



Government of South Australia
Department for Transport,
Energy and Infrastructure

PUBLIC TRANSPORT SERVICES

TECHNICAL SPECIFICATION FOR THE SUPPLY AND INSTALLATION OF "IN BEARER" POINT MACHINES

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Prepared By:	Max Shuard, Rail Engineer		12/11/2010
Reviewed By:	Koos Rohlandt, Signals Engineering Manager		12/11/2010
Approved By:	Rob Taverner, Director – Asset Management		12/11/2010

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1.0 INTRODUCTION

1.1 OVERVIEW

The Department for Transport, Energy and Infrastructure (DTEI) Public Transport Services Division (PTS) owns and operates the Adelaide Metropolitan Passenger Rail Network (AMPRN). This Specification forms part of the engineering management system used to ensure safety and customer service levels are efficiently and effectively supported.

Point machines are electromechanical devices used to control the position of movable sections of rail, known as point blades, to enable rail rollingstock movements through converging and diverging rail junctions.

1.2 PURPOSE

The purpose of this Specification is to describe the requirements for “in bearer” point machines for use on AMPRN main line track and stabling roads controlled by the Operational Control Centre.

1.3 SCOPE

This Specification applies to all PTS projects and contractor organisations designing, supplying or installing point machines for the AMPRN.

1.4 DEFINITIONS

Defined Term	Definition
Desirable	A Desirable annotation indicates that the stated requirement would add to the tenderer’s proposal. A tender which includes a departure from one or more requirements with a Desirable annotation would not represent a significant divergence from the PTS requirement. However it may be passed over in favour of tenders that more effectively meet the requirements with a Desirable annotations.
Essential	An Essential annotation indicates that the stated requirement shall be met by the tenderer’s proposal. A tender which does not meet any requirement with an Essential annotation will be excluded from consideration on the grounds that the tenderer’s proposal is not suitable.
Important	An Important annotation indicates that the stated requirement should be met by the tenderer’s proposal. A tender which includes a major departure from one or more requirements with an Important annotation, or a substantial number of minor departures from one or more requirements with an Important annotation, would represent a significant divergence from the PTS requirement and may be passed over in favour of tenders that more effectively meet the requirement with an Important annotation.
Shall	The word Shall is used to qualify an action or requirement that is mandatory
Specification	Means this document



Type Approval	A formal statement given by PTS that declares the suitability of an item to be used within the AMPRN system
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1.5 RELATED DOCUMENTS

Document Number	Document Title
314-A0-2009 Sh 548	AMPARN Drawing for Turnouts 50 kg rail titled "Switch Assembly Fixed Heel 4571 Straight Cut 50 kg AS Rail for Gauge Convertible Turnouts"
314-R-2008-239	AMPARN Drawing for Turnouts 60 kg rail titled "Switch Assemblies – 6.000 m Long Fully Curved 60 kg AS Rail"
CP-TS-963	Track and Civil Infrastructure – Points and Crossings
AS 1085.1 2002 & Amendment 1	Railway track material – Steel rails
301-A2-86-2239	Drawing – Allowable Infringements Minimum Structures 1600 mm Gauge



2.0 REQUIREMENTS

The requirements of this specification are:

2.1 GENERAL

2.1.1 Completeness

The point machines shall be complete with operating rods, detection rods, lock rods, switch extension pieces, spreader bars, insulations and all fittings and any other ancillary equipment necessary for complete installation of operating turnouts. (Essential)

2.1.2 Proven Design

The point machines shall be a proven design with a demonstrated service history. (Important)

2.1.3 Alternative Features

This Specification shall be read to permit the proposal of alternative features provided the Essential requirements are met.

2.2 CONSTRAINTS

2.2.1 Gauge

The point machines shall be installed on the AMPRN broad gauge (1600 mm) rail system. (Essential)

2.2.2 Traction Power Suitability

The point machines shall be suitable for use with a 25 kV AC electric traction power system. (Essential)

2.2.3 Gauge Convertible

The point machines shall be suitable for operation on both broad gauge and standard (1435 mm) gauge, if necessary with replacement of minor rodding components and/or connecting pieces. (Important)

2.2.4 Structure Clearance

The point machines shall not infringe within the AMPRN structure clearance defined in Drawing No 301-A2-86-2239. (Essential)

2.2.5 Track and Civil Conformance

The point machines shall conform to CP-TS-963 Track and Civil Infrastructure – Points and Crossings (Table 4.1) with regard to:



- 2.2.5.1 Nominal standard movement clearance at the toe of the point blades. (Essential)
- 2.2.5.2 Minimum flange way clearance for the length of the open point blades. (Essential)

2.3 INTERFACES

2.3.1 Signalling

The point machines shall be designed for integration with the AMPRN signalling control system. (Essential)

2.3.2 Turnouts

The point machines shall be designed to interface with:

- 2.3.2.1 Turnouts, 1:8, 60 kg rail. (Essential)
- 2.3.2.2 Turnouts, 1:8, 50 kg rail. (Important)

2.3.3 Electrical Power

The point machines shall operate using 110 V AC electrical power supply. (Important)

2.3.4 Signals Control

The signals control interface point for the point machine shall be the electrical connector on the point machine casing. (Essential)

2.4 CAPABILITY REQUIREMENTS

2.4.1 Rail Weight

The point machines shall be capable of operating the points of rail turnouts constructed using fixed heel configuration from:

- 2.4.1.1 AS1085.1 Rail 60 kg rail stock, as defined in Drawing 314-R-2008-239. (Essential)
- 2.4.1.2 AS1085.1 Rail 50 kg rail stock, as defined in Drawing 314-A0-2009 Sh 548. (Important)

2.4.2 Tampable

The point machines including all rodding, control and actuating mechanisms shall be capable of allowing resurfacing and adjustment of the rail turnout position by tamping with a standard production resurfacing tamping machine adapted for switch tamping. (Essential)

2.4.3 Time of Operation

The time of operation measured from the application of the activation signal to the completion of the throw cycle including locking and detection shall not exceed:



2.4.3.1 Seven seconds (Essential)

2.4.3.2 Five seconds (Desirable)

2.4.4 Dynamic Operating Features

The point machine shall incorporate:

2.4.4.1 A feature to prevent the overloading of the mechanism if the points blades are obstructed.
(Essential)

2.4.4.2 A feature to disconnect the electrical power feed if the switch operation is not completed within the prescribed time. (Important)

2.4.4.3 A feature that brings the mechanism to rest in a controlled manner without damage or undue wear at the end of each complete movement. (Important)

2.4.4.4 A feature to allow the points to complete their movement in the event that the local and/or approach electric track circuit locking is activated whilst the points blades are in mid stroke.
(Essential)

2.4.5 Detection of Position and Locking

The electric detection circuit shall prove for each individual blade that the operating mechanism has closed and locked each blade. (Essential)

2.4.5.1 Detection shall be between 3.2 mm to 5.0 mm GO to NO GO. (Essential)

2.4.5.2 Locking shall be between 1.6 mm to 3.2 mm GO to NO GO. (Essential)

2.4.6 Manual Operability

The point machines shall have a manual mode of operation for maintenance use and for use under abnormal or emergency conditions that enables mainline train operations. (Essential) The manual mode shall enable the cycle of operation in either direction to be completed within:

2.4.6.1 120 seconds (Essential)

2.4.6.2 60 seconds (Desirable)

Note: PTS preference is for throw arm operation rather than use of a crank handle.

2.5 HUMAN FACTORS

2.5.1 Safe Design

Components of the point machines shall be designed to be safely manipulated by installation workers with respect to individual part's mass, shape and ability to be handled. (Desirable)

2.5.2 Operator Exertion

Manual operation modes shall:

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- 2.5.2.1 Be capable of operation without excessive exertion by the operator. (Important)
- 2.5.2.2 Be capable of operation without the operator needing to adopt adverse (bent over or squatting) positions. (Important)

2.6 COMMUNICATIONS AND INFORMATION MANAGEMENT

2.6.1 Signals Control

The point machines shall operate in response to control signals delivered by the AMPRN rail network signaling system. (Essential)

2.6.2 Detection

The point machines shall have electric detection. (Essential)

2.6.3 Remote Condition Monitoring

The point machines shall enable remote condition monitoring. (Important)

Note: The Contractor shall state the details of any condition monitoring features in sufficient detail for the condition monitoring to be incorporated into the design of the signaling system by others.

2.7 ENVIRONMENTAL CONDITIONS

2.7.1 Location

The point machines shall operate in the Adelaide region of South Australia under all prevailing weather conditions. (Important)

2.7.2 Coastal Exposure

The point machines shall be impervious to the effects of installation within 500 metres of a coastal environment. (Important)

2.7.3 Environmental Contaminants

The point machine casing shall be sealed against the ingress of water, dust, insects and other natural contaminants with appropriate pressure venting and moisture control. (Important)

2.8 OCCUPATIONAL HEALTH, SAFETY AND ENVIRONMENT

2.8.1 Safety as Primary Consideration

The point machines shall be designed with health and safety during construction, operation and maintenance as the primary consideration. (Important)

2.8.2 Trip and Posture

The point machines shall minimise trip and posture hazards to maintenance workers. (Important)



2.8.3 Distance from Rail

The point machines shall minimise the requirement for maintenance workers to approach within 3 metres of the closest running rail line. (Important)

2.8.4 Materials

The selection of materials for the manufacture of the point machines shall minimise combustibility, the production of smoke or toxic fumes or corrosive emissions. (Important)

2.8.5 Prohibited Materials

The point machines shall not include asbestos or polychlorinated biphenyl materials. (Essential)

2.8.6 Manufacture

The point machines shall not possess any sharp edges, contours or corners liable to cause injury. (Important)

2.8.7 Unauthorized Access

The point machines shall prevent access to internal workings by unauthorised persons through the use of special drive fasteners or locks or similar devices. (Important)

2.9 LOGISTICS AND THROUGH LIFE SUPPORT

2.9.1 Design Life

The economic design life shall exceed 25 years. (Important)

2.9.2 Durability

The point machine shall be capable of withstanding without damage a point load of 100 kg applied over an area of 25 x 25 mm anywhere on the external casing or exposed components.

2.9.3 Spare Parts

Spare parts and technical support shall be readily available. (Essential)

2.9.4 Warranty

The warranty period shall be:

2.9.4.1 5 years (Desirable)

2.9.4.2 2 years (Essential)

2.9.5 Overhaul Period

The operating period between major overhauls shall exceed:



2.9.5.1 25 years (Desirable)

2.9.5.2 15 years (Important)

2.9.5.3 10 years (Essential)

2.9.6 Special Tools and Test Equipment

The point machines shall be supplied with, for each batch order, one set of special tools and test equipment required to install, test, commission, operate and maintain the machines. (Essential)

2.9.7 Technical Data Supplied

The point machines shall be supplied with, for each batch order, one hard copy and one electronic copy of technical data consisting of operator handbooks, recommended maintenance schedules, maintenance manuals, training course material, spare parts listings, and fault finding and diagnostic charts. (Essential)

2.9.8 Engineering Drawings Standard

The point machine technical data shall include engineering drawings that provide complete technical interface information for all electrical and physical connections to other systems and components. (Essential)

2.9.9 Technical Data Format

The electronic copy of the technical data shall be in native file format able to be modified by PTS accompanied by a free licence to use the intellectual property for the purposes of operating and maintaining the AMPRN. (Important)

2.10 PAINTING, FINISHES AND IDENTIFICATION

2.10.1 Protection

The point machines shall be finished by painting or having another form of external protective coating that is durable. (Important)

2.10.2 Colour

The external finish shall be a dark colour. (Important)

2.10.3 Identification of Type

The point machines shall be identified with a mechanically attached permanent identification plate inscribed with at least the manufacturer's name, part number, serial number. (Important)

2.10.4 Identification of Control Function

The point machines shall be identified with identification labels permanently fixed to the top and track side of the point machine case using lettering at least 80 mm high. (Important)



3.0 VERIFICATION PROVISIONS

3.1 TYPE APPROVAL

3.1.1 Process

The point machines shall be subject to Type Approval by PTS if not already in service within the AMPRN in a similar use. (Essential)

3.1.2 Evidence

Type Approval evidence shall be provided prior to delivery of the first batch of the point machines. (Essential)

3.2 TEST AND INSTALLATION DOCUMENTATION

3.2.1 Documentation

Documentation to be provided with the point machines shall include at least:

3.2.1.1 Factory Acceptance Test plan, results and certification (Essential)

3.2.1.2 Installation and commissioning procedures (Essential)

3.2.1.3 Site Acceptance Test plan, results and certification (Essential)

