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Engineering Standard – NSW

Category
Signalling

Title
Lightning/Surge Protection for Communications Lines - Line Protection Unit (LPU)

Reference Number
SPS 38 - (RIC Standard: SC 09 15 06 00 SP)

Document Control

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About This Standard

This Specification provides the technical requirements for Lightning/Surge protection equipment on communication lines to be fabricated and supplied to Australian Rail Track Corporation or contractors to Australian Rail Track Corporation

Document History

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List of Amendments –

ISSUE	DATE	CLAUSE	DESCRIPTION
1.1	01/09/2004		Reformatting to ARTC Standard
1.2	14/03/2005	Disclaimer	Minor editorial change
1.3	06/05/2005	All	Document reformatted

Contents

1. Introduction

This Specification provides the technical requirements for Lightning/Surge protection equipment on communication lines to be fabricated and supplied to Australian Rail Track Corporation or contractors to Australian Rail Track Corporation

Installation details of the above equipment are also included in this specification.

2. Applicable Documents

2.1 International Standards

ANSI/IEEE C62.41 category B (4): - Guide for Surge voltages in low voltage AC power circuits - major feeder short branch circuit service panel (indoor)

2.2 ARTC Standards

Specification SCP 04 - Lightning/Surge Protection Requirements

Specification SPS 04 - Labelling of Signalling Equipment

3. General

The equipment shall be required to provide primary and secondary level lightning/surge protection on Communication lines.

The equipment shall be in a non-metallic enclosure made of PVC, ABS or similar plastic material of electrical grade suitable for outdoor installations. The enclosure shall be in conformity with Environmental Protection Class IP56.

The equipment shall be referred to as "Line Protection Unit" (LPU). The equipment shall be in accordance with drawing M08-404

The LPU as discussed above or the Transient Barrier "CRITEC" type LSJK-3R alone shall be used to protect Communication Lines against Lightning/surges. (The selection will be a compromise between the cost of protective equipment and the value of equipment to be protected.)

4. Installation

1) The LPU shall be mounted on the line pole in the case of an open wire line bearer, provided the following conditions are satisfied, otherwise it shall be mounted inside the Relay room at the entry point

2) The Earth resistance of the Earth electrode close to the pole is less than 10 Ohms , and

3) The distance between the Earth electrode at the pole and the Earth electrode at the Relay room is less than 10 metres.

If the LPU is to be mounted on the pole, then the Earth electrode near the pole shall be connected to the Earth electrode of the Relay room Earthing system.

In the case of a cable bearer the LPU shall be mounted inside the Relay room or any other room where the cable terminates.

If a line matching transformer is available at the equipment end, then the LPU shall

be installed before the matching transformer on the line side.

5. Environmental

The equipment shall be capable of operating satisfactorily under the following conditions:

1) Ambient temperature range: -10 to + 50 Celsius.

2) Relative Humidity: 0 to 95%

3) Vibration : 0.04cm p-p displacement at 10Hz to 55Hz held for 15 minutes, out of which 3 minutes should be at 55 Hz and applicable in all three axes.

6. Electrical Specification

1) Upper Frequency Limit : 1 MHz.

2) Insertion Loss : Less than 1 dB.

3) Line Impedance : 600 Ohm or 150 Ohm - (To be specified while ordering)

4) Surge Protection : to withstand 20KA, 8/20 Microsecond impulse.

5) Clamping Voltage : 15 Volts

7. Design

7.1 Design Requirements

The construction of the LPU shall be in accordance with the Drawing Nos. M08-404/1, M08-404/2 and M08-404/3.

All components shall be readily and individually replaceable in case of component failure. All material fittings, bolts, nuts, terminal lugs, etc shall be made of Nickel plated Brass.

7.2 Components

Varistors shall be "Siemens" type SIOVB32K75 or an approved type equivalent in voltage and power rating.

Transient Barrier shall be type LSJK-3R manufactured by Component Resources Pty Ltd or any other approved device, which is equivalent or superior in performance to the latter.

Transient Barrier shall be selected in accordance with Line Impedances

600 Ohm - for Open wire line bearer- which has a characteristic impedance of 600 Ohms. 150 Ohm - for Cable bearer which has a characteristic impedance of 150 Ohm

8. Wiring

Internal wiring leads shall be 70/0.076 with PVC insulation.

For the Earth connections, wiring shall be black in colour and installed with smooth curves avoiding sharp bends

Each wire shall be looped twice around its Varistor before terminating on the LSJK-3R unit. (as shown in drawing M08-404/2).

Nickel plated Brass eye lugs shall be provided for 2 Sqmm communication line wire terminations; Similarly 4 Sqmm lugs shall be provided for the 4 Sqmm multi-stranded Earthing cable.

9. Labelling

All labelling shall be permanently affixed, clearly legible, and of a material which will not deteriorate (refer Signals Standards Specification 1031-Labelling of Signalling Equipment)

The cable outlets shall be labelled as "Line", "Equipment" and "Signalling Earth"

The "Line" and "Equipment" Terminals shall be labelled as "L1" & "L2" , "Eq1" and "Eq2" on the top base of the box.

The common Earth (Signalling Earth) point on the busbar (as per the drawing M08-404) shall be labelled as "SE" on the top base of the box.

In addition the unit must be fitted with a readily visible label on the front cover stating "LPU", the Material Identity number, manufacturer's identification and the date of manufacture.

The circuit diagram of the unit shall be displayed on the inner side of the cover (The top part of Drawing M08-404/1).

All labels to be used within the box should be of electrically non-conductive material.