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Engineering Recommendation S37

Issue 3 2018

Code of practice for the safe working on pilot, auxiliary and communication cables

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PUBLISHING AND COPYRIGHT INFORMATION

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Amendments since publication

Issue	Date	Amendment
Issue 3	2018	Major revision to previous issue which includes the following principal technical changes. - Addition of new guidance on identification of hazards. - Addition of new guidance on assessing risk. - Addition of new guidance on safety tools/equipment. - Addition of new guidance for assessing induced voltage. New Foreword added to document. Introduction and Scope clarified. Terms and definitions clarified and new terms added to document including: - ‘accepted’ (this term replaces the word ‘approved’ which was used throughout the previous Issue of S37); - ‘communications network provider’ (this term replaces ‘BT’ throughout document); - ‘fixed line’; - ‘high reliability circuit’; - ‘high voltage’; - ‘r.m.s.’

		New Clause 4, Overview of induced voltage in communication cables: The clause provides guidance on assessing induced voltage in communication cables. It covers induction due to load conditions as well as fault conditions. Clause 5 (Issue 1 Clause 5), Risk assessment: This clause has been subject to a major amendment to provide more in-depth guidance on identification of induced voltages and evaluation of risk. Clause 6 - 8 inclusive: Minor editorial amendment to improve clarity of guidance. Clause 8.1 added covering work on ‘cold’ sites. Clause 9, Working methods: This clause has been subject to a major amendment to align the guidance on insulated working with National Grid document, NSI 5 [11]. Clause 11 (Issue 1, Clause 12), Safety tools/equipment: Major amendment to this clause - a list of Standards has been added to guide the reader as to the appropriate specification for tools and safety equipment. Details of all other technical, general and editorial amendments are included in the associated Document Amendment Summary for this Issue (available on request from the Operations Directorate of ENA).

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Foreword

This Engineering Recommendation (EREC) is published by the Energy Networks Association (ENA) and comes into effect from the date of publication. It has been prepared under the authority of the ENA Engineering Policy and Standards Manager and has been approved for publication by the ENA Electricity Networks and Futures Group (ENFG). The approved abbreviated title of this engineering document is “EREC S37”.

This EREC supersedes EREC S37 Issue 2, which is now withdrawn.

This EREC is intended to be used as a code of practice, providing guidance and recommendations to supervisors and operatives on safe working practices when working on communication cables subject to induced voltage and all cables terminated at ‘hot’ sites.

This EREC is not intended to be used as a specification, and particular care should be taken to ensure that claims of compliance are not misleading.

This EREC does not replace ENA Member Company safety regulations and procedures for compliance to safety warning instructions and notices, nor does it preclude the need for attention to general safety, e.g. the provision and maintenance of safe access to and from the place of work, a safe place of work, a safe working environment, safe methods of work and the correct use of personal protective equipment (PPE).

The classification of ‘hot’ sites by the Electricity Industry (EI), and their notification to a Communications Network Provider (CNP), is covered by ENA EREC S36 [N1].

Detailed guidance on the calculation of induced voltage in cables is described in ENA EREC C99 [N2].

Detailed guidance on safe methods for working on or near cable systems and their accessories, at all voltages, is described in National Safety Instruction Guidance, NSI 5 [11], published by National Grid.

Where the term “shall” or “must” is used in this document it means the requirement is mandatory. The term “should” is used to express a recommendation. The term “may” is used to express permission.

NOTE: Commentary, explanation and general informative material is presented in smaller type, and does not constitute a normative element.

Introduction

Load current in a live high voltage (HV) cable may induce voltages onto conducting parts of an adjacent communication cable. Larger voltages may be induced during an earth fault on a live HV cable or overhead line. Voltages may also be impressed onto conducting parts during voltage rise occurrences in the electrical earth system. Such voltages may create a hazard to people and equipment.

Generally, there are two well documented effects that can cause high voltages to appear on the conductive parts of communication cables.

a) Induced voltage is a direct result of current returning through the soil or phase/earth faults. This longitudinal voltage is proportional to the value of current and the distance over which the communication cable and power circuit run in parallel.

b) Rise of earth potential (ROEP) at a site feeding the faulted power circuit. When an earth fault occurs, the entire area of a site where the fault current flows to earth may momentarily rise in potential with respect to the general mass of earth. This rise in potential is due to the fault current flowing through the earth system impedance. The communication cable may import ‘true’ earth to the fault site or it may export the rise in potential from the fault area to a separate site. In each case, the potential difference between the communication cable and local earth potential may create a hazard to people and equipment. (refer to ENA TS 41-24 [2] for full explanation of earth potential rise).

Communication cables may be subject to either or both of the above effects. In the case where both induced voltage and ROEP need to be considered, the resulting voltage impressed onto the communication cables is the vector addition of the two sources.

This EREC identifies the hazards and recommends working practices to minimise the risks from both induced voltage and ROEP.

ITU-T Directives Volume VI [3] presently prescribes limits (for induced or impressed voltages derived from HV supply networks) of 430 V r.m.s or, in the case of high reliability circuits, 650 V r.m.s. Voltages above these limits are termed ‘hot’ and voltages below these limits are termed ‘cold’, although it should be noted that these terms do not relate directly to safety voltages.

Risk assessment studies, previously undertaken by ENA and British Telecom (BT) and presented in ENA ETR 128 [N3] and ENA ETR 129 [N4], are the basis for defining the acceptable ROEP values for third parties using equipment connected to CNP lines and for CNP operators working in a ROEP zone.

ENA ETR 128 [N3] advises that the threshold of 1,150 V r.m.s. can be applied to system networks, in place of the 430 V r.m.s. threshold, to provide safe working for CNP operatives. For high reliability circuits, 1,700 V r.m.s. can be applied in place of the 650 V r.m.s. threshold, for safe working.

ENA ETR 129 [N4] recommends the adoption of a threshold of 1,150 V r.m.s., or 1,700 V r.m.s. for high reliability circuits, for ROEP contours that could affect CNP services within third party properties.

Circa 1984 the Electricity Industry (EI) and BT implemented a policy document for the provision of BT services to electricity sites and adjacent premises that were classified as being ‘hot’ sites.

The policy document, EPT/PPS/B012 [4], is now maintained by BT Openreach and is supported by three further documents; EPT/PPS/B013 [5], EPT/PPS/B014 [6], and EPT/PPS/B018 [7], which cover the provision of Openreach services at electricity sites.

This EREC was originally developed to disseminate good engineering practice for the cabling, wiring, isolation, segregation and protection of communications services to 'hot' sites. It now serves as a guide to safe working practices when working on communication cables subject to induced voltage and all cables terminated at 'hot' sites.

1 Scope

This EREC applies to all communication cables, such as privately provided pilot and auxiliary communications cables and to CNP provided communications cables, which are subject to induced voltage due to being laid in proximity to power lines and cables or to ROEP, and includes all communication cables terminated at 'hot' sites.

Communication cables that are not be considered as being part of the system and are therefore not be covered by the general requirements under specific ENA Member Company safety rules that applies to work on other cables, i.e. access restrictions and safety documents such as permits-to-work and sanctions-for-test etc. This EREC provides guidance for safe working when communication cables are not classed as part of the system.

This EREC is not applicable to communication cables which have no conducting materials.

This EREC does not cover the extreme case of the hazards associated with the discharge of lightning energy caused by direct strike.

2 Normative references

The following referenced documents, in whole or part, are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

Standards publications

BS 2559, *Specification for screwdrivers and screwdriver accessories*

BS EN 60900, *Live working. Hand tools for use up to 1 000 V a.c. and 1 500 V d.c.*

BS EN 60903, *Live working. Gloves of insulating material*

BS EN 61057, *Aerial devices with insulating boom used for live working exceeding 1 kV a.c.*

BS EN 61111, *Live working. Electrical insulating matting*

BS EN 61112, *Live working. Electrical insulating blankets*

BS EN 61318, *Live working. Conformity assessment applicable to tools, devices and equipment*

BS EN 61477, *Live working. Minimum requirements for the utilization of tools, devices and equipment*

BS EN 61558-2-4, *Safety of transformers, reactors, power supply units and similar products for supply voltages up to 1 100 V. Particular requirements and tests for isolating transformers and power supply units incorporating isolating transformers*

Other publications

[N1] ENA EREC S36, *Procedure to identify and record 'hot' substations*

[N2] ENA EREC C99, *Guidance for working on cables under induced voltage conditions*

[N3] ENA ETR 128, *Risk Assessment for BT operators working in a ROEP zone*

[N4] ENA ETR 129, *ROEP Risk Assessment for third parties using equipment connected to BT lines*

[N5] ENA TS 12-4, *Terminating equipment for pilot cables subject to induced transient voltages exceeding 650 V r.m.s.*

[N6] Statutory Instrument 2003 No. 2553, *The Electronic Communications Code (Conditions and Restrictions) Regulations 2003*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
accepted
conforms to an agreed Standard thus satisfying appropriate requirements to permit safe and efficient use

NOTE: The term ‘accepted’ refers to tools and equipment in this EREC.

3.2
communication cable
system of cables intended to support the operation of information technology equipment, or as part of, a telecommunications system

NOTE: A fixed-line is a communication cable.

3.3
Communications Network Provider (CNP)
company installing fixed-line communications apparatus under the Electronic Communications Code Regulations [N4]

NOTE 1: The Electronic Communications Code Regulations [N6] applies to the infrastructure forming networks which support broadband, mobile internet and telephone, cable television and landlines.

NOTE 2: At the time of publishing this EREC, known CNPs in the UK are Openreach and Virgin Media.