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Engineering Standard – NSW

Category
Signalling

Title
Lightning/ Surge Protection - Power Inductors

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About This Standard

This Specification describes the design requirements for Power Inductors with ratings 15A to 200 Amperes to be manufactured and supplied to Australian Rail Track Corporation or contractors to Australian Rail Track Corporation

Document History

Primary Source – RIC Standard SC 09 15 04 00 SP Version 2.0

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 describes the design requirements for Power Inductors with ratings 15A to 200 Amperes to be manufactured and supplied to Australian Rail Track Corporation or contractors to Australian Rail Track Corporation.

The Inductor shall form part of the following equipment, which shall provide lightning/surge suppression on AC and DC power supply mains.

1) Inductor/Diverter Panel (IDP)

2) Inductor/Varistor Panel (IVP)

3) Inductor/Varistor/Arrestor Panel (IVAP)

The Inductor shall be referred to as PI-15A, PI-50A, PI-100A or 200A depending on the current rating of the indicator

2. Applicable Documents

- Specification SCP 04 - (Lightning/Surge Protection Requirements)
- Specification SPS 39 - (Lightning/Surge Protection - Inductor/ Diverter Panel (IDP))
- Specification SPS 33 - (Lightning/Surge Protection - Inductor/ Varistor Panel (IVP))
- Specification SC 09 15 05 00 SP - (Lightning/Surge Protection - Inductor/ Varistor/Arrestor Panel (IVAP))

3. Operation Conditions

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

1) Ambient Temperature range: - 10C to +70C.

2) Humidity: Relative Humidity 0 to 95%

4. Design Requirements

4.1 Electrical Specifications

The inductor is an air-cored inductor with the following ratings.

Power Inductor	Operating Voltage	L	R	Max Continuous Current
PI-15A/240V	120, 240V	25 Micro-H	10 m ohm	25A
PI - 50	120V	25 Micro-H	7 m ohm	80A
PI - 100	120V	25 Micro-H	2 m ohm	160A
PI - 200	120V	25 Micro-H	1.12 m ohm	300A

Inductors designed for higher current ratings than shown above, the values of L & R shall be selected such that the heat rise at full load for an ambient temperature of 70 C shall not exceed 40 C and Voltage drop across the inductor shall not exceed 2.0 Volts at maximum continuous current rating.

4.2 Design Considerations

The cross section area of the conductor shall be based on the continuous current of 80 Amperes for PI-50, 160 Amperes in the case of PI-100 and 25 Amperes in case of PI-15A.

The spacing of the windings and the insulation of the conductor shall be such that the voltage produced by a surge current of 20KA, 8/20 microseconds shall not breakdown the insulation.

The spacing of the windings and the insulation of the conductor shall be such that the coil should be able to withstand a voltage of 30KV generated internally (current flow x impedance of the coil). The beginning and end of the coil should be at the two ends of the coil former or at least separated by 60 millimetres if ended at one end of the former.

The progressive voltage between the turns and the layers of windings (if more than one layer of winding is required) should be carefully considered to provide proper separation and insulating material to withstand the breakdown voltage.

4.3 Impregnation

The coil should be either:

- Vacuum Impregnated, or
- Encapsulated in Epoxy casting, Polyester casting or in Poly Carbonate casting.

4.4 Insulation Resistance

The insulation resistance shall be greater than 100 M-Ohms when measured using an Insulation tester with an injected voltage of 500 V. The test shall be conducted for 1 minute with the body of the inductor immersed in water. The water shall be in a metal tank and the insulation tester applied from either inductor terminal to the water tank.

4.5 Terminals

Terminals shall be M6 and 30 mm long Nickel plated Brass studs provided with 2 washers, a nut and a lock nut for each stud. Appropriate terminals shall be selected for higher current ratings.

4.6 Dimensions

The maximum height of the inductor rated up to 100A shall not exceed 200mm from the mounting surface.

4.7 Labelling

- All labelling shall be permanently affixed, clearly legible, and of a material which shall not fade or deteriorate due to handling, environmental conditions or ageing.

- The unit must be fitted with a readily visible label stating PI-15A, PI-50, PI-100 or PI-200A, the manufacturer's identification and the date of manufacture.