EARTH LEAKAGE CIRCUIT BREAKER (ELCB) TESTING PROCEDURE

Rev No.	Reason for Revision	Revised By	Checked By	Approval by
R0	On the basis of incident Investigation report	Ravindra Panchal	Navendra Singh	V K Chourey
R1	To add SOP of ELCB Testing	Ravindra Panchal (Lead Engineer – Corp safety)	Navendra Singh (Group Head – P & CB; Corp Safety.)	Vijay Chourey (Chief – Corp Safety)
R2	Periodic revision	Navendra Singh Head- Safety (T&D) Corp safety	Rajesh Sharma Head- Safety (Generation) Corp safety	Suresh Khetwani Chief - Corporate Safety & Environment

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1. **OBJECTIVE:**

   The objective of this procedure is to define the minimum requirements for testing of Earth Leakage Circuit Breaker (ELCB).

2. **SCOPE:**

   This procedure applies to all operating & Project sites of TATA Power Group Companies including JVs/Subsidiaries.

3. **EXPECTED RESULTS:**

   3.1. Manage activities/jobs associated with ELCB safely.

   3.2. Control of incidents related to failure of ELCB.

   3.3. Compliance to Regulatory requirements to make work place safety

4. **ACCOUNTABILITY & RESPONSIBILITY:**

   4.1. ACCOUNTABILITY: Concerned Division's Heads / Assets Custodian

   4.2. RESPONSIBILITY: Concerned Engineer.

5. **GLOSSARY/ DEFINITIONS:**

   Shall: mandatory requirement

   Should: Optional requirement

   Earth Leakage Circuit Breaker (ELCB): An Earth Leakage Circuit Breaker (ELCB) is a safety device used in electrical installations with high earth impedance to prevent shock. It detects small stray voltages/differential current and interrupts the circuit if a dangerous voltage is detected. ELCB is also known as RCCB.

   RCCB: Residual Current Circuit Breaker

   JSA: Job Safety Analysis

   LOTO: Lock Out Tag Out

   PPE: Personal Protective Equipment

   PTW: Permit To Work

   Work Permit - The written or printed document that is issued to control working in operational area/ in vicinity of electrical equipment.

Work supervisor - A person who is authorized; to verify that all conditions for working have been met, to define ongoing precautions to maintain safe working conditions during the work, to authorize the work to occur, and to cancel the permit allowing the work; also known as proprietor, work group supervisor, or authorizing person.

Licensed Electrician: PWD Electrical license Holder.

6. PROCEDURES :

Power system protection plays important role for the safety of humans and electrical equipment in Plants and buildings. Earth leakage circuit breaker (ELCB) is an important protection device especially for plants, houses, buildings and Portable Electrical Equipment. The ELCB's spring trap will trip to isolate the fault from the system when line to ground fault occurs. So the healthy condition of the ELCB is very important for safety of human beings and protection of the system.

6.1. Any power supply provided for the use of portable electrical tools shall be given through portable power supply board fitted with ELCB of 30 miliAmp rating.

6.2. If tripping timing exceeds more than 50 Miliseconds at 30 MiliAmp then ELCB shall be replaced immediately.

6.3. The power supply cable shall be free of any joints.

6.4. Testing Schedule: Following testing schedule shall be followed for ELCBs.-

6.4.1. All fixed type ELCBs installed on switchboards shall be tested Half yearly with the help of ELCB tester as per attached SOP (Appendix C) by the licensed Electrician & record shall be maintained as per attached Appendix A.

6.4.2. All ELCBs installed on portable switchboards, switchboard installed at Temporary sheds, and outside areas (outside buildings) shall be tested quarterly with the help of ELCB tester as per attached SOP (Appendix C) by the licensed Electrician.

6.4.3. Before starting any work ELCB provided / installed for that Electrical Circuit to be tested by pressing Push Button provided on ELCB to confirm ELCB is tripping mechanically.

6.4.4. Defective ELCB shall be replaced immediately with new ELCB.

6.4.5. The ELCB testing & failure record shall be maintained in format given in appendix - B.

6.4.6. It is recommended to carry periodic inspection and maintenance through SAP-PM

7. RECORDS :

7.1 ELCB Testing record (TPSMS/GSP/ELCB/016/FORM/01) - Retention period three (3) years

7.2 ELCB failure record (TPSMS/GSP/ELCB/016/FORM/02) - Retention period three (3) years

8. TRAINING & COMMUNICATION

8.1. Training of ELCB procedure shall be covered along with Electrical safety Training.

8.2. Initial Communication to be done through Corporate Communication, Email and subsequently this procedure shall be made available at safety portal at Sangam.

9. VERIFICATION

9.1. Verification of implementation of ELCB Testing shall be done during Safety Audit, Field Safety visit and inspections.

10. EXCEPTION :

Any Exception to this procedure shall only be done as per section 6.3 of Document Control .Procedure (**TPSMS/GSP/DC/014/REV01).**

11. REFERENCES

11.1. Tata Power Electrical Safety procedure (TPSMS/CSP/ELEC/010).

11.2. Indian Electricity act and Rules

11.3. IS : 12640: 2008

12. REVIEW

12.1. Review of this procedure shall be done as and when but not later than once in every three (03) years. Typical Factors like Changes in legislation, Review of Incident Reports, Inspection & Audit findings, Feedback from users, Recommendations in

Incident investigation reports may be inputs for the review and revision of the procedure.

12.2. In case release of revised procedure gets delay due to obtaining feedback or any other reasons, safety advisory may be issued immediately to take precautions for the proposed changes in the procedure and revised procedure should be released subsequently.

13. ATTACHMENTS/APPENDIX :

Appendix-A - Format for ELCB Testing (**TPSMS/GSP/ELCB/016/FORM/01)**

Appendix-B - Format for ELCB Failure record (**TPSMS/GSP/ELCB/016/FORM/02)**

Appendix-C- SOP For Testing ELCB

Appendix-D- Photographs of ELCB Tester.

Appendix-A

TPSMS/GSP/ELCB/016/FORM/01

Format for ELCB Testing

Date	Sr. No. of ELCB	Location	Type & Make of ELCB	Rating in mA	Trip Time in Seconds	Remarks	Name & Sign.

Appendix-B

TPSMS/GSP/ELCB/016/FORM/02

Format for ELCB Failure record

Date	Sr. No. of ELCB	Location	Type & Make of ELCB	Rating in mA	Defect (Mechanical / Electrical)	Remarks	Name & Sign.

Appendix-C

SOP for Testing ELCB

Sr. No.	Particulars of Events	Time	Tick
A	**Testing of ELCB/RCCB by pressing Push Button provided on ELCB/RCCB.**		
01	Inform concerned peoples about the testing of ELCB.		
02	Press Push Button provided on ELCB.		
03	Confirm ELCB has tripped i.e. ELCB is tripping mechanically.		
04	If ELCB does not trip then either AC circuit is defective or ELCB is defective.		
05	Rectify AC circuit if faulty. Replace ELCB if Faulty.		
06	Defective/Faulty ELCB record to be maintained in format given.		
B	**Testing of ELCB/RCCB by using 3 Pin/Plug connected to Testing cord**		
01	While carrying out testing of ELCB , Testing crew will wear following PPEs (1) Safety Shoes (2) Safety Helmet (3) Rubber Hand Gloves.		
02	Confirm all the 3 terminals (Phase, Neutral, Earth) of the cable used for testing are properly connected to healthy 3 pin (5A/10A).		
03	Same way all the 3 terminals (Phase-Line ,Neutral, Earth) are properly connected to the terminals of ELCB Tester. Ref. Fig no. 1 of Attached Annexure D.		
04	Confirm ELCB tester is in Off condition		
05	Keep Range selector switch on ELCB tester at 30 for 30 Milliamps rating of ELCB. Ref. fig. 2 of Attached Annexure D.		
	Insert the 3 Pin inside a plug whose ELCB to be Tested & switch on the Plug/Pin supply. Ref. Fig. 3 of Attached Annexure D.		
06	Switch ON ELCB tester .		
07	If all connections are proper then Voltage & Frequency will appear on the display of ELCB Tester. Ref. Fig. 4 of Attached Annexure D.		
08	If connections are not proper or no earthling is extended to that circuit then N-E lamp on ELCB Tester will glow which means Do not proceed for the Test. (Rectify the circuit & then start the Test) Ref. Fig. 6 of Attached Annexure D.		
09	If N-E lamp is not glowing, voltage is proper on display then start Test by pressing PRESS switch provided on ELCB Tester.		
10	Confirm that desired ELCB has tripped & note down the values from the display of ELCB Tester.		

Sr. No.	Particulars of Events	Time	Tick
11	Tripping timing of ELCB should be 30Miliseconds		
12	If tripping timing exceeds more than 50 Miliseconds at 30 MiliAmp then ELCB shall be replaced immediately.		
13	Defective/Faulty ELCB record to be maintained in format given. Frequent failure analysis to be done.		
C	**Testing of ELCB/RCCB by using Testing cord (No 3 Pin connected to Testing cord)**		
01	While carrying out testing of ELCB, Testing crew will wear following PPEs (1) Safety Shoes (2) Safety Helmet (3) Rubber Hand Gloves.		
02	Confirm ELCB tester is in Off condition		
03	Confirm all the 3 terminals (Phase-Line, Neutral, and Earth) of the cord used for testing are properly connected to ELCB Tester.		
04	In case of 3 Phase ELCB there are 4 points (Holes access to 3 phases & Neutral) on ELCB i.e. R,Y,B,N.		
05	For Testing R phase, insert phase-Line cord coming from ELCB tester inside R phase of ELCB, Neutral to N point of ELCB & Earth to Earth point nearby. Ref. Fig. 5 of Attached Annexure D.		
06	Switch ON ELCB tester.		
07	If all connections are proper then Voltage & Frequency will appear on the display of ELCB Tester.		
08	If connections are not proper or no earthling is extended to that circuit then N-E lamp on ELCB Tester will glow which means Do not proceed for the Test. (Rectify the circuit & then start the Test)		
09	If N-E lamp is not glowing, voltage is proper on display then start Test by pressing PRESS switch provided on ELCB Tester.		
10	Confirm that desired ELCB has tripped & note down the values from the display of ELCB Tester.		
11	Tripping timing of ELCB should be 30 Miliseconds		
12	If tripping timing exceeds more than 50 Miliseconds at 30 MiliAmp then ELCB shall be replaced immediately.		
13	Defective/Faulty ELCB record to be maintained in format given. Frequent failure analysis to be done.		
14	Same way test to be conducted for other Phases.		

Appendix-D

Photographs of ELCB Tester

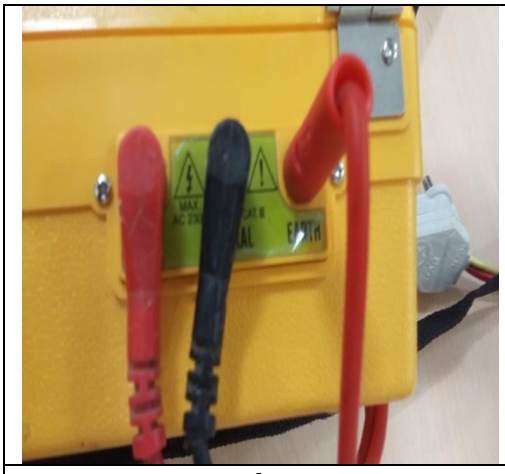

Fig. 1

Fig 2

Fig. 3

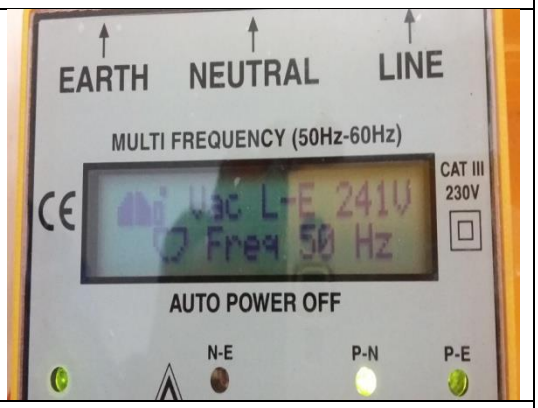

Fig. 4

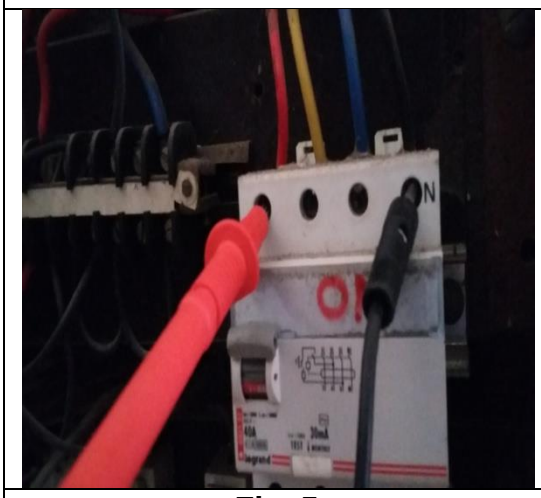

Fig. 5

Fig 6