



# Engineering Specification

## Track

### CRN CP 205

### FIELD TESTING

Version 1.1

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## Document control

Revision	Date of Approval	Summary of change
1.0	March, 2012	First Issue
1.1	May, 2016	See 'Summary of changes' below

## Summary of changes from previous version

Section	Summary of change
Various	Changed 'Principal Civil Engineer' to 'Principal Track and Civil Engineer'

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# 1 Scope and application

This specification details requirements for the planning, approval, conduct and management of field trials of track and structures products and processes in Country Regional Network (CRN) track infrastructure.

It provides guidance to designers, asset managers, manufacturers and suppliers on

- the process to be followed to submit a field test for approval
- the evidence to be provided with the submission, and
- the approval process

The requirements apply to the in-track testing of products and processes.

# 2 References

## 2.1 Australian and International Standards

Nil

## 2.2 CRN documents

CRN CM 202 – Track Fundamentals

CRN CM 203 – Track Inspection

## 2.3 Other references

Nil

## 2.4 Definitions

Nil

# 3 Introduction

New components are generally introduced when existing components do not perform satisfactorily or better technologies become available. Operational changes, such as higher axle loads or operational speed, often dictate the need to test existing components or to test new components of improved design.

Only in-track testing of components under the actual service conditions will yield data for strength, component life, wear rate and required maintenance.

The Principal Track and Civil Engineer must approve testing of any components in track.

Field tests shall only be undertaken following the establishment and approval of a testing protocol that meets the following requirements:

## 4 Procedure for trials

1. Establish the need for testing
2. Establish testing protocol  
Includes determining site, installation requirements, test methodology and reporting requirements
3. Undertake risk assessment
4. Submission for approval
5. Register test  
Includes waiver and notifications
6. Undertake test
7. Complete test  
Includes final report, decommissioning test site, changes to standards

## 5 Guidelines

The following guidelines are intended to assist with the development of an appropriate testing regime. The testing regime requirements will normally be incorporated into any waiver that is required.

### 5.1 Establishing the need for testing

#### Is testing necessary?

- Is there sufficient evidence of successful use of the product or technique in other rail systems to provide validation of the design?
- Are there unknown risks in applying the product in the CRN?  
Remember that testing may also be used to gather information on existing components.

#### What questions are you trying to answer?

There is no point in conducting a trial if you don't know what the objective is.

- Are you trying to compare the performance of a product against similar components?
- Are you assessing the component life, or its compatibility with other components in the CRN system?
- Are you trying to assess how easy or difficult it is to install, maintain or remove, and whether any special tools or techniques are needed?
- Are you trying to establish transport and storage requirements?
- Are you trying to validate the claims made by the manufacturer regarding form, fit and function?

#### How are you going to answer the questions?

What measurements and visual assessments will you need to conduct?

What will constitute a successful outcome?

- Are you trying to establish deterioration over time (or MGT)?
- Are you trying to assess the component under different axle load or speed regimes?
- Are you trying to assess non-measurable outcomes?

You need to establish the answers to these questions to be able to establish your test methodology.

## 5.2 Establishing the testing protocol

“Stick it in and see how it goes” IS NOT an appropriate testing protocol. Before you conduct field tests you MUST establish:

### 1. What is being tested?

The product or process

### 2. What feature of the product are you testing

Safety, failure mechanism, wear rate, impact on operations or other interfaces, fit with other infrastructure, etc.

Ease of installation and removal, reduction in maintenance, reduction in OH&S safety risk etc.

Some of these attributes may require testing methods that are incompatible. You might have to conduct multiple trials to answer all your questions

Do you really have to test it in-track? Some attributes can be tested just as effectively in off-site or laboratory conditions. (e.g. trial of a robotic welder on a crossing carried out in a disused tunnel proved the effectiveness of the technology for welding manganese in confined spaces).

### 3. How long will the trial last?

There must be a defined end to the trial so that maintenance can return to normal. (normal means that the maintainer doesn't need to do anything special any more). It may still continue as a monitored site to get longer term information, but its special status as a test site is removed. Some sites may be monitored to destruction. Every effort should be made to avoid tests that last more than 12 months.

### 4. How big is the trial site? Are there multiple sites

Do you need a control site as well as the test site, or do you need to conduct “before and after” tests on the same site?

### 5. How are you going to resource the trial?

#### Preparation

Who is arranging material and equipment for the test? Where is it being stored? Does any preparation need to be done on the testing equipment or the components being tested before they are installed?

#### Installation

Who is installing the test equipment? Do they need training to use the test equipment? Who is doing the training?

#### Who is installing the components being tested?

If you are testing a process, who is going to use the process during the test? Do they need special training to use the process? Who is doing the training?

#### Monitoring/ testing/ reporting

Who will be undertaking the field testing and monitoring. Are any special skills required?

#### Maintenance

If test equipment is installed, who will be maintaining the equipment during the trial?

Since the test will be conducted on operational track, it may need maintenance attention during the trial period. Who will be undertaking the maintenance work?

**Decommissioning and removal**

Who will decommission the test site at the end of the trial?

Who will remove test equipment?

Who will remove any track components that are not suitable for normal (unmonitored) operation?

**6. Who's paying for the test?**

Who is paying for the following items:

- ~ Hardware (track material)
- ~ Measuring equipment
- ~ Installation
- ~ Monitoring and Reporting
- ~ Maintenance
- ~ Decommissioning and Removal

**7. Where are you going to conduct the test?**

Is this the best location to conduct the test? Why? Are you looking for particular loading conditions, curve radius, speed, track or structure configuration? Is it the location where the problem that you are testing occurs? Is the site representative of the conditions you are testing, so that the evaluation will not be significantly affected by non-typical or non-quantifiable conditions?

Have you assessed the risks of conducting the test at the site? Safe access and conditions for installation and testing; Reliability risk; Operational safety risk.

Have you checked to make sure that track at the site is not planned to be renewed or reconstructed before the proposed end of the trial?

Have you negotiated with the maintainer and reached agreement for the site to be used. You must make sure that the maintainer is aware of the full details of the trial, including limitations to be placed on maintenance and use of maintenance resources for monitoring.

**8. How are you going to identify the trial area?**

This will depend on who needs to know about the site, and what activities you wish to be controlled. Do you want maintenance machines (tamper, grinders etc.) to avoid the site? It is not enough to identify the location on paper. Some form of paint marking and signage is required on the ground.

You should mark the start and end of the site. Each mark should display the following information:



**9. What are the installation requirements?**

What are you installing? Is there anything special about the installation? What test instruments are being installed? What are they connected to? Does it need a power supply? Is rail size, sleeper type, ballast condition a constraint?

Document the Installation requirements so that the people installing the test site can understand and follow them. Unless you are installing the test yourself and need to establish some requirements as you go (this may be a valid approach in some cases), clear, detailed instructions (including plans and diagrams) will avoid incorrect installation and a wasted test opportunity.

#### **10. Have you established installation procedures**

Are there special installation procedures to be followed? DO NOT assume that field staff will install a component the way you think it will be installed. Check your assumptions by discussing the installation procedure with those who will be doing the installation.

Try to think of all the things that could go wrong with the installation that would invalidate the test. Establish an installation method that minimises the risk of poor installation.

Is special expertise required for the installation? How will the installers get this expertise? Are you involving product supplier reps who have the required expertise?

#### **11. Will there be any restrictions post-installation**

Are you imposing any limits on speed or axle load?

Are maintenance and/or renewal activities restricted over the site for the duration of the trial?

Are there any restrictions on the activities of other disciplines at the trial site?

#### **12. Testing protocols**

##### **Tests**

What tests and/or monitoring are you conducting? How often will you conduct the test/monitor? Is it a "once off" or will there be a series of measurements and/or assessments at periods over the life of the trial.

The data may be qualitative and quantitative, suitable for evaluation and analysis at a later date

Do you need track possession to do the testing?

Testing could be undertaken by specialist engineering personnel, technical officers or field staff. The complexity of the testing method will dictate the personnel used.

The method of taking measurements should be determined and documented. You may refer to standard methods of measurement (See CRN CM 202 or CRN CM 203) or document the method to be used.

Testing methods may vary during the trial. Initial tests may differ from follow up testing.

##### **Have you established criteria for assessment of the test?**

Do you know what pass or fail is?

In many cases you may not. Some tests are conducted by assessing performance over a period to gain a comparative measurement or assessment. Even in these circumstances assessment criteria should be established e.g. test for 5MGT then document results.

##### **Records and reports**

The documentation required includes:

- ~ Installation plan showing site boundaries (km from and to), test points (km), test point identification, spot locations of items under test etc.
- ~ Monitoring Record sheets with checklist of items to be measured and/or assessed
- ~ Periodic Reports. The test proposal needs to define the frequency, content and intent of the reports. They may occur immediately following a periodic assessment or may be less frequent, relying on the assessment of a number of periodic tests.

- ~ Final Report. The test proposal needs to define the purpose, content and timing of the report. It will generally include complete test data, evaluation, analysis and recommendations. It may also include reference to similar products, information on the basic performance, the expected life, wear rate and required maintenance of the component under test.

### 5.3 Undertaking a risk assessment

As part of the development of the Testing Protocol, you will need to undertake a Risk Assessment of the Trial.

The assessment needs to consider the hazards and risks associated with:

1. Failure of the component being tested – Are there system safety risks? Are there reliability risks?

Is there a previous history of use of the product in other rail systems? Is the historical use comparable with the conditions proposed for the trial?

If there is no comparable performance history, DO NOT undertake in-track testing without further assessment.

Where there is no component data available, a laboratory assessment is generally advisable to avoid the possibility of costly repair to track or vehicles caused by damage from component failure. Laboratory tests may also be performed under accelerated rates to obtain data within a reasonable period for component life data. Wear rates cannot be achieved by this method.

2. Catastrophic failure in service – If this is possible then monitoring by field staff will be required. Staff will need to be provided with guidelines on evidence to look for that indicates potential failure, and appropriate authorities to override the trial in the interest of operational safety.
3. Environment impacts
4. Occupational Health and Safety

### 5.4 Submission for approval

When the Testing Protocol has been developed and the risks assessed, submit the proposal to the Principal Track and Civil Engineer for approval. If an Engineering Waiver is required for the testing to be undertaken, the Principal Track and Civil Engineer's approval of the Waiver constitutes approval of the Testing Protocol.

The approval should also include sign off from the Civil Maintenance Engineer for the trial to be conducted. If required, the Principal Track and Civil Engineer will arrange Configuration Sign off.

The Principal Track and Civil Engineer will nominate a person to liaise with the nominated Project Manager to ensure the Principal Track and Civil Engineer's requirements for reporting and evaluation are met.

## 6 Register test

Following approval for the test to proceed arrange for the Principal Track and Civil Engineer to include the test on the "Field Trials Register" on JHR CRN's Engineering Intranet.

## 7 Undertake test

Testing will be undertaken in accordance with the approved testing protocol. If, during the test period, unplanned events occur, variations to the testing protocol shall be discussed with the Principal Track and Civil Engineer.

## 8 Complete test

At the agreed conclusion of the test, arrange the following:

1. Decommissioning the test site including removal of components under test, removal of testing equipment and restoration of the site to the satisfaction of the Maintenance Superintendent.
2. Final report including assessment of the success of the trial and any recommendations, including any changes to standards.