



Work carried out on partially earthed HV system

On a recent 33kV cable fault repair, it was discovered that a Permit for Work had been issued and jointing work carried out where 11kV primary earths had disengaged.

A Primary Earth had been applied at the Grid substation. At the other end of the circuit, Primary Earths were also applied on the 11kV incoming circuit breakers (CB) on the low voltage side of a 33/11kV transformer. The 11kV CB's were English Electric CV type and had been closed to transformer earth. These CB's do not have the facility to mechanically lock the CB in this position, consequently, local practice is to close the cabinet door and apply a yellow safety lock.



English Electric CV

The engineering team carried out the usual Sanction for Test activities to locate the fault, to identify and spike the cable, and then issued a Permit for Work for jointing. Another engineer then took over the job, cancelled the Permit for Work and took out a further Sanction for Test to pressure test the circuit. Upon arrival at the primary, he discovered that the 11kV CB's had tripped at an earlier point on intertrip receive. The local intertrip relay had also flagged. He advised control immediately who raised an NOI and advised the Duty Manager.

Clearly this is a serious incident with jointing carried out on an HV system which was not adequately earthed. Following investigation, it was discovered that the CB's tripped during the Sanction for Test phase as PowerOn alarms and CB open indication were received. It has been established that the links were not removed to prevent electrical tripping of the breaker.

Recommendations and action points

When using a CB as a Primary Earth always follow the guidance below:

- COMPANY SAFETY INSTRUCTION (CSI 1.1.1 Primary Earths)

(v) When a movable CB is used, the automatic trip feature shall be rendered inoperative before closing where practicable. After closing, where reasonably practicable, any means of opening the CB shall be locked.

(vi) When a fixed CB is used the tripping functions shall be rendered inoperative after closing and the CB locked in the closed position.

- LWM 2.2 section 10.4.15:

When an earth is to be applied via a Circuit Breaker, means other than locking the mechanism shall be used to ensure that electrical tripping of a Circuit Breaker is prevented when closing into the "earth" position and once the earth has been applied. If it is necessary to remove the Circuit Breaker tripping fuses, the Control Person shall be notified.

- *If you come across circuit breakers that require fuses or links to be removed it is essential they are replaced. You are advised to modify the switching schedule to insert a line for removal and importantly also one for replacement.*