



AUSTRALIAN RAIL TRACK CORPORATION LTD

Discipline: Engineering (Track & Civil) Category: General Appendix to ARTC CoP

# Points & Crossings - Specification Clauses

## ETG-03-01

### Applicability

ARTC Network Wide		Western Jurisdiction	✓
New South Wales		Victoria	✓

### Primary Source

ARTC A1 Specifications Points and Crossings – Design & Rating, Inspection & Assessment and Work on Assets/TCS-19

### Document Status

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1.1	05 Jan 09	Standards dept	Manager Standards	Chief Operating Officer	Safety Committee 05/05/2008 as part of ETA-03-03 approval

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1.0	01 May 06		First issue
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## 3.7 Points and Crossings Specifications

### 3.7.1 Procurement and Design

#### 3.7.1.1 Procurement of Points and Crossing Components

Points and crossing components and structures shall conform to Clause 3.7.1.2, *ETA-03-02 Specification for New Turnouts and Diamonds*, *ETA-03-03 Technical Specification for Manufacture of Components for Points & Crossing Structures*, and *ETD-03-02 Specification for Concrete Bearers*, as applicable.

#### 3.7.1.2 Design Parameters for New Turnouts and Diamonds, 60 kg rail

##### a) General

Wherever possible, new turnouts should be in line with the standard footprints shown in Clause 3.1.3.

Gauge:	1435 mm
Turnout Radius:	250 metres – Minimum desirable
Turnout Angle:	As specified
Rail:	60kg/m head hardened

The bearers are to be installed in a fan-shaped arrangement to ensure that for RH and LH turnouts the same set of bearers can be utilised.

Diamonds and mixed gauge turnouts should use standard turnout components (ie v crossings, check rails and fastenings) so far as possible.

##### b) Performance Requirements and Approvals

In general points and crossing assemblies and componentry should meet the following performance requirements:-

(i) Axle loads and Train Speeds	20 tonnes at 160 km/h 30 tonnes at 80 km/h
(ii) Design Life	25 years or 400 MGT

#### 3.7.1.3 New Products and Components

The use of new products is subject to ARTC approval and will only be permitted after defined testing procedures and / or acceptance trials are completed.

### 3.7.2 Handling and Storage

#### 3.7.2.1 Lifting and Handling of Points and Crossing Components

Points and crossing components shall be handled and stockpiled with care to minimise the potential for damage. They shall be stored such that items are easily identified and they do not deteriorate.

During unloading from rail or road vehicles, points and crossing components shall be placed or stockpiled in such a manner to prevent them from moving and to eliminate any potential damage to traffic.

### 3.7.3 Construction

#### 3.7.3.1 Installation of New Turnouts and Diamonds

##### a) General

This specification covers the requirements for the installation of new turnouts and diamonds.

b) Purchase and Supply

The nominated Contractor shall be responsible for the delivery of all components to the installation sites.

The nominated Contractor shall be responsible for all purchasing requirements associated with the installation process including, plant hire, ballast, geotextile fabric and select (stabilised) fill where required, or otherwise directed by ARTC.

c) Installation Process

c.1) Removal of Turnouts and Diamonds

Track components of turnouts and diamonds due to be replaced with new points and crossing assemblies shall be assessed for future use. (refer to Clause 3.6)

c.2) Preparation of Base

Ballast shall be removed back to the formation.

At locations where remedial work is required, the formation work shall be overhauled as specified in *ETC-08-02 Specification for Earthworks*.

c.3) Ballast

Ballast shall comply with the specification in Clause 4.7.1.

Ballast profiles shall be in accordance with Clause 4.1 and variation.

The minimum ballast depth beneath the base of bearers shall be 250 mm.

Sufficient ballast shall be distributed over the installation site before installing new turnouts to allow for a 30 – 50 mm (maximum) lift to achieve design alignment.

c.4) Turnout Assembly

Turnouts shall be assembled in accordance with the relevant drawings and manufacturers specifications. Failure to comply with these instructions could invalidate warranties and/or guarantees.

c.5) Installation Method

The Area Maintenance Contractor shall determine the procedure for the installation of the turnouts and bearers and shall demonstrate to ARTC that the proposed method of installation is practical, economical, will cause minimum disruption to train operations, and will not cause damage to any components.

c.6) Interlocking

Operating bars and switch rodding shall be connected in accordance with the relevant drawings and manufacturers specifications.

c.7) Track Geometry

Turnouts shall be tamped immediately after installation in accordance with Clause 5.7.1.6.

Superelevation through turnouts or diamonds to be as specified, usually zero.

c.8) Released Material

All reusable rail and turnout track components are to be marked for retention and stacked in locations as agreed with ARTC. Where components are reusable but require refurbishing, the nominated Area Maintenance Contractor shall manage this activity.

Every endeavour shall be made to reuse released material. The Area Maintenance Contractor shall disperse these materials between line sections as required.

Any reusable material shall not be sold as scrap.

### 3.7.3.2 Installation of Part Worn Points and Crossing Assemblies

Before installing part worn points and crossing components in track, components shall be carefully assessed for use.

The installation of partly worn components shall be carried out as for new components.

### 3.7.4 Maintenance

#### 3.7.4.1 Adjust Gauge through Switches and Crossings

The Area Maintenance Contractor shall have a procedure for the adjustment and post work inspection of gauge through switches and crossings including:

- Adjustment Process
- Method of final gauge measurement
- Equipment to be used

The gauge after adjustment shall be as specified in Clause 3.4, tables 3.3A and 3.4A where the response is routine inspection.

#### 3.7.4.2 Adjustment of Switch Actuating Mechanisms

The nominated Contractor shall have a procedure for the adjustment and post work inspection of switch actuating mechanisms including:

- Adjustment Process
- Method of final measurement
- Equipment to be used

The Gauge, Throat Gap, Switch Toe/Stock Rail gap open throw and closed gap clearance and Points Operation after adjustment shall be as specified in Clause 3.4, table 3.3A where the response is routine inspection.

#### 3.7.4.3 Lubrication of Turnout Components

The nominated Contractor shall ensure that the slide surfaces of switch chair plates and baseplates, which are located between the toe and first fixed heel (or pivot heel) blocks of points, are effectively lubricated with Rocol Switch Plate Lubricant or approved equivalent.

In application of the lubricant the following should be taken into account:

- The slide surfaces to be lubricated must be thoroughly cleansed by removing all, rust, grease and moisture and scraping off any other abrasive contaminants before applying a fresh coat of lubricant.
- Dust and contaminants shall not be permitted to come into contact with the wet lubricant.
- Switch slide surfaces require attention every four weeks, however some locations may require more frequent attention due to their operating environment.

Points that have special high duty inserts fixed to the slide surfaces or are fitted with rollers, do not require lubrication, however regular inspection of the operation of these points must be maintained.

#### 3.7.4.4 Profile Grinding of Crossing Nose, Running and Wing Rails

The Area Maintenance Contractor shall have a procedure for the grinding and post grinding inspection of crossing nose, running and wing rails including:

- Grinding equipment to be used
- Method of gauging final profile
- Grinding Process

After profile grinding, Crossing and Wing Rail Profiles shall be restored to original design for that component.

Where required metal flow shall be removed to the running edge of the rail to match the adjacent rail section.

### 3.7.4.5 Profile Grinding of Switch and Stock Rails

The Area Maintenance Contractor shall have a procedure for the grinding and post grinding inspection of switch and stock rails including:

- Grinding equipment to be used
  - Method of gauging final profile
  - Grinding Process
- a) Grinding of the toe of switch blades

Profile grinding of the Toe of switch blades shall be in accordance with the relevant drawings for the switch blade.

- b) Profile Grinding for Metal Flow removal

Where required metal flow shall be removed to the running edge of the rail to match the adjacent rail section.

### 3.7.4.6 Replace / Repair damaged/broken/missing Switch Operating Components

Damaged or defective switch operating components including spreader bars, actuating rods and detection components shall be replaced or repaired.

### 3.7.4.7 Replace / Repair Defective Crossings

Crossings shall be replaced as complete units.

- a) Crossing Wear and Repair by Welding

The service life of crossings can be extended by regeneration through surface welding. An accredited welder must carry out this welding. The welding process shall be in accordance with Clause 1.2.2.

Prior to welding it is essential that the crossing and components are thoroughly inspected for serviceability. Damaged and suspect components shall be replaced.

The wheel transfer area of fabricated and rail bound manganese crossings, ie. wing rails and nose rails, may be built up by welding. Original machining profiles must be maintained.

This type of repair is carried out generally before the amount of wear on the crossing exceeds 6mm in depth. Any crossing with more than 12mm of wear is not permitted to be repaired by welding and shall be replaced.

The crossing shall be lifted and tamped to the correct alignment on completion of welding.

- b) Fastenings

Loose fastenings must be adjusted or replaced. Ineffective fastenings shall be replaced. When replacing swage fastenings it is preferable for all bolts in the crossing be renewed.

- c) Check Rail Effectiveness

The check rail effectiveness dimension at crossings must be checked. Track gauge adjustments may be required where the crossing nose exhibits wheel impact marks.

### 3.7.4.8 Replace / Repair Defective Switch, Stock Rail Components

- a) Switch Blade and Stock Rail

Mainline points shall be replaced in half sets.

Siding points switch blades and stock rails may be replaced separately.

Switch blades damaged (crippled) by run-throughs or derailments shall be replaced. Straightening by heating and crowing may be used as an approved emergency measure only.

b) Toe of Switch Blade

A damaged or worn switch blade toe may be repaired by grinding and blending to a suitable profile within 100 mm of the tip of blade.

No rail welding is permitted at the toe.

c) Components

All damaged or defective components including Point Stops, Chair Plates, bolts and split pins shall be replaced.

### 3.7.4.9 Replace / Repair other damaged/broken/missing Components

a) Check Rails

Check rails must be replaced when the extent of wear does not permit gauging to required tolerance specifications.

Ineffective fastenings shall be replaced, loose fastenings shall be replaced or where possible tightened.

b) Bearers

Refer to Clause 2.7.3.

c) Fastenings

Ineffective resilient fastenings, bolts, washers, screw spikes and track spikes shall be replaced in accordance with relevant drawings and manufacturers specifications.

Loose fastenings shall be replaced or where possible tightened to specification.

### 3.7.4.10 Tighten and Adjust Fastenings and Bolts

Loose fastenings and bolts shall be tightened, adjusted or replaced as appropriate.

When replacing defective or missing high tensile bolts in crossings with swage lock fastenings (Huck bolts) all bolts in the crossing shall be renewed.

Swage fastenings must not be used in the heel of pivot or loose heel points.

When replacing loose swage fastenings in crossings all bolts in the crossing shall be renewed.

Like for like components shall be used when rectifying defective resilient fastening assemblies. The use of alternative components shall be subject to ARTC approval.

### 3.7.4.11 Switch Support on Chairplates

The switch assembly should be well supported.

Any gaps between the chair plate and the rails should be rectified to ensure correct operation of the switch assembly is not inhibited.

### 3.7.4.12 Points Operation

The nominated Contractor shall maintain components and connections to ensure that:

- Point operating mechanisms, spring levers, operating rods and bars, operate freely without binding
- The switch blade is held securely against the stock rail
- Faults do not occur which may affect signaling in circuited track sections
- Point stands and markers are correctly visible.

## 3.7.5 Inspection and Assessment

### 3.7.5.1 Turnout and Diamond Assemblies

a) Layouts (new installations)

Check compliance for the quantity, type, location and installation of all components with the relevant drawings. The quantity, type, location and installation of components that do not comply with the drawings should be rectified.

b) Turnout Offsets (new installations)

Check compliance against design drawings. Offsets should be + 2 mm, -2 mm from the design. Items that do not comply with the drawings shall be rectified.

**3.7.5.2 Rail Alignment in Crossings and Check Rails (Maintenance Tolerances)**

a) The running face edges over the length of the crossing shall not deviate away from a straight line laterally (alignment) or vertically (top) by greater than  $\pm 4$  mm.

Under no circumstance shall the nose of the crossing be permitted to be exposed vertically.

b) Following adjustment of Standard Gauge turnouts the Check Rail Effectiveness Dimension shall be 1392 mm +0, - 3mm from running edge of crossing to checking face of check rail.

During inspection close monitoring of wheel impact marks on the nose of crossings shall be carried out as a guide to determine whether immediate check rail/track gauge adjustments are required.