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TERMINAL TOWER EARTHING WITH A TEMPORARY BOND PRIOR TO THE REINSTATEMENT OF THE FIXED EARTH WITH A PERMANENT REPAIR

PURPOSE AND SCOPE

This note describes the recommended procedure for making a temporary bond between a terminal tower and a substation main earthing system (MES) prior to permanent connection reinstatement.

The procedure herein is for use where the terminal tower to MES interconnection has been tested and where the tests have indicated a defective connection. It is to be used only to facilitate a permanent reinstatement of the interconnection. The temporary bond must not be relied upon as a substitute for the normal tower to MES connection.

PART 1 – GUIDANCE

1 INTRODUCTION

Terminal towers should have two separate connections to the substation MES taking diverse routes and connecting on to separate tower legs. At older sites one interconnection was typically installed. However, tests have indicated that in a substantial number of cases these interconnection(s) have become defective thereby rendering the tower electrically discontinuous from the MES. This can give rise to safety hazards under both fault and steady state conditions.

This note provides guidance as to how to manage the hazards and make a temporary connection between the tower and the MES safely.

2 PROPOSED PROCEDURE

2.1 Hazards

2.1.1 Transferred Potentials

If the connection between the terminal tower and the MES is in satisfactory condition, the potential at the tower and the MES will be similar even under fault conditions. If the connection is broken or degraded there could be a hazardous potential difference between the tower and the MES which may appear as a transferred potential hazard by virtue of any conductors connected to them. This may be the case under both fault and steady state conditions. There is therefore a risk of electric shock if a person were to bridge between the tower and the MES or between any conductors connected to them.

A transferred potential hazard may occur under steady state conditions where there is a double circuit line associated with the tower and one of the circuits is out of service and earthed and the other remains in service. Under this condition energy can be coupled from the energised circuit into the earthed circuit and generate voltages and currents in any earth connections. It is however National Grid procedure to check the condition of the terminal tower to MES connection to make sure there is adequate continuity prior to putting the line into this condition.

Rarely, a transferred potential hazard may also exist where the overhead line is configured normally, due to system imbalances. However, this should have been revealed by prior testing (see 2.3.1) to check the continuity between the tower and the MES.

The risks to an operator from transferred potentials are considered in Appendix A.

2.1.2 Touch and Step Potentials

If the connection between the terminal tower and the MES is in satisfactory condition, touch potentials at the tower under fault conditions should not be hazardous. However, where the connection is broken or degraded touch potentials will almost certainly exceed safe limits. Step potential safe limits may also be exceeded up to several metres from the tower legs. In Appendix A the risks to an operator due to exposure to touch or step potential is considered.

2.2 Risk Control Measures

2.2.1 Competency

Persons working to this procedure must be competent in accordance with NSIs 6, 8 and 24.

2.2.2 Weather Conditions

Since the likelihood of there being a system fault can be partly correlated with poor weather conditions, work in accordance with this procedure must not be carried out during lightning risk 1 conditions or where there are high winds, snow storms, heavy or persistent rain, fog or mist.

2.2.3 Insulating Footwear

Persons working to this procedure must wear insulating footwear to protect against touch and step potentials. Insulating boots having a 20kV withstand and conforming to BS EN 50321 are available from Arco (www.arco.co.uk) product code 586300.

2.2.4 Time Spent Close to Tower

In order to minimise the chance of exposure to touch, step or transferred potentials, the time spent in close proximity (within 10m) to the tower legs should be minimised.

2.2.5 One circuit in service / one circuit out of service

Where the condition of the line associated with the tower is one circuit in service and one circuit out of service, work in accordance with this procedure must not be carried out.

2.3 Determination of Tower Connection Status

2.3.1 Tower Test Report

The continuity between the terminal tower and the MES will have been found to be defective by testing (in accordance with TGN(E)204) and the relevant report detailing these tests and any other observations should be reviewed.

2.3.2 Earthing Drawings

The earthing layout drawings showing the terminal tower to MES connections (where available) should be obtained and reviewed.

2.3.3 Conductor Tracing

Where break(s) are suspected in the existing connection(s), it may be possible to locate these using radio-detection.