

Ref	NR/GN/ELP/45002
Issue	4
Date	June 2003

The Installation of Electric Point Heating (formerly RT/E/C/45002)

This temporary front sheet facilitates change to the new Network Rail Standards referencing nomenclature.

The Ref above will be formally allocated to this standard when it is next changed in the meantime the contents, date and issue number of this Network Rail Standard are UNCHANGED and with immediate effect it should be referred to as “(new ref) formerly (old ref)”.

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Network Rail Company Code of Practice

The Installation Of Electric Point Heating

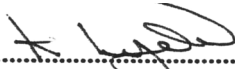
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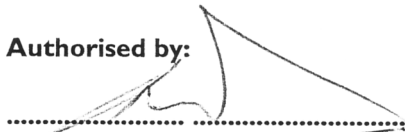

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ISSUE RECORD

ISSUE	DATE	COMMENTS
4	June 2003	Supersedes Issue 3

IMPLEMENTATION

The implementation date of this Code Of Practice is 2nd August 2003

COMPLIANCE

This Code of Practice communicates good practice for the installation of points heating on Network Rail Infrastructure. An alternative practice which achieves the same goals as this code of practice may be adopted provided that adequate records are kept, although prior acceptance by Network Rail Regional Electrification and Plant will be required.

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Published & Issued by **Network Rail**
40 Melton St
LONDON
NW1 2EE

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APPENDIX A

1 INTRODUCTION

1.1 Purpose

This Code of Practice states the best practice for the design, layout, installation and commissioning requirements of generic types of electric point heating systems for use on Network Rail infrastructure.

Detailed requirements of the electric point heating components and systems are contained in Network Rail Company Standard RT/E/S/40045 Electric Point Heating, which should be read in conjunction with this Code of Practice.

1.2 Scope

This Code of Practice is applicable to all electric point heating installations on non-electrified, 25kV AC overhead electrified, 1500V DC overhead electrified, 3rd rail DC electrified and 4th rail DC electrified lines, and in close proximity to 750V DC overhead electrified lines.

The principles of this Code of Practice affect the design and installation criteria of the complete electric points heating system.

1.3 European, International and British Standards etc.

Except where specifically stated otherwise, the equipment should comply with the relevant European international and British Standards whether or not reference is made to them. The current edition shall apply. Where more than one Standard exists then the order of precedence shall be taken as follows:

First	European Standard
Second	International Standard
Third	British Standard

Where a British Standard only is quoted, an equivalent European or International Standard will be accepted subject to the prior agreement of Network Rail.

Where reference is made to other Standards, Specifications etc., the current edition shall apply.

1.4 Definitions

British Standard	A standard published by the British Standards Institution. Its numeric identity is prefixed by BS.
Cess	The space alongside the railway line(s).
Clamplock Heater	A cartridge type heater, which is fitted into the clamplock mechanism operating the points blades.
Equipment	Equipment including all component parts and accessories.
European Standard	A standard published by the European Committee for Electrotechnical Standardisation. Its numeric identity is prefixed by EN.
International Standard	A standard published by the International Electrotechnical Commission. Its numeric identity is prefixed by IEC.
Specification	The contract specific Network Rail technical document to be used with the relevant Network Rail Company Standard(s) for contract works.
Network Rail Company Standard	A standard, forming a Specification, Instruction or a Code of Practice, published by a directorate of Network Rail. Its alphanumeric identity is prefixed by RT/, followed by a letter designating the directorate.
Railway Group Standard	A standard produced by Railway Safety Ltd, which is mandated upon all Railway Group Members. The Standard is prefixed G.
Tamping	A process used to consolidate the ballast beneath the sleepers.
Track Circuit	An electrical device using the rails in an electrical circuit which detects the absence of trains on a defined section of line. It is a high integrity device and a fundamental part of the signalling safety system.
Four Foot	The space on the track between the running rails.

1.5 Abbreviations

AC	Alternating Current
CPC	Circuit Protective Conductor
CSA	Cross Sectional Area
DC	Direct Current
HV	High Voltage
Hz	Hertz
KVA	Kilo Volt Ampere
MCB	Miniature Circuit Breaker
mV/A/m	Millivolts per Ampere per metre
OD	Overall Diameter
P Way	Permanent Way
PCB	Polychlorinated Biphenyl
PVC	Polyvinyl Chloride
RCD	Residual Current Device
SP&SN	Single Phase and Switched Neutral
SWA	Steel Wire Armour
TP&SN	Three Phase and Switched Neutral
UIC	Union Internationale des Chemins de Fer
W/m	Watts per metre
XLPE	Cross Linked Polyethylene

1.6 References

Appendix A lists examples of relevant Standards, Specifications and other documents applicable to this Code of Practice.

2 OVERVIEW

2.1 Requirement for Electric Point Heating

Electric point heaters are important in maintaining the operational integrity of the railway network during freezing weather conditions. Their purpose is to ensure that points and associated mechanisms operate satisfactorily during all but exceptionally severe adverse weather conditions.

2.2 Types of System

Five types of electric point heating system are currently in use: railchair pad heaters, cartridge heaters, constant wattage strip heaters, self-regulating strip heaters and parallel constant wattage strip heaters.

Railchair pad heaters are positioned under the slide baseplates of a set of points and heat the baseplates and chairs thus preventing the points from freezing. Because of the difficulties incurred during the replacement of the railchair pad heaters and their relative expense, it is not Network Rail policy to install new railchair pad heater systems and hence, these heaters have not been included in this Code of Practice.

Cartridge heaters are positioned horizontally in the jaw-blocks attached to the point stock rail and heat the railchairs and stock rail.

Constant wattage, self-regulating and parallel constant wattage strip heaters are positioned on both the stock and switch rail of a set of points and can heat these rails as well as associated equipment.

Other products can be used in conjunction with the heaters fitted to the switch and stock rails to provide additional protection. These include heat-retaining shields, slide chair heaters, stretcher bar heaters and windshields.

2.3 System Description

Sensors are used to detect rail and/or weather conditions that could effect the operation of the point(s). When the monitored conditions reach pre-determined values, the electric point heating is automatically energised. The conditions are continuously monitored to ensure that the rail temperature is maintained throughout the freezing weather conditions.

The heating circuit comprises track-mounted heating elements and associated supply cables.

Special care is taken in the design of the heating circuit to ensure that the signalling equipment system remains unaffected by the operation of the heating circuit both under normal and fault conditions.

The control cubicle contains the electric point heating system distribution circuitry and is fed by the supply cubicle or supply source point. A manual override facility is also provided.

All new points heating installations are required to have the facility for remote monitoring. The equipment should only be fitted where a business case demonstrates the benefits. This system is used to control and/or determine the status of the electric point heating system.

2.4 New Installations

All new installations should use strip type heating. Existing railchair pad and cartridge installations may be maintained while it is cost effective to do so. However, upgrading these systems to strip heating should be considered at the earliest opportunity.

Key considerations in determining the type and positioning of the electric point heater equipment are:

- (a) the type of rail;
- (b) the type of point(s);
- (c) the type of point drive mechanism e.g. clamplock;
- (d) the presence and type of jaw-block i.e. slotted or unslotted or with cartridge heater hole;
- (e) the presence of conductor rail(s);
- (f) the need for signalling track circuit immunity;
- (g) the presence of obstructions on the rail(s).

3 PERFORMANCE REQUIREMENTS

The severity of the winter weather conditions in Britain varies geographically and seasonally. To provide electric point heaters which will perform satisfactorily under even the most exceptional conditions would require large quantities of heat and therefore an increase in capital and running costs. These costs cannot be justified for every point. It is likely that under such severe conditions the railway line would be impassable in any event, possibly requiring the use of a mechanical snow and ice clearing machine.

An effective electric point heating installation should operate in light wind to an ambient air temperature of down to -25°C, and against a precipitation rate of up to 150mm/hour, to ensure that:

- (a) under frost or freezing rain conditions the switch rail does not freeze to the stock rail or its supports;

- (b) under snow or hailstone conditions, the improper closure of the points is prevented by addressing the accumulation on the rail support or between the switch and stock rails.

At locations where drifting snow could substantially reduce the effectiveness of an electric point heating installation where the switch must be kept at a temperature of up to +3°C, suitable snow fences should be erected, where reasonably practicable, and the use of windshields considered.

4 SELECTION OF GENERIC TYPE OF SYSTEM

Installations using 200W cartridge heaters or (100 to 200)W railchair pad heaters, are only effective down to an ambient air temperature of -10°C. These are not the most effective systems currently available but may be deemed acceptable in some locations where either the winter weather conditions are typically not severe, or the cost of replacing an existing system is prohibitive. Self-regulating strip heaters are made of a material which is non-conducting and because of this property have a unique application. This type of heater is the most suitable to heat points in 3rd or 4th rail electrified areas where the conductor rail passes through or into the points.

Electrical energy costs can be substantially reduced by the use of insulated heatshields.

Strip heaters are available in short lengths as replacements for single defective railchair pad or cartridge heaters.

5 SITE LAYOUT

A typical site layout is shown in Figure 1.

The electric point heating installation should not have any equipment positioned such that it could be caught, snagged, scuffed or damaged by the normal passage of trains or persons walking on the track.

In as far as is reasonable practicable, the supply cubicle shall be sited at a location away from a Red Zone to allow authorised non-railway industry staff (e.g. meter readers) access to the cubicle without encroachment onto Network Rail infrastructure. If necessary consideration should be given to fences and/ or gated compounds to achieve this.

Supply and control cubicles should be positioned so that the doors face away from the running lines.

Wherever there is a danger to maintenance staff from the passage of trains a 1m high barrier should be provided and positioned such that they are clear of the structure gauge.