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Physical Protection of Cables Crossing Bridges

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Issue	Date	Amendment

Contents

Figures

Tables

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 C98".

This is the first issue and does not cancel or replace any other document.

ENA Member Companies on occasions are required to install power cable circuits on bridges. Cables that are laid close to the surface are vulnerable to damage from the passage of heavy traffic. This document sets out recommendations for the physical protection of cables crossing bridges and the associated impact on cable ratings.

This document has been prepared with particular reference to EA Technology Strategic Technology Programme (STP) Report No. S3178_1, *Physical Protection of Cables Crossing Bridges* [N1] authored by Graham J Le Poidevin, which provides information relating to installation of power cables on bridges and for calculating the effect on cable ratings for different installations.

This document is intended for technical staff within ENA Member Companies, who are tasked with developing cable installation practices and for those who carry out cable circuit design and cable rating calculations. This document might also be a useful reference for individuals in ENA Member Companies, who are responsible for installing cable circuits crossing bridges.

Where the term "should" is used in this document it means the provision is 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

Cable circuits crossing motorway, canal and rail bridges often lie close to the surface where they are vulnerable to damage from the passage of heavy traffic. Regulation 14 of the Electricity Safety, Quality and Continuity Regulations (ESQCR) [1] applies to these situations and requires that underground cables are protected to avoid, so far as is reasonably practicable, damage or danger. Advice on suitable types of physical protection in these situations and their effect on cable ratings is limited.

Various methods to protect cable circuits are presented in this document including shallow burial in plastic ducts, shallow burial in steel pipes, additional protection using plates or arches in combination with plastic ducts, attaching ducts to the outside of the bridge parapet or to the underside of the bridge and installation in troughs or Durasteel® containment. These methods of protecting cable circuits will assist with meeting the requirements of Regulation 14 of the ESQCR [1].

In particular, the suitability of using steel pipes to protect cable circuits and the effect on ratings for Medium Voltage (MV) polymeric cables is considered.

1 Scope

This document provides recommendations for suitable physical protection of cable circuits crossing bridges and their effect on cable ratings for different cable installation scenarios together with calculations for Medium Voltage (MV) single core polymeric cables in steel pipes (using CRATER).

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

IEC 60287, *Electric cables - Calculation of the current rating*

Other publications

[N1] EA Technology Strategic Technology Programme (STP) Report No. S3178_1, *Physical Protection of Cables Crossing Bridges,* September 2011

[N2] EREP 2 *Guidance on Security of Substations, Cable Bridges & Cable Tunnels*

[N3] ENA ER P17 Part 3, *Current ratings for distribution cables. Part 3: Ratings for 11 kV and 33 kV cables having extruded insulation*

3 Terms and definitions

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

3.1
CRATER
Cable Rater software package

3.2
STP
Strategic Technology Programme