FIRE SAFETY AND ELECTRICAL SAFETY AUDIT OF RAM LAL ANAND COLLEGE- DELHI UNIVERSITY SOUTH CAMPUS

Conducted By: EM Project Services

Principal Auditor: Satvinder Singh

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INTRODUCTION

Ensuring life safety is the most essential aspect of all building codes. In India, the 2016 version of the National Building Code (NBC) is representing the present state of knowledge on various aspects of building construction, which is followed by all most all parts of the country. The NBC as a whole is the basic model code for all other codes in the country and by and large most of the states and local bodies in India have adopted many of the code provisions in their own building regulations.

A fire can happen at any time at any place. The recent major fires that occurred in various parts of country during the last few months reinforce the view that a fire can happen at any place. You can expect a fire at any structure, irrespective of its occupancy status. It means that a fire in any structure has the potential to cause harm to its occupants and property.

The magnitude of the problem can be reduced only when the structures are designed, constructed, equipped, maintained and operated with a view to save the life and property of its occupants following exhaustive guidelines contained in National Building Code-2016. Therefore, any structure or building should be erected only after meeting the basic infrastructure needed to protect them from fire and explosion, and even to withstand natural calamities like earthquake, lightning, etc.

NBC recommends for periodical fire safety inspection by the key personnel of the occupants of the building, to ensure fire safety standards.

The audit was conducted by the following team members of M/S EM Project Services

1. Mr.S.S.Maan, Principal Auditor.
2. Mr.Ranjit Singh,Data Surveyor and Instrument technician
3. Mr. Ashwani, Instrument Technician.

The electrical safety audit which was conducted on-site focused on current electrical safety conditions, and selected other safety measures for Ram Lal Anand College. The following are key objectives of the Electrical safety audit as per the assigned scope by Management.

A thorough visual inspection of the entire electrical system to identify circuit components, visual defects, visual circuit inconsistency and deviation from design, damage component, and a sign of overheat and sign of any other potential problems and any other nonconformity of statutory requirement.

- Main LT Panel
- Review of Single line diagram.
- Review of Polarity in sockets/receptacles.
- Review of installed Earth system
- Review of Lightning Arrester system
- Review of Fire NOC from Fire Authority.
- Review of Electrical maintenance
- SOP for Routine, Preventive, Predictive Maintenance, and condition-based monitoring for Electrical switchgear, Cables, and wiring system.

- Review of competence of electrical personnel.
- Review of Compliance to Statutory Rules
- Review of classification and identification of hazards.
- Digital Thermal imaging.
- A study of the appropriateness of circuit-protecting equipment.
- Personnel protection aspects.
- Tools and Portable equipment.
- Review of training.

SCOPE OF FIRE SAFETY AUDIT:

Fire Safety audit is found to be an effective tool for assessing fire safety standards of an organization or occupancy. It helps the people to identify the areas for improvement and evolve an action plan. A comprehensive fire safety audit is a structured and systematic examination of an organization or occupancy to identify the hazards from fire. In other words, the fire safety audits are structured to check current adequacy of components, services and equipment; report of the expected performance, make recommendations for the compliance with the existing building rules, regulations, codes and standards, and the requirement of providing a safe place for living or carry out commercial or industrial activities. It is presumed that a comprehensive fire safety audit can cover various aspects which are related to design, operation and maintenance of the facilities, and even the review of inherent fire hazards associated with the day to day activities in a building. It assesses the building for compliance with the existing building codes, national standards and the building fire safety regulations. Thus the fire safety audits will allow us to identify any non conformances and / or provide recommendations to the Administration allowing them to attend to these matters and therefore seek to achieve compliance with relevant legislation. It may be remembered here that the fire safety audits are not limited to a desk top review of available documentations or a visual inspection. On the contrary an active system test can also be carried out to ensure all systems operate and interface as designed and included in a fire safety audit report.

OBJECTIVES OF AUDIT

Fire Safety Audit

- Review of installed Active fire fighting measures in various occupancy types in college premises as per requirement of NBC-2016.
- Evaluate passive fire protection systems provided.
- Identify all significant fire hazards.
- Identify the people who are at risk from each hazard.
- Evaluate the existing control measures.
- Determine the additional control measures required.

- Evaluate the general awareness of occupants and security personnel on matters relating to fire safety and rescue operations.
- Evaluate the training and instructions on fire safety imparted to the employees and occupants.

FIRE SAFETY STUDY:

Fire safety inspections were conducted to check of all fire safety procedures, installations and records within building structures to determine compliance with appropriate legislation and regulation.

A fire safety inspection helps to ensure that the owners and occupiers of buildings are meeting their responsibilities under the legislation, that buildings are fitted with correct fire safety installations required by the fire safety standard, and that these fire safety installations are maintained in an operational condition. Thus, building occupiers are required to ensure that all fire safety installations in their building are maintained in accordance with fire safety regulations / codes prevailed from time to time.

The occupiers are also required to keep records of maintenance of their fire safety installations in the building. The fire safety inspection will involve an inspection of the building's fire safety installations and an inspection of the maintenance records for each of the fire safety installations in the building.

Where it is found that the building does not comply with legislative requirements or that fire safety systems have not been correctly maintained, the faults will be noted on the inspection report together with the action required by the owner / occupier and the time by which the owner / occupier must have faults corrected.

FIRE SAFETY SURVEY:

Fire safety survey, is an assessment of the building against all legislative requirements, such as, a check of evacuation instructions given to employees and residents, a check of the records of maintenance of fire safety installations and an operational test of these fire safety installations.

In other words, a fire safety survey will involve a check of the structural aspects of the building, such as, travel distances to exits and emergency escapes etc. The survey also checks the level of compliance with the legislative requirements and that all required fire safety systems are installed, functioning and being correctly maintained. Any deficiencies detailed

in the fire safety survey report must be resolved to the satisfaction of the inspecting officer within the timeframe specified in the report.

Applicable Standards

1. NBC-2016
2. IS-14489-Code of practice on occupational safety and health audit.
3. OHSAS-18001
4. IS 2190: Selection, Installation and maintenance of first aid fire extinguishers: Code of practice
5. Local Fire Guidelines

Executive Summary

Fire Safety

The college comprises of Principal block with basement, Academic blocks-1, 2 and 3, Library block, Office block, Auditorium block, canteen and kitchen block.

There is no site plan and floor lay out plans are available for various blocks of colleges.

As the major risk of fire in such types of buildings is from electricity and major portion of consumption of electricity is in Air conditioners. As the current/load of electrical system increases, there is a risk of fire due to loose connections, damaged insulation and specially the connections which remain hidden like the one in Split and Window Air conditioners. The loose connection fault is pre-dominant due to in-correct of in-sufficient electrical preventive maintenance owing to absence of regular electrical maintenance staff, competence level of staff.

The major hazards of fire in college emanate from Canteen and Kitchen block because LPG is used for cooking and is highly combustible gas. There are a number of issues found in this area that can transform to major risks if remain un-addressed. The condition of electrical wiring in kitchen is very bad and that can be a potential hazard for fire.

Another important building that needs to be addressed is Library building due its higher fire load. In library also there are many electrical and housekeeping issues have been found that need to be addressed due to high fire load of library. The detailed description has been given in report.

Another area that needs to be addressed is Auditorium which is an assembly building and the by virtue of peculiar occupancy profile, the risk of fire and its remedies have been addressed in NBC-2016 in a special occupancy category. There is requirement of down comer system to be fed from dedicated overhead tank of 25000 litres capacity.

In principal block, there is a basement which measures more than 200 sq.mts. Thus requiring Sprinkler system to be installed.

There is a requirement of First aid hose reels except for canteen and kitchen.

For study of fire risks both Active and Passive systems have been installed versus the requirement as per National Building Code-2016. Minimum requirements which are imperative have been recommended and during course of discussion additional fire fighting provisions can be provided for important fire risk area like library, canteen and kitchen of Ram Lal Anand College.

At present there are no active systems for fire fighting that are operational. The required tower wise capacity of fire water tanks is required to be provided.

Electrical Safety

During electrical safety study of Ram Lal Anand College the following aspects have been studied and non-conformities noted have been brought out in the report. The detailed points have been given in observation and Recommendations head.

The following major points were evaluated

a. Arc Flash
b. Earthing Studies
c. Cable laying and termination practices
d. Polarity of installed Lighting and power sockets.
e. Condition of installed panels and switchgears
f. Shock hazard
g. Fire hazard due to use of electricity.
h. Illumination levels in Electrical switchgear area.
i. Thermal Imaging

During audit study it has been noticed that condition of electrical system especially electrical systems up to Distribution boards and there are arc flash potential noticed that may cause arc flashes which can transform into a major fire.

Earthing has been found not to be up to mark and earth measurements at site have shown higher earth resistances than acceptable level and at many locations earth connection is found disconnected.

The cable laying and termination practices are not as per requirement of applicable electrical specifications and standards.

During study of polarity of installed sockets there are issues found with earth continuity also reversal of polarity has been noticed and the schedule is included in report for immediate reference and corrective action.

Overall the condition of electrical cabling wiring and panels is in extremely bad shape and the **complete wiring is recommended to be replaced for electrically safe condition and reducing the risk of fire due to electrical use.**

Thermal imaging has been conducted for electrical panels and also especially the connections of Air condition units which normally remain un-attended once the AC is installed. There are issues found with temperature of switchgear and also electrical

connections of air conditioners. There are loose connections found requiring immediate action for tightening of connections and making it a practice to periodically get the connections tightened.

Type of Occupancies in college as per NBC-2016

1. **Educational Building-B-1**
   a. Principal Block with basement
   b. Administration building plus library
   c. Academic building-1
   d. Academic building-2
   e. Academic building-3
   f. Canteen

2. **Assembly Building-D-2**
   a. Auditorium Block

Observation and Recommendations
Fire Safety -Active systems

1. There are no site plan and floor layout plans are available. All these should be got prepared and kept updated with inclusions of any changes or any addition alteration at all times.
2. Fire Extinguishers: The inventory of installed fire extinguishers has been prepared. All the fire extinguishers are ABC type of 4 kg capacity. The quantity and type of fire extinguisher to be supplemented to the existing inventory has been included.
3. First aid hose Reels : The first aid hose reels which are required to be provided in various buildings have been included
4. Sprinkler system: There is a requirement of sprinkler system for basement in principal block. The water to these sprinklers shall be fed from an overhead fire tank with 2 Nos. down comer pumps installed at terrace.
5. Wet Riser/ UG Static water tanks, Electrical, Diesel engine fire pump And Jockey pump : There is no requirement of these equipment in college premises as per requirement of National Building Code-2016.
6. Down comer system: There is requirement of down comer system in Auditorium block to be fed from Overhead tanks with 2 Nos. down comer pumps.
7. Manually operated Electronic Fire Alarm system : It is required to be put only for Auditorium building as per requirement of NBC-2016
8. Overhead fire tanks for individual towers/buildings: The requirement of overhead water tank for feeding water to hose reels, down comer or sprinkler system to be provided in basement of Principal block has been included in the report.

9. Yard Hydrants: There is no requirement for provision of yard hydrant as per requirement of NBC-2016.

At present it is noticed that there are no operational fire fighting or fire alarm system in college premises. The provision of fire fighting system and fire alarm and detection system has been recommended as per bare minimum requirement of National Building Code-2016. However for providing extra safety additional provision beyond NBC-2016 can also be provided.

Fire Safety –Passive systems

1. Lightning protection of buildings: There is no lightning protection system has been provided and no risk evaluation study for lightning protection system has been conducted. It is recommended to provide lightning arrester system after evaluation.
2. Surface Interior Finishes Material of paneling, partition and roofing.
   It is recommended that for all future work including Auditorium work being undertaken the material with fire rating be provided to reduce the impact and intensity of fire.
3. Duct work: presently there are no duct work is in place. In case ducts are provided there should be a provision of automatic actuation of dampers should there be detection of fire.
4. General Exit Requirements: The exit requirement has been studied and tabulated. The exit single or double has been provided for rooms as per requirement.
5. Basement : There is only one basement existing in principal block which is more than 200 sq. mts. necessitating Sprinklers system fed from overhead fire tank are required to be provided.
6. Maximum occupancy signage for assembly building. As per NBC-2016, are required to be provided.
7. Exit Access: These have been provided as per requirement.
8. Capacities of means of egress :
9. Travel Distance: For approaching stair cases is as per requirement. These have been measured and calculated.
10. Access controlled doors: There are no access controlled doors provided in college premises.
11. Staircases and External staircases: The stair cases are documented and commensurate to the requirement of NBC-2016.
12. Encroachment of corridors: There is no encroachment of corridors except at one place steel ladder has been placed in movement area.

13. Housekeeping from fire safety point of view: Housekeeping is required to be improved. Cleanliness and storage of flammable area near electrical points should not be there.
14. Static water storage tanks: None has been provided. There is no requirement of UG static water tank.
15. Storage of hazardous material if any. There is LPG storage in kitchen. NO LPG leak detector has been provided and there are extra pipes hanging near manifold. There is no indication of Empty and filled cylinders as per requirement.
16. Whether two door is provided in all rooms for more than 45 occupants: yes provided.
17. Material of decoration of assembly building and its treatment. It is recommended that all decoration material be either fire rated else this should be treated with fire rated pints/coatings.
18. Arrangement and type of seats in auditorium: there are fixed type seats in the auditorium and provision of stage is also there in auditorium. The requirement of active fire alarm and fire-fighting system has been accordingly addressed.
19. Kitchen : Along with gas leak detector provision in kitchen there should be a practice of cleaning exhaust to eliminate accumulation of suit that could cause fire if remain attended.
20. Signage for Staircases is required to be provided in the following pattern.

21. The assembly occupancies and call centres shall be required to display, limiting occupant load details positioned in a conspicuous place near the entrance of each of such respective occupancy to avoid possible overcrowding and overloading. The display shall preferably be engraved on a metal plate of not less than 300 mm × 200 mm, with letters of height and width not less than 50 mm, with detail of occupancy, area and occupancy load (see figure below).
It is required to be provided for MP Halls/Auditorium on both floors.

22. There is no fire NOC available with college.

The requirement of NBC-2016 as applicable to Educational and Assembly buildings

Educational Building

Table 7 — (*Continued*)

Sl No.	Type of Building Occupancy	Type of Installation								Water Supply (litre)		Pump Capacity (litre/min)	
		Fire Extinguisher	First Aid Hose Reel	Wet Riser	Down Comer	Yard Hydrant	Automatic Sprinkler System	Manually Operated Electronic Fire Alarm System (see Note 1)	Automatic Detection and Alarm System (see Note 2)	Under-ground Static Water Storage Tank Combined Capacity for Wet Riser, Yard Hydrant and Sprinklers per Set of Pumps	Terrace Tank over Respective Tower Terrace	Pump Near Underground Static Water Storage Tank (Fire Pump) with Minimum Pressure of 3.5 kg/cm^2 at Remotest Location	At the Terrace Tank Level with Minimum Pressure of 3.5 kg/cm^2
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
2)	15 m and above but not exceeding 30 m	R	R	R	NR	R	R	R	R	150 000	20 000	(see Note 11)	NR
3)	Above 30 m in height	R	R	R	NR	R	R	R	R	200 000	20 000	(see Note 11)	NR
e)	**Hotels** (A-4)	R	R	R	NR	R	R	R	R	200 000	20 000	(see Note 12)	NR
EDUCATIONAL BUILDINGS (B) (*see* Note 16)													
1)	Less than 15 m in height												
	i) Ground plus one or more storeys	R	R	NR	NR	NR	R (see Note 4)	NR	NR	NR	10 000 (5 000) (see Note 6)	NR	450 (450) (see Note 6)
2)	15 m and above but not exceeding 24 m in height	R	R	NR	R	NR	R (see Note 4)	R	NR	NR	25 000	NR	900
3)	Above 24 m but not exceeding 30 m in height	R	R	R	NR	R	R (see Note 4)	R	NR	50 000	(5 000) (see Note 6)	(see Note 14)	NR
INSTITUTIONAL BUILDINGS (C) (*see* Note 16)													
a)	**Hospitals, Sanatoria and Nursing Homes** (C-1)												
i)	Less than 15 m in height with plot area up to 1 000 m^2												
	i) Up to ground plus one storey, with no beds	R	NR	NR	NR	NR	R (see Note 4)	R	NR	NR	(5 000) (see Note 6)	NR	(450) (see Note 6)

Assembly Buildings

Table 7 — *(Continued)*

Sl No.	Type of Building Occupancy	Type of Installation								Water Supply (litre)		Pump Capacity (litre/min)	
		Fire Extinguisher	First Aid Hose Reel	Wet Riser	Down Comer	Yard Hydrant	Automatic Sprinkler System	Manually Operated Electronic Fire Alarm Systems (*see* Note 1)	Automatic Detection and Alarm System (*see* Note 2)	Under-ground Static Water Storage Tank Combined Capacity for Wet Riser, Yard Hydrant and Sprinklers per Set of Pumps	Terrace Tank over Respective Tower Terrace	Pump Near Underground Static Water Storage Tank (Fire Pump) with Minimum Pressure of 3.5 kg/cm^2 at Hydrant Location	At the Terrace Tank Level with Minimum Pressure of 3.5 kg/cm^2
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
2)	10 m and above but not exceeding 15 m in height	R	R	R	NR	R	R (*see* Note 4)	R	R	100 000	5 000 (5 000) (*see* Note 6)	(*see* Note 10)	NR
3)	15 m and above but not exceeding 24 m in height	R	R	R	NR	R	R	R	R	150 000	10 000	(*see* Note 11)	NR
4)	24 m and above but not exceeding 30 m in height	R	R	R	NR	R	R	R	R	200 000	20 000	(*see* Note 11)	NR
ASSEMBLY BUILDINGS (D) (*see* Note 16):													
a)	**Buildings (D-1 to D-5)**												
1)	Less than 10 m in height												
	i) Up to 300 persons	R	R	NR	R	NR	R (*see* Note 4)	R	NR	NR	20 000 (5 000) (*see* Note 6)	NR	450 (450) (*see* Note 6)
	ii) More than 300 persons	R	R	NR	R	NR	R (*see* Note 4)	R	NR	NR	25 000 (5 000) (*see* Note 6)	NR	900 (450) (*see* Note 6)
2)	Above 10 m but not exceeding 15 m in height	R	R	R	NR	NR	R (*see* Note 4)	R (*see* Note 1)	R	100 000	5 000 (5 000) (*see* Note 6)	(*see* Note 10)	450 (450) (*see* Note 6)
3)	Above 15 m but not exceeding 24 m in height	R	R	R	NR	R	R	R	R	150 000	10 000	(*see* Note 10)	NR
4)	Above 24 m but not exceeding 30 m in height	R	R	R	NR	R	R	R	R	200 000	20 000	(*see* Note 11)	NR
b)	D-6	R	R	R	NR	R	R	R	R	200 000	20 000	(*see* Note 12)	NR
c)	D-7	For details *see* 6.4.4											

R – Required
NR – Not Required

NOTES

1 MOFPA System shall also include talk-back system and public address system for the occupancies given in the table for (d) (1) (iii) under A-3, (a) (1) (iv) and (a) (2) under C-1, and (a) (2) under D-1 to D-5, in all buildings 15 m and above in height, except for A-3 and A-4 occupancies where these shall be provided for buildings of height 24 m and above. These shall also be provided in car parking areas more than 300 m^2 and in multi-level car parking irrespective of their areas.

2 Automatic detection and alarm system is not required to be provided in car parking area. Such detection system shall however be required in other areas of car parking such as electrical rooms, cabins and other areas.

3 Buildings above 15 m in height are not to be permitted for occupancies A-1 and A-2.

4 Required to be installed in basement, if area of basement exceeds 200 m^2.

5 Required to be provided if basement area exceeds 200 m^2.

Table 7 — *(Concluded)*

6 Additional value given in parenthesis shall be added if basement area exceeds 200 m^2.

7 Required to be provided for buildings with more than two storeys (Ground + One).

8 Required to be provided for buildings with height above 15 m and above.

9 Sprinklers shall be fed water from both underground static water storage tank and terrace tank.

10 Provide required number of sets of pumps each consisting of one electric and one diesel pump (stand by) of capacity 2 280 litre/min and one electric pump of capacity 180 litre/min (*see* Fig. 11) (*see also* notes 22 and 23).

11 Provide required number of sets of pumps each consisting of two electric and one diesel pump (stand by) of capacity 2 280 litre/min and two electric pump of capacity 180 litre/min (*see* Fig. 12) (*see also* Notes 22 and 23).

12 Provide required number of sets of pumps each consisting of two electric and one diesel pump (stand by) of capacity 2 850 litre/min and two electric pump of capacity 180 litre/min (*see* Fig. 12) (*see also* Notes 22 and 23).

13 Lower levels in high rise buildings 60 m or above in height are likely to experience high pressure and therefore, it is recommended to consider multi-stage, multi-outlet pumps (creating pressure zones) or variable frequency drive pumps or any other equivalent arrangement.

14 Provide required number of sets of pumps each consisting of one electric and one diesel pump (stand by) of capacity 1 620 litre/min and one electric pump of capacity 180 litre/min. (*see* Fig. 11) (*see also* Notes 22 and 23).

15 Required to be provided for buildings with more than one storey.

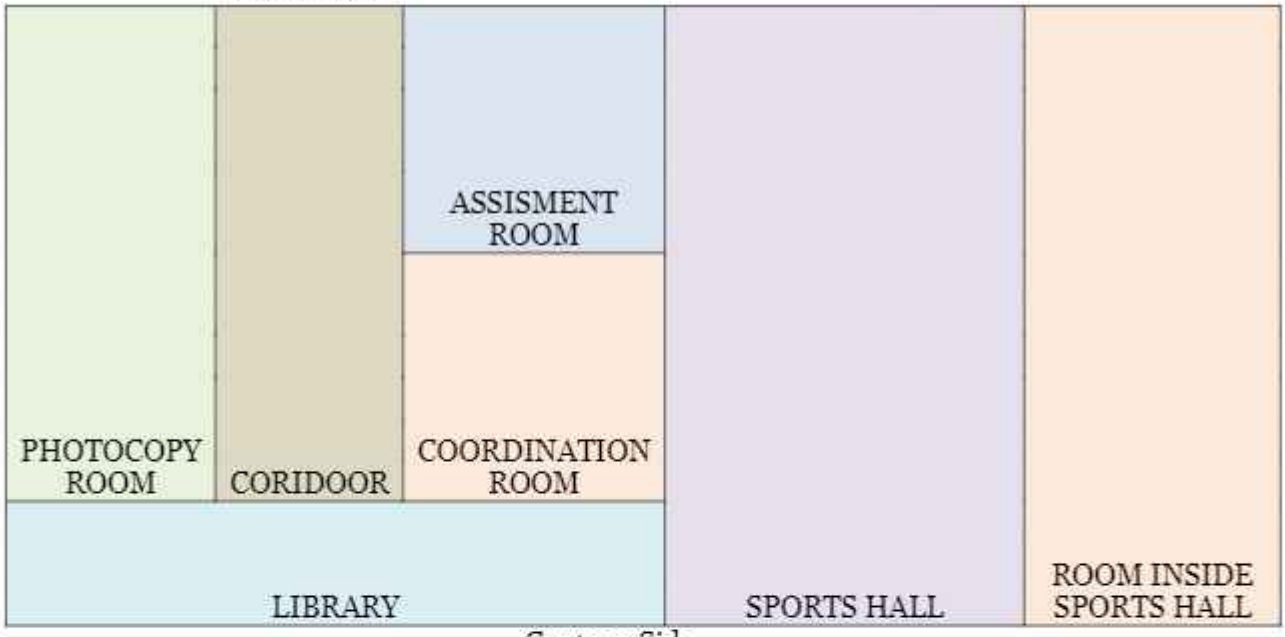
16 Buildings above 30 m in height are not to be permitted for Group B, Group C, Group D and Group F occupancies.

Description of Campus-Ram Lal Anand College

Detail of Area of Basement at RLA College

S.No.	Location	Length - in Metres	Width- in Metres	Area in Sq. Mts.	H- in Metres
	Basement Dimension- External	**23.25**	**14.3**	**332.475**	**2.76**
1	Sports hall	13.6	9.75	132.6	2.76
2	Room-1 inside - Sports hall	13.6	4.4	59.84	2.76
3	Corridor and main entry door to photocopy room			0	
4	Photocopy room	7.8	2.4	18.72	2.76
5	Library	5	4	20	2.76
6	Coordination room	7.3	4.7	34.31	2.76
7	Assessment room	5.4	4.7	25.38	2.76
	Total Internal Area of basement			**290.85**	

BASEMENT FRONT SIDE ENTRY TO WARDS CANTEEN



Canteen Side

Detail of Stair case of Blocks at RLA College

S.nos	Location		W- in metres	Distance between stair cases	Distance in metres
1	Principal office block to Landing	S - 1	1.58		
2	Landing to 1st Floor towards Academic Block		3.41		
3	Landing to Staff Room side		1.58		
4	Landing to Staff Room back side to G. floor	S -2	0.9	S - 1 to S - 2	23
5	Near Room no-1 G. Floor to Second floor	S -3	1.3	S - 3 to S - 4	34
6	Right side G. Floor to Second floor	S -4	1.16	S - 4 to S - 5	52
7	Left side G. Floor to Second floor	S -5	1.14		

Inventory of Installed Fire Extinguishers with recommendations for proposed fire extinguishers					
S .No.	Location	Fire Extinguisher installed - 4kg-ABC type	Additional Fire Extinguisher to be installed -6 kg-ABC type	Mechanical Foam type-50 Litres	6 kG-CO_2 type fire extinguishers
1	Library	16	8		
2	Staff Room	1	1		
3	Girls Common Room	1	1		
4	Principal office	2	1		
5	Canteen	3	2		
6	outside Room no - 17	1	1		
7	outside Room no - 18	2	1		
8	outside Room no - PC-1	1	1		
9	outside Room no - PC-5	1	1		
10	Deptt. Of Statistics	3	2		
11	Deptt. Of computer science	1	1		
12	Deptt. Of Microbiology	5	3		
13	Deptt. Of Geology	1	1		
14	Room no - 15,16	1	1		
15	BJMC	1	1		
16	Commerce Lab	1	1		
17	MP theatre	1	1		
18	Main office	1	1		
19	kitchen			1	
20	DG Set Area			1	
21	Electrical Area-MP Hall				4
22	Main LT panel				4
23	Near Electrical Areas				10
Total		**43**	**29**		**18**

भारतीय मानक

प्राथमिक सहायता अग्नि शामकों का चुनाव, संस्थापन एवं रख-रखाव — रीति संहिता

(चौथा पुनरीक्षण)

Indian Standard

SELECTION, INSTALLATION AND MAINTENANCE OF FIRST-AID FIRE EXTINGUISHERS — CODE OF PRACTICE

(Fourth Revision)

ICS 13.220.10

BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

November 2010

Price Group 8

AMENDMENT NO. 2 MARCH 2017
TO
IS 2190 : 2010 SELECTION, INSTALLATION AND MAINTENANCE OF FIRST-AID FIRE EXTINGUISHERS — CODE OF PRACTICE

(Fourth Revision)

(*Page* 19, *Annex* F) — Insert the following new annex at the end:

ANNEX G
(*Clauses* 13 *and* 14)

REGISTER OF FIRE EXTINGUISHER

G-1 Record of fire extinguishers installed in a premise, its inspection, maintenance and operational history shall be maintained as per the format given below:

Sl No.	*Type*	*Capacity*	*Year of Manufacture*	*Make*	*Location*	*Quarterly Inspection Dates*	*Annual Inspection Dates*	*Pressure Tested on*	*Date of Discharge*	*Refilled on*	*Due for Refilling*	*Remarks*
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
i)	-	-	-	-	-	-	-	-	-	-	-	-
ii)	-	-	-	-	-	-	-	-	-	-	-	-
iii)	-	-	-	-	-	-	-	-	-	-	-	-
iv)	-	-	-	-	-	-	-	-	-	-	-	-
v)	-	-	-	-	-	-	-	-	-	-	-	-
vi)	-	-	-	-	-	-	-	-	-	-	-	-

NOTES

1 In remarks column fill details of date of operation as per annual maintenance date, date of rejection and disposal with details of observations and date of calibration of safety valves and pressure gauges in case of high capacity extinguishers.

2 Each extinguisher should be allotted one full page and the particulars of a permanent nature like Sl No., Type, Capacity, Year of Manufacture, Make and Location can be transferred to the top portion of the register.

3 The maintenance of the fire extinguishers shall be done by the manufacturer or their authorized agent or qualified fire professionals.

SELECTION OF FIRE EXTINGUISHERS

Various types of fire extinguishers specified in this standard are of value but all are not equally effective on all types of fire. For this reason, the nature of contents of a building, the processes carried out therein and the types of fire which may occur shall be taken into consideration while selecting fire extinguishers.

For all practical purposes, the basic types of fires can be grouped into following four classes:
a) *Class A fires* — Fires involving solid combustible materials of organic nature such As wood, paper, rubber, plastics, etc, where the cooling effect of water is essential for Extinction of fires.
b) *Class B fires* — Fires involving flammable liquids or liquefiable solids or the like where a blanketing effect is essential.

c) *Class C fires* — Fires involving flammable gases under pressure including liquefied gases, where it is necessary to inhibit the burning gas at fast rate with an inert gas, powder or vaporising liquid for extinguishment.

d) *Class D fires* — Fires involving combustible metals, such as magnesium, aluminium, zinc, sodium, potassium, etc, when the burring metals are reactive to water and water containing agents and in certain cases carbon dioxide, halogenated hydrocarbons and ordinary dry powders. These fires require special media and techniques to extinguish.

NOTE — it is important to decide selection and use of extinguisher on live electrical installations. The extinguisher that have passed electrical conductivity test should only be used.

SUITABILITY OF PORTABLE FIRE EXTINGUISHERS

10.1 The types of extinguishers mentioned below against each class of fire are generally most suited.

Details of suitability as a guide of each type of extinguisher are shown in Table. It may, however, be noted that this is only for guidance and does not cover special cases.

a) *Class A fires* — Water, foam, ABC dry power and halocarbons.

b) *Class B fires* — Foam, dry powder, clean agent

And carbon dioxide extinguishers.

c) *Class C fires* — Dry powder, clean agent and carbon dioxide extinguishers.

d) *Class D fires* — Extinguishers with special dry powder for metal fires.

10.2 Where energized electrical equipment is involved in a fire, non-conductivity of the extinguishing media is of utmost importance, and only extinguishers expelling dry powder, carbon dioxide (without metal n horn) or clean agent should be used. Once the electrical equipment is de-energized, extinguishers suitable for the class of the fire risk involved can be used safely.

10.3 Where cleanliness and contamination of sensitive electrical equipment are of importance or where the sensitivity of the control instruments or electronic equipment and systems are likely to be affected, only carbon dioxide or clean agent type extinguishers should be used.

(As per-IS-2190)-11. INSPECTION AND MAINTENANCE OF FIRE EXTINGUISHERS

11.1 The owner or designated agent or occupant of a property in which fire extinguishers are located shall be responsible for such inspection, maintenance, and recharging.

11.2 Maintenance, servicing, and recharging shall be performed by trained persons having available the appropriate servicing manual(s), the proper types of tools, recharge materials,

lubricants, and manufacturer's recommended replacement parts or parts specifically listed for use in the fire extinguisher.

11.3 Labels indicating fire extinguisher use or classification or both shall be placed on the front of the fire extinguisher.

11.4 A well-planned and approved maintenance schedule is essential to ensure that extinguishers,

a) Will operate properly between the time intervals stipulated in the maintenance programme for periodical inspection/ maintenance; and

b) Will not constitute a potential hazard to persons in its vicinity or to those who operate or recharge the extinguishers.

11.5 Periodic inspection of fire extinguishers shall include a check of at least the following items:

a) Location in designated place;

b) No obstruction to access or visibility;

c) Operating instructions on nameplate legible and facing outward;

d) Safety seals and tampers indicators not broken or missing;

e) Fullness determined by weighing or lifting;

f) Examination for obvious physical damage, corrosion, leakage, or clogged nozzle;

g) Pressure gauge reading or indicator in the operable range or position; and

h) Condition of tyres, wheels, carriage, hose, and nozzle checked (for wheeled units).

Table 3 Suitability of Different Types of Fire Extinguishers for Different Classes of Fires
(*Clause* 10.1)

Sl No.	Type of Extinguisher	Type of Fires (3)			
(1)	(2)	A	B	C	D
i)	Fire extinguisher, water type (gas cartridge) , IS 940 and IS 13385	S	NS	NS	NS
ii)	Fire extinguisher, water type (stored pressure) , IS 6234	S	NS	NS	NS
iii)	Fire extinguisher, mechanical foam type (gas cartridge), IS 10204 and IS 13386	S	S	NS	NS
iv)	Fire extinguisher, mechanical foam type (stored pressure), IS 14951 and IS 15397	S	S	NS	NS
v)	Fire extinguisher, dry powder type (stored pressure), IS 13849	S	S	S	NS
vi)	Fire extinguisher, dry powder type (gas cartridge), IS 2171 and IS 10658	S	S	S	NS
vii)	Fire extinguisher, dry powder type for metal fires, IS 11833	NS	NS	NS	S
viii)	Fire extinguisher, carbon dioxide type, IS 2878 and IS 8149	NS	S	S	NS
ix)	Fire extinguisher, clean agent gas type, IS 15683	S	S	S	NS
x)	Fire extinguisher, halon 1211 type, IS 4862 (Part 1) and IS 11108	S	S	S	NS

NOTES
1 S – Suitable, NS – Not Suitable,
2 See Annex A for list of Indian Standards.

ANNEX B
(*Clause* 5.3)
RECOMMENDATIONS FOR INSTALLATION OF FIRE EXTINGUISHERS

B-1 Occupancies classified according to IS 1641 are given together with nature of fire hazard and type of fire risk along with typical examples. The classifications, groupings, etc, given in this Annex are only for general guidance for installation of fire extinguishers, and not for other purposes.

CLASS OF FIRE AS PER BUILDING TYPES

Class of Occupancy	*Type of Occupancy*	*Nature of Occupancy*	*Class of Fire*	*Typical Examples*
Group A	Residential buildings	LH	Class A	Lodging or rooming, one or two family houses, private dwellings, dormitories, apartment houses, flats, upto 4 star hotels, etc
		LH	Class C	Small kitchens having LPG connection, electrical heaters, etc
		MH	Class A	Multi-storeyed buildings, multi-risk buildings, five star hotels, etc
Group B	Educational buildings	LH	Class A	Tutorials, vocational training institutes, evening colleges, commercial institutes
		MH	Class A	Schools, colleges, etc
Group C	Institutional buildings	MH	Class A	Hospitals, sanatoria, homes for aged, orphanage jails, etc
Group D	Assembly buildings D-1	HH	Class A	Theatres, assembly halls, exhibition halls, museums, restaurants places of worship, club rooms, dance halls, etc, having seating capacity of over 1 00 persons
	D-2	MH	Class A	Theatres, assembly halls, exhibitions halls, museums, restaurants, places of worship, club rooms, dance halls, etc, having seating capacity less than 1 000 persons
	D-3	MH	Class A	Theatres, assembly halls, exhibition halls, museums, restaurants, places of worship, club rooms, dance halls, etc, but having accommodation for more than 300 persons, but less than 1 000 persons, with no permanent seating arrangement
	D-4 D-5	LH	Class A	Theatres, assembly halls, exhibition halls, museums, restaurants, places of worship, club rooms, dance halls, etc, but having accommodation less than 300 and those not covered under D-1 to D-3
Group E	Business buildings E-1	SH	Class A	Offices, banks, record rooms, archives, libraries, data processing centres, etc
	E-2	MH	Class B	Laboratories, research establishment, test houses, etc
	E-3	SH	Class A	Computer installations
Group F	Mercantile buildings	MH	Class A	Shops, stores, markets, departmental stores underground shopping centres, etc
Group G	Industrial buildings	LH	Class A	Small industrial units
		MH	Class A	Corrugated carton manufacturing units, paper cane units, packing case manufacturing units, cotton waste manufacturing units
		HH	Class A	Large number yards, saw mills, godowns and warehouses storing combustible materials, cold storages, freight depots, etc
		LH	Class B	Demonstration chemical plants, small chemical processing plants, pilot plants, etc
		MH	Class B	Workshops, painting shops, large kitchens, industrial canteens, generator rooms, heat treatment shops, tread rubber manufacturing units, petrol bunks, tubes and flaps units, etc
		HH	Class B	Petroleum processing units, chemical plants, industrial alcohol plants, effluent treatment plants, etc
		LH	Class C	—

RECOMMENDED SCALE OF EQUIPMENT TO BE INSTALLED

B-2 RECOMMENDED SCALE OF EQUIPMENT TO BE INSTALLED

B-2.1 Class A

LH Occupancy	One 9 litre water expelling extinguisher or ABC 5 kg/6 kg fire extinguisher, for every 200 m^2 of floor area or part thereof with minimum of two extinguishers per compartment or floor of the building. The extinguishers should be so located as to be available within 15 m radius.
MH Occupancy	Two 9 litre water expelling extinguishers or ABC 5 kg / 6 kg fire extinguisher, for every 200 m^2 with minimum of 4 extinguishers per compartment/floor. The extinguisher should be so located as to be available within 15 m radius.
HH Occupancy	Provision as per MH occupancy; in addition to one 50 litre water CO_2/ 25 kg ABC fire extinguisher for every 100 m^2 of floor area or part thereof.
Special Hazard	One 4.5 kg capacity carbon dioxide or one 2/3 kg capacity clean agent extinguisher for every 100 m^2 of floor area or part thereof with minimum of two extinguishers so located as to be available within 10 m radius.

B-2.2 Class B

LH Occupancy	One 9 litre foam extinguisher, mechanical or BC or ABC, 5 kg/6 kg fire extinguisher, for every 200 m^2 of floor area or part thereof with minimum of two extinguishers per compartment or floor. The extinguishers should be

	so located as to be available within 15 m radius.
MH Occupancy	Two 9 litre foam extinguisher, mechanical type, or 5/6 kg dry powder extinguisher (or one of each type) for every 200 m^2 area with minimum of four extinguisher per compartment. Extinguisher should be available within 15 m radius.
HH Occupancy	Provision as per MH, and in addition to one 50 litre mechanical foam type extinguisher or 25 kg BC fire extinguisher for every 100 m^2 or part thereof one 135 litre foam mechanical extinguisher for every 300 m^2 of floor area or part thereof.

B-2.3 Class C

LH Occupancy	One 2/3 kg dry powder of clean agent extinguisher for every 20 m^2 of floor area or part thereof; extinguisher available within 15 m radius.
MH Occupancy	One 10 kg dry powder extinguisher (stored pressure) or 6.5 kg carbon dioxide extinguisher or 5 kg clean agent for 100 m^2 of floor area or part thereof, with minimum of one extinguishers of the same type for every compartment; extinguisher should be available within a radius of 15 m.
HH Occupancy	Dry powder extinguisher (stored pressure) of 10 kg or 6.5 kg CO_2 extinguisher, or 5 kg clean agent extinguisher for every 100 m^2 of floor area or part thereof, subject to a minimum of two extinguishers of same type per room or compartment. Extinguishers should be available within a radius of 10 m.

B-2.4 Class D

HH Occupancy	One 10 kg dry powder extinguisher with special dry powder for metal fires for every 100 m^2 of floor area or part thereof with minimum of two extinguishers per compartment/room. Extinguishers should be available within a radius of 10 m.

NOTES

1 The recommendations are minimum for a specific area. In case, the area is more than specified, high capacity extinguisher may be used based on these minimum requirements, that is proportionately higher capacity can be used.

2 In case of dry powder/CO_2/clean agent types, equivalent lower capacities may also be used.

3 The halons shall be restricted for essential use only.

4 On implementation of IS 15683, 6 kg and 9 kg dry powder extinguishers shall be replaced by 5 kg and 10 kg dry powder extinguishers.

ANNEX D

(*Clauses* 11.4.1 *and* 12.3)

REFILLING SCHEDULE FOR FIRE EXTINGUISHERS AND SCHEDULE FOR OPERATIONAL TEST ON FIRE EXTINGUISHERS

D-1 EXTINGUISHERS TO BE REFILLED/ OPERATED FOR PERFORANCE TEST IN ANNUALLY CYCLIC MANNER

D-1.1 Once in Two Years

a) Portable fire extinguisher, water type stored pressure.
b) Portable fire extinguisher, mechanical foam type stored pressure.
c) 135 litre fire engine, foam type.

D-1.2 Once in Three Years

BC and ABC powder extinguisher confirming to IS 4308 and IS 14609 respectively.

D-1.3 Once in Five Years

a) Portable fire extinguisher, water type 9 litre (gas cartridge).
b) Portable fire extinguisher, mechanical foam type 9 litre (cartridge type).
c) Portable fire extinguisher, water type 50 litre (gas cartridge).
d) Portable fire extinguisher, mechanical foam type 50 litre (cartridge type).
e) Fire extinguisher, carbon dioxide type (portable and trolley mounted).
f) Higher capacity dry powder fire extinguisher (trolley mounted).
g) Dry powder fire extinguisher for metal fires.
h) Clean agent fire extinguishers.

NOTES

1 In corrosive environments, it is desirable to have the discharge test carried out at half the frequency mentioned.

2 As per the restriction on release of halon in atmosphere, it need not be necessary to refill/operate Halon 1211 type portable fire extinguisher with in any stipulated period. However, as regards the pressure of injections gas, that is dry N_2 should be checked up for the adequate pressure on the pressure gauge/ indicating gauge and the contents by weighing the fire extinguisher.

ANNEX F

(*Clauses* 12.2.1)

LIFE OF FIRE EXTINGUISHERS

Sl No.	*Type of Extinguisher*	*Life Time,* Year
i)	Water type	10
ii)	Foam type	10
iii)	Powder type	10
iv)	Carbon dioxide	15
v)	Clean agent	10

NOTES

1 Life of extinguishers shall be considered from date of manufacture of extinguishers.

2 In case of failure in hydraulic pressure testing, extinguisher shall be rejected immediately before the life time given above.

Detail of Area of various blocks at Ram Lal Anand College						
S.nos	**Location**	**Length - in Metres**	**Width in metres**	**Area - Sq. Metres**	**Height- in Metres**	**Floors**
1	Principal office block	23.25	14.3	332.48	10.4	Basement, Ground and First Floor
2	Academic Block - 1	34.7	10	347.00	12.1	Ground, First and Second floor
3	Academic Block - 2	52.4	10	524.00	12.1	Ground, First and Second floor
4	Academic Block - 3	24.7	10	247.00	12.1	Ground, First and Second floor
5	Library block	15	11.8	177.00	11	Ground with internal Mezzanine
6	Office block	15.4	12.1	186.34	11.8	Ground and First Floor
7	Canteen block	14.3	9	128.70	4.1	Ground Floor
8	Kitchen block	10.7	3.5	37.45	2.8	Ground
9	**Basement- External Area**	**23.25**	**14.3**		**2.76**	
10	Basement - Internal area			290.85		
				Seating Capacity		
11	**Auditorium Block**				9.08	Ground -First Floor
a	Auditorium - Ground Floor			115	4.54	
b	Proposed Auditorium - First Floor			120	4.54	

Cl-NBC-2016-2.6 Building, Height of. The vertical distance measured in the case of flat roofs, from the average level of the ground around and contiguous to the building or as decided by the Authority to the terrace of the last liveable floor of the building adjacent to the external wall; and in the case of pitched roofs, up to the point where the external surface of the outer wall intersects the finished surface of the sloping roof; and in the case of gables facing the road, the mid-point between the eaves level and the ridge. Where the building is

located in a sloped terrain, height shall be determined from the lowest level (that is approachable
by the fire service vehicles) to the terrace level.
Architectural features serving no other function except that of decoration shall be excluded for the purpose of measuring heights.

Type of Occupancy as per NBC classification in College

S. No.	Description	Height of Building-Metres	Categorization of occupancy as per NBC-2016	Sub category
1	Principal Block with basement more than 200 sq.mts.	10.40	Educational Building-(B)	(1)-Less than-15 Metres height
2	Academic Block-1 & 2	12.10	Educational Building-(B)	(1)-Less than-15 Metres height
3	Academic Block-3	12.10	Educational Building-(B)	(1)-Less than-15 Metres height
4	Library Block	11.00	Educational Building-(B)	(1)-Less than-15 Metres height
5	Canteen block	4.10	Educational Building-(B)	Ground Floor only
6	Kitchen Block	2.80	Educational Building-(B)	Ground Floor only
7	Office Block	11.80	Educational Building-(B)	(1)-Less than-15 Metres height
8	Auditorium Block with 225 Nos. seating capacity with performance stage	9.08	Assembly Building	(a)-Buildings (D-1 to D-5)-Height Less than 10 Metres

Requirement as per NBC-2016

Table 7 Minimum Requirements for Fire Fighting Installations
[Clauses 4.9(a), 4.9(c), 4.9(e), 5.1.1(a), 5.1.1(d), 5.1.2.1, 5.1.3(a), E-7, H-2(f) *and* Table 2]

Occupancy –Educational –Building-B-Less than 15 metres height- Principal Block with basement more than 200 sq.mts.

S.No.	Description		Requirement-	Present status	Recommendations
1	Type of Installation	Fire Extinguisher	Required	Not available as per requirement	To be supplemented as per requirement of IS-2190
2		First Aid hose reel	Required	Not provided as per requirement	To be provided as per requirement
3		Wet Riser	Not required	Not Applicable	None
4		Down Comer	Not Required	Not Applicable	None
5		Yard hydrant	Not Required	Not Applicable	None
6		Automatic sprinkler system	Required	Not provided as per requirement	To be provided as per requirement
7		MOEFS-Manually operated electronic fire alarm system-Note-1	Not Required	Not Applicable	None
8		Automatic detection and fire alarm system-Note-2	Not Required	Not Applicable	None
9	Water Supply (Litres)	Underground static storage tank combined	Not Required	Not Applicable	None

		capacity for wet riser, yard hydrant and sprinkler per set of pumps.			
10		Terrace tank over respective tower	10000+5000 = 15,000 Litres	Not provided as per requirement	To be provided as per requirement
11	Pump capacity-litres per minute	Pump near underground static storage water tank (Fire Pump)-with minimum pressure of 3.5 kgs/sq.cms	Not Required	Not Applicable	None
12		At the terrace tank level with minimum pressure of 3.5 kgs/sq.cms.	900 Litres per Minute	Not provided as per requirement	To be provided as per requirement

Occupancy –Educational –Building-B-Less than 15 metres height- Academic Block-1

S.No.	Description	Requirement-	Present status	Recommendations	
1	Type of Installation	Fire Extinguisher	Required	Not available as per requirement	To be supplemented as per requirement of IS-2190
2		First Aid hose reel	Required	Not provided as per requirement	To be provided as per requirement
3		Wet Riser	Not required	Not Applicable	None
4		Down Comer	Not	Not Applicable	None

			Required		
5		Yard hydrant	Not Required	Not Applicable	None
6		Automatic sprinkler system	Not Required	Not Applicable	None
7		MOEFS-Manually operated electronic fire alarm system-Note-1	Not Required	Not Applicable	None
8		Automatic detection and fire alarm system-Note-2	Not Required	Not Applicable	None
9	Water Supply (Litres)	Underground static storage tank combined capacity for wet riser, yard hydrant and sprinkler per set of pumps.	Not Required	Not Applicable	None
10		Terrace tank over respective tower	10000	Not provided as per requirement	To be provided as per requirement
11	Pump capacity-litres per minute	Pump near underground static storage water tank (Fire Pump)-with minimum pressure of 3·5	Not Required	Not Applicable	None

		kgs/sq.cms			
12		At the terrace tank level with minimum pressure of 3.5 kgs/sq.cms.	450 Litres per Minute	Not provided as per requirement	To be provided as per requirement

Occupancy – Auditorium Block with 225 Nos. seating capacity with performance stage- Height less than 10 Meters.

S. No.	**Description**		**Requirement-**	**Present status**	Recommendations
1	Type of Installation	Fire Extinguisher	Required	Not available as per requirement	To be supplemented as per requirement of IS-2190
2		First Aid hose reel	Required	Not provided as per requirement	To be provided as per requirement
3		Wet Riser	Not Required	Not Applicable	None
4		Down Comer	Required	Not provided as per requirement	To be provided as per requirement
5		Yard hydrant	Not Required	Not Applicable	None
6		Automatic sprinkler system	Not Required	Not Applicable	None
7		MOEFS-Manually operated electronic fire alarm system-Note-1	Required	Not provided as per requirement	To be provided as per requirement
8		Automatic detection and fire alarm	Not Required	Not Applicable	None

		system-Note-2			
9	Water Supply (Litres)	Underground static storage tank combined capacity for wet riser, yard hydrant and sprinkler per set of pumps.	Not Required	Not Applicable	None
10		Terrace tank over respective tower	25000 litres	Not provided as per requirement	To be provided as per requirement
11	Pump capacity-litres per minute	Pump near underground static storage water tank (Fire Pump)-with minimum pressure of 3.5 kgs/sq.cms	Not Required	Not Applicable	To be provided as per requirement
12		At the terrace tank level with minimum pressure of 3.5 kgs/sq.cms.	900 Litres	Not provided as per requirement	To be provided as per requirement

Occupancy –Educational –Building-B-Less than 15 metres height- Academic Block-2 and 3

S.No.	**Description**		**Requirement**	**Present status**	Recommendations
1	Type of Installatio	Fire	Required	Not available as	To be supplemented as

	n	Extinguisher		per requirement	per requirement of IS-2190
2		First Aid hose reel	Required	Not provided as per requirement	To be provided as per requirement
3		Wet Riser	Not required	Not Applicable	None
4		Down Comer	Not Required	Not Applicable	None
5		Yard hydrant	Not Required	Not Applicable	None
6		Automatic sprinkler system	Not Required	Not Applicable	None
7		MOEFS-Manually operated electronic fire alarm system-Note-1	Not Required	Not Applicable	None
8		Automatic detection and fire alarm system-Note-2	Not Required	Not Applicable	None
9	Water Supply (Litres)	Underground static storage tank combined capacity for wet riser, yard hydrant and sprinkler per set of pumps.	Not Required	Not Applicable	None
10		Terrace tank over respective tower	10000	Not provided as per requirement	To be provided as per requirement
11	Pump capacity-	Pump near underground	Not	Not Applicable	None

	litres per minute	static storage water tank (Fire Pump)-with minimum pressure of 3·5 kgs/sq.cms	Required		
12		At the terrace tank level with minimum pressure of 3·5 kgs/sq.cms.	450 Litres per Minute	Not provided as per requirement	To be provided as per requirement

Occupancy –Educational –Building-B-Less than 15 metres height- Library Block

S.No.	Description	Installation	Requirement	Present status	Recommendations
1	Type of Installation	Fire Extinguisher	Required	Not available as per requirement	To be supplemented as per requirement of IS-2190
2		First Aid hose reel	Required	Not provided as per requirement	To be provided as per requirement
3		Wet Riser	Not required	Not Applicable	None
4		Down Comer	Not Required	Not Applicable	None
5		Yard hydrant	Not Required	Not Applicable	None
6		Automatic sprinkler system	Not Required	Not Applicable	None
7		MOEFS-Manually operated electronic	Not Required	Not Applicable	None

		fire alarm system- Note-1			
8		Automatic detection and fire alarm system- Note-2	Not Required	Not Applicable	None
9	Water Supply (Litres)	Underground static storage tank combined capacity for wet riser, yard hydrant and sprinkler per set of pumps.	Not Required	Not Applicable	None
10		Terrace tank over respective tower	10000	Not provided as per requirement	To be provided as per requirement
11	Pump capacity- litres per minute	Pump near underground static storage water tank (Fire Pump)- with minimum pressure of 3·5 kgs/sq.cms	Not Required	Not Applicable	None
12		At the terrace tank level with minimum pressure of 3·5 kgs/sq.cms.	450 Litres per Minute	Not provided as per requirement	To be provided as per requirement

Occupancy –Educational –Building-B-Less than 15 metres height- office block					
S.No.	**Description**	**Installation**	**Requirement**	**Present status**	**Recommendations**
1	Type of Installation	Fire Extinguisher	Required	Not available as per requirement	To be supplemented as per requirement of IS-2190
2		First Aid hose reel	Required	Not provided as per requirement	To be provided as per requirement
3		Wet Riser	Not required	Not Applicable	None
4		Down Comer	Not Required	Not Applicable	None
5		Yard hydrant	Not Required	Not Applicable	None
6		Automatic sprinkler system	Not Required	Not Applicable	None
7		MOEFS-Manually operated electronic fire alarm system-Note-1	Not Required	Not Applicable	None
8		Automatic detection and fire alarm system-Note-2	Not Required	Not Applicable	None
9	Water Supply (Litres)	Underground static storage tank combined capacity for wet riser,	Not Required	Not Applicable	None

		yard hydrant and sprinkler per set of pumps.			
10		Terrace tank over respective tower	10000 Litres	Not provided as per requirement	To be provided as per requirement
11	Pump capacity-litres per minute	Pump near underground static storage water tank (Fire Pump)-with minimum pressure of 3.5 kgs/sq.cms	Not Required	Not Applicable	None
12		At the terrace tank level with minimum pressure of 3.5 kgs/sq.cms.	450 Litres per Minute	Not provided as per requirement	To be provided as per requirement

Occupancy –Educational –Kitchen and Canteen-Ground Floor only

S.No.	Description	Installation	Requirement	Present status	Recommendations
1	Type of Installation	Fire Extinguisher	Required	Not available as per requirement	To be supplemented as per requirement of IS-2190
2		First Aid hose reel	Not required	Not Applicable	None
3		Wet Riser	Not required	Not Applicable	None
4		Down Comer	Not Required	Not Applicable	None

5		Yard hydrant	Not Required	Not Applicable	None
6		Automatic sprinkler system	Not Required	Not Applicable	None
7		MOEFS-Manually operated electronic fire alarm system-Note-1	Not Required	Not Applicable	None
8		Automatic detection and fire alarm system-Note-2	Not Required	Not Applicable	None
9	Water Supply (Litres)	Underground static storage tank combined capacity for wet riser, yard hydrant and sprinkler per set of pumps.	Not Required	Not Applicable	None
10		Terrace tank over respective tower	Not required	Not Applicable	None
11	Pump capacity-litres per minute	Pump near underground static storage water tank (Fire Pump)-with minimum pressure of 3.5 kgs/sq.cms	Not Required	Not Applicable	None

12		At the terrace tank level with minimum pressure of 3.5 kgs/sq.cms.	Not required	Not Applicable	None

Overhead Tank required to be installed

S. No.	Building	Tank Capacity in Litres	Remarks
1	Principal Block with basement	15000	At terrace level
2	Academic block-1	10000	At terrace level
3	Auditorium	25000	At terrace level
4	Academic block-2 &3	10000	At terrace level
5	Office Block	10000	At terrace level
6	Library Block	10000	At terrace level
7	Canteen and Kitchen	None	At terrace level

Terrace pump with 3.5 kgs/sq.cms

S. No.	**Building**	**Pump Flow-Litres per minute**	**Remarks**
1	Principal Block with basement	900	At Terrace level-Set of two pumps-one running and one standby
2	Academic block-1	450	At Terrace level-Set of two pumps-one running and one standby
3	Auditorium	900	At Terrace level-Set of two pumps-one running and one standby
4	Academic block-2 &3	450	At Terrace level-Set of two pumps-one running and one standby
5	Office Block	450	At Terrace level-Set of two pumps-one running and one standby

6	Library Block	450	At terrace level
7	Canteen and Kitchen	None	

Internal yard hydrant

S. No.	Building	Basement-Hose Reel	Ground Floor-Hose Reel	First Floor - Hose Reel	Second Floor-Hose Reel/Terrace	Terrace Floor	Total Hose Reel - Qty.	Remarks
1	Auditorium		2	2	2		6	
	Total		**2**	**2**	**2**		**6**	

TABLE 2.1

VARIOUS COMPONENTS OF FIREFIGHTING INSTALLATIONS

S. No.	System component	Wet Riser	Down Comer	Wet Riser cum Down Comer	Automatic Sprinkler and Wet Riser cum Down Comer
(i)	Electric Motor Driven Fire Pump	Y	N	Y	Y
(ii)	Diesel Engine Driven Fire Pump (as stand by)	Y	N	Y	Y
(iii)	Pressurization Pump (Jockey Pump)	Y	N	Y	Y
(iv)	Terrace Pump	N	Y	Y	Y
(v)	Vertical risers in the building.	Y	Y	Y	Y
(vi)	Pipe network inside the building throughout the area to be protected with Sprinklers	N	N	N	Y
(vii)	External pipe line around the building.	Y	N	Y	Y
(viii)	Internal Hydrant	Y	Y	Y	Y
(ix)	Yard Hydrant (External Hydrants)	Y	N	Y	Y
(x)	First-aid hose reel.	Y	Y	Y	Y
(xi)	Hose Pipe and Branch Pipe.	Y	Y	Y	Y
(xii)	Air Vessels.	Y	Y	Y	Y
(xiii)	Fire Service Connections.	Y	N	Y	Y
(xiv)	Fire Service Inlet.	Y	Y	Y	Y
(xv)	Control components like pressure switches, flow switches level indicator, alarm etc.	Y	Y	Y	Y
(xvi)	Electrical Power and Control Panel with cable and earthing etc.	Y	Y	Y	Y
(xvii)	Pipe line accessories like Butterfly/ Sluice Valve, Non-Return Valve etc.	Y	Y	Y	Y

'Y' Stands for: to be provided.

'N' Stands for: not to be provided.

First Aid Hose Reel

S. No.	Building	Basement-Hose Reel	Ground Floor-Hose Reel	First Floor - Hose Reel	Second Floor-Hose Reel/Terrace	Terrace Floor	Total Hose Reel - Qty.	Remarks
1	Principal Block with basement	2	1	1	1		5	
2	Academic block-1		1	1	1	1	4	
3	Auditorium		2	2	2		6	
4	Academic block-2 &3		3	3	3	3	12	
5	Office Block		1	1	1		3	
6	Library Block		1	1* Mez.	1		3	
7	Canteen and Kitchen							
	Total	**2**	**9**	**9**	**9**	**4**	**33**	

Door size in Ram Lal Anand College							
S no	LOCATION	Room size	No of Doors	Height	Width	Corridor width in metres	Remarks
1	G. floor Room No - 1	small	1	2.4	1.85	3.8	OK
2	G. floor Room No - 2	small	1	2.4	1.85	3.8	OK
3	G. floor Room No - 3	small	1	2.4	1.85	3.8	OK
4	G. floor Room No - 4	small	1	2.4	1.85	3.8	OK
5	G. floor Room No - 5	big	2	2.4	1.85	3.8	OK
6	G. floor Room No - 6	small	1	2.4	1.85	3.8	OK
7	G. floor Room No - 7	small	1	2.4	1.85	3.8	OK
8	G. floor Room No - 8	small	1	2.4	1.85	3.8	OK
9	G. floor Room No - 9	small	1	2.4	1.85	3.8	OK
10	G. floor Room No - 10	small	1	2.4	1.85	3.8	OK
11	G. floor Room No - 11	small	1	2.4	1.85	3.8	OK
12	G. floor Room No - 12	big	2	2.4	1.85	3.8	OK
13	G. floor Room No - 13	small	1	2.4	1.85	3.8	OK
14	G. floor Room No - 14	big	2	2.4	1.85	3.8	OK
15	F. floor Room No - 31	small	1	1.98	1.1	3.47	OK
16	F. floor Room No - 32	small	1	1.98	1.1	3.47	OK
17	F. floor Room No - 33	small	1	1.98	1.1	3.47	OK
18	F. floor Room No - 34	small	1	1.98	1.1	3.47	OK
19	F. floor Room No - 35	small	1	1.98	1.1	3.47	OK
20	F. floor Room No - 36	small	1	1.98	1.1	3.47	OK
21	F. floor Room No - 37	small	1	1.98	1.1	3.47	OK

22	F. floor Room No - 38	small	1	1.98	1.1	3.47	OK
23	F. floor Room No - 39	small	1	1.98	1.1	3.47	OK
24	F. floor Room No - 40	small	1	1.98	1.1	3.47	OK
25	F. floor Room No - 41	small	1	1.98	1.1	3.47	OK
26	F. floor Room No - 42	small	1	1.98	1.1	3.47	OK
27	F. floor Room No - 43	big	2	1.98	1.1	3.47	OK
28	F. floor Room No - 44	big	2	1.98	1.1	3.47	OK
29	F. floor Room No - 45	small	1	1.98	1.1	3.47	OK
30	Geography/MJMC/NCC main entry door			2.4	1.1	2.46	OK
31	Geography/MJMC/NCC Room no-19	small	1	2.18	0.8	2.46	OK
32	Geography/MJMC/NCC Room no-20	small	1	2.18	0.8	2.46	OK
33	Geography/MJMC/NCC Room no-21	small	1	2.18	0.8	2.46	OK
34	Geography/MJMC/NCC Room no-22	small	1	2.18	0.8	2.46	OK
35	Geography/MJMC/NCC Room no-23	small	1	2.18	0.8	2.46	OK
36	Geography/MJMC/NCC Room no-25	small	1	2.18	0.8	2.46	OK
37	Geography/MJMC/NCC Room no-26	small	1	2.18	0.8	2.46	OK
38	Geography/MJMC/NCC Room no-27	small	1	2.18	0.8	2.46	OK
39	Geography/MJMC/NCC Room no-28	small	1	2.18	0.8	2.46	OK
40	Geography/MJMC/NCC Room no-29	small	1	2.18	0.8	2.46	OK
41	Geography/MJMC/NCC Room no-30	small	1	2.18	0.8	2.46	OK
42	Geography/MJMC/NCC back side door	chained door locked		2.4	2.3	2.46	chained door locked

43	Second. Floor PC Room no - 1	small	1	2.1	1.15	2.4	OK
44	Second. Floor PC Room no - 2	small	1	2.1	1.15	2.4	OK
45	Second. Floor PC Room no - 3	small	1	2.1	1.15	2.4	OK
46	Second. Floor PC Room no - 4	small	1	2.1	1.15	2.4	OK
47	Second. Floor PC Room no - 5	big	2	2.1	1.15	2.4	OK
48	Second. Floor PC Room no - 6	big	2	2.07	1.08	2.5	OK
49	Second. Floor PC Room no - 7	big	2	2.07	1.08	2.5	OK
50	Second. Floor PC Room no - 8	big	2	2.07	1.08	2.5	OK
51	Second. Floor PC Room no - 9	big	2	2.04	1.1	3.58	OK
52	Second. Floor PC Room no - 10	big	2	2.04	1.1	3.58	OK
53	Second. Floor PC Room no - 11	big	2	2.04	1.1	3.58	OK
54	Second. Floor PC Room no - 12	big	2	2.13	1.08	3.58	OK
55	Second. Floor PC Room no - 13	small	1	1.97	1.1	3.58	OK
56	Second. Floor PC Room no - 17	small	1	2.13	1.08	3.58	OK
57	Second. Floor PC Room no - 18	small	1	2.13	1.08	3.58	OK
58	New MP Theatre entry door-1			2.33	1.11	1.88	OK
59	New MP Theatre entry door-2			2.4	1.08	1.88	OK
60	Library entry door			2.3	1.7	2.3	OK
61	Library emergency exit at mezzanine floor			3.3	1.98		OK
62	Library stare case					1.6	OK
63	Library emergency exit way from stair case					0.86	OK
64	Office entry glass door			2.38	2.1		OK

65	Office entry MS door opening			2.15	1.65		OK
66	Admin. entry door			2.1	0.9		OK
67	Accounts entry door			2.1	0.9		OK
68	Canteen entry door-1			2.31	1.11	1.3	OK
69	Canteen entry door-2			2.05	1.97	2.1	OK
70	Canteen to kitchen door			2.07	1.11		**blocked with deep-freezer only open .44 x 2.07**
71	kitchen entry door			2.09	0.89		OK
72	Principal office entry gate			2.05	1.36	1.45	OK
73	Staff room entry gate			2.3	1.13		OK
74	Girls common room entry gate			2.3	1.13		OK
75	Room no - 15			2.33	1.2	2.5	OK
76	Room no - 16			2.33	1.2	3.47	OK
77	In front of Lift					1.14	OK
78	old MP Theatre entry door-1			2	1.11	1.87	OK
79	old MP Theatre entry door-2			2	1.11	1.87	OK

Electrical Safety Audit

Purpose of Electrical safety Audit

The purpose of an electrical safety audit is to identify potentially hazardous electrical situations and provide corrective actions for these situations.

1. Determine electrical system & electrical safety compliance with:
   – CEA guidelines for Electrical Safety
2. NBC-2016
3. IS-Standard for Earthing systems-IS-3043
4. IS-2309 for Lightning Arrester.
5. IS-Standard for Electrical Safety-IS-5216-Part-I & Part-II.

Observations and Recommendations

1. The condition of LT Panel and LT panel room is very bad. LT panel's bus bar only used by direct termination of cables without any switchgear. –Complete Electrical system is required to be re-done.
2. The practice of termination of cables is not as per standard requirement. Termination is done without Brass compression glands. Continuity of armouring/earthing is compromised and also leading to stress in cables. - Complete Electrical system is required to be re-done.
3. There is no end plates provided giving rise to risk of arc flash due to exposure of live conductors. To be provided
4. Cable laying is not as per prescribed standards. Vertical and horizontal cables are without sleeves and laid in open. Cable laying should either be under ground or in DWC pipe.
5. The cables are not dressed properly.-Work man ship issue
6. Complete earth system is required to be re-done. There are disconnected earthing and earth with very high resistance.
7. None of earth pits are traceable, Earth station lay out available... When new earths are laid, an earth pit lay out drawing be got prepared.
8. Cable trench covers are missing.-To be provided.
9. There is no earth pit inventory. –To be maintained
10. The single line diagram of electrical system is not available. An updated single line diagram is required to be maintained.
11. Non tripping devices have been installed at numerous locations thereby enhancing the risk of more damage in case of fault. Proper tripping device and RCCB as per requirement should be installed.
12. There is back flow of electricity in office of the principal.-needs attention.
13. Earth connection in wet area near water cooler not provided. –Earthing of wet area is critical
14. Main MCB DB and Meter at canteen not earthed. Earth connection be provided.
15. The wires of Exhaust fan at canteen joined openly without covering with PVC tape. Practice should be discontinued. Corrective action is warranted.
16. The wires of Exhaust fan at canteen - no earth provided.-Earth be provided at all locations.
17. All power and light plug points not earthed in canteen- Earth be provided at all locations.

18. Web nets inside found the LT panel front side.-Maintenance issue
19. Lightning Arrester system not installed. Safety hazard-Be provided.
20. Outgoing feeders are not marked in any panel.-There is requirement of permanent marking of all incoming and outgoing feeders.
21. No outgoing marking on any MCBDB- There is requirement of permanent marking of all incoming and outgoing feeders.
22. Earth Mats not provided. All electrical panels should be provided with Earth insulation mats.
23. Insulated gloves are not available. PPE should be available.
24. First Aid kit not available with electrical maintenance staff. To be provided.
25. No shock treatment chart installed. To be provided.
26. There is no training on electrical safety provided to electrical maintenance staff.
27. No earth in bus bar outside computer room. To be provided.
28. No earth in UPS DB in computer room- To be provided.
29. No earth in UPS in computer room- To be provided.
30. Computer science lab AC DP in covered wooden cabinet with joints in wire.-Such type of practices should not be practiced.
31. Staff room dining area - both AC running without plug top.-It is a serious shock and electrocution hazard.
32. Staff room dining area - one AC running when pushing wire with stick- It is a serious shock and electrocution hazard.
33. Sr. PA Room AC - no earth-Earth should be provided.
34. Bursar room - earth leakage-RCCB should be provided in all distribution boards.
35. There is no regular maintenance staff deputed.-There should be a regular electrician engaged based on number of points existing in college premises and during free time he should be engaged in preventive maintenance.
36. The electrical workmen engaged temporarily does not have an electrical wire man's licence.-
37. No preventive maintenance is done. There is no preventive maintenance schedule in place.-preventive maintenance plan should be prepared and done as per decided periodicity.
38. **Thermal imaging conducted revealed that there is higher temperature noticed in many types of switchgear and also on the terminations of Air conditioners. Regular tightening of connections should be done.**

39.

S.NO	Description	Principal Block with basement	Admn +Library Building	Academic Building-1	Academic Building-2	Academic Building-3	Audi Block	Canteen
	ELECTRICAL SAFETY							
1	Inspection of updated Single line diagram up to Distribution Board/Equipment if available.	There is no Electrical single line diagram available. An updated single line diagram is required to be maintained and kept updated at all times.						
2	Checking of Cable laying and termination practices.	The cables have been laid in a very inappropriate manner not adhering to the required CPWD specifications/BIS standard/CEA regulations -2010 amended up to date						
3	Availability and operational status of Fire Fighting and fire alarm system if installed	The fire fighting system is not installed as per requirement of National Building Code-2016 requirement.						
4	Maintenance practices.	There are no regular electrical maintenance staffs available for electrical maintenance.						
5	Register of Accidents and Incidents.	No register of Accidents and Incidents or near misses maintained.						
6	To check competence and adequacy of persons responsible for maintenance.	For day to day maintenance and periodical preventive maintenance no electrical personnel is deputed.						
7	Checking of Electrical	Uncovered opening have been found at a number of locations. Through proper maintenance these should be checked and						

	system for un covered openings	maintained regularly to avert any incident of arc flash, fire and avoiding loss of life and property.
8	Checking of electrical system for overheating and loose connection	Thermal Imaging has been conducted to find out overheating and loose connections. At many locations high temperature has been noticed depicting loose connection. These loose connections can cause fire and unsafe electrical conditions.
9	Compliance to statutory rules-CEA guidelines-2010 as amended up to date.	There is no electrical staffs deployed with required statutory competency certificate required for electrical maintenance employees. There are no records of Insulation resistance, Earth resistance measurement maintained.
10	Measurement of Earth resistance.	No record of checking and recording of earth resistance maintained
11	Measurement of neutral grounding resistance for DG sets.	
12	Recommendation for Lightning Arrester system	There is no Lightning arrester system installed. This is required for safety of Property and Life of occupants.
13	Identification of Non-conformities as per standard requirement.	There are non-conformities noticed in all the areas of Electrical system. These have been detailed in report
14	Visual inspection of installed cables for laying practices and terminations.	The terminations of cables are not as per requirement of standard.

15	PPE available viz. a viz. Requirement	PPE's are not available.
16	Audit of work permit procedure /LOTO.	There is no LOTO procedure in place
17	Checking of wet area	
18	Checking the records of hazard identification.	No hazard identification has been done.
19	Lighting level of all electrical areas	Illumination of electrical area is not adequate as per NBC requirement.
20	Polarity check of receptacles on random basis.	Polarity test conducted and the report is attached.
21	**Thermal Imaging of Electrical panels and distribution-recommendation for Improvement.**	Thermal Imaging conducted. Report has separately been attached. Higher temperature noticed.
22	**Thermal Imaging of Air conditioners electrical connections.**	Thermal Imaging conducted. Report has separately been attached. Higher temperature noticed.
23	Earth Resistance	Earth resistance measured and the result attached in this report.

SUMMARISATION OF AUDIT FINDINGS
Fire Safety audit

1. The following Fire fighting system as per NBC-2016 is recommended to be provided as tabulated below.

S.NO.	Type of Installation/ Building	Principal Block with basement	Academic-1	MPHall/Audi	Academic-2 &3	Library	Admn./ Office	Kitchen /Canteen
1	Additional Fire Extinguisher	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2	First Aid Hose Reel	Yes	Yes	Yes	Yes	Yes	Yes	No
3	Down Comer	No	No	yes	No	No	No	No
4	Manual operated electronic fire alarm system	No	No	yes	No	No	No	No
5	Overhead terrace Fire tank-Cap-Litres.	15000	10000	25000	10000	10000	10000	No
6	Terrace Pumps-2 Nos. with 3.5 kgs/sq.cms head-LPM	900	450	900	450	450	450	No
7	Sprinkler system	Yes	No	No	No	No	No	No

2. The detailed point wise recommendations have been given in report.
3. The fire clearance certificate from Chief fire officer be obtained.
4. There should be appointment of safety committee to oversee the safety aspects of college.
5. There should be regular plan of checking fire extinguishers.
6. The testing of pressure and availability of water in sprinkler system, Down Comer system in MP hall when installed should be regularly checked.
7. Automatic fire alarm system is recommended for Kitchen and canteen, library and MP hall beyond requirement of NBC-2016.

8. There should be automatic water filling system be installed for keeping the fire tanks filled at all times.
9. There should be a regular training and awareness program on fire safety for students, employees regularly.
10. LPG leak detector be installed in kitchen area.
11. The Phone numbers of all emergency services should be conspicuously displayed.
12. New and additional fire extinguishers be provided as per requirement of IS-2190 recommended in report.

Electrical Safety audit

1. Considering the condition of Electrical system, the complete electrical system is required to be re-done.
2. Updated single line diagram be got prepared and kept updated at all times.
3. Regular electrical connection tightening program be made for tightening of connections.
4. Complete earthing system be re-done and regular annual checking of earth resistance should be done and records should be maintained.
5. There should be a regular electrical maintenance employee for looking after maintenance of electrical system.
6. There should be regular training of electrical maintenance employees.
7. First Aid box should be provided and shock treatment chart should be displayed.
8. Required PPE like gloves and Insulating rubber mats be provided to the electrical maintenance employees.
9. There should be a regular electrical safety training program for administration, students and electrical maintenance employees.
10. Sufficient lights be installed for providing adequate illumination level as per requirement of NBC-2016.

----------End of Report----------

Annexure-A

Detail of Lux Level at RLA College

S No.	Location	Maximum Lux	Minimum Lux
1	Electrical panel Room	5	3
2	Pump Room	11	7

Annexure-B

Schedule of Polarity checking of RLA College			
Sno	**Location**	**Polarity/Earth test result**	
1	Principal room LPP - 1	EARTH FAULT	
2	Principal room LPP - 2	EARTH FAULT	
3	Principal room PP - 1	REVERSE POLARITY	
4	Pantry PP-1	OK	Set of 2 power plug points 1 is OK and 2nds Reverse Polarity
5	Pantry PP-2	REVERSE POLARITY	
6	Pantry LPP-1	EARTH FAULT	
7	Vice Principal room LPP - 1	OK	
8	Vice Principal room LPP - 2	OK	
9	Vice Principal room LPP - 3	OK	
10	Vice Principal room LPP - 4	OK	
11	Vice Principal room LPP - 5	OK	
12	Vice Principal room PP - 1	OK	
13	Vice Principal room PP - 2	OK	
14	Vice Principal room PP - 3	OK	
15	AO Room LPP-1	EARTH FAULT	
16	AO Room LPP-2	OK	
17	AO Room LPP-3	OK	
18	AO Room PP-1	REVERSE POLARITY	
19	Conference Room LPP-1	EARTH FAULT	
20	Conference Room LPP-2	EARTH FAULT	
21	Conference Room LPP-3	EARTH FAULT	
22	Conference Room PP-1	EARTH FAULT	
23	Conference Room PP-2	EARTH FAULT	
24	Senior PA Room LPP-1	EARTH FAULT	
25	Senior PA Room LPP-2	REVERSE POLARITY	
26	Senior PA Room PP-1	EARTH FAULT	

27	Senior PA Room Set of 4 no's PP	EARTH FAULT	
28	Bursar Room LPP-1	REVERSE POLARITY	
29	Bursar Room LPP-2	REVERSE POLARITY	
30	Bursar Room PP-1	OK	earth leakage
31	Bursar Room PP-2	OK	earth leakage
32	Bursar Room PP-3	OK	earth leakage
33	Bursar Room PP-4	OK	
34	Seminar Room PP-1	EARTH FAULT	Switch is not fixed in right direction
35	Seminar Room LPP-1	REVERSE POLARITY	
36	Cori door LPP-1	EARTH FAULT	
37	Medical Room LPP-1	OK	
38	Medical Room LPP-2	OK	
39	Medical Room LPP-3	OK	
40	Medical Room LPP-4	OK	
41	Medical Room PP-1	OK	
42	Medical Room PP-2	OK	
43	Library PP-1 - hot case	EARTH FAULT	
44	Library PP-2 - hot case	EARTH FAULT	
45	Library PP-1 - backside counter	OK	Set of 2 power plug points 1 is OK and 2nds Reverse Polarity
46	Library PP-2-backside counter	REVERSE POLARITY	
47	Library PP-3	OK	
48	Acquisition Section PP - 1	OK	Set of 4 power plug points 2 is OK and 2 Reverse Polarity
49	Acquisition Section PP - 2	OK	
50	Acquisition Section PP - 3	REVERSE POLARITY	
51	Acquisition Section PP - 4	REVERSE POLARITY	
52	Acquisition Section Counter PP - 1	OK	2 is OK and 2 Reverse Polarity
53	Acquisition Section Counter PP - 2	OK	
54	Acquisition Section Counter PP - 3	REVERSE POLARITY	
55	Acquisition Section Counter PP - 4	REVERSE POLARITY	
56	OPAC Machine PP	REVERSE POLARITY	
57	Examination Box PP-1	OK	Set of 2 power plug points 1 is OK and 2nds Reverse Polarity
58	Examination Box PP-2	REVERSE POLARITY	
59	Library hall PP - 1	OK	
60	Library hall PP - 2	OK	
61	Library hall PP - 3	REVERSE POLARITY	
62	Library hall PP - 4	REVERSE POLARITY	
63	Teachers Reading Room PP-1	REVERSE POLARITY	
64	Teachers Reading Room PP-2	REVERSE POLARITY	
65	Teachers Reading Room PP-3	REVERSE POLARITY	

66	Teachers Reading Room PP-4	REVERSE POLARITY	
67	E-Book section PP-1	OK	
68	E-Book section PP-2	OK	
69	E-Book section PP-3	OK	
70	E-Book section PP-4	OK	
71	E-Book section PP-5	OK	
72	E-Book section PP-6	OK	
73	E-Book section PP-7	OK	
74	E-Book section PP-8	OK	
75	E-Book section PP-9	OK	
76	Students Reading area PP-1	OK	
77	Students Reading area PP-2	OK	
78	Students Reading area PP-3	OK	
79	Students Reading area PP-4	OK	
80	Students Reading area PP-5	OK	
81	Students Reading area PP-6	OK	
82	Librarian room Set of 4 power plug points	OK	
83	Admin Block-Hot case PP	REVERSE POLARITY	
84	Photocopy machine PP	REVERSE POLARITY	
85	Admin Office room PP-1	OK	
86	Admin Office room Set of 4 power plug points	REVERSE POLARITY	
87	Middle Counter Set of 4 power plug points	2 is OK and 2 Reverse Polarity	
88			
89	Counter - 1 Set of 4 power plug points	2 is OK and 2 Reverse Polarity	
90			
91	Counter - 2 Set of 4 power plug points	2 is OK and 2 Reverse Polarity	
92			
93	Counter - 3 Set of 4 power plug points	2 is OK and 2 Reverse Polarity	
94	Accounts Office room PP-1	EARTH FAULT	
95	Set of 4 power plug points	OK	
96	Counter - 1 Set of 4 power plug points	2 is OK and 2 Reverse Polarity	
97	Counter - 2 Set of 4 power plug points	2 is OK and 2 Reverse Polarity	
98	Counter - 2 Set of 4 power plug points	2 is OK and 2 Reverse Polarity	
99	Counter - 2 Set of 4 power plug points	2 is OK and 2 Reverse Polarity	
100	Counter - 3 Set of 4 power plug points	2 is OK and 2 Reverse Polarity	
101	Canteen Set of 4 power plug points	EARTH FAULT	
102	Canteen Set of 6 power plug	EARTH FAULT	

	points		
103	Canteen Set of 6 power plug points	EARTH FAULT	
104	Canteen Set of 6 power plug points	EARTH FAULT	
105	Kitchen PP-1	EARTH FAULT	
106	Kitchen PP-2	EARTH FAULT	
107	Kitchen PP-3	EARTH FAULT	
108	Kitchen set of 2 PP	EARTH FAULT	
109	Kitchen LPP-1	EARTH FAULT	
110	Staff Room LPP - 1	Neutral Fault	
111	Staff Room set of 2nos PP	EARTH FAULT	
112	Staff Room set of 2nos PP	EARTH FAULT	
113	Staff Room set of 2nos PP	EARTH FAULT	
114	Staff Room Pantry set of 2nos PP	1 is OK and 1 Reverse Polarity	
115	Staff Room Pantry set of 2nos PP	1 is OK and 1 Reverse Polarity	
116	Staff Room Pantry set of 2nos PP	1 is OK and 1 Reverse Polarity	
117	water cooler LPP	OK	
118	Refrigerator set of 2nos PP	1 is OK and 1 Reverse Polarity	
119	Committee Room set of 2nos PP	1 is OK and 1 Reverse Polarity	
120	Committee Room set of 2nos PP	1 is OK and 1 Reverse Polarity	
121	Committee Room set of 2nos PP	1 is OK and 1 Reverse Polarity	
122	Dining Room set of 2nos PP	1 is OK and 1 Reverse Polarity	
123	Dining Room set of 2nos PP	1 is OK and 1 Reverse Polarity	
124	Dining Room set of 2nos PP	1 is OK and 1 Reverse Polarity	
125	Dining Room set of 2nos PP	1 is OK and 1 Reverse Polarity	
126	Gents Toilet Hand Dryer LPP	EARTH FAULT	
127	Ladies Toilet Hand Dryer LPP	EARTH FAULT	
128	sanitizer machine point in corridor	EARTH FAULT	
129	Room no -12 set of 1 no PP + 1no LPP	OK	
130	Room no -12 set of 1 no PP + 1no LPP	OK	
131	Room no -12 set of 1 no PP + 1no LPP	OK	
132	Research Scholars Room-set of 1 no PP + 1no LPP	1 is OK and 1 Reverse Polarity	
133	Research Scholars Room-AC Point	OK	

134	Room no -10 LPP-1	EARTH FAULT	
135	Room no -5 PP-1	EARTH FAULT	
136	Room no -5 PP-2	EARTH FAULT	
137	Room no -5 PP-3	EARTH FAULT	
138	Geography/MJMC/NCC Cori door-set of 1 no PP + 1no LPP	1 is OK and 1 Reverse Polarity	
139	Geography/MJMC/NCC Cori door-set of 1 no PP + 1no LPP	1 is OK and 1 Reverse Polarity	
140	Geography/MJMC/NCC Cori door-set of 1 no PP + 1no LPP	1 is OK and 1 Reverse Polarity	
141	Room NO - 19-set of 1 no PP + 1no LPP	1 is OK and 1 Reverse Polarity	
142	Room NO - 21-set of 1 no PP + 1no LPP	1 is OK and 1 Earth fault	
143	Room NO - 21-set of 1 no PP + 1no LPP	1 is OK and 1 Earth fault	
144	Room NO - 21-set of 1 no PP + 1no LPP	1 is OK and 1 Earth fault	
145	Room NO - 22-set of 1 no PP + 1no LPP	1 is OK and 1 Earth fault	
146	Room NO - 22-set of 1 no PP + 1no LPP	1 is OK and 1 Earth fault	
147	Room NO - 22-set of 1 no PP + 1no LPP	1 is OK and 1 Earth fault	
148	Room NO - 29-set of 1 no PP + 1no LPP	1 is OK and 1 Earth fault	
149	Room NO - 29-set of 1 no PP + 1no LPP	1 is OK and 1 Earth fault	
150	Room NO - 29-set of 1 no PP + 1no LPP	1 is OK and 1 Earth fault	
151	Room NO - 29-set of 1 no PP + 1no LPP	1 is OK and 1 Earth fault	
152	Room NO - 27-set of 1 no PP + 1no LPP	1 is OK and 1 Reverse Polarity	
153	Room NO-15 computer lab - set of 2no LPP	OK	
154	Room NO-15 computer lab - set of 2no LPP	OK	
155	Room NO-15 computer lab - set of 2no LPP	OK	
156	Room NO-15 computer lab - set of 2no LPP	OK	
157	Room NO-15 computer lab - set of 2no LPP	OK	
158	Room NO-15 computer lab - set of 2no LPP	OK	
159	Room NO-15 computer lab - set of 2no LPP	OK	
160	Room NO-15 computer lab - set of 2no LPP	OK	
161	Room NO-15 computer lab - set of 2no LPP	OK	

162	Room NO-15 computer lab - set of 2no LPP	OK	
163	Room NO-15 computer lab - set of 2no LPP	OK	
164	Room NO-15 computer lab - set of 2no LPP	OK	
165	Room NO-15 computer lab - set of 2no LPP	OK	
166	Room NO-44 computer lab - set of 2no LPP	EARTH FAULT	
167	Room NO-42 commerce lab-PP	OK	
168	Room NO-42 commerce lab-PP	OK	
169	Room NO-42 commerce lab-PP	OK	
170	Room NO-42 commerce lab-PP	OK	
171	Room NO-42 commerce lab-PP	OK	
172	Room NO-43 computer science lab-PP	EARTH FAULT	
173	Room NO-43 computer science lab-PP	EARTH FAULT	
174	Room NO-43 computer science lab-PP	EARTH FAULT	
175	Room NO-43 computer science lab-PP	EARTH FAULT	
176	Room NO-43 computer science lab-PP	EARTH FAULT	
177	Room NO-43 computer science lab-PP	EARTH FAULT	
178	Room NO-43 computer science lab-LPP	REVERSE POLARITY	
179	Room NO-43 computer science lab-LPP	REVERSE POLARITY	
180	Room NO-43 computer science lab-LPP	REVERSE POLARITY	
181	Microbiology corridor PP	EARTH FAULT	
182	Microbiology corridor PP	EARTH FAULT	
183	Microbiology corridor PP	EARTH FAULT	
184	Microbiology corridor PP	EARTH FAULT	
185	Room No-33 -set of 2no PP	EARTH FAULT	
186	Room No-33 -set of 2no PP	EARTH FAULT	
187	Room No-33 -set of 2no PP	EARTH FAULT	
188	Room No-36 -set of 2no PP	OK	
189	Room No-36 -set of 2no PP	OK	
190	Room No-31 -set of 2no PP	OK	
191	Room No-31 -set of 2no PP	OK	
192	Room No-34 -set of 2no PP	EARTH FAULT	
193	Room No-34 -set of 2no PP	EARTH FAULT	

194	Room No-34 -set of 2no PP	EARTH FAULT	
195	Room No-34 -set of 2no PP	EARTH FAULT	
196	Room No-35 -set of 2no PP	EARTH FAULT	
197	Room No-35 -set of 2no PP	EARTH FAULT	
198	Room No-35 -set of 2no PP	EARTH FAULT	
199	Room No-35 -set of 2no PP	EARTH FAULT	
200	Girls common room-set of 2no PP	EARTH FAULT	
201	Girls common room-set of 2no PP	EARTH FAULT	
202	Studio -set of 2no PP	1 is OK and 1 Reverse Polarity	
203	Studio -set of 2no PP	1 is OK and 1 Reverse Polarity	
204	Studio -set of 2no PP	1 is OK and 1 Reverse Polarity	
205	Studio -set of 2no PP	1 is OK and 1 Reverse Polarity	
206	PC Room no-3 LPP-1	EARTH FAULT	
207	PC Room no-4 LPP-1	EARTH FAULT	
208	PC Room no-6 LPP-1	EARTH FAULT	
209	PC Room no-6 LPP-2	EARTH FAULT	
210	PC Room no-7 LPP-1	EARTH FAULT	
211	PC Room no-13 LPP-1	EARTH FAULT	
212	PC Room no-17 LPP-1	EARTH FAULT	
213	Photocopy room basement PP		No earthling
214	Sports room basement PP-1	EARTH FAULT	
215	Sports room basement PP-2	EARTH FAULT	
216	Sports room basement PP-3	EARTH FAULT	
217	Sports room basement PP-4	EARTH FAULT	
218	Sports room basement PP-5	EARTH FAULT	

Annexure-C- Schedule of Earth test measurement

Earthing measurement test record at RLA College				
Sno	**Location**	**Earth-1**	**Earth-2**	**Remarks**
1	Main incoming Meter Box			No Earthing done
2	800 amp Bus Bar			No Earthing done
3	800 amp FSU			No Earthing done
4	400 amp Change over			No Earthing done
5	400 amp MCCB	230		Very high resistance
6	LT Panel Bus Bar	2.6		OK
7	LT Panel Front side - lighting	0.76	2.4	OK
8	LT Panel Back side - lighting	1.7	O/L	One earth is not connected at all.
9	outgoing GI wire	1.7		ok
10	LT Panel Front side - Power	3.8	3.2	ok
11	LT Panel Back side - Power	0.75	270	Resistance of One earth is very high
12	MCBDB -power outside room no-1	0.29		O.K
13	MCBDB -light outside room no-1	59		High Earth resistance
14	MCBDB -light outside room no-2	14.5		Higher resistance measured
15	Back side MP Theatre 100amp Bus Bar			No earth
16	MCBDB -light / power-1	O/L		Earth not connected
17	MCBDB -light / power-2			No earth
18	New MP Theatre supply			No earth
19	Geography/MJMC/NCC Cori door-MCBDB-1			No earth
20	Geography/MJMC/NCC Cori door-MCBDB-2	0.17	0.18	O.K
21	MCBDB -in computer lab	O/L		One earth is not connected at all.
22	UPS 4 way MCBDB	O/L		One earth is not connected at all.
23	MCBDB light - stair case computer lab	187		High Earth resistance
24	MCBDB power-1 - stair case computer lab			No earth

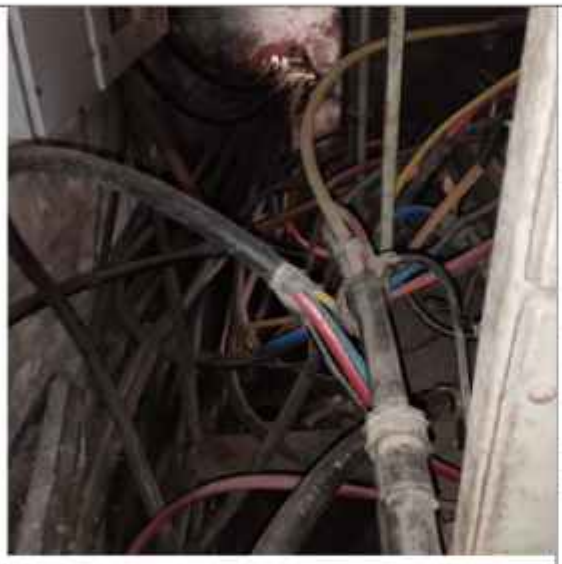
25	MCBDB power-2 - stair case computer lab			No earth
26	UPS MCBDB	74.1		High Earth resistance
27	Library power MCBDB-1 - light	0.53		OK
28	Library power MCBDB-2 - power	1.1	0.9	OK
29	Library power MCBDB-3- power	O/L		One earth is not connected at all.
30	Library- MCBDB-main incoming from LT Panel- power	0.19	1.7	OK
31	DPMCB -outgoing to AC -1	O/L		Earth not connected
32	DPMCB -outgoing to AC -2	0.69		OK
33	Library- MCBDB-main incoming from LT Panel- light	0.5	0.52	OK
34	Lift MCBDB earthling	1.8	1.8	OK
35	Solar panels set -1	O/L		One earth is not connected at all.
36	Solar panels set -2	5.2		Slightly high resistance
37	Solar panels set -3	1.4		OK
38	Solar panels set -4	O/L		One earth is not connected at all.
39	Lightning arrester for solar panels	O/L		
40	RO plant			No earth
41	160 KVA DG Body earth			not possible to measure
42	160 KVA DG neutral grounding	530		Very high resistance of neutral grounding earth pit
43	DG AMF Panel			No earthling
44	All poles			No earthling
45	MCBDB -power outside room no-17	40		Resistance is high
46	MCBDB -light outside room no-17			No earth
47	MCBDB -power outside PC room no-11	0.21		OK
48	MCBDB -light outside PC room no-11	0.25		OK

49	MCBDB -light Near Solar panel			No earth
50	MCBDB -near Solar panel meter			No earth
51	Solar panel meter	O/L	680	One Earth not connected at all. Second earth has high resistance
52	Solar panel meter	O/L	O/L	Both earths are not connected.
53	MCBDB -power outside PC room no-6			No earth existing
54	MCBDB -light outside PC room no-6	980		Very high earth resistance measured.
55	Solar panels set -above library	40	O/L	High resistance in one earthing. Another completely disconnected.
56	MCBDB -power outside AO room			No earth
57	MCBDB -light outside AO room	O/L		Earth not connected

Annexure-D

PICTURES DEPICTING SAFETY RELATED ISSUE-RAM LAL ANAND COLLEGE

S. No	Photograph	Issue	Standard	Recommendations
1		Clothes hanging on LT panel-Cable laid Inappropriately-on ground without any sleeve.-Electrical Arc flash/Shock hazard	CEA-Regulations-2010	The complete electrical work up-to distribution boards are required to be re-done completely.
2		Cables mess up no trench cover. No way to reach Power supply panel-Short Circuit-Arc Flash-Maintenance hazard-Can lead to Fire	CEA-Regulations-2010/ NFPA-70E	The complete electrical work up-to distribution boards are required to be re-done completely.

3		Cables mess up no trench cover and no front or rear covers on LT panel- Short Circuit-Arc Flash-Maintenance hazard-Can lead to Fire-Earth discontinuity due to cable not terminated properly	CEA-Regulations-2010/ NFPA-70E	The complete electrical work up-to distribution boards are required to be re-done completely.
4		Knock outs of cables not covered and no gland-Access to live parts-Arc flash hazard-Fire hazard-Web net seen-Maintenance issue	CEA-Regulations-2010/ NFPA-70E	Proper cleaning practices should be followed after proper terminations and closing of all uncovered openings.

5		Main LT Panels used as bus bar. Main cable directly terminated without any switch gear-No safety in case of any fault condition-will lead to fire	CEA-Regulations-2010/ NFPA-70E	Proper designed system with complete wiring up to Distribution boards is recommended.
6		Knock outs of cables not covered and no gland-Improper termination-Shock hazard-No cable end box provided for terminations.-Off load change over switch has been used.	CEA-Regulations-2010/ NFPA-70E	Switch be replaced with On-Load switch with proper cable end box and end termination with brass compression glands.- Such similar issues to be repaired/treated in similar manner

7		Improper Open cable joint. Arc flash hazard. Proper designed system will replace unsafe conditions and jointing should be done at fixed terminals.	CEA-Regulations-2010/ NFPA-70E	Should be replaced in designed system
8		Improper Open cable joint without any insulation.	CEA-Regulations-2010/ NFPA-70E	Should be replaced in designed system

9		Change over – no gland and knock out plate	CEA-Regulations-2010/ NFPA-70E	Switch be replaced with On-Load switch with proper cable end box and end termination with brass compression glands.- Such similar issues to be repaired/treated in similar manner
10		Main LT Panel covered with sheet. No front or rear doors-Arc flash hazard-can lead to fire	CEA – Guidelines-2010/ NFPA-70E	LT panel To be replaced with complete wiring

11		Knock outs of cables not covered and no gland-Arc flash hazard-can lead to electrocution and fire-Also cable end box not provided for termination.	NFPA-70E/CEA Guidelines	To be provided.
12		Cables mess up no proper dressing and termination	NFPA-70E/CEA Guidelines	To be provided.

13		Reversed polarity-Neutral is controlled through switch instead of phase.	CPWD testing guidelines	All Sockets be got corrected for earth connection
14		Isolator in place of MCB for AC-Non tripping device –Can lead to unsafe conditions.	CEA guidelines-2010	

15		Isolator in place of MCB and no blanking plates-live parts exposed-Non tripping device used. Different make MCB's used	CEA guidelines-2010	All isolators should be replaced with MCB and blanking plates be provided at all locations.
16		Extension box connected inside wooden cabinet-Fire hazard	CEA regulations-2010	Such practices should be not followed and discontinued immediately

17		Wire laying without any conduit-Jointing seen-fire hazard	CPWD specifications	Jointing of wires should be avoided and wires should always be laid inside conduit
18		Exhaust fan connected without any earth wire in canteen-Also wires used is flexible and is not as per requirement-Jointing is noticed-Unsafe condition	IS-3043/CPWD specifications	Such practices should be discontinued.

19		DP MCB connections in canteen-Improper connections in dangerous area where LPG is used-Fire hazard.	CEA guidelines	Proper wiring as per requirement should be done and in future also repair should be done in proper manner.
20		Switch box hanging at canteen for refrigerator-Shock hazard	CPWD specifications/CEA guidelines	Only permanent points should be provided for tapping of electricity

21		Exhaust fan wire joint without any PVC insulated tape-Shock and spark –Fire hazard	CEA guidelines-2010	This type of work should not be done. Proper wire with earth connection should be tapped from ceiling rose.
22		Switch board in canteen without earth wire-Shock and accident hazard	IS-3043/CPWD specifications	Earth connection should be provided and the multi sockets should not be permitted from single circuit to eliminate chance of over loading.

23		Wire laying on ground in passage in canteen-Shock and fire hazard	CPWD specifications/CEA guidelines-2010	Sufficient number of outlets as per requirement should be provided with design wiring.
24		No earthing provided-Shock hazard	IS-3043	All metallic parts –non current carrying are required to be provided with earth connection.

25		Earth wire not connected	IS-3043	All metallic parts –non current carrying are required to be provided with earth connection.
26		Earth wire not connected	IS-3043	All metallic parts –non current carrying are required to be provided with earth connection.

27		Water cooler fixed on stone bricks-Accident hazard	Best practices	Electrical equipment should be installed on firm foundations
28		Reversed polarity		

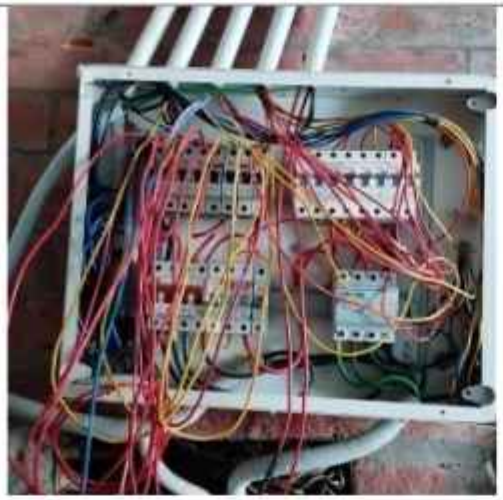
29		Inflammable Material stacking in front of switch board-Fire hazard	CPWD specifications	No inflammable material should be placed in vicinity of electrical plug points.
30		Switch board hanged in library with high fire load	CPWD specifications	No loose electrical points should be installed and all such points be permanently fixed as per requirement .

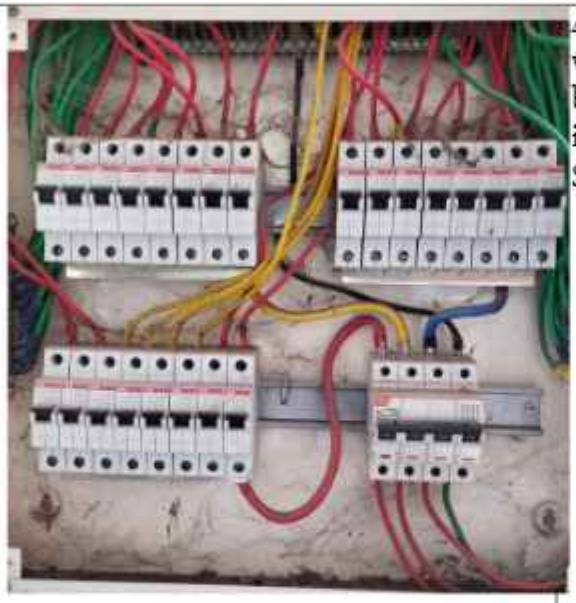
31		Laying of cables out going from front side LT Panels-Practice of requirement of providing mechanical protection is not followed.	CEA guidelines-2010/CPWD specifications	To be corrected with new wiring
32		Cables connected without thimbles-Loose connection and Arc flash hazard.	CPWD specifications	All terminations should be done with thimbles.

33		Wires passing through wall without conduit pipe- Unsafe practice	CPWD specifications	Should be laid following CPWD specifications. be laid as per
34		MCB box and UPS in covered wooden cabinet- Fire Hazard	CPWD specifications	Electrical switch gear should not be enclosed with flammable material
35		MCB box in covered wooden cabinet	CPWD specifications	Electrical switch gear should not be enclosed with flammable material

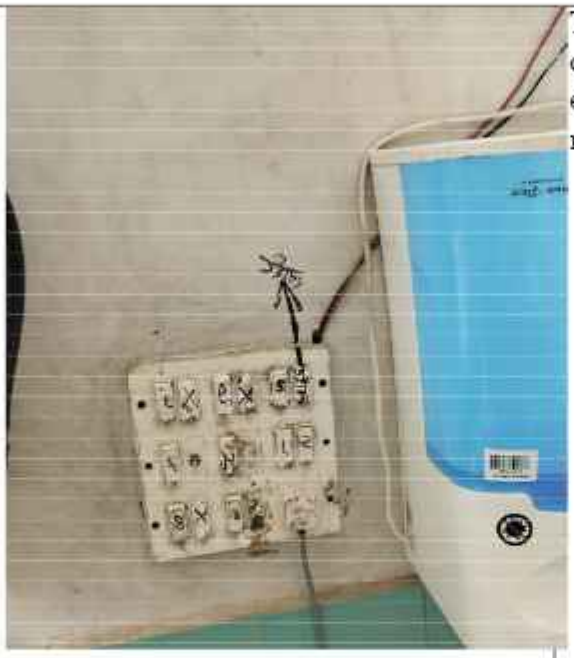
36		UPS supply MCB Box no earthing	IS-3043	Earth should be provided immediately
37		Batteries of UPS stacked inside the room-NO ventilation	CEA Regulations-2010	Batteries room should be provided with adequate ventilation

38		Computer room earth-Not seen connected-Shock hazard	IS-3043	Earth should be provided.
39		Wires entering in bus bar near old Auditorium-Arc flash-Shock and fire hazard	CPWD specifications/CEA guidelines-2010	Properly designed electrical system should be provided.

40		Wiring in MCB DB near old Auditorium	CPWD specifications/CEA guidelines-2010	Properly designed electrical system should be provided.
41		Wiring work going on in MCB DB near old Auditorium-Not proper	CPWD specifications/CEA guidelines-2010	During execution work also, all safety precautions should be taken

42		All outgoing earth wires connected but no earth with incoming cable- Shock hazard	IS-3043	These should be provided as per requirement of two distinct earth connections in case of three phase supply.
43		Extension board connected with heater at committee room- No earth –Heater is used without earth connection- Arc flash, shock and and fire hazard.	IS-3043/CPWD guidelines/CEA reguklations -2010	This is a very serious fire hazard and practice of using extension boards should be stopped

44		Material stacked in front of switch boards at committee room- Fire hazard	CPWD specifications	The practice should be discontinued.
45		Fittings on walls not earthed- Shock hazard. Temporary connections provided.	IS-3043	Earth connection should be provided and temporary wiring should be avoided for safe conditions.

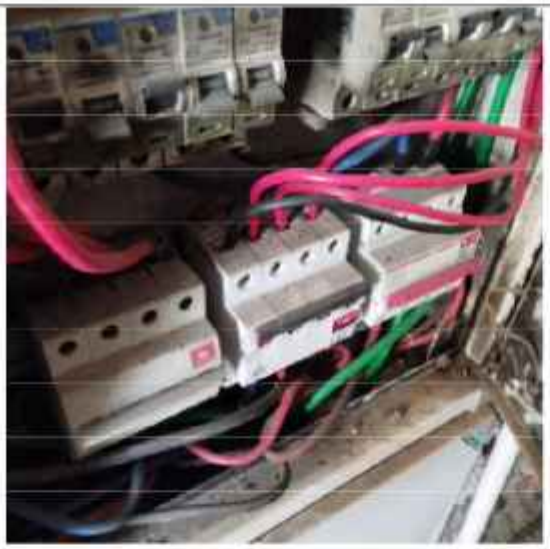
46		Two wires openly connected with exhaust fan-Earth not provided	IS-3043/CEA regulations-2010	Such practices should be immediately stopped.
47		Hanging wires in kitchen- in area where LPG is used.	CPWD specifications	Complete wiring of kitchen should be re-done.

48		Extension switch boards wire laid on ground in kitchen- Electrocution and Fire hazard	CPWD specifications	Complete wiring of kitchen should be re-done.
49		Ceiling fan hanged on MS pipe without earth wire and open wiring- Temporary wiring –Charging of MS structure with leakage current can cause major accident.	IS-3043/CEA regulations-2010	Such practices can lead to serious accidents.

50		Empty LPG cylinders stacking inside kitchen-Fire hazard	Fire guidelines	These should be kept in an enclosure
51		No earth in library AC outgoing-Shock hazard	IS-3043	Earth connection should be provided.

52		Main incoming lighting MCCB in Library – no earth and no proper termination	IS-3043	Earth connection should be provided. Proper terminations should be done
53		Cables directly in hard ground-Improper laying practice-Cables up to 1.8 metres in vertical should be mechanically protected	CEA guidelines/CPWD specifications	Proper specifications for cable laying should be followed.

54		Sand buckets		
55		MCBDB near Solar meter without cover-Arc flash hazard	NFPA-70 E	Access to live opening should not be existing
56		Ladder for second floor at Academic block-Not provided with railing-Fall hazard	IS-14489	Railing should be provided.

57		Cable termination- hazardous- exposure of live parts	CEA guidelines	Need to be terminated as per requirement .
58		Termination without thimbles		

59		Earth wire not connected-shock hazard	IS-3043	Earth be connected
60		Fire extinguisher – in library-not accessible	IS-2190	Fire extinguisher should not be accessible
61		Sheet hanging in library-Fire hazard	CEA regulations-2010	This should be corrected and all installation should be maintained at all times

62		Ac wire connection and no earth wire-Improper AC connections can lead to fire-Shock and fire hazard	IS-3043/CEA guidelines-2010	To avert incident of fire at all air conditioners such practices should be avoided.
63		Material stacked in library under stair case-Improper housekeeping practices-Fire hazard.	CPWD specifications/Best practices	The material should be properly stacked to avert incident of fire.

64		Material stacked in library under stair case-Improper housekeeping practices-Fire hazard.	CPWD specifications/Best practices	The material should be properly stacked to avert incident of fire.
65		Main incoming at canteen- without earth wire-Shock hazard	IS-3043	Earth should be provided.

66		No blanking plates-access to live parts-Arc flash hazard	CEA guidelines/ NFPA-70E	All uncovered opening should be covered with blanking plates.
67		Wires laid on ground at canteen-Shock and Arc Flash hazard-Can cause fire	CEA guidelines-2010/CPWD specifications	All electrical sockets should be fixed at wall for electrically safe condition

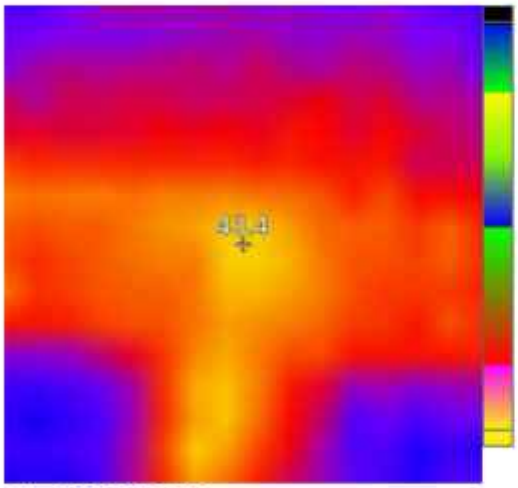
68		Wires laid on ground at canteen- Shock and Arc Flash hazard-Can cause fire	CEA guidelines-2010/CPWD specifications	All electrical sockets should be fixed at wall for electrically safe condition
69		Wires laid on ground at canteen	CEA guidelines-2010/CPWD specifications	All electrical sockets should be fixed at wall for electrically safe condition

70		Wires laid on ground at canteen	CEA guidelines-2010/CPWD specifications	All electrical sockets should be fixed at wall for electrically safe condition

THERMAL IMAGING REPORT

Electrical system Thermal Imaging

Ram Lal Anand College



vt_00001.is2
5/31/2022 11:19:47 AM

Visible Light Image

Location Main LT Panel bus bar

Graph

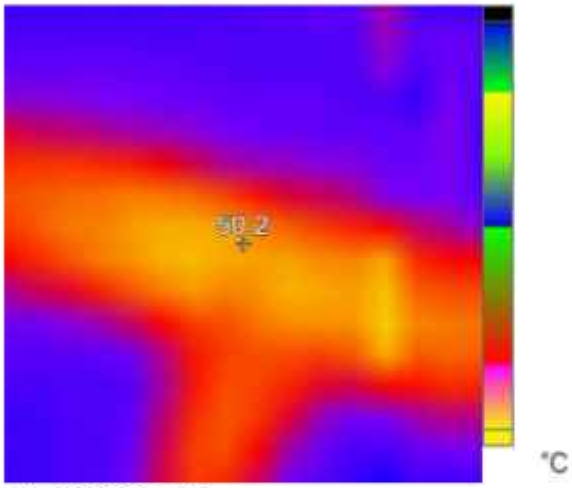
Observation	Inference	Recommendation
Slightly High temperature noticed	Loose connection	Connections should be got tightened

Image Info

Background temperature	20.0°C
Emissivity	0.95
Image Time	5/31/2022 11:19:47 AM
Calibration Range	-10.0°C to 250.0°C

Main Image Markers

Name	Temperature	Emissivity	Background
Centerpoint	43.4°C	0.95	20.0°C



vt_00002.is2
5/31/2022 11:20:04 AM

Visible Light Image

Location Main LT Panel bus bar

Graph

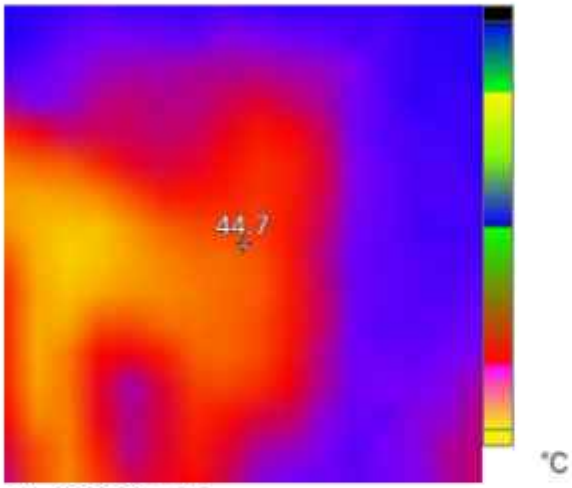
Observation	**Inference**	**Recommendation**
High temperature noticed	Loose connection	Connections should be got tightened

Image Info

Background temperature	20.0°C
Emissivity	0.95
Image Time	5/31/2022 11:20:04 AM
Calibration Range	-10.0°C to 250.0°C

Main Image Markers

Name	Temperature	Emissivity	Background
Center point	50.2°C	0.95	20.0°C



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Visible Light Image

Location Main LT Panel bus bar

Graph

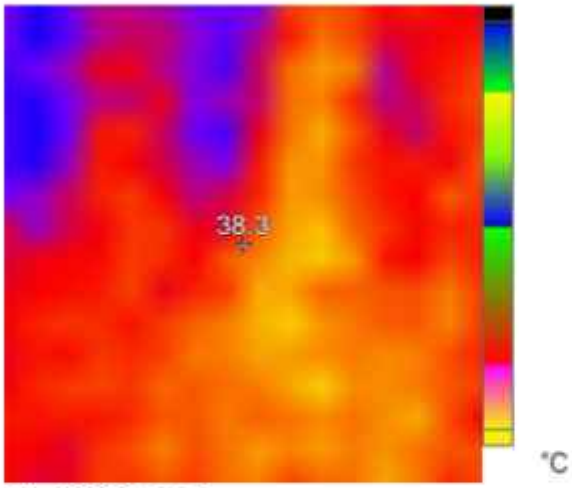
Observation	Inference	Recommendation
Slightly High temperature noticed	Loose connection	Connections should be got tightened

Image Info

Background temperature	20.0°C
Emissivity	0.95
Image Time	5/31/2022 11:20:41 AM
Calibration Range	-10.0°C to 250.0°C

Main Image Markers

Name	Temperature	Emissivity	Background
Center point	44.7°C	0.95	20.0°C



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Visible Light Image

Location 400amp FPMCCB-1 at LT Panel room

Graph

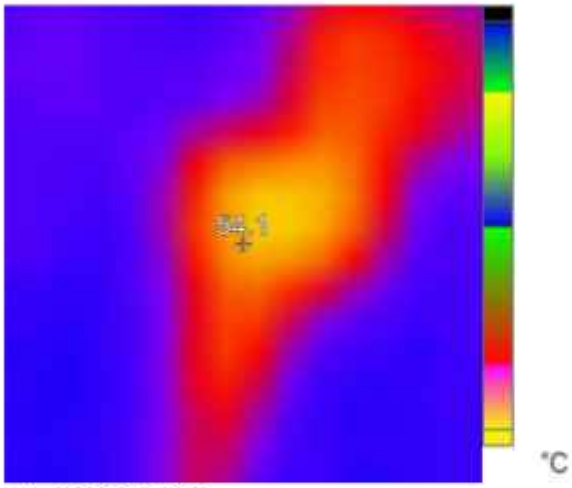
Normal scan

Image Info

Background temperature	20.0°C
Emissivity	0.95
Image Time	5/31/2022 11:21:05 AM
Calibration Range	-10.0°C to 250.0°C

Main Image Markers

Name	Temperature	Emissivity	Background
Center point	38.3°C	0.95	20.0°C



vt_00005.is2
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Visible Light Image

Location 400amp Changeover at LT Panel room

Graph

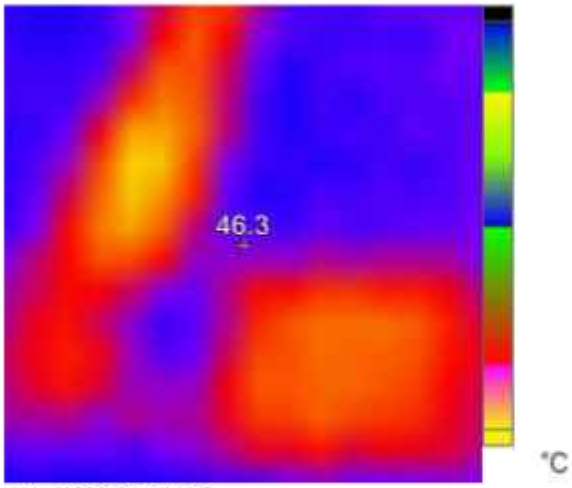
Observation	Inference	Recommendation
Very High temperature noticed	Loose connection	Connections should be got tightened

Image Info

Background temperature	20.0°C
Emissivity	0.95
Image Time	5/31/2022 11:21:45 AM
Calibration Range	-10.0°C to 250.0°C

Main Image Markers

Name	Temperature	Emissivity	Background
Center point	54.1°C	0.95	20.0°C



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Visible Light Image

Location	400amp FPMCCB main incoming power panel front side

Graph

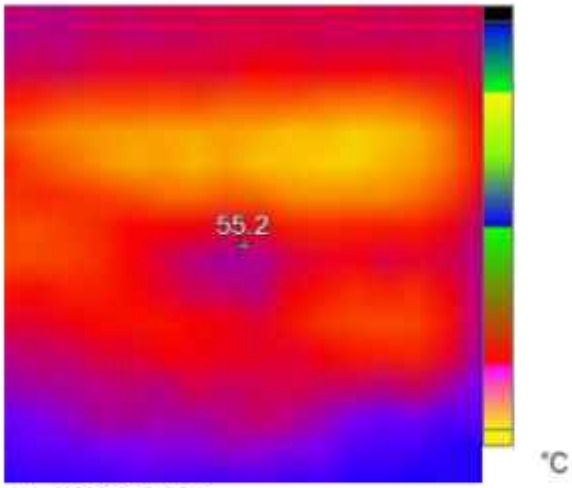
Observation	Inference	Recommendation
High temperature noticed	Loose connection	Connections should be got tightened

Image Info

Background temperature	20.0°C
Emissivity	0.95
Image Time	5/31/2022 11:43:04 AM
Calibration Range	-10.0°C to 250.0°C

Main Image Markers

Name	Temperature	Emissivity	Background
Center point	46.3°C	0.95	20.0°C



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5/31/2022 11:43:30 AM

Visible Light Image

Location 250amp FPMCCB outgoing to MCB DB-1

Graph

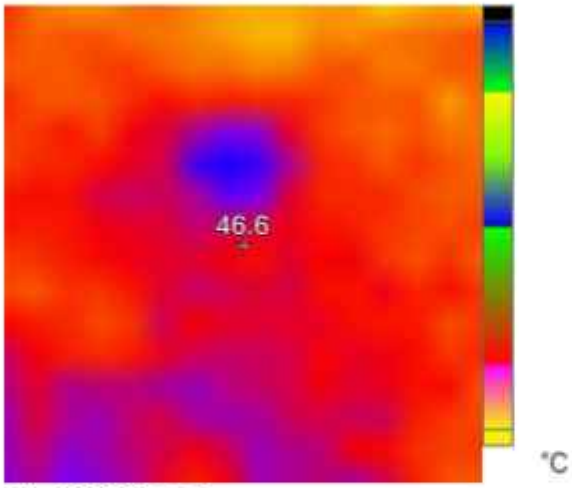
Observation	**Inference**	**Recommendation**
Very High temperature noticed	Loose connection	Connections should be got tightened

Image Info

Background temperature	20.0°C
Emissivity	0.95
Image Time	5/31/2022 11:43:30 AM
Calibration Range	-10.0°C to 250.0°C

Main Image Markers

Name	Temperature	Emissivity	Background
Center point	55.2°C	0.95	20.0°C



vt_00009.is2
5/31/2022 11:43:44 AM

Visible Light Image

Location 250amp FPMCCB outgoing to MCB DB-2

Graph

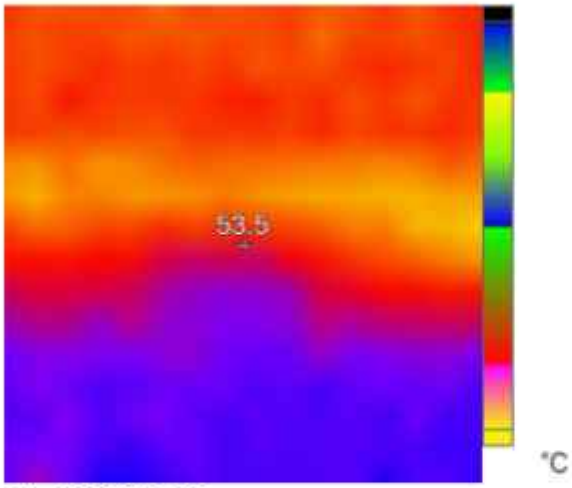
Observation	Inference	Recommendation
High temperature noticed	Loose connection	Connections should be got tightened

Image Info

Background temperature	20.0°C
Emissivity	0.95
Image Time	5/31/2022 11:43:44 AM
Calibration Range	-10.0°C to 250.0°C

Main Image Markers

Name	Temperature	Emissivity	Background
Center point	46.6°C	0.95	20.0°C



vt_00010.is2
5/31/2022 11:44:04 AM

Visible Light Image

Location 250amp FPMCCB outgoing to MCB DB-3

Graph

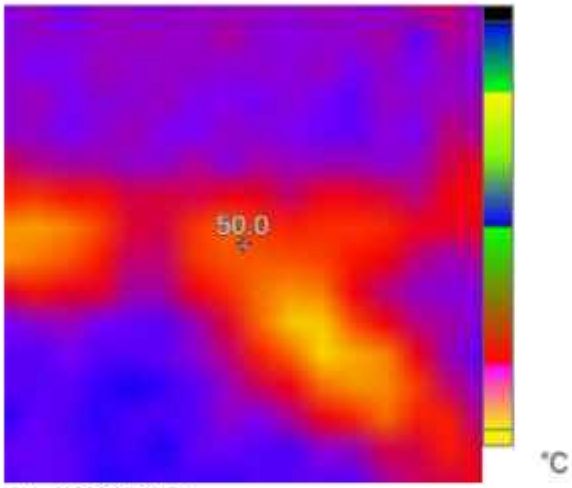
Observation	Inference	Recommendation
Very High temperature noticed	Loose connection	Connections should be got tightened

Image Info

Background temperature	20.0°C
Emissivity	0.95
Image Time	5/31/2022 11:44:04 AM
Calibration Range	-10.0°C to 250.0°C

Main Image Markers

Name	Temperature	Emissivity	Background
Center point	53.5°C	0.95	20.0°C



vt_00011.is2
5/31/2022 11:44:18 AM

Visible Light Image

Location	250amp FPMCCB outgoing to MCB DB-4

Graph

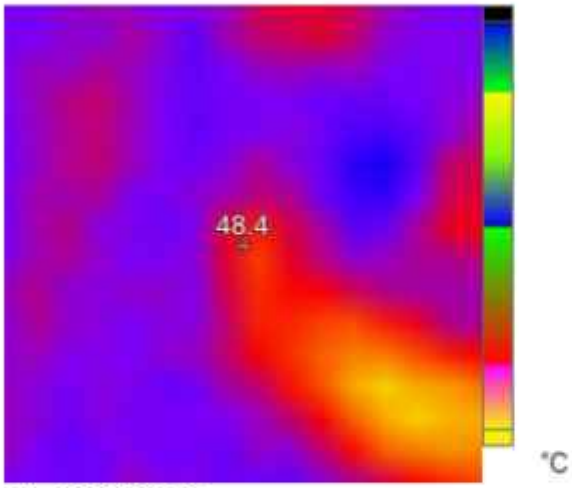
Observation	Inference	Recommendation
High temperature noticed	Loose connection	Connections should be got tightened

Image Info

Background temperature	20.0°C
Emissivity	0.95
Image Time	5/31/2022 11:44:18 AM
Calibration Range	-10.0°C to 250.0°C

Main Image Markers

Name	Temperature	Emissivity	Background
Center point	50.0°C	0.95	20.0°C



vt_00012.is2
5/31/2022 11:44:52 AM

Visible Light Image

Location

250amp FPMCCB main incoming light panel front side

Graph

Observation
High temperature noticed

Inference
Loose connection

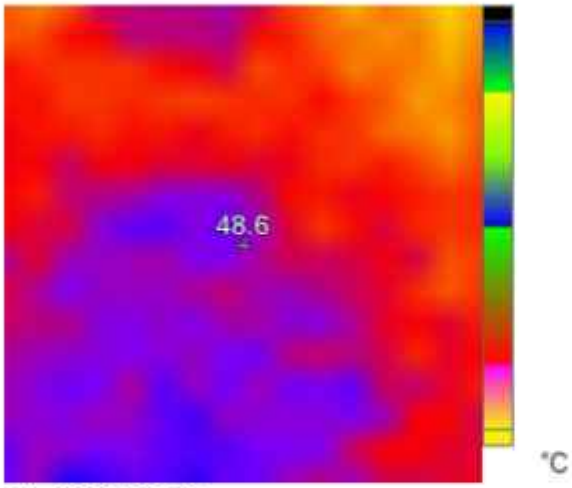
Recommendation
Connections should be got tightened

Image Info

Background temperature	20.0°C
Emissivity	0.95
Image Time	5/31/2022 11:44:52 AM
Calibration Range	-10.0°C to 250.0°C

Main Image Markers

Name	Temperature	Emissivity	Background
Center point	48.4°C	0.95	20.0°C



vt_00013.is2
5/31/2022 11:45:03 AM

Visible Light Image

Location 250amp FPMCCB outgoing to MCB DB-1

Graph

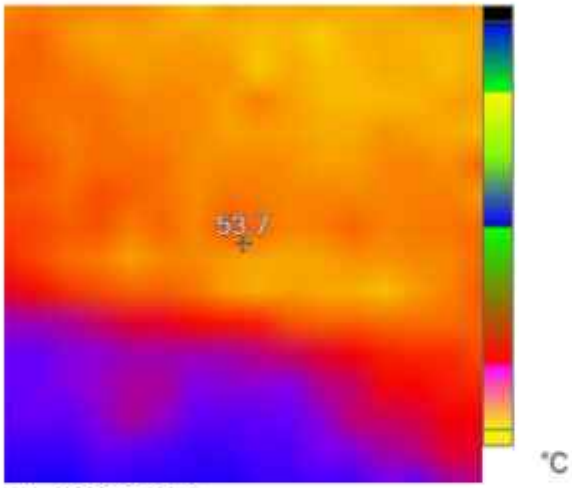
Observation	Inference	Recommendation
High temperature noticed	Loose connection	Connections should be got tightened

Image Info

Background temperature	20.0°C
Emissivity	0.95
Image Time	5/31/2022 11:45:03 AM
Calibration Range	-10.0°C to 250.0°C

Main Image Markers

Name	Temperature	Emissivity	Background
Center point	48.6°C	0.95	20.0°C



vt_00014.is2
5/31/2022 11:45:20 AM

Visible Light Image

Location 250amp FPMCCB outgoing to MCB DB-2

Graph

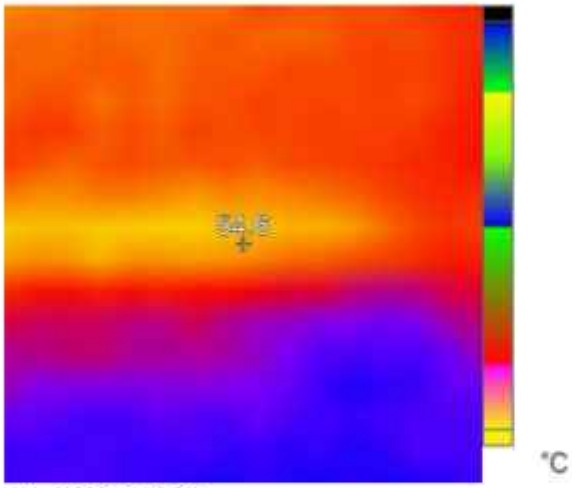
Observation	Inference	Recommendation
Very High temperature noticed	Loose connection	Connections should be got tightened

Image Info

Background temperature	20.0°C
Emissivity	0.95
Image Time	5/31/2022 11:45:20 AM
Calibration Range	-10.0°C to 250.0°C

Main Image Markers

Name	Temperature	Emissivity	Background
Center point	53.7°C	0.95	20.0°C



vt_00015.is2
5/31/2022 11:45:54 AM

Visible Light Image

Location 250amp FPMCCB outgoing to MCB DB-3

Graph

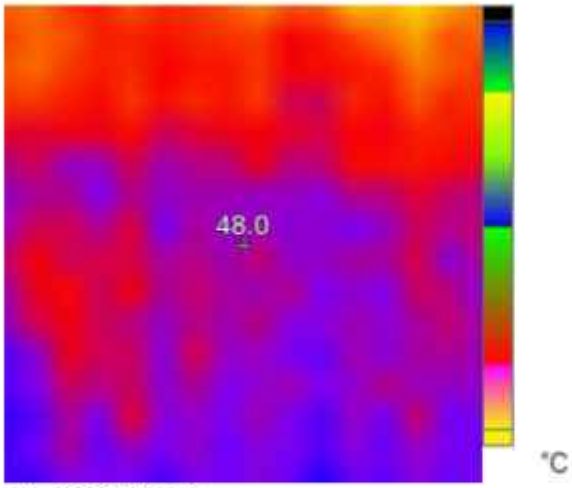
Observation	Inference	Recommendation
Very High temperature noticed	Loose connection	Connections should be got tightened

Image Info

Background temperature	20.0°C
Emissivity	0.95
Image Time	5/31/2022 11:45:54 AM
Calibration Range	-10.0°C to 250.0°C

Main Image Markers

Name	Temperature	Emissivity	Background
Center point	54.6°C	0.95	20.0°C



vt_00016.is2
5/31/2022 11:46:13 AM

Visible Light Image

Location 250amp FPMCCB outgoing to MCB DB-4

Graph

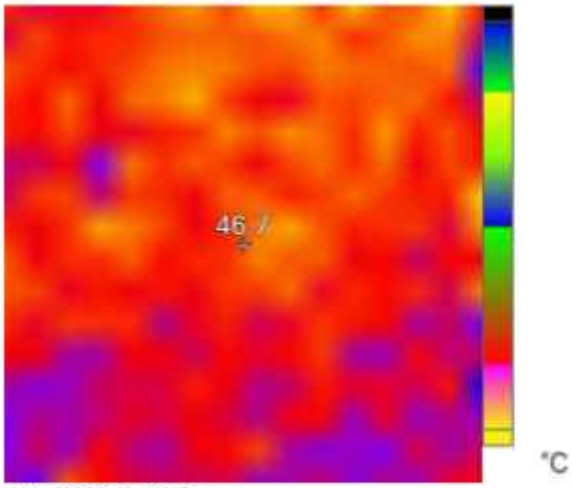
Observation	Inference	Recommendation
High temperature noticed	Loose connection	Connections should be got tightened

Image Info

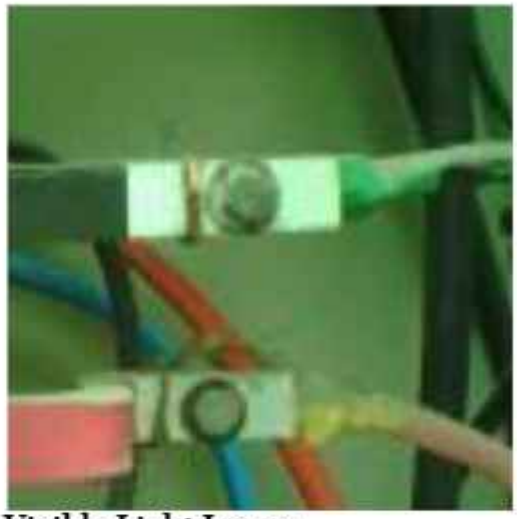
Background temperature	20.0°C
Emissivity	0.95
Image Time	5/31/2022 11:46:13 AM
Calibration Range	-10.0°C to 250.0°C

Main Image Markers

Name	Temperature	Emissivity	Background
Center point	48.0°C	0.95	20.0°C



vt_00017.is2
5/31/2022 11:46:25 AM



Visible Light Image

Location — 250amp FPMCCB outgoing to MCB DB-5

Graph

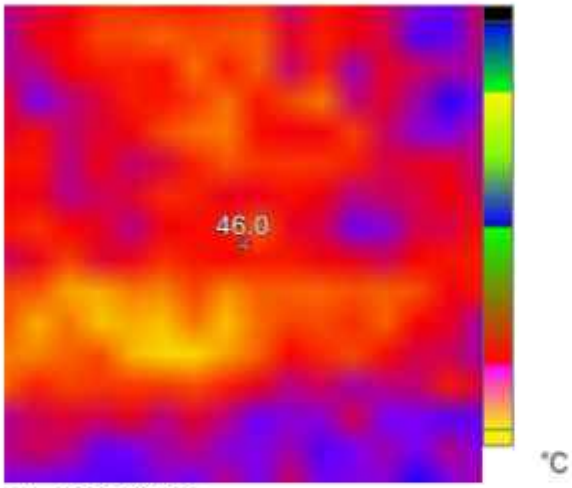
Observation	Inference	Recommendation
High temperature noticed	Loose connection	Connections should be got tightened

Image Info

Background temperature	20.0°C
Emissivity	0.95
Image Time	5/31/2022 11:46:25 AM
Calibration Range	-10.0°C to 250.0°C

Main Image Markers

Name	Temperature	Emissivity	Background
Center point	46.7°C	0.95	20.0°C



vt_00018.is2
5/31/2022 11:46:36 AM

Visible Light Image

Location 250amp FPMCCB outgoing to MCB DB-6

Graph

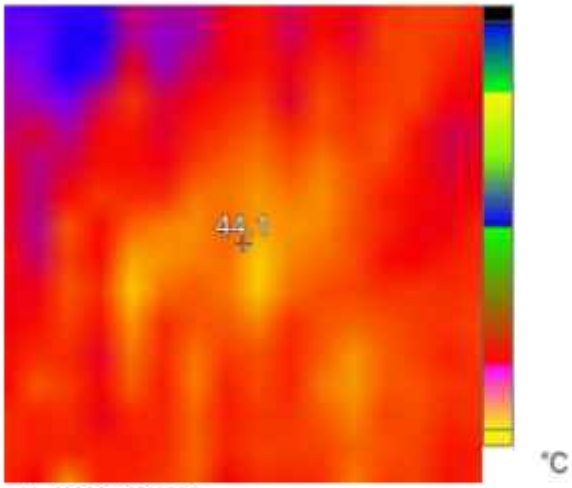
Observation	Inference	Recommendation
High temperature noticed	Loose connection	Connections should be got tightened

Image Info

Background temperature	20.0°C
Emissivity	0.95
Image Time	5/31/2022 11:46:36 AM
Calibration Range	-10.0°C to 250.0°C

Main Image Markers

Name	Temperature	Emissivity	Background
Center point	46.0°C	0.95	20.0°C



vt_00019.is2
5/31/2022 11:47:18 AM

Visible Light Image

Location — Cable joint outside Light panel front side

Graph

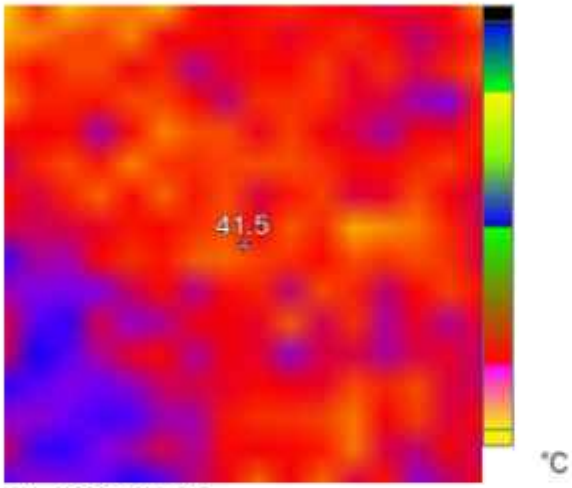
Normal Scan

Image Info

Background temperature	20.0°C
Emissivity	0.95
Image Time	5/31/2022 11:47:18 AM
Calibration Range	-10.0°C to 250.0°C

Main Image Markers

Name	Temperature	Emissivity	Background
Center point	44.1°C	0.95	20.0°C



vt_00020.is2
5/31/2022 12:01:56 PM

Visible Light Image

Location: 400amp FPMCCB main incoming power panel rear side

Graph

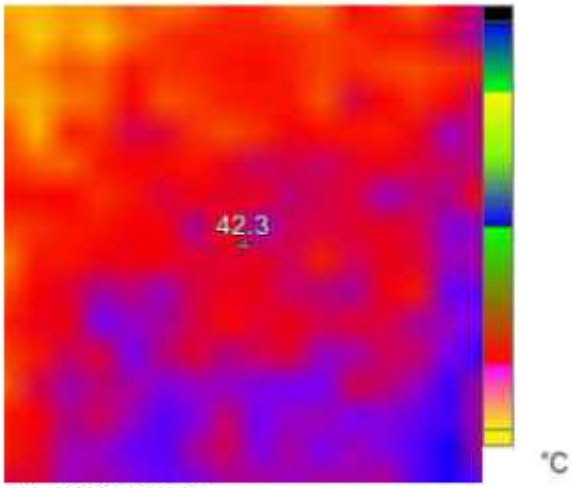
Normal Scan

Image Info

Background temperature	20.0°C
Emissivity	0.95
Image Time	5/31/2022 12:01:56 PM
Calibration Range	-10.0°C to 250.0°C

Main Image Markers

Name	Temperature	Emissivity	Background
Center point	41.5°C	0.95	20.0°C



vt_00021.is2
5/31/2022 12:02:07 PM

Visible Light Image

Location 250amp FPMCCB outgoing to MCB DB-1

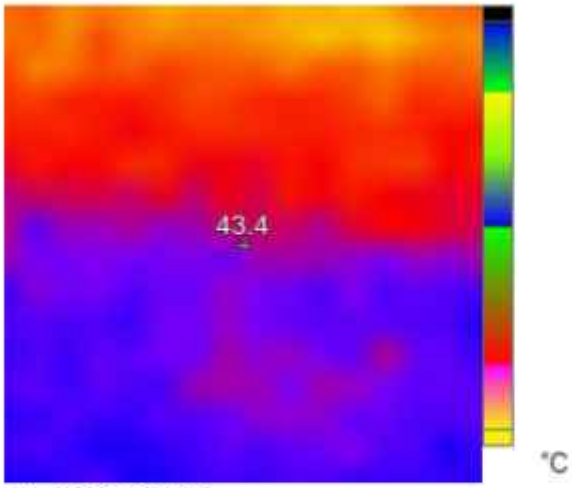
Normal scan

Image Info

Background temperature	20.0°C
Emissivity	0.95
Image Time	5/31/2022 12:02:07 PM
Calibration Range	-10.0°C to 250.0°C

Main Image Markers

Name	Temperature	Emissivity	Background
Center point	42.3°C	0.95	20.0°C



vt_00022.is2
5/31/2022 12:02:19 PM

Visible Light Image

Location 250amp FPMCCB outgoing to MCB DB-2

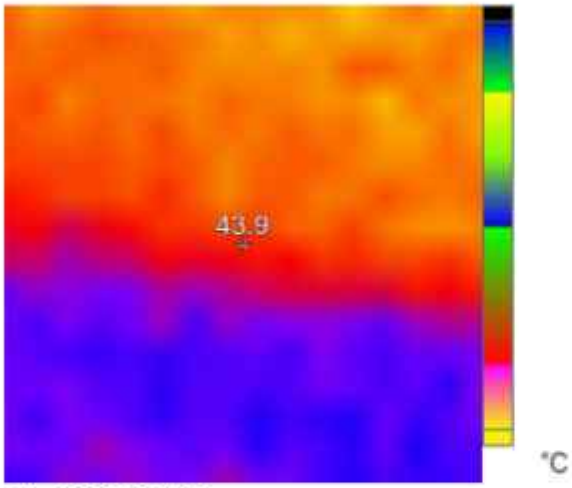
Normal Scan

Image Info

Background temperature	20.0°C
Emissivity	0.95
Image Time	5/31/2022 12:02:19 PM
Calibration Range	-10.0°C to 250.0°C

Main Image Markers

Name	Temperature	Emissivity	Background
Center point	43.4°C	0.95	20.0°C



vt_00023.is2
5/31/2022 12:02:31 PM

Visible Light Image

Location 250amp FPMCCB outgoing to MCB DB-Canteen

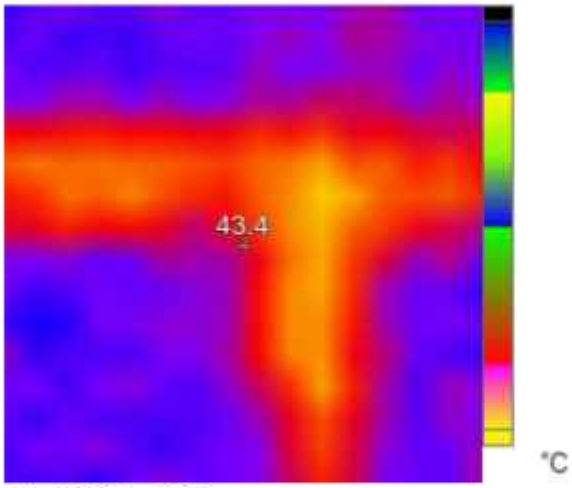
Normal Scan

Image Info

Background temperature	20.0°C
Emissivity	0.95
Image Time	5/31/2022 12:02:31 PM
Calibration Range	-10.0°C to 250.0°C

Main Image Markers

Name	Temperature	Emissivity	Background
Center point	43.9°C	0.95	20.0°C



vt_00024.is2
5/31/2022 12:02:43 PM

Visible Light Image

Location 250amp FPMCCB outgoing to MCB DB-Library Power

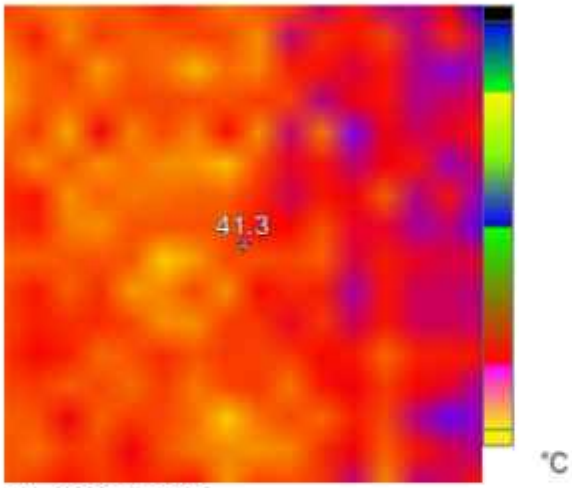
Normal Scan

Image Info

Background temperature	20.0°C
Emissivity	0.95
Image Time	5/31/2022 12:02:43 PM
Calibration Range	-10.0°C to 250.0°C

Main Image Markers

Name	Temperature	Emissivity	Background
Center point	43.4°C	0.95	20.0°C



vt_00025.is2
5/31/2022 12:03:37 PM

Visible Light Image

Location 250amp FPMCCB main incoming light panel rear side

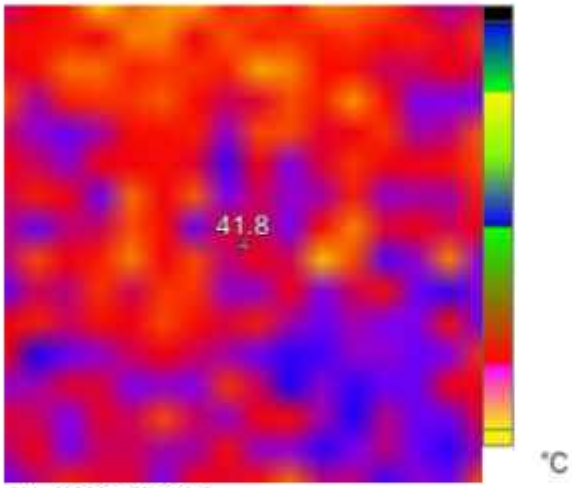
Normal Scan

Image Info

Background temperature	20.0°C
Emissivity	0.95
Image Time	5/31/2022 12:03:37 PM
Calibration Range	-10.0°C to 250.0°C

Main Image Markers

Name	Temperature	Emissivity	Background
Center point	41.3°C	0.95	20.0°C



vt_00026.is2
5/31/2022 12:03:49 PM

Visible Light Image

Location 250amp FPMCCB outgoing to MCB DB-1

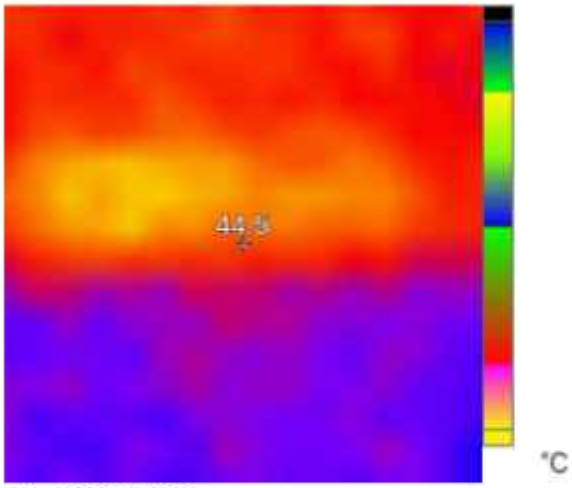
Normal Scan

Image Info

Background temperature	20.0°C
Emissivity	0.95
Image Time	5/31/2022 12:03:49 PM
Calibration Range	-10.0°C to 250.0°C

Main Image Markers

Name	Temperature	Emissivity	Background
Center point	41.8°C	0.95	20.0°C



vt_00027.is2
5/31/2022 12:04:16 PM

Visible Light Image

Location 250amp FPMCCB outgoing to MCB DB-2

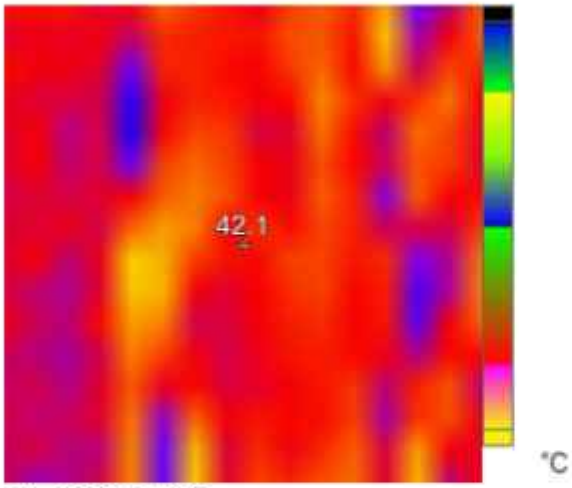
Normal Scan

Image Info

Background temperature	20.0°C
Emissivity	0.95
Image Time	5/31/2022 12:04:16 PM
Calibration Range	-10.0°C to 250.0°C

Main Image Markers

Name	Temperature	Emissivity	Background
Center point	44.5°C	0.95	20.0°C



vt_00028.is2
5/31/2022 12:04:26 PM

Visible Light Image

Location

250amp FPMCCB outgoing to
MCB DB-AC Theater
Computer Science

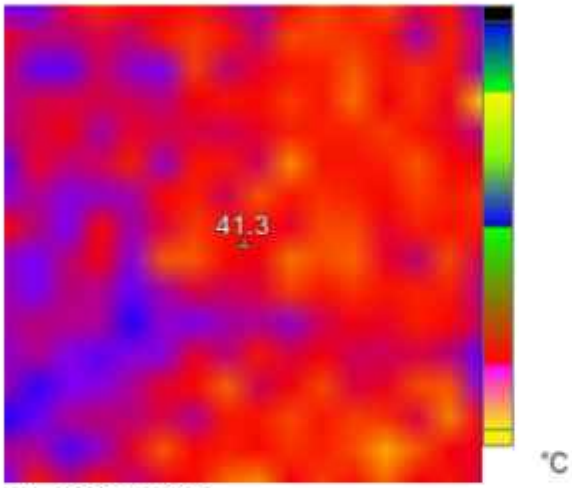
Normal Scan

Image Info

Background temperature	20.0°C
Emissivity	0.95
Image Time	5/31/2022 12:04:26 PM
Calibration Range	-10.0°C to 250.0°C

Main Image Markers

Name	Temperature	Emissivity	Background
Center point	42.1°C	0.95	20.0°C



vt_00029.is2
5/31/2022 12:04:58 PM

Visible Light Image

Location 250amp FPMCCB outgoing to MCB DB-Library Lighting

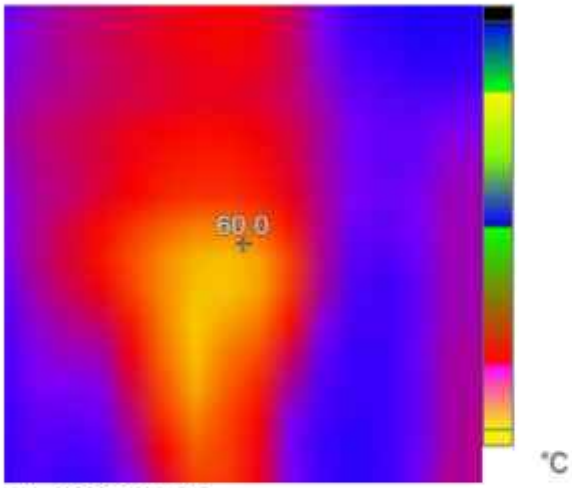
Normal Scan

Image Info

Background temperature	20.0°C
Emissivity	0.95
Image Time	5/31/2022 12:04:58 PM
Calibration Range	-10.0°C to 250.0°C

Main Image Markers

Name	Temperature	Emissivity	Background
Center point	41.3°C	0.95	20.0°C



vt_00030.is2
5/31/2022 2:31:12 PM

Visible Light Image

Location	63amp FPMCB main incoming in power DB-opp. Room no-1

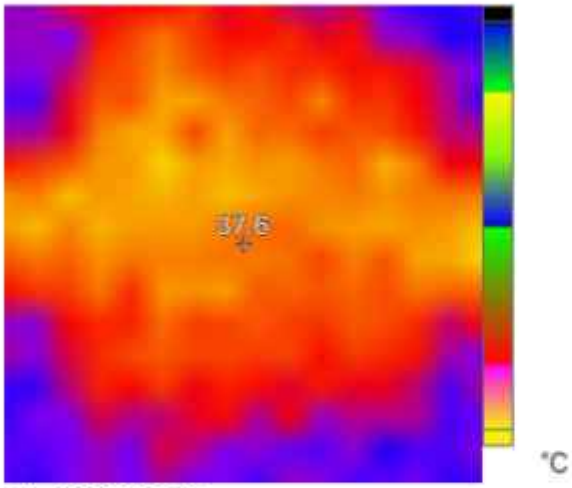
Observation	**Inference**	**Recommendation**
Very High temperature noticed	Loose connection-Y Phase	Connections should be got tightened

Image Info

Background temperature	20.0°C
Emissivity	0.95
Image Time	5/31/2022 2:31:12 PM
Calibration Range	-10.0°C to 250.0°C

Main Image Markers

Name	Temperature	Emissivity	Background
Center point	60.0°C	0.95	20.0°C



vt_00031.is2
5/31/2022 2:31:37 PM

Visible Light Image

Location

63amp FPMCB main incoming in light DB-1 opp. Room no-1

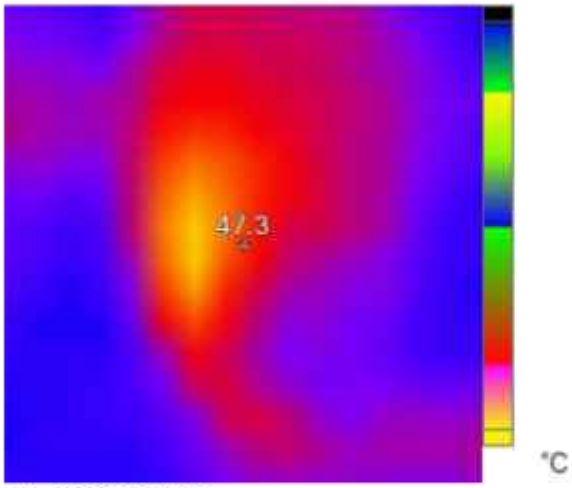
Normal Scan

Image Info

Background temperature	20.0°C
Emissivity	0.95
Image Time	5/31/2022 2:31:37 PM
Calibration Range	-10.0°C to 250.0°C

Main Image Markers

Name	Temperature	Emissivity	Background
Center point	37.6°C	0.95	20.0°C



vt_00032.is2
5/31/2022 2:31:50 PM

Visible Light Image

Location

63amp FPMCB main incoming in light DB-2opp. Room no-1

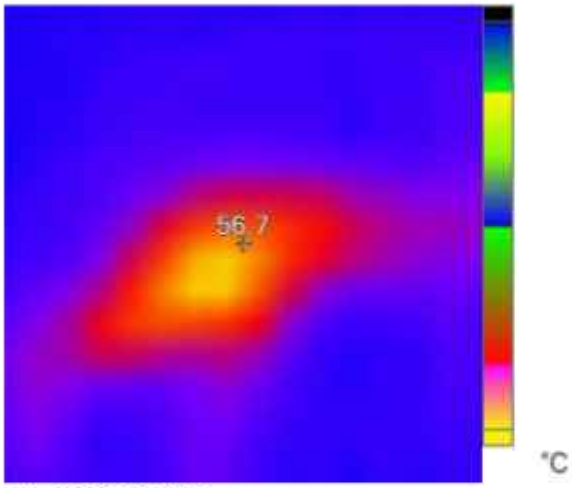
Observation	**Inference**	**Recommendation**
High temperature noticed	Loose connection-Y Phase	Connections should be got tightened

Image Info

Background temperature	20.0°C
Emissivity	0.95
Image Time	5/31/2022 2:31:50 PM
Calibration Range	-10.0°C to 250.0°C

Main Image Markers

Name	Temperature	Emissivity	Background
Center point	47.3°C	0.95	20.0°C



vt_00033.is2
5/31/2022 2:40:23 PM

Visible Light Image

Location	100amp bus bar main incoming back side MP Theater

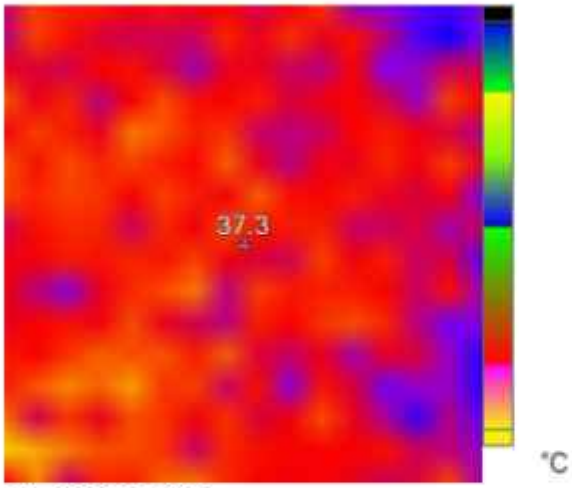
Observation	Inference	Recommendation
Very High temperature noticed	Loose connection-Y Phase	Connections should be got tightened

Image Info

Background temperature	20.0°C
Emissivity	0.95
Image Time	5/31/2022 2:40:23 PM
Calibration Range	-10.0°C to 250.0°C

Main Image Markers

Name	Temperature	Emissivity	Background
Center point	56.7°C	0.95	20.0°C



vt_00034.is2
5/31/2022 2:40:44 PM

Visible Light Image

Location	63amp FPMCB main incoming in DB-1 near MP Theater

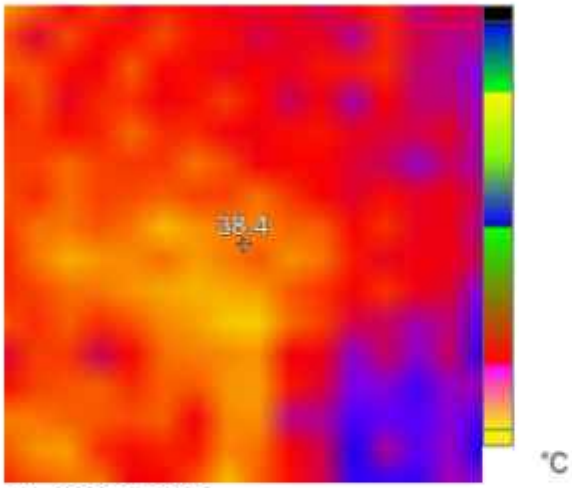
Normal Scan

Image Info

Background temperature	20.0°C
Emissivity	0.95
Image Time	5/31/2022 2:40:44 PM
Calibration Range	-10.0°C to 250.0°C

Main Image Markers

Name	Temperature	Emissivity	Background
Center point	37.3°C	0.95	20.0°C



vt_00035.is2
5/31/2022 2:40:55 PM

Visible Light Image

Location: 63amp FPMCB main incoming in DB-2 near MP Theater

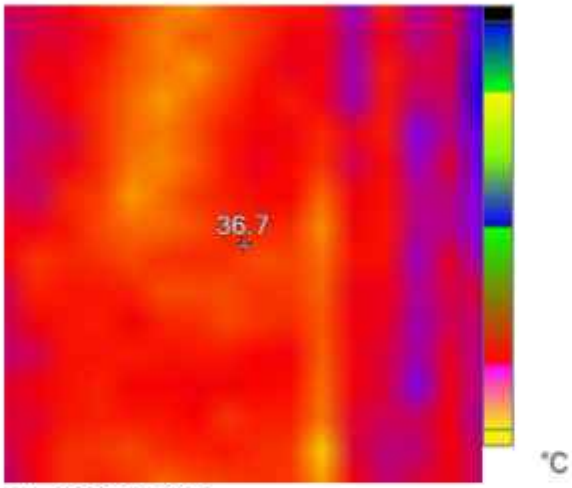
Normal Scan

Image Info

Background temperature	20.0°C
Emissivity	0.95
Image Time	5/31/2022 2:40:55 PM
Calibration Range	-10.0°C to 250.0°C

Main Image Markers

Name	Temperature	Emissivity	Background
Center point	38.4°C	0.95	20.0°C



vt_00036.is2
5/31/2022 2:41:05 PM

Visible Light Image

Location	63amp FPMCB main incoming in DB-new room supply

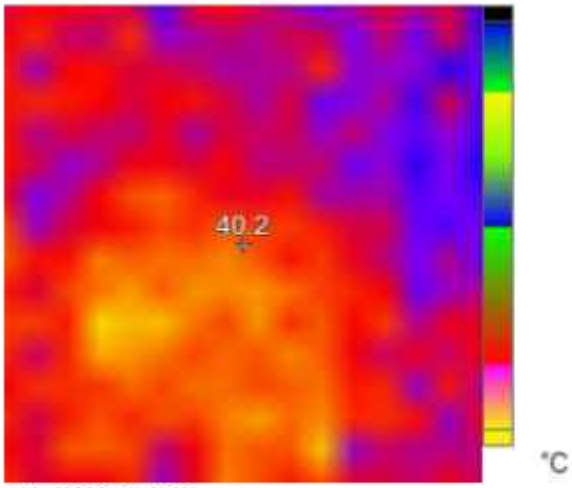
Normal Scan

Image Info

Background temperature	20.0°C
Emissivity	0.95
Image Time	5/31/2022 2:41:05 PM
Calibration Range	-10.0°C to 250.0°C

Main Image Markers

Name	Temperature	Emissivity	Background
Center point	36.7°C	0.95	20.0°C



vt_00037.is2
5/31/2022 2:54:24 PM

Visible Light Image

Location	63amp isolator main incoming in DB-1 geography lab corridor

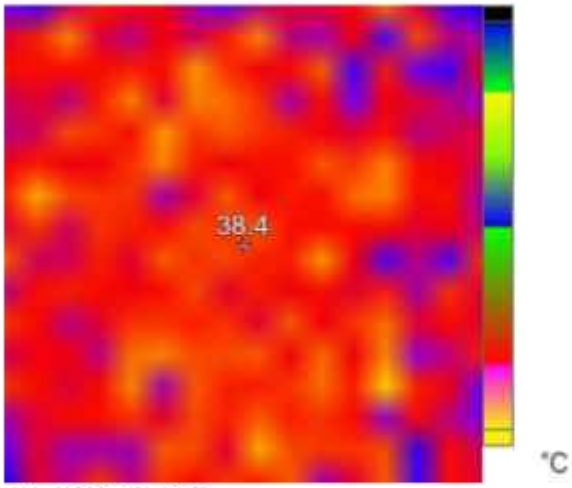
Normal Scan

Image Info

Background temperature	20.0°C
Emissivity	0.95
Image Time	5/31/2022 2:54:24 PM
Calibration Range	-10.0°C to 250.0°C

Main Image Markers

Name	Temperature	Emissivity	Background
Center point	40.2°C	0.95	20.0°C



vt_00038.is2
5/31/2022 3:12:14 PM

Visible Light Image

Location

63amp isolator main
incoming in DB-2 geography
lab corridor

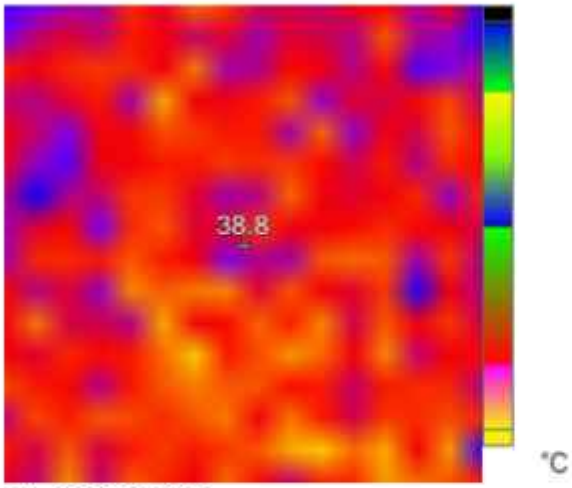
Normal Scan

Image Info

Background temperature	20.0°C
Emissivity	0.95
Image Time	5/31/2022 3:12:14 PM
Calibration Range	-10.0°C to 250.0°C

Main Image Markers

Name	Temperature	Emissivity	Background
Center point	38.4°C	0.95	20.0°C



vt_00039.is2
5/31/2022 3:12:46 PM

Visible Light Image

Location 63amp FPMCB main incoming in DB-computer lab

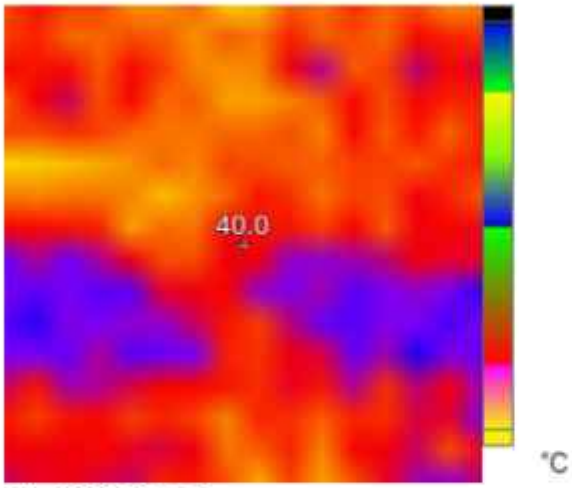
Normal Scan

Image Info

Background temperature	20.0°C
Emissivity	0.95
Image Time	5/31/2022 3:12:46 PM
Calibration Range	-10.0°C to 250.0°C

Main Image Markers

Name	Temperature	Emissivity	Background
Center point	38.8°C	0.95	20.0°C



vt_00040.is2
5/31/2022 3:19:27 PM

Visible Light Image

Location 100amp bus bar main incoming outside computer lab

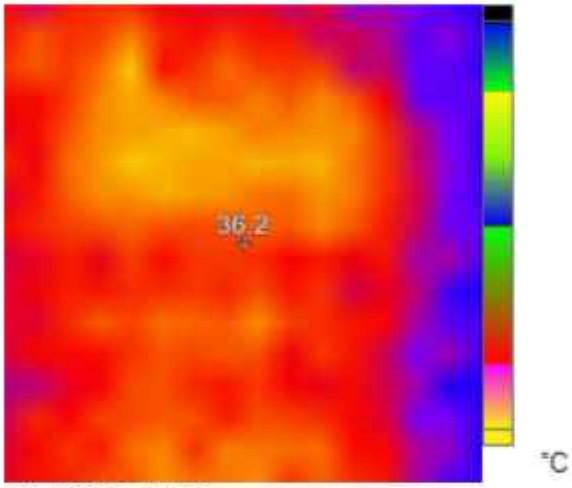
Normal Scan

Image Info

Background temperature	20.0°C
Emissivity	0.95
Image Time	5/31/2022 3:19:27 PM
Calibration Range	-10.0°C to 250.0°C

Main Image Markers

Name	Temperature	Emissivity	Background
Center point	40.0°C	0.95	20.0°C



vt_00045.is2
5/31/2022 4:12:49 PM

Visible Light Image

Location

63amp FPMCB main incoming in DB-3 library

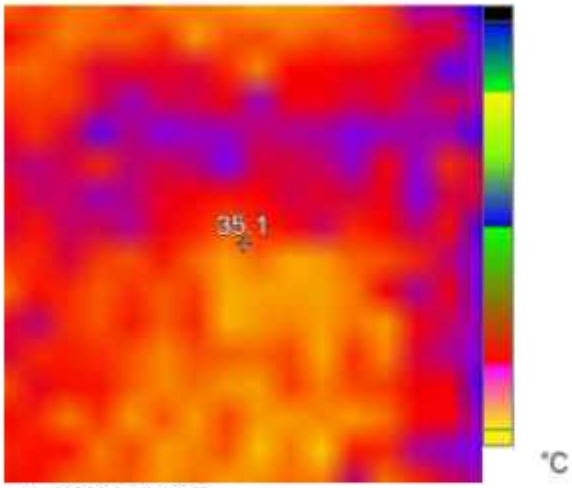
Normal Scan

Image Info

Background temperature	20.0°C
Emissivity	0.95
Image Time	5/31/2022 4:12:49 PM
Calibration Range	-10.0°C to 250.0°C

Main Image Markers

Name	Temperature	Emissivity	Background
Center point	36.2°C	0.95	20.0°C



vt_00046.is2
5/31/2022 4:12:59 PM

Visible Light Image

Location 63amp FPMCB main incoming in DB-4 library

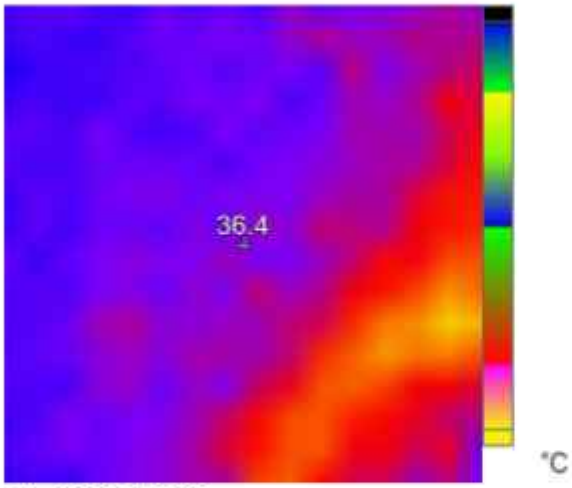
Normal Scan

Image Info

Background temperature	20.0°C
Emissivity	0.95
Image Time	5/31/2022 4:12:59 PM
Calibration Range	-10.0°C to 250.0°C

Main Image Markers

Name	Temperature	Emissivity	Background
Center point	35.1°C	0.95	20.0°C



vt_00047.is2
5/31/2022 4:22:17 PM

Visible Light Image

Location 100amp FPMCCB main incoming in Light DB-library

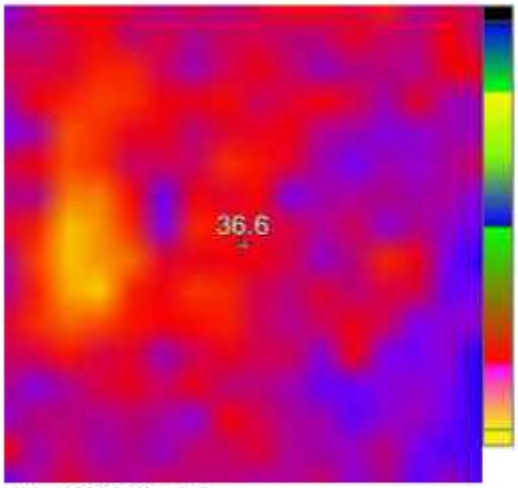
Normal Scan

Image Info

Background temperature	20.0°C
Emissivity	0.95
Image Time	5/31/2022 4:22:17 PM
Calibration Range	-10.0°C to 250.0°C

Main Image Markers

Name	Temperature	Emissivity	Background
Center point	36.4°C	0.95	20.0°C



vt_00048.is2
5/31/2022 4:22:34 PM

Visible Light Image

Location 200amp FPMCCB main incoming in power DB-library

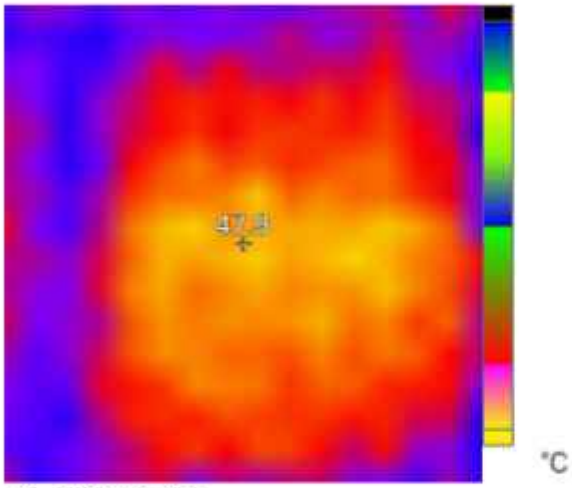
Normal Scan

Image Info

Background temperature	20.0°C
Emissivity	0.95
Image Time	5/31/2022 4:22:34 PM
Calibration Range	-10.0°C to 250.0°C

Main Image Markers

Name	Temperature	Emissivity	Background
Center point	36.6°C	0.95	20.0°C



vt_00050.is2
1/6/2022 3:15:40 PM

Visible Light Image

Location	63amp FPMCB main incoming in DB-light outside Room no-17

Graph

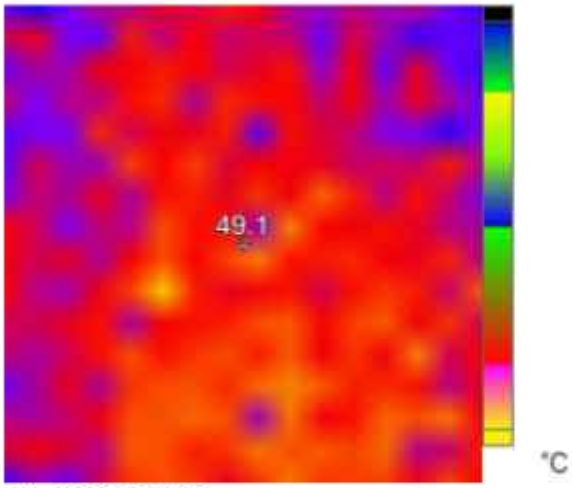
Observation	Inference	Recommendation
Internal heating observed	**Isolator needs replacement**	**It should be replaced**

Image Info

Background temperature	20.0°C
Emissivity	0.95
Image Time	1/6/2022 3:15:40 PM
Calibration Range	-10.0°C to 250.0°C

Main Image Markers

Name	Temperature	Emissivity	Background
Center point	47.9°C	0.95	20.0°C



vt_00054.is2
1/6/2022 3:30:38 PM

Visible Light Image

Location	63amp FPMCB main incoming in DB-1 near solar meters

Graph

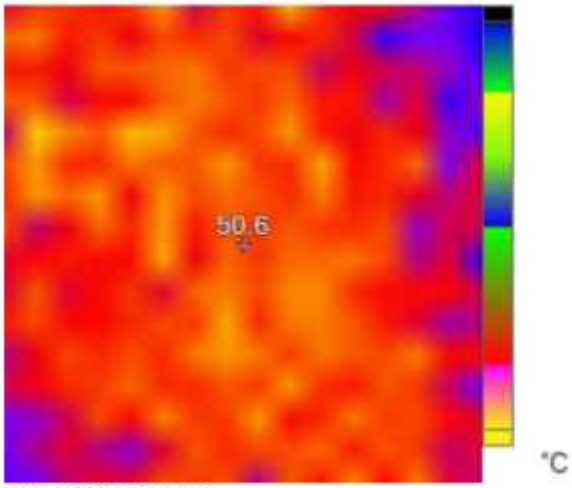
Observation	Inference	Recommendation
Internal heating observed	**Isolator needs replacement**	**It should be replaced**

Image Info

Background temperature	20.0°C
Emissivity	0.95
Image Time	1/6/2022 3:30:38 PM
Calibration Range	-10.0°C to 250.0°C

Main Image Markers

Name	Temperature	Emissivity	Background
Center point	49.1°C	0.95	20.0°C



vt_00056.is2
1/6/2022 3:34:46 PM

Visible Light Image

Location	63amp FPMCB main incoming in DB-light outside RC-6

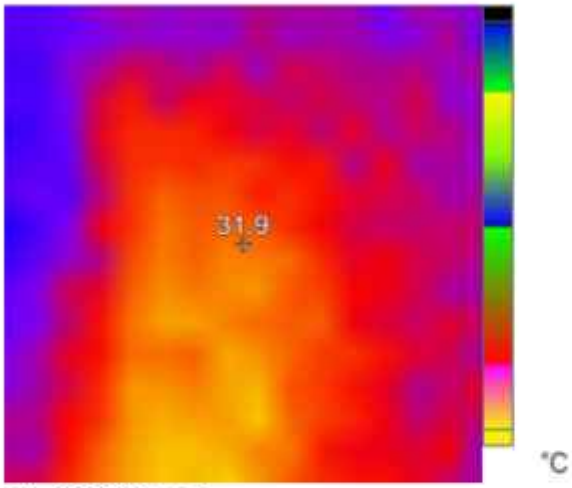
Observation	Inference	Recommendation
Internal heating observed	**Isolator needs replacement**	**It should be replaced**

Image Info

Background temperature	20.0°C
Emissivity	0.95
Image Time	1/6/2022 3:34:46 PM
Calibration Range	-10.0°C to 250.0°C

Main Image Markers

Name	Temperature	Emissivity	Background
Center point	50.6°C	0.95	20.0°C



vt_00060.is2
8/6/20222:07:16 PM

Visible Light Image

Location AC-Principal Room

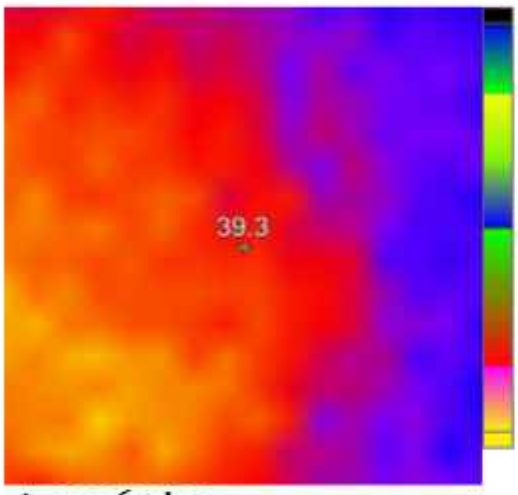
Normal Scan

Image Info

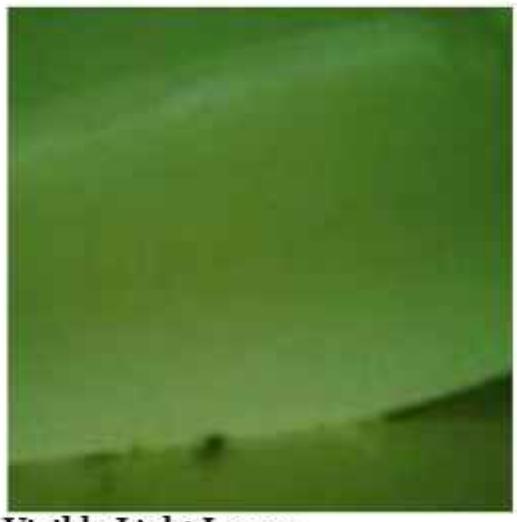
Background temperature	20.0°C
Emissivity	0.95
Image Time	8/6/20222:07:16 PM
Calibration Range	-10.0°C to 250.0°C

Main Image Markers

Name	Temperature	Emissivity	Background
Center point	31.9°C	0.95	20.0°C



vt_00064.is2
8/6/20222:14:48 PM



Visible Light Image

Location AC-2 Conference Room

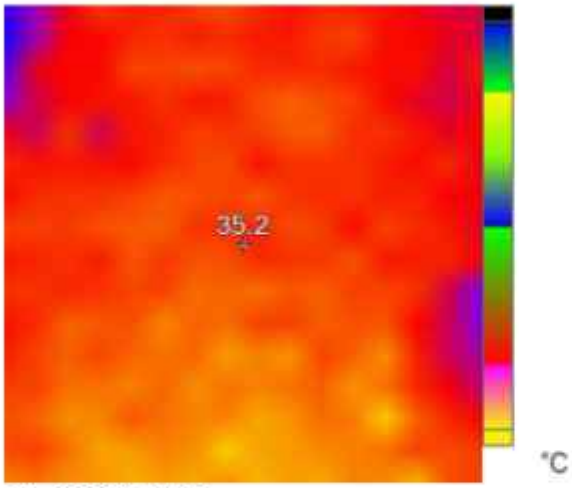
Normal Scan

Image Info

Background temperature	20.0°C
Emissivity	0.95
Image Time	8/6/20222:14:48 PM
Calibration Range	-10.0°C to 250.0°C

Main Image Markers

Name	Temperature	Emissivity	Background
Center point	39.3°C	0.95	20.0°C



vt_00065.is2
8/6/20222:16:16 PM

Visible Light Image

Location AC-Bursar Room

Graph

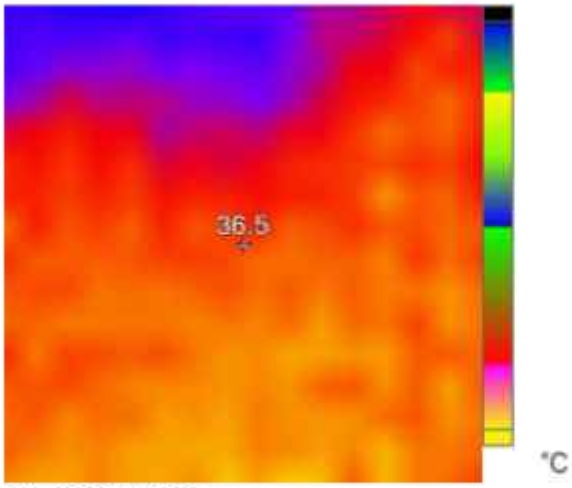
Higher temperature noticed-Connections of AC need to be tightened.

Image Info

Background temperature	20.0°C
Emissivity	0.95
Image Time	8/6/20222:16:16 PM
Calibration Range	-10.0°C to 250.0°C

Main Image Markers

Name	Temperature	Emissivity	Background
Center point	35.2°C	0.95	20.0°C



vt_00072.is2
8/6/20222:29:43 PM

Visible Light Image

Location AC-1 Admin.Block

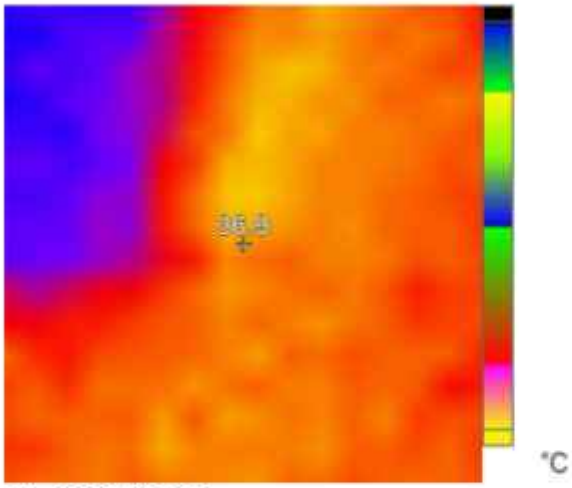
Higher temperature noticed-Connections be got tightened

Image Info

Background temperature	20.0°C
Emissivity	0.95
Image Time	8/6/20222:29:43 PM
Calibration Range	-10.0°C to 250.0°C

Main Image Markers

Name	Temperature	Emissivity	Background
Center point	36.5°C	0.95	20.0°C



vt_00076.is2
6/6/20222:33:52 PM

Visible Light Image

Location AC-2 Accounts Block

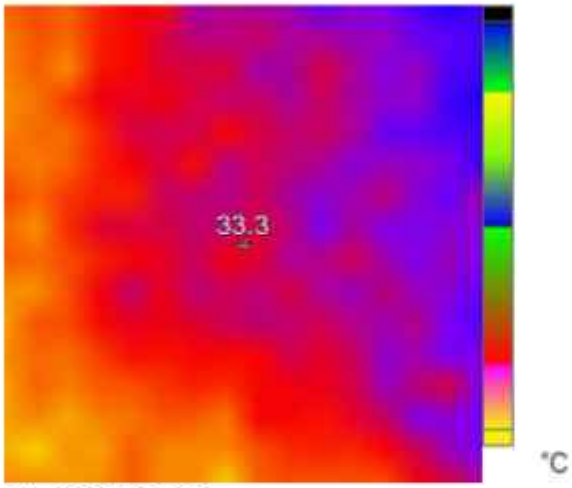
High temperature noticed-Connections be got tightened.

Image Info

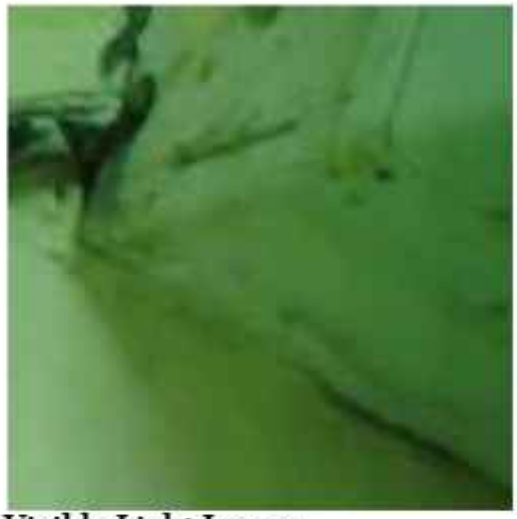
Background temperature	20.0°C
Emissivity	0.95
Image Time	6/6/20222:33:52 PM
Calibration Range	-10.0°C to 250.0°C

Main Image Markers

Name	Temperature	Emissivity	Background
Center point	36.9°C	0.95	20.0°C



vt_00079.is2
8/6/20222:39:25 PM



Visible Light Image

Location AC-1 Library Block

Graph

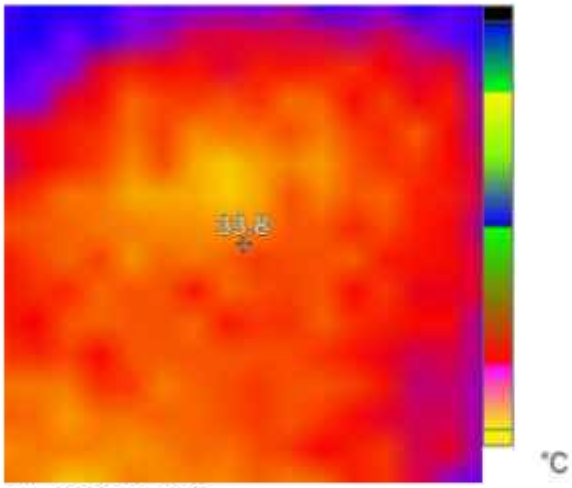
High temperature noticed-Connections be got tightened.

Image Info

Background temperature	20.0°C
Emissivity	0.95
Image Time	8/6/20222:39:25 PM
Calibration Range	-10.0°C to 250.0°C

Main Image Markers

Name	Temperature	Emissivity	Background
Center point	33.3°C	0.95	20.0°C



vt_00082.is2
8/6/20222:41:35 PM

Visible Light Image

Location AC-4 Library Block

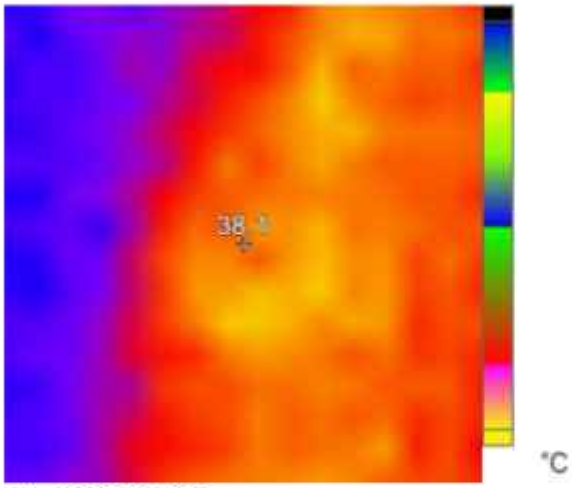
Higher temperature noticed-Connections be got tightened

Image Info

Background temperature	20.0°C
Emissivity	0.95
Image Time	8/6/20222:41:35 PM
Calibration Range	-10.0°C to 250.0°C

Main Image Markers

Name	Temperature	Emissivity	Background
Center point	33.8°C	0.95	20.0°C



vt_00083.is2
8/6/20222:42:44 PM

Visible Light Image

Location AC-5 Library Block

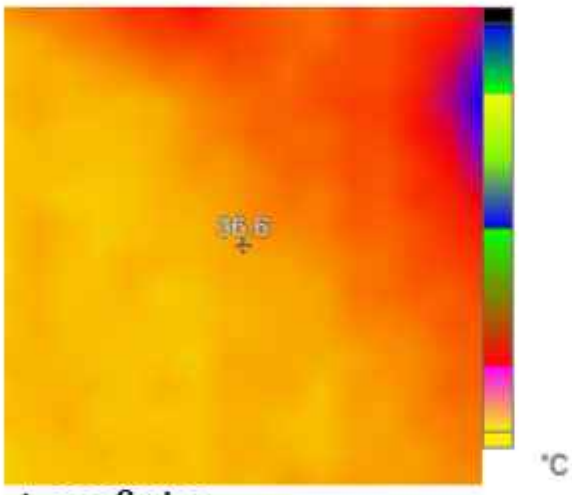
Abnormally high temperature noticed-Connections should be immediately got tightened

Image Info

Background temperature	20.0°C
Emissivity	0.95
Image Time	8/6/20222:42:44 PM
Calibration Range	-10.0°C to 250.0°C

Main Image Markers

Name	Temperature	Emissivity	Background
Center point	38.1°C	0.95	20.0°C



vt_00085.is2
8/6/2022 2:51:32 PM

Visible Light Image

Location AC-1 Statics Lab office

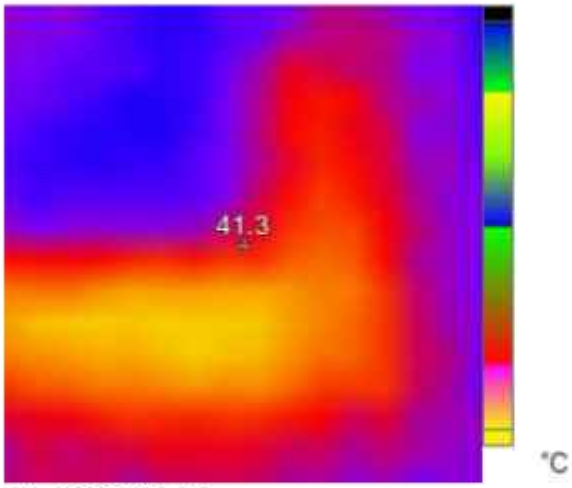
High temperature noticed-Connections should be immediately got tightened

Image Info

Background temperature	20.0°C
Emissivity	0.95
Image Time	8/6/20222:51:32 PM
Calibration Range	-10.0°C to 250.0°C

Main Image Markers

Name	Temperature	Emissivity	Background
Center point	36.6°C	0.95	20.0°C



vt_00086.is2
8/6/20222:52:35 PM

Visible Light Image

Location AC-1-Windowtype Computer Science Lab

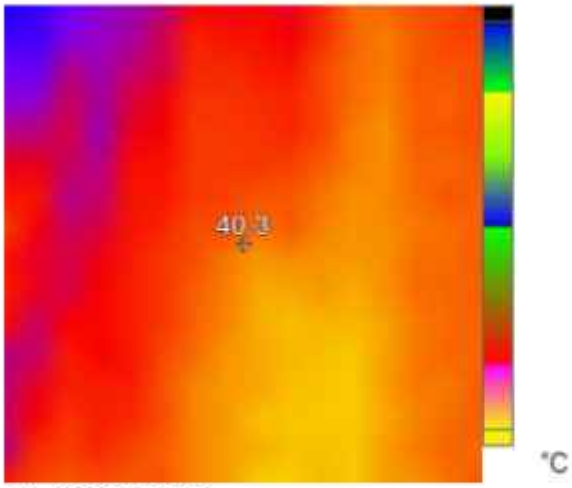
Normal Scan

Image Info

Background temperature	20.0°C
Emissivity	0.95
Image Time	8/6/20222:52:35 PM
Calibration Range	-10.0°C to 250.0°C

Main Image Markers

Name	Temperature	Emissivity	Background
Center point	41.3°C	0.95	20.0°C



vt_00087.is2
8/6/20222:53:09 PM

Visible Light Image

Location AC-2-Window Computer Science Lab

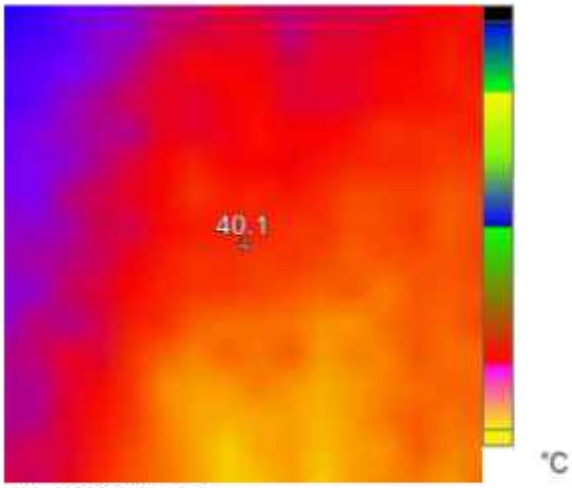
Normal Scan

Image Info

Background temperature	20.0°C
Emissivity	0.95
Image Time	8/6/20222:53:09 PM
Calibration Range	-10.0°C to 250.0°C

Main Image Markers

Name	Temperature	Emissivity	Background
Center point	40.3°C	0.95	20.0°C



vt_00088.is2
8/6/20222:53:44 PM

Visible Light Image

Location AC-3 –Window type-AC-
Computer Science Lab

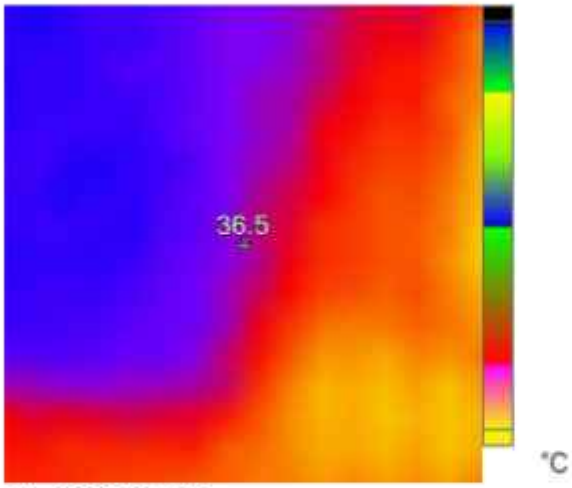
Normal Scan

Image Info

Background temperature	20.0°C
Emissivity	0.95
Image Time	8/6/20222:53:44 PM
Calibration Range	-10.0°C to 250.0°C

Main Image Markers

Name	Temperature	Emissivity	Background
Center point	40.1°C	0.95	20.0°C



vt_00089.is2
8/6/20222:56:47 PM

Visible Light Image

Location AC-Microbiology Lab

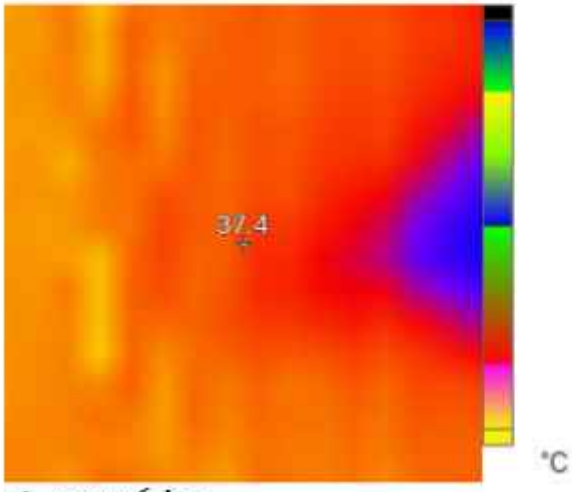
Normal Scan.

Image Info

Background temperature	20.0°C
Emissivity	0.95
Image Time	8/6/20222:56:47 PM
Calibration Range	-10.0°C to 250.0°C

Main Image Markers

Name	Temperature	Emissivity	Background
Center point	36.5°C	0.95	20.0°C



vt_00096.is2
8/6/20223:11:27 PM

Visible Light Image

Location AC-1 Staff Room

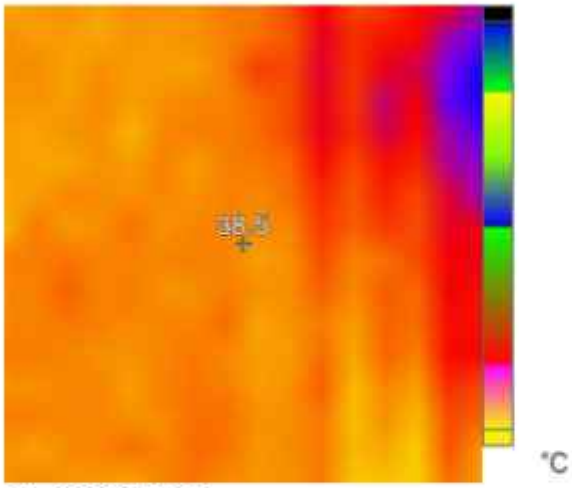
Higher temperature observed.-Connections be got tightened

Image Info

Background temperature	20.0°C
Emissivity	0.95
Image Time	8/6/20223:11:27 PM
Calibration Range	-10.0°C to 250.0°C

Main Image Markers

Name	Temperature	Emissivity	Background
Center point	37.4°C	0.95	20.0°C



vt_00097.is2
8/6/20223:12:09 PM

Visible Light Image

Location AC-2 Staff Room

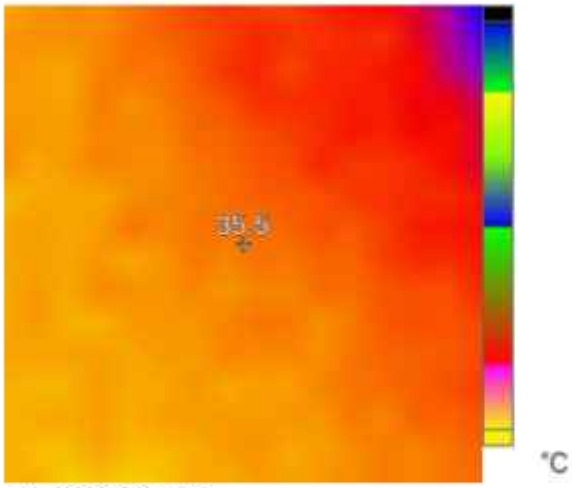
Higher temperature observed.-Connections be got tightened.

Image Info

Background temperature	20.0°C
Emissivity	0.95
Image Time	8/6/20223:12:09 PM
Calibration Range	-10.0°C to 250.0°C

Main Image Markers

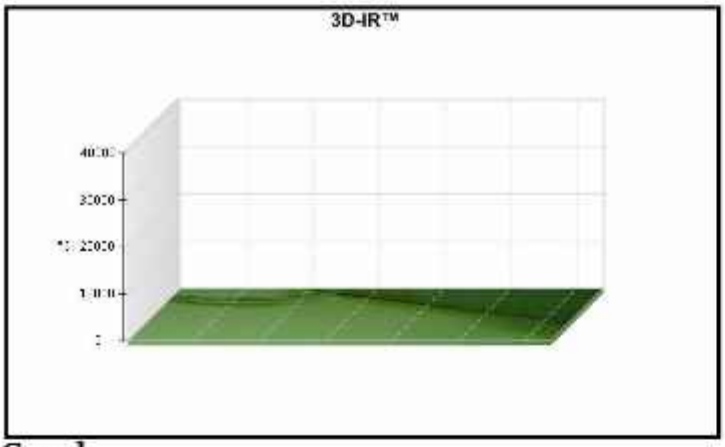
Name	Temperature	Emissivity	Background
Center point	38.5°C	0.95	20.0°C



vt_00098.is2
8/6/20223:12:37 PM

Visible Light Image

Location AC-1 Dining Room



Graph

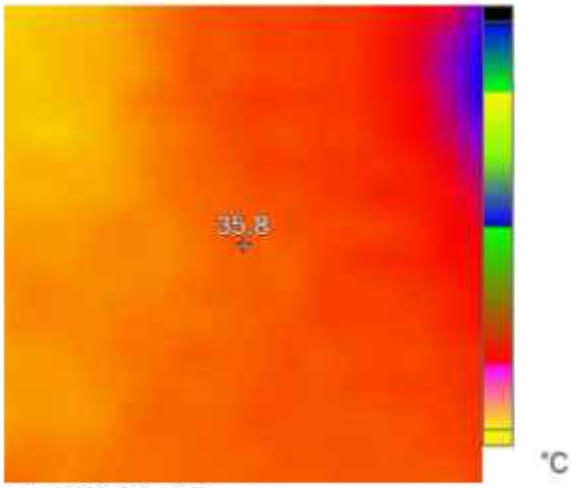
Higher temperature observed.-Connections be got tightened.

Image Info

Background temperature	20.0°C
Emissivity	0.95
Image Time	8/6/20223:12:37 PM
Calibration Range	-10.0°C to 250.0°C

Main Image Markers

Name	Temperature	Emissivity	Background
Center point	35.5°C	0.95	20.0°C



vt_00099.is2
8/6/20223:12:50 PM

Visible Light Image

Location AC-2 Dining Room

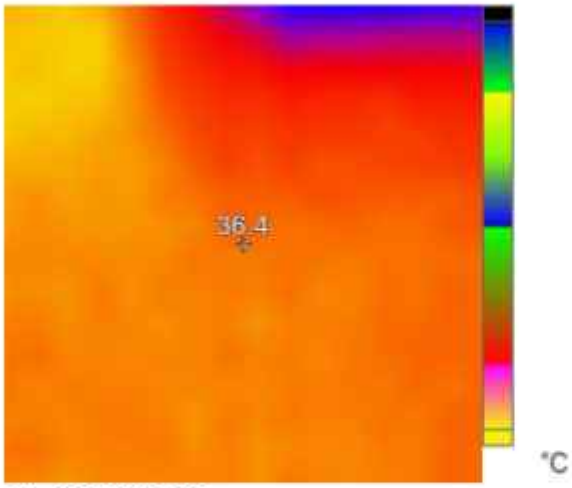
Higher temperature observed.-Connections be got tightened.

Image Info

Background temperature	20.0°C
Emissivity	0.95
Image Time	8/6/20223:12:50 PM
Calibration Range	-10.0°C to 250.0°C

Main Image Markers

Name	Temperature	Emissivity	Background
Center point	35.8°C	0.95	20.0°C



vt_00100.is2
8/6/20223:20:45 PM

Visible Light Image

Location AC-1 Committee Room

Higher temperature observed.-Connections be got tightened.

Image Info

Background temperature	20.0°C
Emissivity	0.95
Image Time	8/6/20223:20:45 PM
Calibration Range	-10.0°C to 250.0°C

Main Image Markers

Name	Temperature	Emissivity	Background
Center point	36.4°C	0.95	20.0°C

Summary

1. **There are higher temperatures recorded which reflect loose connections and internal issues in switchgears**
2. **There are higher temperatures in electrical connections of Air conditioners.**