

# Track Patrol, Front of Train, General and Detailed Inspections

ETE-00-02

## Applicability

ARTC Network Wide SMS

## Publication Requirement

Internal / External

## Primary Source

ARTC NSW Standards TEP 04, TEP 07, TEP 13, TEP 14 and TES 07

## Document Status

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1.8	27 Feb 19	Standards	Stakeholders	Manager Standards	General Manager Technical Standards 05/03/2019

## Amendment Record

Amendment Version #	Date Reviewed	Clause	Description of Amendment
1.0	01 Dec 09		Implementation draft. Supersedes NSW Standards TEP 04 v2.1, TEP 07 v1.2, TEP 13 v1.5 in part, TEP 14 v2.1 and TES 07 v1.2
1.1	18 Jun 10		Banner added regarding mandatory requirements in other documents and alternative interpretations.
1.2	13 Jun 11		Editorial amendments following risk analysis
1.3	29 Nov 11	1, 2.1, 2.4, 2.5.1, 3.1 & 5	Walking inspections replaced by General and Detailed inspections. Further editorial amendments following advice from field staff.

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Amendment Version #	Date Reviewed	Clause	Description of Amendment
1.4	04 Mar 14	2.2, 2.3, 3.5, & 5	Updated to reflect current Infrastructure Management structure and competency identifiers. Inclusion of Adjacent Track Patrol waiver 800/TR/110310/266. Updated for 7-day minimum patrol frequency. Added description of General and Detailed inspections. Review for network wide application. Also amended reference from "WOLO" to "high temperature". (This revision approved by S&EC 14/04/2014 but not published due to extended Regulator Notification period – further updates on version 1.5)
1.5	05 Sep 14	3.1	Editorial amendment to describe the purpose of the track patrol inspection.
1.6	20 Apr 16	All	Rebranded
1.7	28 Jun 16	3.1	Amendment to clarify the use of form EGP1001F-01.
1.8	27 Feb 19	All	Removed duplicate information between clauses or in other documents to avoid conflict.  Clarity of requirement for no alternating track patrols where crossing loops, refuge loops and sidings are inspected from adjacent track.

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**Mandatory requirements also exist in other documents.**

**Where alternative interpretations occur, the Manager Standards shall be informed so the ambiguity can be removed. Pending removal of the ambiguity the interpretation with the safest outcome shall be adopted.**

## 1 Introduction

### 1.1 Purpose

This document sets out the requirements for the track and civil inspections which are carried out on ARTC track and civil assets, the frequency of which is specified in the ARTC Track and Civil Code of Practice (CoP) and related Standards or ETE-00-03 Civil Technical Maintenance Plan (CTMP).

### 1.2 Scope

This document covers:

- Track patrols (walking, hi-rail and engine).
- Front of train inspection.
- General Inspections.
- Detailed inspections.

For structures inspection requirements and frequencies also refer to *CoP Section 9 Structures*, *ETE-09-01 Structures Inspection* and *ETE-09-02 Structures Inspection Procedure*.

Requirements for the inspection of non-operational lines are specified in the Technical Maintenance Plan ETE-00-03.

For information on the track and civil assets to be inspected refer to relevant CoP or the CTMP.

## 2 Track and Civil Inspection System

### 2.1 General

The Track and Civil Inspection System provides the basic elements of Safety Assurance Certification for the Track and Civil Infrastructure.

The system has been developed to assist ARTC infrastructure maintenance management to:

- a. Inspect all important aspects of the track and take appropriate action where exceedance situations are found;
- b. record essential information detailing the condition of the track;
- c. monitor variations of track conditions over time;
- d. prepare priority based asset maintenance and renewal programs.

## 2.2 Responsibilities

With respect to track and civil equipment inspections all line management shall act within the constraints of their individual position descriptions, certified competencies, and delegated engineering authority.

The Corridor Manager is responsible for:

- Resourcing maintenance teams with the tools, materials, plant, competencies, and track access required to complete the scheduled inspections.
- Ensuring that all assets or components for which the CoP or the TMP specifies periodic inspection are recorded in the appropriate ARTC equipment databases and managed within the ARTC Works Management System.

The Area Manager is responsible for:

- The completion of scheduled inspections on track and civil infrastructure within their area of control in accordance with the CoP, this standard, the inspection schedules, track access rules, and other relevant requirements.
- Ensuring that inspection personnel hold appropriate competency certification and are otherwise fit to perform the inspection tasks.
- Ensuring that allocated plant and tools are operated and maintained in accordance with ARTC policies and procedures or manufacturers recommendations.
- Maintaining records of all inspections.

The inspection personnel are responsible for:

- Completion of scheduled inspections to the best of their abilities and in accordance with their certified competencies.
- Recording and/or reporting (electronically or on standard forms where appropriate) the results of their inspections including completion, defects found, and observations made.

Additional responsibilities for structures inspections refer to *ETE-09-01 Structures Inspection* and *ETE-09-02 Structures Inspection Procedure*

## 2.3 Competencies of staff engaged on track inspection

Persons carrying out track and civil inspections shall hold the required competencies listed in the ARTC Track and Civil Competency Matrix for Track Examiner and Track Certifier roles.

## 2.4 Methods of manual measurement

### 2.4.1 General

This section sets out the normal methods of manual track measurement for use during track patrol, general and detailed inspections.

Measurements applicable to the use of track recording cars are not included.

### 2.4.2 Rail Wear

Refer to CoP Section 1 Rail.

### **2.4.3 Gauge of Track**

The track shall be gauged 16mm below the top of the rail.

The gauge recording is to be increased by the amount of any visible movement in the track fastening system. The additional amount added is to be noted.

### **2.4.4 Alignment**

The outer rail of curves should be maintained as the line rail. On tangent track, either rail may be used as the line rail, but the same rail should be used throughout the tangent.

The method of measurement on curves should be by standard string lining techniques.

### **2.4.5 Surface and Level**

Track profile is the running surface along the grade rail which on curves is the low rail.

Cross level/superelevation should be measured square to the track.

Longitudinal level shall be measured using a chord of specified length. The maximum depression shall be measured at the mid-point with the measurement taken at the centre of the rail head.

### **2.4.6 Points and Crossing measurements**

The gauge, superelevation, alignment, longitudinal profile, superelevation ramp and twist throughout points and crossings shall be within the same limits and tolerances as for plain track of the same specified class.

Flangeway width shall be measured as the distance between the gauge side of a running rail and the guard face of a check rail or wing rail.

Flangeway depth shall be measured as the height of the running surface of the rail above the top of the blocks at check rails and in 'V' and 'K' crossings.

The check rail effectiveness measurement is the distance from the guard face of a check rail to the gauge face of the crossing nose rail, measured square to the running rail.

### **2.4.7 Track geometry**

Inspection of Main Lines and Crossing Loops by the Track Recording Car (currently the "AK" Car) is a scheduled requirement. Whilst the AK Car is generally able to maintain the inspection cycle it may sometimes miss Crossing Loops or sections of mainline. In these circumstances maintainers are to undertake their own inspection of track geometry.

The inspection should be undertaken by using portable track recording equipment or the "track master" measuring board which will address twist and gauge. Top and line can be assessed visually supplemented with string line measurements if required. Rail play can also be assessed visually.

All Emergency and Priority One defects detected are to be recorded and marked for appropriate maintenance action.

## **2.5 Timing of Inspections**

Generally, inspections can be scheduled for any time of the year so long as stated frequencies are maintained, with the exception of Track Stability inspections which are to be performed when

seasonal conditions are suitable: typically, in the August to September period for summer analysis; and February to March period where winter analysis is required.

### **3 Types of Inspections**

#### **3.1 Scheduled Inspections**

These inspections are regular inspections occurring at predetermined intervals as detailed in the CoP and related Standards or TMP.

#### **3.2 Unscheduled Inspections**

These are inspections carried out in response to “defined or abnormal events” and include those required at identified problem locations and where defects appear more likely to occur as indicated from other inspections.

Their primary purpose is to ensure that the defined event (initiating condition) has not resulted in any abnormal hazards or unexpected change in the condition of the infrastructure. Typical initiating conditions include:

- Climatic/environmental conditions such as storms, lightning, high winds, heavy rain/floods, fires, extremes of hot and cold air temperatures, earthquakes, etc.
- Bridge strikes, usually by road vehicles
- Dragging loads and/or damaged rolling stock.

ARTC is responsible for arranging suitably qualified staff to conduct the inspection required. When circumstances and/or appropriate resources permit, these inspections may be incorporated into other scheduled inspections. These inspections can often include the involvement of specialist technical/engineering personnel.

### **4 Form of Inspection**

#### **4.1 Track patrol**

##### **4.1.1 General**

The purpose of the Track patrol inspection is to:

- Identify any conditions that might threaten the safe passage of trains operating in accordance with advertised or posted operating limits (e.g. speed, axle load, etc) in the immediate future and at least until the next scheduled track patrol inspection.
- Take any necessary action to repair those abnormal conditions or impose operating restrictions on trains until necessary repairs are carried out.
- Identify other defective conditions that may require monitoring, or planned maintenance.
- Monitor previously identified and reported defects for deterioration.

Patrol Inspections should keep a lookout for obvious abnormal conditions.



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*Note: Track Patrol is a visual inspection intended to detect obvious, abnormal conditions. It is unlikely that hidden failures or conditions that don't have a significant visual impact will be detected by Track Patrol which is typically performed from a hi-rail vehicle at moderate speed. Other scheduled (and ad-hoc) general and detailed inspections focus on specific components or conditions and are intended to detect these less obvious defects.*

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#### 4.1.2 Hi rail or Walking Patrol

Scheduled track patrols are typically performed using hi-rail vehicles or walking.

Track Patrol inspections are to be carried out in a manner and at a speed consistent with the scope of the inspection. The patrol vehicle speed shall be determined by local infrastructure condition and may vary from location to location.

The track patroller is to report by exception using the defect report form EGP1001F-01. Other adverse track condition indicators should also be reported to Area Managers. Where possible, minor necessary repairs and adjustments should be undertaken.

#### 4.1.3 Engine Patrol

A routine Track Patrol may be carried out from the front of an engine as an alternative to hi-rail vehicle. This may only occur:

- a. Where patrol by engine is included in an authorised engineering waiver but is to be limited so that no more than every second patrol can be by engine. Patrols are to be carried out in accord with the requirements specified in the waiver, or
- b. When a patrol opportunity is lost due to strike/loss of track access etc, a single standard patrol may be replaced by an engine patrol.

Engine Patrols are not Front of Train inspections and should be undertaken on the slowest train service where practicable. If, however, the fastest and slowest services coincide, the inspections may be combined.

The following conditions apply to engine patrols:

- Patrol staff to be competent.
- Cannot be used for consecutive routine track patrols.
- The previous scheduled routine track patrol must have been carried out normally.
- Any serious safety issues identified must be followed up with a site inspection.

#### 4.1.4 Multiple Tracks

Two adjacent tracks may be patrolled from one track.

The following conditions apply for mainline and passing lanes:

- a. The patrol vehicle shall have at least two patrollers observing the track. At least one of the patrollers shall be familiar with the track being inspected.
- b. The tracks are to be alternated i.e. tracks are not to be inspected from the same track consecutively.

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*E.g.: Where Up and Down mainlines are adjacent and both have a 7 day inspection interval, patrol may travel on the Down Main one week (with the Up Main observed from the Down Main) and in the following week patrol will travel on the Up Main (with the Down Main observed from the Up Main).*

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Passing refuges, crossing loops and sidings may be inspected from adjacent track without alternating or without the need for two patrollers.

When adjacent tracks are separated (e.g. at island platforms, diversions, grade separations) or when it is not possible to patrol one track from the other due to poor weather, then each track shall be patrolled separately.

#### **4.1.5 Track Patrol – Tools and Equipment**

An overall assessment of tools, equipment, or spare parts needed to be carried on track patrol should be made to reflect the configuration of the track being inspected e.g. continuously welded concrete mainline compared to jointed timber sleeper track. Patrollers shall ensure that any measuring or testing equipment is accurate and in good order and adjustment.

#### **4.1.6 Scope**

##### **4.1.6.1 General**

During Patrol inspections specific locations may be subject to General inspection where known or suspected defects are present. An up to date defect list and a list of specific locations requiring attention should be obtained prior to carrying out the Patrol. Attention is to be paid to any deterioration at those defect locations.

##### **4.1.6.2 Rails and Joints**

As per the CoP Section 1 Rail.

##### **4.1.6.3 Sleepers and fastenings**

As per the CoP Section 2 Sleepers and Fastenings.

##### **4.1.6.4 Turnouts**

As per the CoP Section 3 Points and Crossings.

##### **4.1.6.5 Ballast**

As per the CoP Section 4 Ballast.

##### **4.1.6.6 Track Geometry**

As per the CoP Section 5 Track Geometry.

##### **4.1.6.7 Track lateral stability**

As per the CoP Section 6 Track Lateral Stability.

##### **4.1.6.8 Clearances**

As per the CoP Section 7 Clearances.

**4.1.6.9 Earthworks**

As per the CoP Section 8 Earthworks.

**4.1.6.10 Structures**

As per the CoP Section 9 Structures, ETE-09-01 Structures Inspection and ETE-09-02 Structures Inspection Procedure.

**4.1.6.11 Waterway and drainage system**

As per the CoP Section 10 Flooding.

**4.1.6.12 Operating Signage**

As per the CoP Section 11 Railway Operating Signs.

**4.1.6.13 Level Crossings**

As per the CoP Section 16 Level Crossings.

Road/rail vehicles may not operate the track circuitry at level crossings with “active” protection and the operation of flashing lights, bells, and booms may not be observed during a Track Patrol unless testing of this equipment is specifically included in the Patrol.

**4.1.6.14 Right of Way**

As per the CoP Section 17 Right of Way.

## **5 Front of Train Inspection**

### **5.1 General**

A Front of Train (FoT) inspection is an inspection which assists in the assessment of track by enabling the reaction of trains to the track structure to be experienced (preferably at the maximum allowable speed). A FoT inspection is not mandatory where train speed is less than 50 km/h.

The Front of Train inspection is to be carried out from the Driver's compartment of the fastest train over the length where this is practical. Whilst Track Patrol is essentially a visual inspection FoT inspections use the other senses of hearing and feeling, in addition to vision, to gather information about infrastructure defects or condition. Train crew can also be a valuable source of information.

On Freight only lines, if trains run only at night, the effectiveness of this type of inspection should be reviewed with the ARTC Corridor Manager or nominated representative and an engineering waiver applied where appropriate.

### **5.2 Scope**

Front of Train inspection assesses following track elements:

- Broken or loose joints which may be felt and/or heard.
- Track geometry defects or deterioration which can be felt and/or seen.
- Signage defects due to restricted sighting or sign clarity.
- Right of Way condition including fire hazard, corridor security, and vegetation growth.

- Level Crossing conditions including sight distances, track geometry, and road vehicle behaviour.

Typically, all the above track elements would be inspected concurrently, although multiple FoT inspections may be performed if required as long as the minimum frequency is maintained for all track elements.

## **6 General Inspections**

General inspections are typically visual but may include some elementary site testing and measurement. They typically include the elements of a patrol inspection in addition to inspection of all readily visible elements of the infrastructure, and elements known to contain critical defects. They are at a level of detail enough to:

- observe and record unsatisfactory conditions or changes in condition of the infrastructure since the previous inspection
- enable the need for more detailed or frequent inspections to be determined
- identify locations requiring more regular inspection due to expected high deterioration rates
- determine required repairs or remedial actions in cases where a detailed inspection is not required.

## **7 Detailed Inspections**

Detailed Inspections address specific aspects of the infrastructure condition or behaviour and may involve visual inspection, measurements, testing and some diagnostic assessment. In addition to the elements included in general inspections, detailed inspections are at a level of detail enough to record the condition of the infrastructure for purposes such as:

- determining necessary repairs or remedial actions
- establishing the capacity rating against set condition standards or assessment guidelines.

## **8 Records**

Closing of the inspection work order is confirmation the inspection has been completed.

Inspection personnel are to report the results of their inspections including repaired defects to their Manager or nominated representative (where applicable) on EGP1001F-01

Inspection/Defects Found Report Form or relevant detailed inspection form either using hard copies or electronic formats.