

NEW EQUIPMENT & SYSTEM APPROVAL PROFORMA

Ref: 08-08-11-069

Note: the prompts given below are only a guide to the information required for approval. Dependent on the type of equipment or system that requires approval delete any section that is not applicable or include additional information if necessary. **Mandatory** fields are marked with an asterisk (*).

1 Equipment or System to be approved *

RailFrame stress free temperature measuring equipment

2 Originator *

Name: Tim Calver/Max Shuard & Associates Pty Ltd Company: ARTC

3 Introduction *

RailFrame (see photo below) is a device for measuring stress free temperature in rails, developed by Queensland Rail. It works on the principle that the more a rail is in tension, the greater the force required to lift it. A short section of rail is unfastened, and the force required to lift it by a defined amount is measured. From this measurement, stress free temperature is determined from lookup tables.



4 Determination of Need *

The principal need for this equipment is to improve track stability. Stress free temperature in rail has traditionally been unable to be verified directly. Suspected stress free temperature irregularities have been identified indirectly (such as by detection of creep). The only available testing, including to confirm indirect indications of Stress Free Temperature variations, has been destructive (by cutting and destressing the rail). Direct measurement, avoiding the need to cut and destress rail, has evolved to become a satisfactory alternative.

The concept of measuring frames has developed to a stage where they are now regularly used on a production basis. Two types of measuring frame have become available commercially:

- RailFrame, which gives reasonable accuracy and is relatively simple to use; and
- Verse, which is more sophisticated and very accurate, but requires greater specialised skill to operate.

Use of RailFrame will improve current practices by facilitating improved management of rail stress free temperatures.

5 Significant Change or Not *

This change in equipment or system is assessed as minor.

6 Review Panel *

- John Cowie - Manager Standards & Systems
- Tim Calver - Standards and Technical Services Engineer
- Graeme Templer - Maintenance Manager

7 Safety

There are no specifications, ARTC procedures or Australian Standards that this measuring device needs to comply with.

RailFrame has been extensively trialled on the ARTC network in Victoria, and to some extent in NSW and on the Western Jurisdiction. It has been found suitable for the task and the environment, subject to the limitations of the device. The supplier specifies that it not be used on curves of radius less than 800 metres.

8	Performance and Suitability	<p>The supplier of the equipment (QR) advises that its accuracy is $\pm 3^{\circ}\text{C}$. Comparative trials with Verse, carried out by Southern Infrastructure Alliance at Harden, produced an average difference in results of less than 2°C. (The accuracy of Verse has been the subject of a number of published independent overseas studies, which have confirmed the manufacturer's claims of high accuracy).</p> <p>For the purposes of verifying stress free temperature, RailFrame is considered to have adequate accuracy. Rail stress management is not an exact process; direct measurement is considered to be at least as accurate as destructive testing (destressing), the accuracy of which is very dependent on staff diligence in adhering to procedures.</p> <p>RailFrame is not required to interface with any other ARTC equipment or systems. Development of an IT system to record and assess testing outcomes is under consideration; in the meantime, paper records will be kept.</p>					
(i)	Use in other rail networks	<p>RailFrame is extensively used on the developer's network, QR. It is also used on the intrastate network in Victoria, and elsewhere. RailFrames are owned by Works Infrastructure and by Transfield Services.</p>					
(ii)	Use in the ARTC network	<p>It is intended that RailFrame be used throughout the ARTC network. Constraints are:</p> <ul style="list-style-type: none"> The rail being measured must be in tension (i.e. its temperature at the time of measuring must be less than its actual Stress Free Temperature); The design of the machine is such that the manufacturer specifies a minimum curve radius of 800 m; and Because of the need to unfasten and refasten the rails, RailFrame is more suited to track with resilient fastenings than to dogspike fastenings. 					
(iii)	Issues arising from usage of the equipment/system	<p>An issue arising from direct measurement of Stress Free Temperature is that there are no non-conformance intervention standards published. This issue is being addressed through the ARTC project to review Welded Track Stability Analysis (WTSa) in NSW.</p> <p>The WTSa project will also produce guidelines on where direct measurement devices should be used (principally in areas of higher stability risk).</p>					
(iv)	Changes required to infrastructure or systems for use of the equipment	<p>No changes to infrastructure or existing systems are required.</p>					
9	Reliability	<p>Periodic recalibration of the pressure gauge, the digital depth gauge, and the rail thermometer will be required.</p>					
10	Maintainability	<p>RailFrames are expected to be readily maintainable, key components being the hydraulic jack for lifting the rail, a pressure measuring gauge, and a digital depth gauge for measuring rail lifting height. All are standard industry components.</p>					
11	Approval *	<p>It is proposed that RailFrame be approved for measuring rail stress free temperature throughout the ARTC network.</p>					
12	Conditions of Approval *	<p>Proposed conditions of approval are:</p> <ul style="list-style-type: none"> That RailFrame be operated in accordance with the supplier's manual; That operators be suitably instructed in use of the equipment and demonstrate competence. 					
13	Does the Originator accept the additional Conditions of Approval as set by the Review Panel:	Yes	<input checked="" type="checkbox"/>	No	<input type="checkbox"/>	N/A	<input type="checkbox"/>

14	Sign off	ARTC office use only
	Review Panel:	
	John Cowie	Date: 19. 4. 07
	Tim Calver	Date: 16/4/07
	Graeme Templer	Date: 16/4/07