Safety Advice

everyone home safe every day

Lifting of Operational Restrictions on the use of FSK II Circuit Breakers



Issued to: All line managers, safety professionals and accredited contractors

Ref: NRA26-05 update to NRA24-09

Date of issue: 01/06/2026

Location: National

Contact: Tahir Ayub, Network Technical Head Distribution HV/LV

Overview

During Test before Earth of an isolation between Finnieston and Rutherglen in Scotland it became apparent that one of the electrical sections was still live.

Applying the “test before earth” Life Saving Rule, the team avoided an accident which could have led to a fatality or life changing injury and instead led to the identification of a failure of this circuit breaker.

Subsequent investigations have found that a Circuit Breaker, which is an ABB supplied FSKII Circuit Breaker (FT/PR1, top photo), had failed in the closed position.

Failure Investigation

Investigations were carried out with collaboration of the supplier, ABB. It has been determined that:

- **Failure Cause:** The operating rod became detached from its base within the high-voltage (HV) pole. This detachment disrupted the mechanical transmission chain between the actuator and the vacuum interrupter, preventing proper operation.
- **Vacuum Interrupter Condition:** The vacuum interrupter was inspected and found to be free of abnormalities. It remains fully functional.
- **Supplier Investigation:** A detailed review of the operating rod’s supplier did not reveal an underlying design flaw.
- **Site Testing & Inspection:** Mechanical testing was conducted on the remaining FSKII units installed in Finnieston. Measurements of closing and opening time-travel curves were compared against Factory Acceptance Test (FAT) certificates, confirming consistent alignment and positive results.
- **Analysis of Similar Units**: A detailed examination of FSKII (FT/PR2), which had similar operational exposure to the original faulty FSKII (FT/PR1), was performed. Upon disassembly, the operating rod and vacuum interrupter did not exhibit the same failure mode.
- **Analysis of Similar Unit, same batch:** A detailed examination of FSKII (FT/DF7), which was manufactured on the same batch as FT/PR1, was performed. Upon disassembly, the operating rod and vacuum interrupter did not exhibit the same failure mode.

Immediate action required

Based on the investigation and testing undertaken as part of the failure analysis, all evidence indicates that this was a one-off failure affecting this specific type of circuit breaker.

As all relevant testing has now been completed, the operational restrictions stated in previous issues of this Safety Advice may be lifted for all FSKII circuit breakers installed on Network Rail infrastructure.

Learning lessons

This event highlights that mechanical failures within high-voltage switching equipment may not be detected through indications, SCADA status, or historical operating data. In this case, despite no prior warning signs, the equipment presented a latent unsafe condition.

Critically, the correct application of the Life Saving Rules, specifically *Test Before Earth* and *Test Before Touch,* provided the final line of defence and prevented potential death or serious injury. These controls ensured that the presence of live equipment was identified before any physical contact or intervention took place.

This reinforces that the Life Saving Rules are not procedural formalities but essential safeguards, particularly where hidden or undetectable faults may exist. Their consistent and correct application remains vital to protecting staff from exposure to live electrical hazards.

Part of our group of Safety Bulletins

