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Requirements for Powered Point Operating Equipment (formerly RT/SRS/2001)

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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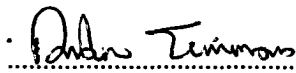
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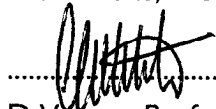
REQUIREMENTS FOR POWERED POINT OPERATING EQUIPMENT

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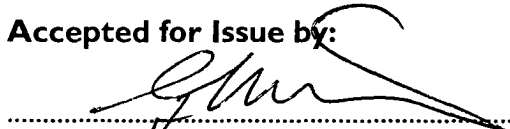


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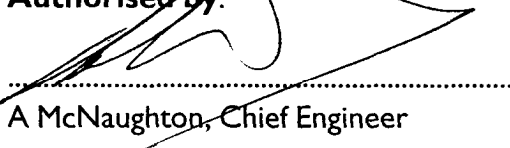
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Summary

This Company Specification details the functional, physical, interface, performance and safety requirements for Point Operating Equipment.

Standard Issue/Revision Record

This specification will be updated when necessary by the distribution of a complete document. Amendments will be marked by a vertical black line in the adjacent right hand margin. The latest issue of this specification shall be implemented immediately upon receipt.

Issue	Date	Comments
Issue 1	August 2000	First Issue
Issue 2	December 2001	Revised to include CEN60 Rail and Swing Nose Crossings

Implementation

The requirements of this Specification shall apply to new designs of point operating equipment supplied for use on Railtrack controlled infrastructure with effect from 1 December 2001. It is not retrospective. The following documents are superseded:

Superseded document reference number	Issue	Date
RT/SRS/2001	I	August 2000

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Safety

All persons are reminded that all appropriate safety precautions must be observed when undertaking any work involving the subject of this specification.

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I. INTRODUCTION

I.1 Purpose

This Specification details the functional and safety requirements for point operating equipment involved in the actuation, locking and detection of sets of points and swing nose crossings.

I.2 Scope

Point operating equipment (POE) consists of the track mounted equipment providing the actuation, locking and detection over the length of the moving rail.

This specification states the requirements to be considered for the design, manufacture and testing of the point operating equipment. The requirements of this specification apply to point operating equipment suitable for standard gauge trackwork installed on Railtrack's Infrastructure at speeds up to 125mph.

Point operating equipment shall be suitable for Plain leads but versions should be available to operate Single Switch Configurations, Tandems, Slips, Switch Diamonds and Swing Nose Crossings.

I.3 Safety Requirements

Throughout this document, Functional Safety Requirements are identified by an **(S)** at the end of the requirement statement.

I.4 Definitions

ALARP (As Low As Reasonably Practicable)

Risk reduction to as low a level as possible, given the time, effort and cost of the control measures required.

Apparatus Case

The term Apparatus Case defines the Line side housing, usually to a BR standard, which contains the equipment that supplies the POE with electrical power and commands. The Apparatus Case also receives detection output signals from the POE and interfaces with the Signal Interlocking.

Lock	To secure the switch rails and swing nose so that they are prevented from moving relatively to the stock rails, when they have completed their movement.
Longitudinal	The term "Longitudinal" is used to denote any horizontal axis that is parallel to the track.
Modular Replaceable Units	The term "Modular Replaceable Units" (MRUs) is used to define any unit that is designed to be replaced as a complete unit in the field.
Normal and Reverse Positions	The terms "Normal" and "Reverse" position are used to describe the two positions of the Switch Rails in which train movements are permitted. Commonly, but not always, the Normal position corresponds to the higher speed or most frequently used route of the Switch.
Personnel	The term "Personnel" includes:- Operators - who are required to operate (manually and remotely) the POE. Technical staff - who are required to install, test, inspect, commission, maintain and operate the POE or components thereof.
Point Operating Equipment	The term Point Operating Equipment (POE) describes the track mounted equipment providing the actuation, locking and detection throughout the length of the moving rail.
Run Through	The term used to describe the trailing movement of the rolling stock through a switch against the direction set by the POE.
Scoop-Proof	The term "Scoop-Proof" is applied to electrical plug couplers, where the design prevents the possibility of pins becoming distorted as the mating halves of the connector are fitted together.
Single Switch	A single switch driven and detected, normally as a

Configuration Slips	catch or trap point. Additional directional facilities provided at Diamonds.
Stock Rail	A fixed rail to which the switch rail moves. This includes the wing rail in the case of the swing nose crossing or switch diamond.
Swing Nose Crossing	An acute crossing in which the crossing vee can move laterally to give continuous support to the vehicle wheels. This type of crossing does not require the use of check rails.
Switch Rail	A moving rail associated with a plain lead, slip, switch diamond or swing nose crossing.
Switch Diamond	An obtuse crossing in which the obtuse point rails are replaced by switch rails.
Tandems	Two integral turnouts in which the toes of the second turnout are adjacent to the heel of the first turnout.

1.5 Abbreviations and Acronyms

ALARP	As Low As Reasonably Practicable
BIT	Built In Test
HSE	Health and Safety Executive
MRU	Modular Replaceable Unit
MTBAF	Mean Time Between Attributable Faults
MTTR	Mean Time to Repair
OHLE	Overhead Line Equipment
POE	Point Operating Equipment
S&C	Switch and Crossing
SIL	Safety Integrity Level
SSI	Solid State Interlocking

2. CONSTRAINTS

Point Operating Equipment shall be suitable for shallow depth UIC 54B, CEN 60 and full depth I 13A switch rail sections.

Point Operating Equipment shall be able to operate all Switch sizes from A to J, swing nose crossings and Switch Diamonds I in 5 $\frac{1}{2}$ to I in 28.

Point Operating Equipment shall be able to work in non-electrified, third rail and overhead electrified routes.

Point Operating Equipment shall be suitable for line speeds up to 125 mph.

3. FUNCTIONAL REQUIREMENTS

3.1 Key Functions

3.1.1 The POE will provide a safe means for changing the route taken by Rolling Stock over a set of points. The POE shall provide the following key functions:

- a) Actuation of Switch Rails - providing powered and manual actuation to enable the switch rails to be positioned in either Normal or Reverse positions for the route required.
- b) Locking of switch rails - providing the means to hold the switch rail toes securely, relative to the stock rails, within the specified tolerances. **(S)**
- c) Detection of switch rails - providing confirmation that the switch rails are held securely by the locking mechanism in either the Normal or Reverse positions within the specified tolerances. **(S)**
- d) Supplementary drive(S) for switch rails - where necessary, providing actuation to enable the rear parts of the switch rail to be positioned within the specified tolerances.
- e) Supplementary detection for switch rails - where necessary, providing confirmation that the rear parts of the switch rail are in their respective positions within the specified tolerances. **(S)**

3.2 Powered Operation

3.2.1 The POE shall be capable of moving the switch rails to either Normal or Reverse position as required by the operator, by means of a command sent via the Apparatus Case, using one of the specified electrical power supplies.

3.2.2 The sequence for powered operation between the normal and reverse positions shall be:

- a) Release Switch rail Locking
- b) Move the Switch rails
- c) Re-apply Switch rail Locking

3.2.3 The POE shall be designed such that movement of the switch rails may be stopped, reversed, or obstructed at any time during travel without causing damage or degradation in future performance. Failure to complete an operation or to achieve a valid detection state for either Normal or Reverse positions shall not restrict the system from being commanded to return to the opposite position and provide a valid detection output (subject to achievement of the specified criteria).

3.2.4 The elapsed time from receipt of instruction to successful completion of the above sequence a) to c) shall be

Max. time of operation (seconds)	Length of Switch
4.0	Up to F
5.0	SG to J
4.0	Swing Nose Crossing

3.2.5 The POE actuator shall be rated to ensure that up to 15 successive powered operations (with a maximum rest time of 3 seconds between operation) can be completed prior to the need for a maximum rest period of 5 minutes.

3.2.6 The actuation force shall be 8kN maximum applied in such a way that there is no possibility of permanently deforming the rails. **(S)**

3.2.7 The Switch Rails shall be moved to achieve the following positions in either the Normal or Reverse Directions:

- a) Closed Side - To be no greater than 3.5mm from its associated Stock Rail at the toe, and a maximum of 12 mm (15mm for CEN 60 layouts) from the Stock Rail at all other locations along the length of the Switch Rail Head planing. **(S)**
- b) Open Side Except for Swing Nose Crossings, to be no less than 102mm and no greater than 120mm from its associated fixed rail at the toe, and a minimum of 50 mm at all other locations along the length of the Switch Rail Head planing.
- c) For Swing Nose Crossings, the open toe clearance distance is to be a minimum of 85 mm with a minimum clearance of 50 mm elsewhere along the length of the switch.

3.3 Manual Operation

- 3.3.1 The POE shall be capable of being manually operated to either Normal or Reverse positions by a single trained Operator from one position.
- 3.3.2 The manual operation facility shall only allow entry to authorised on - site Operators and Technical Personnel, and shall make use of locks or padlocks as defined in clause 5.10.3.
- 3.3.3 The POE shall be capable of manual operation, irrespective of the position of the switch rails.
- 3.3.4 The sequence for manual operation shall be as follows: -
- a. Unlock the security system to open covers
 - b. Manually disable the power supply circuits to the motor
 - c. Engage manual crank handle (or equivalent device)
 - d. Release switch rail locking
 - e. Move the switch rail
 - f. Re-apply switch rail locking
 - g. Disengage the crank handle
 - h. Manually enable the power supply circuits to the motor
 - i. Close the covers and lock the security system.
- 3.3.5 The design shall allow completion of tasks b) to g) inclusive by a single trained operator within 1 minute and require a manual effort of no more than 80 Newtons.
- 3.3.6 The manual operation facility shall:
- a) not allow engagement of the Crank Handle until the power supply is disabled from the motor. **(S)**
 - b) not allow the security system to be locked until the Crank Handle has been disengaged.
 - c) allow the crank handle to be removed and the security system to be locked with the power supply disabled from the motor.
 - d) not allow power to be enabled without a separate action.
- 3.3.7 The Switch Rails shall be moved to achieve the positions specified in 3.2.7.