

भारत सरकार / Government of India
श्रम एवं रोजगार मंत्रालय / Ministry of Labour & Employment
खान सुरक्षा महानिदेशालय / Directorate General of Mines Safety

DGMS (Tech) Circular No. 04 Dhanbad, dated: 14/07/2026

To,
Owners/Agents/Managers of all mines

Subject: Consideration of System Capacitive Current in Restricted Neutral System of Power Supply in Mines—Reg.

1.0 Introduction

The trend of electrical accidents in mines has shown an increase during the last three years. During the year 2025 alone, seven persons lost their lives and four persons sustained serious injuries due to electrical accidents. The situation is a matter of serious concern and warrants not only a comprehensive review of the existing electrical safety management system but also strict compliance with the provisions of relevant statutory circulars and safety directives to prevent recurrence of such accidents.

Year	Fatal	Serious
2023	4	2
2024	2	1
2025	7	4

In accordance with Regulation 103(1) of the Central Electricity Authority (Measures relating to Safety and Electric Supply) Regulations, 2023, all electrical installations in mines (above 1100 V and up to 11 kV) are mandated to limit the magnitude of earth fault current to 10 A by employing a suitably designed restricted neutral system of power supply, including neutral-ground monitoring protection.

The objective of such a system is to reduce shock hazard by limiting fault current and thereby lowering Touch and Step Potentials during insulation failure.

2.0 Observations on Capacitive Current

System studies conducted by DGMS in several opencast and underground mines have established that in large electrical installations with extensive cable networks, the system capacitive current may exceed 10 A.

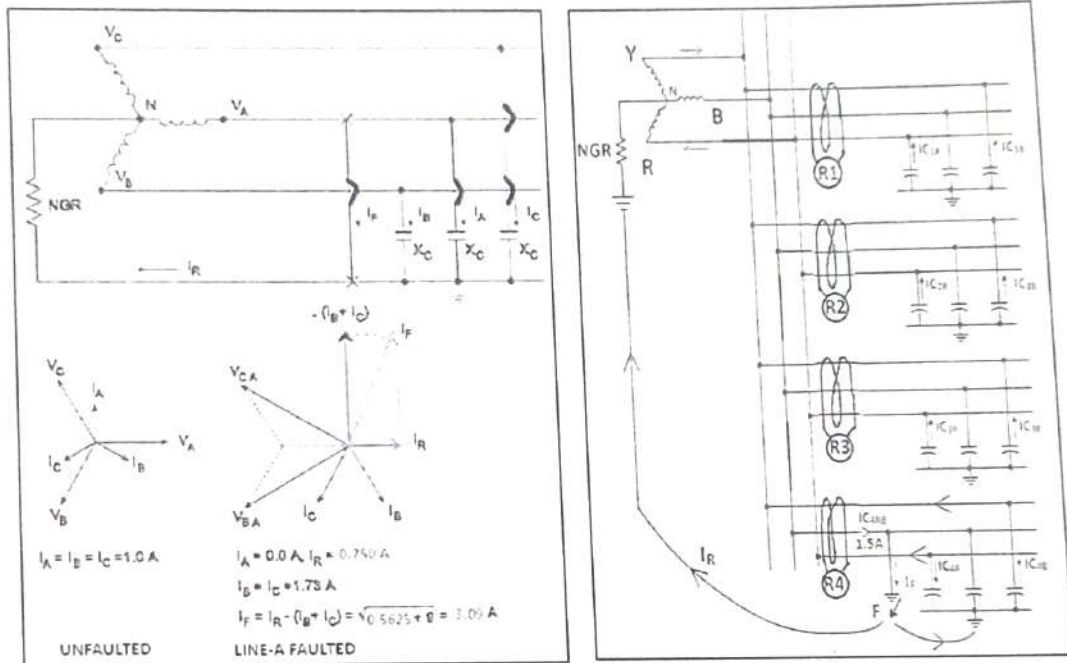
Under such conditions, during a single line-to-ground (1L-G) fault, the following may occur:

- Total earth fault current exceeding the intended 10 A limit due to capacitive contribution;
- Transient over-voltage rising up to nearly three times the rated voltage;
- Unwanted tripping of healthy feeders (sympathetic tripping) due to capacitive current exceeding relay settings (as displayed in diagram (ii));
- Increased risk of simultaneous failure of connected electrical equipment; and
- Elevated Touch and Step Potentials, posing safety risks.
- The various scenarios associated with the occurrence of a single line-to-ground (1L-G) fault, the resultant flow of capacitive current, and the method of its measurement are illustrated hereunder for better understanding:

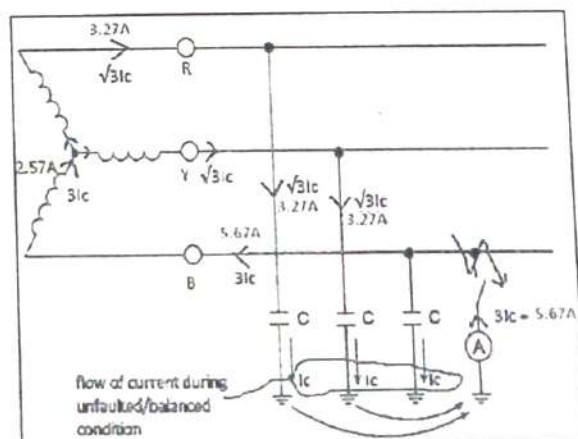


(i) 1L-G Fault

(ii) Flow of capacitive current through healthy feeders in the event of fault, causing nuisance tripping



(iii) Measurement of capacitive current



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3.0 Recommendations and Regulatory Deliberations

The matter was deliberated in the National Seminar on Futuristic Approaches to Electrification and Automation in Mining Industry held on 28th August, 2025, and was further discussed in the 7th Meeting of the Standing Committee on Electrical Safety under the aegis of the Central Electricity Authority, Ministry of Power, held on 21st November, 2025 at Bengaluru.

The following recommendations emerged during the course of the seminar:

- Detailed system studies are essential for appropriate design of restricted neutral systems; and
- Specific regulatory approvals as per Regulation 45 of CEAR, 2023 are required in cases where system capacitive current exceeds the prescribed limit of 10 A.

4.0 Compliance Directions

In view of the above, and to ensure safety of persons and equipment, the following shall be strictly ensured:

4.1 System Study:

A detailed system study shall be conducted to determine capacitive current and touch potential prior to finalization of the restricted neutral system.

4.2 Design Consideration:

The design of the power supply system shall take into account total earth fault current, including capacitive components.

4.3 Statutory Approval:

Where system capacitive current exceeds 10 A, prior approval in writing shall be obtained in line with Regulation 45(7) of CEAR, 2023, supported by relevant test reports and technical justification.

4.4 Standardization of NGR:

The Neutral Grounding Resistor (NGR) shall conform to IEC 60076-25:2023 and relevant Indian Standards.

4.5 Testing and Certification:

The NGR and associated protection devices shall be tested and certified by NABL-accredited laboratories or Government test houses.

4.6 Protection Coordination:

Protection settings and relay coordination shall be designed considering the impact of capacitive current.

4.7 Safety Compliance:

The earthing system shall be maintained such that Touch and Step Potentials remain within safe limits under all operating and fault conditions.

All Owners, Agents and Managers of mines shall ensure strict compliance with the above directions to safeguard electrical installations and ensure personnel safety.


(Director General of Mines Safety)