

ELECTRICAL SAFETY AUDIT REPORT

PREPARED FOR



M/s JANKI DEVI MEMORIAL COLLEGE

Sir Ganga Ram Hospital Marg, Old Rajinder Nagar,
Rajinder Nagar, New Delhi - 110060

PREPARED BY



M/s GREENTREE GLOBAL

B-67, Sector 67 Rd, Block B, Sector 67,
Noida, Uttar Pradesh 201301

OCTOBER 2024

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ACKNOWLEDGMENT

M/s GreenTree Global, Noida (hereafter referred to as GreenTree Global) appreciates the keen interest shown by **M/s. Janki Devi Memorial College, New Delhi** (hereafter referred to as **JDMC, New Delhi**) for carrying out an Electrical Safety Audit of their College. The audit was conducted in the month of **September-2024**.

We acknowledge the wholehearted guidance & continuous support extended by **Smt. Swati Pal – Principal**. The Study team members of GreenTree Global would sincerely like to thank all the officials, department heads and support staff members of JDMC, New Delhi who have rendered their all possible assistance and co-operation and courtesy extended to the energy audit team during the entire period of assignment.

We do hope that you will find the recommendations given in this report useful in enhancing workplace safety and minimizing risks related to electrical installations, equipment, and operations. While we have made every attempt to adhere to high quality standards, in both data collection and analysis, as well as in presentation through the report, we would welcome any suggestions from your side as to how we can improve further.

Officials from Janki Devi Memorial College, New Delhi

Smt. Swati Pal – Principal

Energy Audit Team Members for GreenTree Global, New Delhi

Mr. Gurpreet Singh (Sr. Engineer)

Mr. Satish Chandra Madhukar (Engineer)

Mr. Nitin Kumar Mishra (Engineer)

**Dhruv Jain, Director
For GreenTree Global**

ABBREVIATIONS

Avg.	:	Average
BSES, Yamuna	:	Bombay Suburban Electric Supply Yamuna Power Limited
DG	:	Diesel Generator
GreentTree	:	GreenTree Global
PPE	:	Personal protective equipment
HT	:	High Tension
JDMC	:	Janki Devi Memorial College
LED	:	Light Emitting Diode
LT	:	Low Tension
THD	:	Total Harmonics Distortion

1. INTRODUCTION

1.1 INTRODUCCION

JDMC, New Delhi receives its power supply from BSES Yamuna at a high voltage of **11 kV**. The incoming 11 kV is stepped down to **0.433 kV** using one (1) transformer of **400 kVA which is installed and maintained by BSES Yamuna**.

Safety Audit Team visited following facilities during the course of Audit.

- Incoming Supply & SEB's Meter
- LT Panels
- DG Sets Area
- Earthing Systems
- Admin Building
- Hostel
- JDVC
- Library
- Solar Panels

1.2 OBJECTIVE

The main objective of this exercise is to study and critically analyze Electrical Safety System of the Plant with respect to requirements of **“The Electricity Act”, “Indian Electricity Rules 1956” and other relevant standard**.

- a) Physically check, measure, test existing system for its adequacy.
- b) To examine and evaluate the accident prevention measures taken in the electrical system installed.
- c) To analyze the safety procedures, systems and practices.
- d) To observe the working conditions and operating methods, including storage and handling of raw materials and finished products.
- e) To comment upon applicable statutory compliances.

1.3 GENERAL APPROACH & METHODOLOGY

In order to fulfill the above objectives and scope, the following approaches and methodologies were adopted:

- Pre-Audit Meeting (opening meeting) with management and all concerned departments.
- On-site visit to identify electrical hazards as per the scope of the audit such as incoming supply receiving section, electrical equipment installed in building, cabling, earthing, lighting protection, maintenance condition, loose cabling, temporary wiring, electrical fire hazards, shock potential etc.
- Discussion with members of the house
- Review of Documentation / Records (All the relevant maintenance documentation, test records, electrical records, electrical inspector reports)
- Submission of final electrical safety audit (ESA) report to client incorporating agreed changes/comments

2. EXECUTIVE SUMMARY

2.1 KEY POINTS

In conclusion, the following key observations and recommendations have been made regarding the electrical systems:

- **Earthing System:** Immediate attention is required for the earthing system, as there are no visible earth pits throughout the premises except for the solar and admin lifts. The current connections are unclear, and the earthing requirements for the DG and other panels are inadequate. It is essential to ensure that earth pits are housed in 2x2 concrete boxes for proper maintenance. A detailed table (Table-2) has been provided for required earthing locations and equipment specifications.
- **Load Imbalance:** Significant load imbalance has been detected across all electrical distribution panels, resulting in high current flow through the neutral. It is crucial to balance the load on each phase to prevent potential overheating and ensure system stability.
- **Heating Issues:** Thermal imaging has identified heating issues in several panels. A thermography report detailing these findings has been attached as Annexure-A for further review and action.
- **Transformer Connections:** There is a lack of knowledge among college staff regarding the connections of the transformer's outgoing breakers. The audit highlighted the need for a comprehensive understanding of the electrical network, which was attempted using energy meters. It is recommended that a single line diagram (SLD) of the entire electrical and earthing system be developed and displayed on the main panels to enhance understanding and operational efficiency.

Addressing these issues promptly will significantly improve the safety, reliability, and efficiency of the electrical systems in the facility.

3. ELECTRICAL SAFETY POLICY & STATUTORY COMPLIANCE


3.1 ELECTRICAL SAFETY POLICY AND STATUTORY COMPLIANCES

Sr. No.	Check Point	Remarks
1	Safety Policy	➤ Electrical safety policy is not documented at college level by the management.
		➤ Safety awareness training programs are not conducted for staff on regular basis. It is essential to conduct to create aware of occupational safety amongst staff. A mock drill is conducted on non-regular basis.
		➤ Danger sign boards are placed over electrical panels. Assembly point in case of emergency is not defined yet.
2	Reporting process for electrical faults and work permit system	➤ It is appreciated that, electrical system faults are reported immediately. ➤ Entire facility is managed by one team of electrical. Any kind of electrical fault is reported to this team for entire campus (Hostel, JDVC, Admin building, others). ➤ No proper log books are maintained for any attended faults or repairs. It is recommended to have proper documentation of above process using "log-books" for future use. (Electrical faults and repairs log- book). The book shall cover: 1. Date and time of fault 2. Type of fault 3. Attended by 4. Down time 5. Possible cause of fault through root-cause analysis 6. Preventive action taken to avoid repetitive faults
		➤ Fault attending system is fully manual.
		➤ Operating manuals of equipment's are not available since manual installations are as old as 10 to 20 years.
3	Statutory Compliances	➤ Relevant drawings for electrical system, i.e. single line diagrams, layouts, etc. are shown by operational staff; but are not matching with the existing network. The college's electrical staff is not even aware of which breaker the transformer's outgoing connection is linked to. It is recommended that the electrical system's Single Line Diagram (SLD) be redrawn and displayed on the main LT panels. ➤ A certificate is to be obtained from electrical contractor validating the electrical installation as per statute. A copy of same will be retained by Institute at management level and with maintenance team.
		.
4	Personal Protective Equipment (PPE) as per statutory requirements	➤ Personal Protective Equipment (PPE) are not available anywhere in the college. It is suggested that college must keep the PPE kits in LT panels, PPE kit list given below. 1. Electrical safety shoes 2. Helmets 3. Insulated hand gloves 4. Fire Buckets (Only kept outside Main Panel next to DG) 5. Insulated earth rod etc

Sr. No.	Check Point	Remarks
		<ul style="list-style-type: none"> ➤ Most of the electrical staff are not wearing safety shoes. It is recommended that all staff involved in handling the electrical system wear safety shoes. ➤ Rubber mats are installed at some panel locations. It is recommended to install rubber mats wherever they are not available. ➤ First aid box and shock treatment chart are not provided in Electrical room.
5	Electrical O&M	<ul style="list-style-type: none"> ➤ While sub-letting O&M of electrical system work to the external agency, competency level of employed person is to be verified by institute management for holding minimum wireman's permit certificate issued by govt.
6	Preventive Maintenance Program	<ul style="list-style-type: none"> ➤ Preventive maintenance documentation and schedule is completely missing. ➤ Regular O&M documents are not maintained for major equipment's, however, at many panel and DB level, preventive maintenance schedule is not available. ➤ Level of dust deposits are observed on LV distribution boards, lighting fixtures, cable ducts, trenches etc. The same needs to be cleaned.

4. EARTHING

4.1 EARTHING SYSTEM COMPLIANCE

Sr. No.	Check Point	Remarks
1	General	
1.1	Whether earthing system is designed complying to IS:3043 or any other international standard	No. Earthing SLD is not available
2	Earthing stations	
2.1	Type of Earthing Stations and material of construction of earth electrode	Strip/Wire
2.2	Nos. of Earthing Stations	Not Adequate
2.3	Whether identification tags are duly painted on each earthing station for ease of traceability	No
2.4	Is the chamber around Earthing Station is properly constructed	No. All underground
2.5	Whether proper equi-potential bonding among all Earthing Stations is made	No
2.6	Whether distance between adjacent Earthing Stations for electrical system is greater than 2.5m	Most of the earth Pits are not identified
2.7	Whether distance between walls or structures and all Earthing Stations is greater than 1.5m	
2.8	Is the test link is provided between Earthing Station and grid conductor to facilitate isolation for testing	No
2.9	Whether Earthing Stations are properly maintained and earth pits are properly cleaned	No. Underground not able to see.
2.10	Whether records for testing of earthing system resistance are properly maintained and check interval of periodic testing	No
2.11	Check whether pipes/funnel are provided in Earthing Stations for water pouring	No. Earth Pits are total covered
2.12	Whether hinged CI cover with frame is provided over chamber of Earthing Station	No. No Chamber
3	Earthing Stations for electronic sensitive equipment	
3.1	Whether dedicated Earthing Stations are installed for earthing of electronic sensitive equipment	Yes, but not adequate
3.2	Whether all electronics equipment's are earthed as per the vendor's requirements/IS Specification	No
4	Earthing Stations for lightning protection system	
4.1	Whether dedicated Earthing Stations are installed for lightning protection system	No
5	Earth mat conductors and Equipment-potential bonding conductors	
5.1	Material of construction of mat conductors and size	No
5.2	Check that all the earthing cables (Wherever used) are with green colour insulation	Yes, randomly checked in class rooms 
5.3	Whether earthing cables (Wherever used) are properly identified for ease of traceability	No

Sr. No.	Check Point	Remarks
6	Earth pit measurements	
6.1	Measured value	Attached below

4.2 EARTH PIT ASSESSMENT

Detail assessment of Earth-pits are provided below:

Table 1 Earth Pit Assessment

Sr. No.	Location	Type	Measured Resistance (Ω)	Acceptable Values Ω	Result	Earth Pit Identification
1	160kVA DG Body Earthing Strip-1	GI	3.11	<5	Satisfactory	Not identified
2	160kVA DG Body Earthing Strip -2	GI	3.11	<5	Satisfactory	Not identified
3	160kVA DG Neutral Earthing	GI	25 to 32	<5	Not Satisfactory	Not identified
4	(JDVC+Hostel) Panel Earthing Strip	GI	41 to 49	<5	Not Satisfactory	Not identified
5	Admin Building Main Panel Earthing Strip -1	GI	0.17	<5	Satisfactory	Not identified
6	Admin Building Main Panel Earthing Strip -2	GI	0.17	<5	Satisfactory	Not identified
7	Admin Lift Earthing-1	GI	0.41	<5	Satisfactory	Identified
8	Admin Lift Earthing-2	GI	0.41	<5	Satisfactory	Identified
9	Solar Panel Earthing-1	GI	0.36	<5	Satisfactory	Identified
10	Solar Panel Earthing-2	GI	0.32	<5	Satisfactory	Identified
11	Solar Panel Earthing-3	GI	0.41	<5	Satisfactory	Identified
12	Library Panel Earthing Strip -1	GI	0.12	<5	Satisfactory	Not identified
13	Library Panel Earthing Strip -2	GI	0.14	<5	Satisfactory	Not identified
14	JDVC Panel Earthing Strip -1	GI	0.24	<5	Satisfactory	Not identified
15	JDVC Panel Earthing Strip -2	GI	0.24	<5	Satisfactory	Not identified
16	Hostel Main Panel Earthing Strip -1	GI	0.30	<5	Satisfactory	Not identified
17	Hostel Main Panel Earthing Strip -2	GI	0.30	<5	Satisfactory	Not identified
18	62.5kVA DG Body Earthing	GI	0.21	<5	Satisfactory	Not identified
19	62.5kVA DG Neutral Earthing	GI	29 to 39	<5	Not Satisfactory	Not identified

4.2.1 OBSERVATION & RECOMMENDATIONS ON EARTH PITS MEASUREMENT

- **No SLD for Earth Pits:** Proper electrical SLD should be made and displayed near the equipment being served by the earth pits. A copy of the same to be held in Records of Maintenance Division. SLDs should be readily available on Demand.

- Earth pits are provided at places for equipment, but apart from the three for Solar and two for lifts, all of them have gone below the ground. It's very difficult to check the condition of pits. The earth pits must be inside a concrete box of 2 x 2 and can be accessed & maintained properly.



**Solar & Admin Lift Earth Pits
(Above the ground, No Tagging)**



All other Earth Pits Arrangements



Sample Illustration for designing Earth Pit Cover

- The pits in DG Yard are not marked and identified; it's difficult to know which earth pit is for Body and which for Neutral. None of the earth pits have tagging.
- All electrical panels doors need to be earthed.
- At most locations, two strips are coming from the ground, but it is unknown whether they are coming from two separate earth pits or one. It is strongly recommended that the earthing system be thoroughly checked,

and as per requirements, all necessary earth pits should be connected to the equipment. The earthing requirements and their present condition are mentioned in the table below, along with remarks.

Table 2 Earthing Requirements & Present Condition

Area	Requirement	Present Condition
Transformer		
Transformer Body	2 Body & 2 Neutral Earthing	Not known, comes under BSES. Needs to be checked with BSES
Transformer Neutral	2 Neutral Earthing	Not known, comes under BSES. Needs to be checked with BSES
Transformer Switchyard Earthing	Earthing Required	Not known, comes under BSES. Needs to be checked with BSES
DG		
DG-160 kVA	2 Body, 2 Neutral Earthing	1. Two earth strips are connected from the ground to both sides of the body, but it is unknown whether they are coming from two separate earth pits or from the same pit. Identification is needed. 2. One earth pit is connected with the neutral. 3. Neutral earthing is connected at many unknown locations. 4. The neutral's earth pit for the 160 kVA DG is in front of the main gate. It should be located in a place where no one can accidentally step on it. 5. The value of the DG's neutral earthing was not stable. The reason for this could be oxidation can occur at the connection point of the earth strip, which causes the readings to be inaccurate. It is recommended to clean the earth pit and check the values again.
DG-125 kVA	2 Body, 2 Neutral Earthing	Body not earthed. For neutral it is connected with 160 kVA neutral earthing.
DG-62.5 kVA	2 Body, 2 Neutral Earthing	One for body & one for neutral which was not identified. The value of the DG's neutral earthing was not stable. The major reason for this is that oxidation can occur at the connection point of the earth strip, which causes the readings to be inaccurate. It is recommended to clean the earth pit and check the values again.
DG Switchyard (160 kVA & 120 kVA)	Earthing Required	Not Earthed
LT/Distribution Panels		
Hostel+JDVC Panel next to DG Switchyard	2 Earthing	Two Earth strips are connected on both sides of the panels, but it is unclear whether they are coming from one earth pit or two, and they may possibly be connected to the DG's earthing, which could be why the earthing values were not stable. Proper identification is needed.

Area	Requirement	Present Condition
Admin Panel	2 Earthing	Two Earth strips are connected on both sides of the panels, but it is unclear whether they are coming from one earth pit or two. Need identification
Hostel	2 Earthing	Two Earth strips are connected on both sides of the panels, but it is unclear whether they are coming from one earth pit or two. Need identification
JDVC	2 Earthing	Two Earth strips are connected on both sides of the panels, but it is unclear whether they are coming from one earth pit or two. Need identification
Library	2 Earthing	Two Earth strips are connected on both sides of the panels, but it is unclear whether they are coming from one earth pit or two. Need identification
Solar		
Solar Panels	As per panel size	3 Earth pits are connected. No Tagging. Earth pit chamber above the ground.
Admin Lifts		
Lift	1	2 Earth pits are connected. No Tagging. Earth pit chamber above the ground.

5. FEEDER LOAD BALANCE STUDY

There are a total of 10 distribution panels in the college, supplying different areas. To check for imbalance in these panels, the amperage of all three phases (R, Y, B), Neutral, Phase to Earth (P-E) voltage (to identify if earthing is connected), and Neutral to Earth (N-E) voltage, which should be less than 5, were all measured. The measured values for all panels are shown in the table below.

Table 3 Hostel Panel Load Balance Study

Sr. No.	Feeder Name	Running Current					
		R-Phase	Y-Phase	B-Phase	Neutral Phase	Connected MCB/MCCB	Current Unbalance %
1	Main Incoming	69.5	68.3	55.4	17.9	320	7.9
2	Fire+ Compost	0.0	0.0	1.7	1.7	100	200.0
3	Ground Floor	4.7	15.3	1.3	10.1	100	115.5
4	First Floor	3.4	3.0	3.2	0.8	100	6.2
5	Second Floor	2.7	3.1	10.4	0.0	100	92.6
6	Reception	1.6	0.0	4.8	5.3	100	125.0
7	Kitchen	2.3	2.0	10.1	8.5	100	110.4
8	Third Floor	23.1	22.2	8.7	14.3	100	28.3
9	Fourth Floor	18.0	21.9	22.8	6.3	100	9.1
10	400watt light	16.3	0.4	0.0	12.5	100	192.8
11	P-E	222.2					
12	N-E	5.3					

Table 4 JDVC Panel Load Balance Study

Sr. No.	Feeder Name	Running Current					
		R-Phase	Y-Phase	B-Phase	Neutral Phase	Connected MCB	Current Unbalance %
1	Main Incoming	71.2	43.0	49.0	31.6	250	30.9
2	Ground Floor	2.7	9.8	4.6	6.6	100	71.9
3	First Floor	15.9	2.6	3.0	14.4	100	121.9
4	Room # 7	0.0	0.0	0.0	0.0	100	#DIV/0!
5	Room # 8	0.0	0.0	0.0	0.0	100	#DIV/0!
6	UPS	13.9			14.1	100	0.0
7	Main old DB	3.3	11.7	0.6	11.1	250	125.0
8	AC Main	34.0	18.6	28.8		250	25.3
9	P-E	221.0					
10	N-E	0.0					

Table 5 Canteen Panel Load Balance Study

Sr. No.	Feeder Name	Running Current					
		R-Phase	Y-Phase	B-Phase	Neutral Phase	Connected MCB	Current Unbalance %
1	Main Incoming (1F1)	24.6	30.5	16.7	13.9	160	27.4
2	Feeder-1F3	16.5	4.9	4.2	15.0	100	93.4

Sr. No.	Feeder Name	Running Current					
		R-Phase	Y-Phase	B-Phase	Neutral Phase	Connected MCB	Current Unbalance %
3	Feeder-1F4 (Distribution Panel)	4.4	23.6	11.1	24.5	-	
4	P-E	227.0					
5	N-E	0.0					

Table 6 Admin FF Panel Load Balance Study

Sr. No.	Feeder Name	Running Current					
		R-Phase	Y-Phase	B-Phase	Neutral Phase	Connected MCB	Current Unbalance %
1	Main Incoming	0.6	27.5	7.1	23.5	160	134.4
2	Feeder-1F3	0.0	15.0	4.0	14.3	-	136.8
3	Feeder-1F4 (Distribution Panel)	0.6	11.8	3.7	13.4	-	119.9
4	P-E	223.0					
5	N-E	0.0					

Table 7 Admin third Floor Panel Load Balance Study

Sr. No.	Feeder Name	Running Current					
		R-Phase	Y-Phase	B-Phase	Neutral Phase	Connected MCB	Current Unbalance %
1	Main Incoming	0.0	3.3	2.7	3.6	125	65.0
2	Feeder-1F1 Floor light	0.0	0.0	0.0	0.0	-	
3	Feeder-1F2 Floor DB	0.0	2.2	0.0	2.3	-	200.0
4	Feeder-1F3 lighting DB	0.0	2.0	2.5	3.5	-	
5	P-E	231.0					
6	N-E	0.0					

Table 8 Library Panel Load Balance Study

Sr. No.	Feeder Name	Running Current					
		R-Phase	Y-Phase	B-Phase	Neutral Phase	Connected MCB	Current Unbalance %
1	Main Incoming (1F2)	14.9	20.4	24.4	7.1	160	22.6
2	Feeder-1F3	2.9	0.5	1.3	1.6	100	85.1
3	Feeder-1F4	18.4	19.4	16.6	5.7	-	
4	P-E	230.0					
5	N-E	0.0					

Table 9 Auditorium Panel Load Balance Study

Sr. No.	Feeder Name	Running Current					
		R-Phase	Y-Phase	B-Phase	Neutral Phase	Connected MCB	Current Unbalance %
1	Main Incoming (1F2)	0.7	7.8	29.5	25.1	-	132.9
2	Feeder-1F2	0.4	7.0	27.0	26.7	-	135.5
3	Feeder-1F3	0.0	0.0	3.2	2.7	-	200.0
4	P-E	232.0					
5	N-E	0.0					

Table 10 Admin Main Panel Load Balance Study

Sr. No.	Feeder Name	Running Current					
		R-Phase	Y-Phase	B-Phase	Neutral Phase	Connected MCB	Current Unbalance %
1	Main Incoming (1F1)	73.6	97.6	118.1	64.9	630.0	22.5
2	AMF Supply (1F2)	38.5	50.1	60.2	45.7	400.0	21.4
3	AMF Supply (2F1)	34.6	45.7	57.5	22.3	250.0	25.2
4	Additional Class Room (2F3)	0.0	9.8	0.0	10.2	63.0	200.0
5	Pantry (2F4)	16.9	20.5	28.2	22.9	160.0	29.0
6	Computer Lab (2F5)	9.7	15.0	16.8	11.1	160.0	21.4
7	Class Room (2F6)	2.8	18.0	7.8	15.0	160.0	88.8
8	Spare-1 (2F7)	21.1	21.1	25.1	4.2	125.0	11.9
9	Co Switch (3F2)	0.0	0.0	0.0	0.0	200.0	#DIV/0!
10	Pump House and auditorium (3F3) (small size wire)	1.8	11.8	2.6	10.3	160.0	118.5
11	Pump House and auditorium (3F3) (Big size wire)	1.0	20.8	40.2	27.8		94.5
12	Office Block (3F4)	20.1	6.1	5.3	16.1	100.0	91.4
13	Lift (3F5)	0.6	0.3	0.4	0.4	100.0	38.5
14	P-E	225.0					
15	N-E	0.0					

Table 11 Admin GF Main Sub Panel-3 Load Balance Study

Sr. No.	Feeder Name	Running Current					
		R-Phase	Y-Phase	B-Phase	Neutral Phase	Connected MCB	Current Unbalance %
1	Main Incoming (1F2)	14.0	5.3	4.8	6.1	100.0	74.3
2	N-E	0.0					

Table 12 Admin GF Sub Main Panel-4 Load Balance Study

Sr. No.	Feeder Name	Running Current					
		R-Phase	Y-Phase	B-Phase	Neutral Phase	Connected MCB	Current Unbalance %
1	Main Incoming (1F2)	12.5	15.3	30.0	17.2	100.0	55.7
2	Auditorium-1F3	1.2	10.9	30.2	25.8	100.0	114.2
3	N-E	0.0					

5.1.1 OBSERVATIONS AND RECOMMENDATION ON FEEDER ANALYSIS

- At a total of **39 locations**, the unbalance is greater than 10%. It is recommended that the maximum load on all these feeders be evenly distributed as much as possible. Due to the unbalance, high current flows through the neutral, which can cause heating. However, in single-phase loads, it is very difficult to balance the load on each phase.

6. OTHER SITE OBSERVATION

6.1 OTHER SITE OBSERVATION

Image	Location	Observation	Recommended Action
	TR Switch Yard	Transformer Outgoing wires is kept above the ground and have cracked insulation which is covered with regular insulation tape	It should be supplied through the trench. Need Proper Insulation
	TR Switch Yard	Grass in Transformer Switchyard	Cleaning required
	DG 160 kVA	It is unknown which earth pit is connected with DG Body	Identification Required




Image	Location	Observation	Recommended Action
	DG Yard	DG Yard has only two tube lights. Low lux level.	Need more lights for safety & working.
	DG 125 kVA	Hanging wires from DG to Panel Room. (125 kVA)	Use cable tray or conduits.
	DG Yard	Low Height entrance at DG Yard. No key near entrance	Need bigger height gate for easy approach. Panel key must be near the gate.

Image	Location	Observation	Recommended Action
	DG 160 kVA	Neutral Earthing Wire cables are kept open and connected to different areas	If required keep the wires in conduit or trench & it is recommended to connect only DG neutral with earthing.
	TR Switch Yard	No Danger sign board, sand buckets or fire extinguisher kept near TR Yard.	All required.
	DG 160 kVA	Obstruction near 160 kVA DG	Remove unwanted items.

Image	Location	Observation	Recommended Action
	DG 125 kVA	Open wire near DG 125 kVA.	Attention required.
	DG 125 kVA	Open wire near DG 125 kVA	Keep in conduit.
	160 kVA DG Cum AMF Manual Panel	B Phase connection burnt. Insulation melted due to heat, Lizard	Need proper ventilation and cleaning.



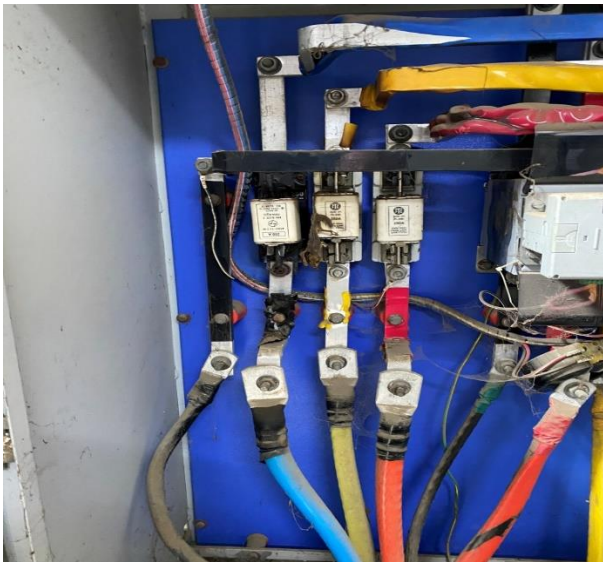
Image	Location	Observation	Recommended Action
	Hostel+JDVC Panel	Capacitor Panel Dusty	Cleaning required.
	Hostel+JDVC Panel	Cobwebs in panel	Need regular maintenance & cleaning.
	160 kVA DG Cum AMF Manual Panel	Dusty Panel	Need regular maintenance & cleaning.




Image	Location	Observation	Recommended Action
	Hostel+JDVC Panel	Dusty Panels	Need regular maintenance & cleaning.
	Hostel+JDVC Panel	No exhaust Fan working	Repair for proper ventilation.
	Hostel+JDVC Panel	Hanging Lights & wires	Proper hanging of lights and open wires in conduit.

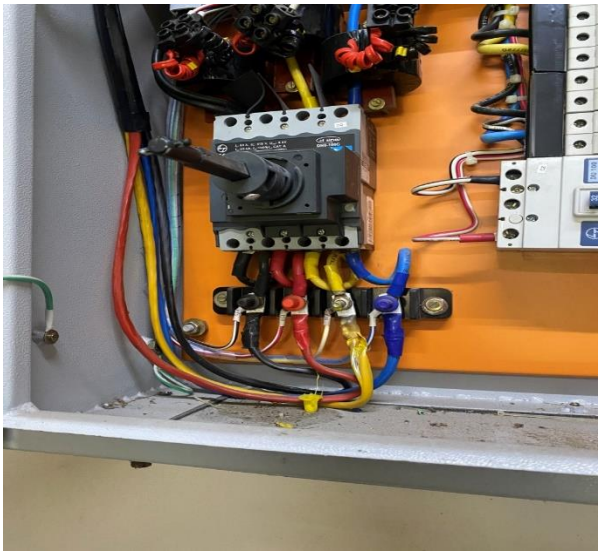


Image	Location	Observation	Recommended Action
	Hostel Panel GF	Y Phase Heat	Heating may be because of unbalance load or loose connection.
	Hostel+JDVC Panel	Cobwebs	Need regular maintenance & cleaning
	Hostel+JDVC Panel	No nomenclature, SLD, danger sign board, panel key, authorised person list with no.	All required




Image	Location	Observation	Recommended Action
	Hostel+JDVC Panel	No rubber mats	Install rubber mats
	Hostel+JDVC Panel	Open hanging wires	Keep it in conduit
	Hostel+JDVC Panel	Open holes for cable	Close



Image	Location	Observation	Recommended Action
	Hostel+JDVC Panel	Open wires outside panel room	Trench required
	Hostel+JDVC Panel	Panel not earthed on one side	Need earthing
	Hostel+JDVC Panel	Shutter always open and not earthed	Need proper gate with earthing


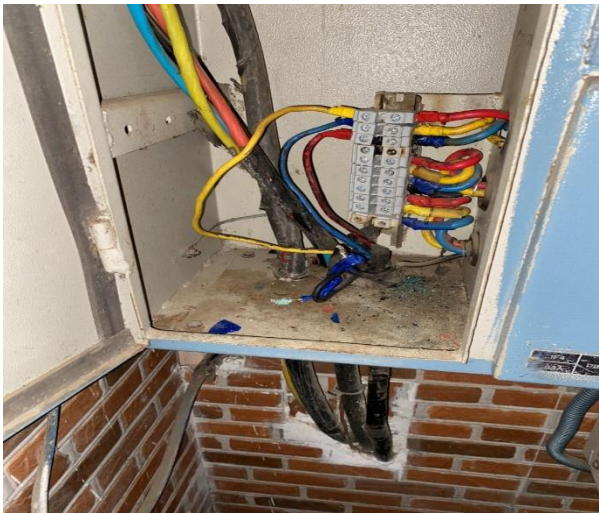
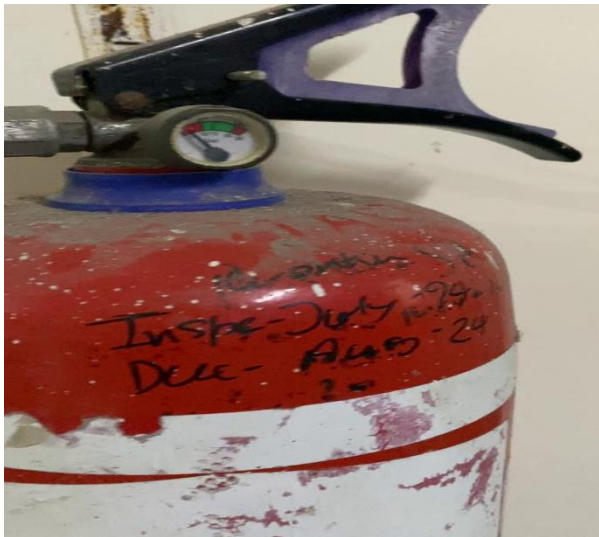

Image	Location	Observation	Recommended Action
	Hostel+JDVC Panel	Open window	Window need to be closed to avoid dust
	Admin GF Sub Panel	Wires Heating	Check unbalance and wire connection
	Admin Main Panel	Expired Fire Extinguisher	Recharge

Image	Location	Observation	Recommended Action
	Admin Main Panel	Unwanted Material	Remove
	Admin Main Panel	No Danger sign board at the main entrance gate and gate not earthed	Pase danger sign board and earthed the main gate
	Admin Main Panel	Obstruction at Main entrance & Gate always open	Remove unwanted material & close gate when not required.

Image	Location	Observation	Recommended Action
	Admin Main Panel	Open cable	Keep it in conduit
	Admin Main Panel	Open window	Close & provide exhaust Fan
 <small>Sep 18, 2024, 15:23</small>	Admin 3 rd Floor Panel	Unwanted Material	Remove for free movement

Image	Location	Observation	Recommended Action
	Admin 3 rd Floor Panel	Wire is being openly joined inside the panel.	Need proper connection

6.1.1 OBSERVATION & RECOMMENDATIONS

- During the audit, fire safety precautions around the panels appeared to be lacking. The required fire equipment and their uses are mentioned below:

1. Class C Fire Extinguisher (for Electrical Fires):

Class C fire extinguishers are specifically designed for fires involving energized electrical equipment. These extinguishers use non-conductive agents like CO₂ (Carbon Dioxide) or dry powder to extinguish the fire without risking electric shock.

2. Fire Blankets:

Fire blankets are non-flammable materials that can be used to smother small fires or prevent flames from spreading. These are useful for suppressing fires near or involving electrical panels quickly.

3. Smoke Detectors:

Smoke detectors should be installed near electrical panels to provide early warning in case of a fire. They help detect smoke or overheating before the fire spreads, allowing for quick intervention.

4. Heat Detectors:

Heat detectors monitor rising temperatures near electrical panels and can trigger alarms if a dangerous temperature is detected, helping prevent fire outbreaks due to overheating components.

5. Thermal Imaging Devices:

While not typically "firefighting equipment," thermal imaging cameras or devices can be used during regular inspections to detect overheating components or hotspots in electrical panels that might lead to a fire.

6. Automatic Fire Suppression Systems:

Clean agent fire suppression systems, such as FM-200 or Novec 1230, can be installed near critical electrical panels. These systems detect fires early and release a gas that suppresses the fire without damaging electrical equipment or causing harm to personnel.

7. Emergency Shutoff Switches:

Ensure there is a clearly labeled emergency shutoff switch near the electrical panel. In case of an emergency, quickly cutting off the power supply can prevent further escalation of a fire.

8. Fire Alarm Systems:

Fire alarms should be installed and connected to the smoke or heat detectors. This ensures quick notification to staff or emergency personnel when a fire is detected near the electrical panels.

9. Signage and Safety Labels:

Warning signs and fire safety instructions should be posted near electrical panels to guide personnel on what to do in case of a fire, including the location of fire extinguishers and emergency shutoff switches.

10. Sand Buckets (for small fires):

Sand buckets can sometimes be kept near electrical panels, especially in industrial setups, to handle small electrical fires. Sand is non-conductive and can be used to extinguish fires without causing electrical risks.

11. Emergency Lighting:

Install emergency lights near panels to provide visibility during a fire or power outage, ensuring safe evacuation and access to fire fighting equipment.

- Thermography has been conducted for all panels to check for heating, and the report is attached separately as **Annexure-A**.

7. ANNEXURES

**Annexure-A
(Thermography Report)
Attached Separately**