

EPR 012

TESTING OF LOCOMOTIVE ALL WEATHER ADHESION

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1 Introduction

Before any locomotive is permitted to operate on the RailCorp network, the locomotive is tested to confirm its all weather adhesion.

If locomotives were to exceed the all weather adhesion, delays to other trains can occur.

2 Purpose

The following procedure assists in determining the optimum load that a locomotive can haul up a given grade in all reasonable weather conditions.

Once determined from practical tests this load can then be expressed as a percentage of available total tractive effort available for traction, usually given as the all weather adhesion level (AWAL). The AWAL can then be used to determine a suitable load for this class of locomotive on any grade on the network.

3 Scope

The test shall be conducted on one of every type of locomotive prior to operation on the RailCorp network. The test shall also be conducted after any modification to the locomotive control system, including software.

4 Application

This procedure is to be used by rolling stock manufacturers, owners, operators in conjunction with RailCorp testing personnel.

5 References

ESR 0001 Minimum Operating Standards for Rolling Stock

ESR 0001 – 300. 7 (RSU 341), Traction Performance

TMR 001 – OS 001 IM Train Operating Conditions (TOC) Manual

EPR-013 Static Test Site Safety Evaluation

Locomotive manufacturer's tractive effort speed curve

6 Equipment Required

1. Typical locomotive representing the locomotive class to be tested.
2. Suitable load preferably pre weighed to determine total mass.
3. Suitable recording instrument unless locomotive fitted with data logger.

The following parameters shall be recorded during the test:

- Speed
- Sectional running time
- Wheel slip
- Traction motor current.
- Throttle notch

- Sanding
4. Suitable water-spraying equipment.
- The water spraying equipment shall have the following characteristics:
- The Water tank capacity shall be sufficient to last for the duration of testing
 - The water spraying equipment shall pump water at a flowrate of 3 L/min, using CROPLANDS QUICK TEEJET nozzle housings with fan spray jets. The pump used shall be a FLOJET, model 2135-568, 12 volt 7 Amps, 6.4 Litres / minute (Max), with a pressure of 75 psi maximum or equivalent.
 - Water spraying equipment is to be applied such that the water spray is directed to the head of both rails vertically from an approximate height of 250mm, and 1 metre in front of the leading wheels of the leading locomotive of the test train.

7 Test Train Preparation

- a) As a starting point determine from the manufacturers tractive effort speed curve the tractive effort level available at the continuous rating and from this determine a load.
 - b) Assemble a suitable train consist incorporating a train consist as close as practicable to the continuous load as calculated in 5.1.
 - c) Include in the train consist a suitable locomotive that can be utilised to clear the line if the locomotive under test fails to perform adequately. The assist locomotive must be shutdown (unless required to assist in the event of test failure), and should preferably be marshalled directly behind the locomotive under test.
- Note:** When testing AC traction locomotives, the assist locomotive MUST also be a AC traction locomotive, unless it is independently crewed.
- d) The test site shall be nominated by RailCorp and should contain a section of track with a continuous nominal grade of at least 900 metres long.
 - e) Conduct a site inspection of the proposed site, paying particular attention any rail greasers in the area and to the railhead on the grade. Note any evidence of rail burns; grease contaminant and general rail profile condition.
 - f) Indicate to the appropriate train operations area that an adhesion test is to be performed in their area. The test plan should include allowances for several passes of the test train over the test site.
 - g) Conduct a safety site inspection and safety briefing in accordance with EPR-013 Static Test Site Safety Evaluation.
 - h) Prepare locomotive for test, check and record fuel level and sand, check wheel profile, fit water-spraying equipment to the leading wheel set of test locomotive as described above.
 - i) Prepare train consist for test (only required if testing for compliance). Assemble independent air brake equipment on leading consist vehicles, to enable the brakes to be applied during test to increase train resistance.

8 Test Train Procedure

- a) Commence ascent of the grade at the test location with sufficient distance before the grade such that the grade is approached at a normal speed for that location.
- b) The leading locomotive must be powering during the test.
- c) Simulated wet weather conditions are to be applied using suitable water spraying equipment, as described in section 4.4 above, with sufficient capacity for the duration of the testing.
- d) The water spraying equipment shall be operating continuously on the grade being tested. For example, if testing on Cowan Bank, this means between Hawkesbury River and Cowan.
- e) The water spraying equipment shall be deployed regardless of the ambient weather conditions.
- f) Air blowers are not to be used.
- g) The train speed shall not exceed the posted speed boards.
- h) The data specified in section 4.3 is to be recorded for the duration of the test.

9 Test Acceptance Criteria

- The test train shall not exceed the scheduled running time for the section under test, as published in the Train Operating Conditions (TOC) Manual.
- For example, if testing a 4500 tonne trailing load on Cowan Bank, the applicable section running time shall be 26 minutes between Hawkesbury River and Cowan, as published for a C2 schedule.
- The minimum speed of the test train shall not reach less than 10 km/h at any time during the test.
- There shall not be any uncontrolled wheel slip during the test. Uncontrolled wheelslip is any wheelslip as indicated in the locomotive cab, not including wheel creep.
- Traction motor currents shall not exceed their short time ratings during the test.
- The locomotives shall demonstrate that they can haul the specified trailing load in accordance with this acceptance criteria and test conditions on at least one occasion. If any doubt exists as to the locomotive's performance, or the test conditions or acceptance criteria being met, then the locomotive will not be accepted until there is no doubt as to its compliance with this test criteria under the specified conditions.

10 Publication

- a) Assess results – determine load category
- b) Publish info in RailCorp TOC Manual; include locomotive in master load table.