			
3	Staff strength detail of Branch/Zonal Office/Building	Officers-	Clerk-	Sub Staff
4	Name of designated Security/GAD officer of branches/Office & Zonal office with contact no			
5	Name of Electrical Auditor and contact no Registration No./License No.			

2. Last Audit

Sr. No	Date of last electric audit	Electric risk rating (High/Medium/Low)	Compliance date	Closure Date

3. Electrical Supply Details

Sr. No	Electric supply company/Dept	Sanction Load	Maximum Load (in last one year)	Average Load (in last one year)	Any penalty (in last one year)

3.1 Electric supply (Single phase/Three phase) (please tick)

Phase-I	Phase-II	Phase-III

3.2 Electric Load Distribution (in Volts)

R-phase(R-N)	Y-phase (Y-N)	B- phase(B-N)

4. Earthing System.

Sr No	Separate earthing for UPS anti raw power (Yes/No)	Type of earthing (chemical/Normal)	Earth resistance (in ohm)	Earth pit identified (Yes/No)
	Earthing System review	Status (Functional/Nonfunctional)	Observations	Recommendations

5. Protective & Switching Device.

Sr. No	Equipment's	Quantity/ Rating/ Parameter	Status (Functional/ Nonfunctional)	Observations	Risk Level	Remarks
1.	Air Circuit Breaker/					
2.	(MCB) Miniature Circuit breaker					
3.	(MCCB)Molded Case Circuit Breaker					

4.	(ELCB) Earth Leakage Circuit Breaker					
5.	RCCB (Residual current Circuit breaker)					
6.	Electrical Cable/Wire					

6. Details of Electrical Equipment

Sr. No	Equipment's	Quantity/ Rating/ Paramete	Status (Functional/ Nonfunctional	Observations	Risk Level	Remarks
1.	Computers					
2.	Printers					
3.	Scanner/Color Printer					
4.	Public administration System					
5.	Split ACs/Window Cassettes/Tower / ACs					
6.	Fans					
7.	Router					
8.	Fire alarm and burglar alarm					
9.	CCTV					

10.	DG Sets					
11	UPS System					
12.	Battery System					
13.	Gate pass machine					
14	Flap barrier					
15	Baggage Scanner					
16	Door Scanner					
17	Motor Pump					
18	Others					

7. Lightning System.

Sr.No.	Details of light Fittings (Conventional/LED/CFL)/ LUX Level Sruvey	Quantity/ Rating/ Parameter/ Observations	Status (Functional/ Nonfunctional)	Comparison with acceptable standards	Recommendations

8. Performance Assessment

1.	<p>UPS & Batteries</p> <ul style="list-style-type: none"> > AMC Vendor & Expiry date >UPS Connection (Three Phase/Single Phase <ul style="list-style-type: none"> Any overload in UPS (Yes/No) (if yes give reason/details) (Overload-more than 80% of UPS capacity) >Any battery bypassed with UPS (Yes/No) (if yes give details) >Any chemical rust or loose connection on battery terminal/ lug(Yes/No) <ul style="list-style-type: none"> (if yes give reason/ details) >Unwanted material kept inside UPS & battery room (Yes/No) (if yes, provide details) >No. of Batteries (More than 3 year old) and having capacity below 80% of full capacity >Last date of battery backup test on full load and have any deformity (Give Details) 	Review/Status/ Details
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	Equipment's Study Review & analysis	Quantity/ Rating/ Parameter	Status (Functional / Nonfunctional)	Observations	Risk Level	Remarks

2. A.C UNITS.

	<p>AMC vendor & expiry date (if any)</p> <p>Proper electric connection with compressor. Contactor. relay and capacitor</p> <p>%Auto timer (functional/non- functional) (if provided)</p> <p>>Adequate rating MCB/fuse for ACs unit (Yes/No)</p>					
	Equipment's Study Review & analysis	Quantity / Rating/ Parameter	Status (Functional/ Nonfunctional)	Observations	Risk Level	Remarks
.	<p>Diesel Generator</p> <p>AMC Vendor & expiry date (if any)</p> <p>>Date of last engine oil and filter replacement (Not more than 06 month or 250 running hrs.)</p> <p>All gauges like temp. meter. Voltmeter, ammeter, wattage, KWH. hour meter etc. are working properly (Yes/No) (If no give reason/detail)</p> <p>>Any deformity noise, leakage, fuel consumption rate and spark in exhaust system (Yes/No) (if yes give reason/detail)</p>					Review/Status) Details

11. Other Electrical Works.

Sr No	Electrical Risk	Category (High/Medium/Low)	Observations	Reason/detail and recommendation (For High only)
1	Any hanging electrical wire/temporary electric connection etc. in premises			
2.	Any multi pin plug or extension cable/board use in premises			
3.	Any danaline /loose electric connection or portion of live wire with damage jacket/insulation			
4.	Flammable combustible material dumped near electric panel(Those electrical equipment run on 24x7 basis)			
5.	Voltage fluctuation			
6.	Any MCB/Fuse etc. by pass from the electrical system			
7.	Any other electrical risk			

(Stamp & Signature of Electrical Auditor)

(Stamp &. Signature of Zonal/Branch head! In charge)

Date -

Compliance Certificate

This is to certify that Electrical Audit of Zonal office & its control Branches with total no (As per List) Currency chest has been

Carried out on Date & Compliance wherever required has been made as per Circular No. AX1/CSD/Annexure/AKR/Methodology for detailed Electrical cum Energy Audit/2019-20 dated 03rd September 2019. The certified electric auditor has verified the same & has recommended for closure report.

(Stamp & Signature of Zonal Head/In charge)

Date -