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Preface

This Code of Practice was prepared by the Operating Road Rail Vehicles Development Group, overseen by the RISSB Rolling Stock Standing Committee.

Objective

The objectives of this Code of Practice (CoP) are as follows:

- Provide users with the necessary information and guidance on Road Rail Vehicles (RRVs) to develop their own procedures for ensuring their safe use.
- Enable the user to ensure suitable and sufficient training and competence for the operators of RRVs is identified and provided.
- Ensure that all RRV's including 3rd party machines are correctly engineered and maintained to a suitable standard.
- Ensure that all operators are at an acceptable standard of competence for activities on the Rail Infrastructure Managers track and for the required operations to be carried out.
- To highlight the key risk factors and possible risk control measures associated with the operation of RRVs.
- To assist in providing a clear standardized approach for all RRV operations across Australia and New Zealand.

Using this CoP will assist all owners and users to ensure and/or improve the overall management and operation of RRVs and minimize the potential for incidents.

Background

This CoP has been developed for all those who use or have responsibility for, either directly or through contracting arrangements, the operation of RRVs. It applies to all vehicle types in use in the Australasian Rail Industry.

RRVs are a ubiquitous part of the railways and are used in a wide variety of activities and tasks. Such use has seen several adverse incidents and instances of misuse throughout the country.

This CoP provides all users with relevant information and guidance on RRVs and their management. This aids the development and establishment of systems and procedures to ensure the safe and effective operation of RRVs.

Attendant to this, there is information and advice on the necessary training, competence requirements and familiarisation aspects necessary for the safe use and effective operation of these vehicles.

The use of third party RRVs supplied under dry/wet hire or under sub-contract conditions is an area that presents concerns for users. The principal concerns are in relation to the competency of operators, machine familiarisation, effectiveness of maintenance regimes, poor safety culture and the general standard of machine management processes for their safe operation on the track.

This CoP also provides some basic tools, such as example forms, to assist in the establishment of baseline processes that can be utilized in the user's own operations and/or be applied to other parties to enable an acceptable minimum standard and ensure consistency.

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Section 1 Scope and general

1.1 Scope

This document covers the operation of road rail vehicles (RRV) for rail operations only. Road operations are required by law to comply with Australian Design Rules, National Heavy Vehicle Regulations and all relevant road rules. Operation of plant and equipment is covered by Work Health and Safety legislation.

This CoP does not generally apply to the Work Health and Safety aspects of the operation of the RRV host vehicle, although there are some circumstances where the interface between WHS and rail safety requires acknowledgement and clarity. In general, it only applies to the operation, use and maintenance of the rail wheel guidance system when being utilized on rail.

This CoP also does not apply to operations of RRVs when not on the railway track.

1.2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document:

- AS 1418.10, *Cranes, hoists and winches – Part 10: Mobile elevating work platforms*
- AS 1906.1, *Retroreflective materials and devices for road traffic control purposes*
- AS 2809.1:2020, *Road tank vehicles for dangerous goods, Part 1: General requirements for all road tank vehicles*
- AS 7502, *Road Rail Vehicles*
- AS 7509, *Rolling Stock – Dynamic Behaviour*
- AS 7479, *Track maintenance and road rail vehicles – Collision avoidance and proximity warning*
- AS 10896.1, *Rough-terrain trucks – Safety requirements and verification – Part 1: Variable-reach trucks*
- *ONRSR Guideline – Road Rail Vehicle Management and Operations*
- *NTC Load Restraint Guide*

NOTE:

Documents for informative purposes are listed in a Bibliography at the back of the document.

1.3 Defined terms and abbreviations

For the purposes of this document, the following terms and definitions apply:

1.3.1

aggregate trailer mass (ATM)
total weight of the fully loaded trailer

Note 1 to entry: ATM includes the trailer's own weight (tare weight) and the weight of its maximum payload.

1.3.2
base vehicle
host vehicle

road-based vehicle which has been modified to operate on railway

1.3.3
dry hire
hiring of a vehicle or plant without an experienced operator from the supplier

1.3.4
gross vehicle mass (GVM)
maximum permissible weight of a fully loaded vehicle

Note 1 to entry: The GVM includes its operator(s), load/cargo, and any weight transferred from the trailer, as specified by the manufacturer.

1.3.5
gross combination mass (GCM)
maximum permissible combined weight of a vehicle and the trailer(s) it is towing

Note 1 to entry: The GCM includes everything on board both vehicles (i.e. operators, materials, fuel, etc.) It is a safety limit set by the manufacturer to ensure that the vehicle can safely handle the combined weight.

1.3.6
LPA
possession

local possession authority as defined in the ANRP Glossary

Note 1 to entry: An authority that closes a defined portion of track for a specified period.

1.3.7
original equipment manufacturer (OEM)
company whose products are used as components in the products of another company

Note 1 to entry: The OEM generally works closely with the company that sells the finished product, referred to as the value-added reseller (VAR), and customizes designs based on that company's needs.

1.3.8
on-tracking
process whereby an RRV changes from off-rail operations to on-rail operation

Note 1 to entry: On tracking is usual deemed to commence the instant the vehicle operator initiates deployment for the first set of rail wheel equipment and ends when all rail wheel equipment on the vehicle is fully deployed.

1.3.9
off-tracking
process whereby a RRV changes from on-rail operations to off-rail operation. Deemed to commence the instant the vehicle operator initiates retraction for the first set of rail wheel equipment and ends when all rail wheel equipment on the vehicle is fully stowed.

1.3.10
owner
person or body with legal title to the road rail vehicle

1.3.11
road rail vehicle operator
generic term for a person who is in direct control of the RRV and its operations

1.3.12
RIM
rail infrastructure manager as defined in Rail Safety National Law

Note 1 to entry: In relation to rail infrastructure of a railway, means the person who has effective control and management of the rail infrastructure, whether or not the person owns the rail infrastructure or has a statutory or contractual right to use the rail infrastructure or to control or provide access to it.

1.3.13
rail guidance equipment (RGE)
structures and equipment enabling a road/ground-based vehicle/machine to mount and travel on rail. Also commonly referred to as rail gear and rail guidance system.

1.3.14
road rail vehicle (RRV)

self-propelled machine that can travel over the ground and also travel on rail by virtue of a rail wheel guidance system.

1.3.15
rail transport operator (RTO)
rail transport operator as defined in Rail Safety National Law

1.3.16
rolling stock
any vehicle that operates on, or intends to operate on, or uses a railway track, including any loading on such a vehicle, but excluding a vehicle designed for both on- and off-track use when not operating on the track

Note 1 to entry: Rolling stock is a collective term for a large range of rail vehicles of various types, including locomotives, freight wagons, passenger cars, track machines and road-rail vehicles.

1.3.17
RSO
rolling stock operator as defined in Rail Safety National Law

1.3.18
tare mass
the unladen weight of the vehicle

1.3.19
TOA
track occupation authority as defined in the ANRP Glossary

Note 1 to entry: An authority for competent workers and their equipment to occupy a defined portion of track for a specified period

Note 2 to entry: Often simply referred to as an occupation.

1.3.20
track vehicle
vehicle, usually self-propelled, used mainly for inspecting and/or maintaining infrastructure

1.3.21
track vehicle operator (TVO)
competent worker controlling the movement of a track vehicle

1.3.22
TWA
track work authority as defined in the ANRP Glossary

Note 1 to entry: An authority for non-exclusive occupancy of track by track workers and equipment within specified limits.

1.3.23
wet hire
hiring of a vehicle or plant with an experienced operator from the supplier.

1.3.24
user
organisation, entity or individual who has the responsibility for the day-to-day decision making in relation to the operation of RRVs

1.3.25
WoTA
work on track authority as defined in the ANRP Glossary

Note 1 to entry: An authority to perform work on track. See Local Possession Authority (LPA); Track Occupancy Authority (TOA) and Track Work Authority (TWA)

1.3.26
worksite
worksite is an area with defined limits that is protected by a WoTA or other means so that work can be performed.

1.4 Responsibility

All users of RRV's are to establish and define the roles, responsibilities and relationships of all persons involved in the life cycle of RRVs. This should include the following aspects as appropriate to the RRV operations undertaken:

(b) Procurement;
(c) commissioning;
(d) certification/network acceptance;
(e) operations;
(f) maintenance;
(g) modification; and
(h) disposal.

Such definition of roles and responsibilities will assist in improving the safety of RRVs and reducing the risk of incidents for all parties.

Section 2 Types of RRV

The various types of RRVs are fully described in AS 7502 which classifies RRVs into three (3) main types, depending on their braking and traction arrangement, as follows:

(a) Type 1 - Self Powered Rail Wheels

(b) Type 2 - Friction Drive

(c) Type 3 - Direct Drive

It is possible that some RRVs fall into two or more classification types. Typically, the difference in classification type can be between travel and work modes.

Refer to AS 7502 for full details and a description of the various types.

Section 3 Rolling stock (RRV) network acceptance

All RRVs are classed as rolling stock. Before any item of rolling stock is permitted to operate on a RIM's infrastructure, it shall be required to go through a formal acceptance process (also often referred to as registered) for use on that infrastructure.

The RRV acceptance process is usually controlled by the RIM and it is broadly similar in all networks and jurisdictions. It is a formal process whereby all aspects of the rolling stock are assessed and subjected to scrutiny against the RIM's operational and interface standards for the infrastructure. The process includes gauge, outline (i.e. swept, kinematic, etc.) braking performance and other factors.

Accredited RSO contractors that have their own acceptance process(es) for RRV(s) does not negate the need for the same RRV(s) having to be formally accepted by any RIM to operate on their infrastructure.

When the RRV has been formally assessed and accepted under the RIMs acceptance process, the RRV will be permitted to operate on that infrastructure. It should be noted that the process can result in certain restrictions and limitations on the use of the RRV on that specific infrastructure and/or under specific circumstances. Such conditions will be noted on the registration documentation and advised to the owner of the RRV.

In some cases, the RIM might also require annual recertification (or at timescale that they define) in order to ensure that the RRV's compliance is maintained.

Section 4 Network operating rules and RRVs

All rail networks, private sidings and tracks under construction have specific rules and procedures for the operation of RRVs on the railway. These rules cover a variety of aspects, but in general, the following items are always addressed:

(a) Occupying a running line.

(b) Level crossing protocols detailing how the RRVs are to approach and travel over these.

(c) Entering and leaving WoTA/worksite limits.

(d) Communication protocols including the loss of communication.

(e) Operation in convoy on open track.

(f) Actions to be taken in the event of a degraded condition which does not result in the RRV being disabled. Examples include failure of headlights, warning lights and similar.

(g) Breakdown or other emergency.

All persons who are operating or controlling the operation of RRVs shall be suitably trained and competent in these rules.

Section 5 Safety and risk

5.1 General

A risk assessment shall be carried out on all types of RRVs and the operations that they are going to undertake. Such a risk assessment is to be carried out in accordance with the owner's risk management procedure as described in their Safety Management System (SMS) or under the RTO's accredited SMS if the RRV is owned by a non-accredited organisation. This assessment shall include clear demonstration of the risks being controlled so far as is reasonably practicable (SFAIRP).

The risk assessment should cover all aspects of the RRV including its whole of life cycle as appropriate in the circumstances of intended and foreseeable unintended use including operations on the network, the specific activities to be undertaken and any modifications. This should include foreseeable degraded and emergency conditions and their control (e.g. breakdown conditions, stranding, etc.)

Notwithstanding this requirement, there are some general safety considerations that are common to all RRVs. These are described in the following sections.

5.2 Documentation

5.2.1 Operator's manual

All vehicles shall have an OEM operator's manual. In some cases, there can possibly be two manuals; The first for the host vehicle and the second for the rail guidance equipment. It is required that the Operators Manual(s) are to be kept in a suitable weather-proof stowage on board the vehicle.

It is noted that there is a growing move towards such information being kept and managed electronically. If the owner or user of an RRV chooses to make use of such technology, the obligation is to ensure that the information is correctly backed up in a suitable, secure location and any updates correctly managed and disseminated as appropriate. It should be easily accessible by the operator/driver.

5.2.2 Other documentation

In addition to the OEM manual(s), other documentation relevant to the operation of RRVs can include:

(a) a vehicle log book;

(b) a maintenance manual which includes a maintenance schedule;

(c) records of maintenance carried out. This should include both the vehicle and the rail guidance equipment. Some organisations also have a plant defect record in each RRV. This will be dependent on the specific owner's/RTO's procedures;

(d) pre-start inspection record documents;

(e) RIMs acceptance/registration/time-based recertification documentation requirements;

(f) engineering and design documents as applicable;

(g) where the owner of the RRV decides to use electronic record systems, there needs to be still some way for the person who will operate the vehicle, or auditors, to readily establish and demonstrate the state of maintenance and upkeep; and

(h) operations and maintenance manuals for auxiliary equipment (e.g. cranes, EWPs etc.)

Documentation produced by the owner relevant to the RRV and its operations, and documentation/information produced by the OEM should support and/or complement each other. This means avoiding discrepancies in, for example, maintenance frequencies, tyre specifications or loading conditions except and unless as has been established by means of the owners Change Management process supported by the appropriate engineering and risk evaluations to ensure suitability.

5.3 Tyres and wheels

A key area for ensuring safety and safe operations are the tyres and wheels. The specific design and selection requirements for tyres and wheels are addressed in AS 7502. For the operation of RRVs, the aspects to be managed include:

a) when requiring tyre replacement, the owner of the RRV shall ensure that the tyres on the vehicles are the correct type as specified by the OEM. Correct tyre types, pressures and tread pattern are essential to the safe operation of the RRV. Failure to ensure this presents a risk of unbalanced braking and acceleration as the tyre on one side can outperform the other, leading to risk of derailment;

b) ensuring the continuing security of the wheels and torque of the wheel nuts – The use of wheel nut indicators is valuable for this aspect;

c) monitoring of the general condition of the rail wheels including flange and tread condition (e.g. no sharp flanges or steps, thin flanges, tread hollowing, skids, evidence of spalling and similar);

d) tyres and wheels may not be changed for/to different types and/or sizes without appropriate authority and following application of the change management process;

e) recap (or retread) type tyres are forbidden for use on RRV's; and

f) condition monitoring of the rail wheel bearings, studs, nuts and sandwich rubber (where used) is required. See Section 13 for further information about tyres.

5.4 Tyres and tyre loading

There are specific requirements in relation to tyred vehicles and loading aspects. It is the obligation of the user of the RRV for its operations to ensure that the tyres recommended for the vehicle, and their on-rail pressures are maintained in compliance with the RRV OEM manual or other suitable instructions.

Loads on rubber tyres in contact with the rail shall not exceed the manufacturers' load rating under any condition of loading. This is particularly important if the vehicle is used as a load-shifting vehicle such as loaders, cranes or similar where loads can be variable, asymmetric and/or subject to changing dynamic operating conditions. It is recommended that irrespective of the vehicle load, the maximum load on the tyre does not exceed 90% of its load rating.

It is also necessary to ensure that sufficient load is maintained on the tyres to provide adequate grip for traction and braking of the RRV, noting that the contact patch between the tyre and rail head is significantly smaller than when operating on-road

Those vehicles that have dual rear wheels and therefore have a pair of tyres not in contact with the rail head, that would normally be sharing the load and braking performance, need to also be considered in terms of loading, braking performance and uneven wear, given any particular operations they are expected to carry out. There should not be an expectation that such vehicles can perform operations that involve carrying the same loads on rail as they can on road. Refer to AS 7502 for more information.

5.5 Rail guidance equipment – General

The rail guidance equipment shall be regularly inspected for general wear-and-tear to suspension hydraulic systems and hoses, structural damage to the frame. etc. See Section 9, Section 13, Appendix A and Appendix D for more information.

5.6 Vehicle information systems

The amount and type of information that is to be provided to the operator of the RRV shall be relevant and required for the safe operation of the RRV. The amount and type of secondary information not directly related to the task needs to be minimized.

Unnecessary distraction, particularly within operating worksites, can lead to serious incidents and injury to the operator of the RRV or other personnel in the vicinity.

The same requirements apply to other sources of potential distraction including mobile phones and any on-board computer systems such as those that might be used for operational activities. Use of these should be minimized and designed to be integrated with the vehicle operations and connected to the vehicle's own on-board system where practical.

The aspect of in-cab signage also needs to be carefully assessed. These should be kept to the minimum.

The placement of such signage is also of importance. Ideally, they should be at a location where the operator will notice them when seeking to perform a particular action related to the warning or advice of the sign, such as adjacent to the actuating switch or lever or within sight lines for operations.

5.7 Collision avoidance systems

RRVs are not required to be fitted with anti-collision devices as standard. However, there can be some operators who consider the fitment of these items to be desirable.

Such fitment should only be carried out following a careful review of the risks to be controlled and any potential unintended consequences to the safety of the RRV operation(s).

Any such anti-collision systems should meet the requirements of AS 7479:2020.

5.8 Operating conditions

As with all items of plant and equipment, RRVs have limitations imposed by the constraints of engineering and the operating environment on the nature and extent of operations they can undertake. This includes such factors as:

(a) operational characteristics of the RRV including maximum speed (forward and reverse), braking performance, traction, lifting capacity, reach capacity and so on depending on the nature and type of the vehicle;

(b) the track conditions including track grades, curves and cant;

(c) general environment factors including remote areas, extremes of cold and heat, wet conditions vegetation, fauna etc.;

(d) working under live overhead traction wiring equipment, and

(e) traffic conditions.

It is the responsibility of the owner of the RRV to ensure that the full range and limitations of operating conditions are known, understood and adequately communicated to the vehicle operator. This is best achieved by conducting a comprehensive risk assessment carried out by person(s) with the relevant knowledge and understanding of the vehicle(s), its performance and the task requirements.

Where an RTO seeks to utilize an RRV for infrastructure related activities, it is the responsibility of the RTO to fully understand the nature and operating condition in which they seek to use the RRV and select an RRV suitable for the task.

5.9 Change management

Where changes, including engineering modifications, as described under AS 7502 are deemed necessary or desirable to an RRV, the modification shall only be done under the direct authority of the RRV owner and the supervision of a suitably competent and qualified person.

In addition to the above, detailed records of any changes/modifications shall be kept and made available along with risk assessment of the change(s). Similarly, any vehicle operating manuals shall be updated to accurately reflect the changes or modification, and all personnel suitably trained and familiarized with the change as necessary.

This aspect is described in more detail in Section 12 of this document.

5.10 Decommissioning/disposal of RRVs

5.10.1 General

When the operator of an RRV no longer requires the RRV because:

(a) the RRV has reached the end of its serviceable life;

(b) the RRV RGS has deteriorated beyond economical repair;

(c) the RRV has sustained irreparable damage; or

(d) the RRV is no longer required for operational use,

the RRV owner will require to arrange for the decommissioning and/or disposal of the RRV in accordance with the requirements described in AS 7502.

5.10.2 Transfer of RRV

Where it is decided to sell or otherwise transfer custodianship of an RRV to another party, other than as described in Section 5.10.1 or as scrap or spare parts, the owner of that RRV shall:

(e) provide suitable and sufficient information on the hazards of the RRV and its use;

(f) advise, in writing, any specific requirements or limitations on the use of the RRV such as out of gauge, operating restrictions, specialist training or working under overhead traction systems;

(g) provide the full available history of the RRV including its maintenance history, defects or other out of course faults and any changes/modifications; and

(h) ensure the provision of the relevant OEM documentation, e.g. operators manual, to the party taking over control of the RRV from the original owner.

The new owner of the RRV shall ensure that they advise all relevant RIM(s) of the change of ownership, and the confirmation that the vehicle is unmodified

Section 6 Training and competence

All RTOs that utilize RRVs, either directly or under contract, are required to ensure that personnel operating the RRV are suitably competent for the tasks they require to undertake in relation to RRVs. This includes:

(a) track vehicle operators;

(b) RRV operators; and

(c) maintainers

When contract RRV provision is being used, the RTO is still required to ensure that the contractor providing the RRV has competent personnel. This is normally done as part of the pre-selection review. The RTO shall ensure the contractor has:

(d) suitable and sufficient processes for training and assessment of competencies of the operators of the specific RRVs;

(e) when dry hiring, that a competent person provides any necessary formal and/or familiarization training to the RIM/RTOs personnel as necessary;

(f) evidence that such training and assessment has been done;

(g) ongoing training and refresher/ familiarization processes in place and delivered; and

(h) evidence of maintenance/utilization of competence.

As part of this process, there is a requirement for formal training which can be delivered based on the Vocational Education and Training – Transport and Logistics Infrastructure (TLI) competencies for RRV's (reference TLIC 3045 Operate Road Rail Vehicle). This will still require formal verification of competence on the specific RRV to be operated.

In addition to this formal qualification, there is other training required for the safe operation of the RRV on the railway system. This includes RIMs additional specific training requirements for their networks and these shall be established and undertaken in advance of any operations.

In addition to the foregoing, all RRV operators should have a good knowledge and understanding of the user's manual for the vehicle they are using, including actions to be taken in the event of an unplanned failure on track.

In many cases where major project/new construction works are being carried out, such as new tracks or major track rehabilitation, it is often the case that the construction works will have local rules for traffic management including for RRVs and the operators of the vehicles will require training and competence in these localized processes.

Route knowledge is a requirement for any RRV operator. Route knowledge is essential in knowing and understanding the network and any unique aspects which all existing networks and new construction infrastructure have. It is also necessary to ensure the safe operation and handling of the RRV and also for the safety of other personnel, particularly in worksites and the public in such circumstances as at level crossings or other interface locations.

A consideration in terms of competency, is that person can be a correctly and formally trained operator of an RRV. That does not, however, make them a safe and effective operator of any other RRV.

Where a person is to take control of a vehicle they have never operated before or which they have not operated for some considerable time, they shall undertake (re)familiarization on that specific vehicle.

Familiarization training shall be given by a competent person in the specific type of vehicle in question.

This can be in relation to such factors as changes, operations or technology as might be appropriate.

Owners of RRVs should assess whether they need to implement refresher training for their RRV operators. This is highly desirable for those RRV operators who are not using the vehicle(s) regularly. It is also useful in ensuring that poor practices being picked up by regular operators are rectified. The frequency of such refresher training should be established on a risk-based decision, which should take into account:

h) the number and type of RRVs being used;

i) the frequency of operations;

j) the operating environment(s); and

k) any incidents.

Persons who are required to perform maintenance on an RRV are required to be suitably competent and have demonstrated experience in the maintenance and repair of the vehicle's rail guidance system. It is not sufficient to simply have competence in the maintenance of the host vehicle.

Section 7 RRV – Trailers

7.1 Trailers – Overview

It is common for trailers to be used with RRV, especially for track construction and maintenance activities.

Although this document is a CoP with informative requirements, the trailer requirements below are considered the minimum for the acceptance and operation of trailers on rail networks and would be expected by RIM's. It is anticipated that these requirements are implemented in future RISSB Standards and have been included here to provide guidance on the requirements and use of trailers in the interim.

7.2 Trailers – General

A trailer is a small non-powered infrastructure maintenance vehicle used for conveying tools and equipment along the track.

Trailers should be readily removable from track, although due to their mass, this is generally limited to lifting off rail by an appropriate machine/vehicle/plant and not by hand.

A trailer can be operated as a trolley or attached to another vehicle for towing using an acceptable towbar or drawbar. A trailer that is not attached to a motorised vehicle shall be treated as a trolley. Where the trailer is used as a trolley, it shall meet the requirements for trolleys.

Some trailers can be basic rail-bound trailers (i.e. no road wheels) and others can also have road rail equipment like normal RRV units.

A trailer shall be accompanied, at all times, by sufficient persons or other means to control and remove the vehicle from the track as required.

The combined GVM of both trailer and towing vehicle shall be less than or equal to the towing vehicle's GCM.

Trailers shall only be hauled by authorized/accepted vehicles.

7.3 Trailers – Network acceptance

Trailers are treated similarly to RRV's and generally require formal network acceptance onto rail networks as per the relevant RIM network acceptance process.

The network acceptance generally involves the appropriately designed and tested trailer being submitted to the relevant RIM with the following information:

- Information packs/drawings/diagrams.
- Testing/inspection documentation.
- Engineering assessments/reports.
- Sponsorship documentation.

- Operation and maintenance documentation, including maintenance service schedules for both base vehicle and guidance gear if fitted.
- Photographic evidence.

For continued operation on rail, there shall be clear evidence that the maintenance requirements of the vehicle are being met.

Trailers are generally accepted onto a rail network as a combination with the hauling vehicle and any subsequent operating conditions.

7.4 Trailers – Engineering

Trailers shall require an engineering assessment to ensure safe operation on rail. The engineering assessment is generally submitted to the applicable RIM as part of the vehicle submission and network acceptance process.

The engineering assessment shall be carried out by a competent and qualified engineering person or engineering company.

The engineering assessment is a one-off assessment, providing the vehicle configuration or operation does not change.

Engineering assessment shall include:

(a) wheel design used in reference to the maximum expected loading;

(b) bearings used in the wheel assemblies in reference to the maximum expected loading;

(c) axle design used in reference to the maximum expected loading;

(d) frame structure design in reference to the maximum expected loading;

(e) drawbar design including structural strength and maximum safe hauling load;

(f) suspension design (including any pivoting axle) with reference to the maximum expected loading;

(g) brake design, capability, capacity and effectiveness of the brakes including failsafe nature of brakes; and

(h) multiple trailer design, including its effects on frame structure and drawbar design, l/v affects, braking performance, and failsafe brake design.

The report shall be structured to clearly show the assessment details in items (a) to (h) in this list. If the report is not structured to clearly show these details, a reference section shall be included to provide a clear reference to the applicable sections that the above assessments are detailed in.

7.5 Trailers – Body

Trailers shall not exceed the relevant rolling stock outline for the network being operated on. Refer to AS 7507:2025, Reference Vehicle 21, or as per the RIM's permitted outline.

Rail guidance wheels shall be laterally centred with respect to the vehicle body or road wheels by design. A maximum tolerance of ± 10 mm between rail guidance wheels and the vehicle body or road wheels is permitted.

When operating under overhead wire, all trailers require an electrical safety inspection and operate in accordance with all relevant electrical specific rules and safety procedures.

7.6 Trailers – Rail wheels

All rail wheels fitted to trailers shall meet the requirements as per AS 7502 but shall not be less than 250 mm in diameter.

7.7 Trailers – Wheelset back-to-back measurement

The lateral spacing of the rail wheels shall meet the requirements of AS 7502.

7.8 Trailers – Static vehicle twist test

All trailers shall be designed such that they meet the requirements of AS 7502 and AS 7509 regarding wheel unloading performance due to track twist.

Vehicles with only two rail wheels (one rail axle) and no road tyres contacting the rail shall be exempt from the twist test on the basis that a spherical-type coupling is used in the towbar or drawbar with sufficient free rotational movement to accommodate the required track twist.

7.9 Trailers – Transferring to and from rail operation (road/rail trailers only)

All road/rail trailers shall meet the requirements of AS 7502 regarding transfer from road to rail mode and from rail to road mode (and between rail modes if applicable). This would include:

- transferring to and from rail operation;
- emergency transfer to and from rail operation; and
- indication of transfer to and from rail operation.

The requirements listed in this section shall be met with and without the hauling vehicle attached. The indication of transfer to and from rail is not required at the hauling vehicle driving position but is required at the controls of the trailer guidance gear.

7.10 Trailer – Brakes

7.10.1 General

All trailers shall be equipped with a fail-safe braking system.

The brake system shall proportionally apply the trailer brakes as the brakes on the hauling vehicle are applied and releases the trailer brakes as the brakes on the hauling vehicle are released.

The brake system shall provide a service brake function and a park brake function.

7.10.2 Fail-safe requirement

The brake system shall require a positive action to release and hold the brake in the released position. After this positive action is released, the brake shall reapply.

If the trailer separates from the hauling vehicle, the brakes of the trailer shall apply in a fail-safe manner. The connections and couplings used in the brake system shall be such that the braking system of the trailer is not suppressed in any way during or after separation.

Couplings and fittings such as Dry Break, Autoseal or Quick Connect that are designed to seal when hydraulic pressure is lost, are not suitable for this application as they can suppress the braking system.

NOTE:

The fail-safe nature of spring applied hydraulic or pneumatic release brake systems rely on the hydraulic fluid or air venting from disconnected or severed hoses, fittings, or couplings. Since venting can possibly be suppressed when dry-break or quick-connect type couplings are used, these styles of connections are not suitable.

7.10.3 Brake performance requirements – Service brakes

The brake performance testing requirements for trailers shall include the following tests:

- Hauling road/rail vehicle without trailer attached.
- Hauling road/rail vehicle with empty trailer attached.
- Hauling road/rail vehicle with fully loaded trailer attached.

All three of the test requirements listed in this section shall meet the brake performance requirements of road/rail vehicles as detailed in AS 7502.

NOTE:

These test requirements provide the performance characteristics of the trailer under all conditions and provide evidence of hauling vehicle and brake system compatibility. The RIM can require additional brake testing to be carried out with loaded hauling vehicle with loaded trailers to ensure braking performance at maximum loading is maintained

7.10.4 Brake performance requirements – Park brakes

All trailers shall be fitted with a park brake that hold the fully loaded trailer, with and without the hauling vehicle attached, indefinitely on a 1 in 30 grade or the maximum grade for the network on which it shall operate, whichever is greatest or as otherwise specified by the RIM.

7.11 Trailers – Drawbars

Drawbars and attachments shall be designed for use on the trailers on which they are to be used.

As part of the trailer engineering assessment, drawbars shall have engineering certification detailing maximum rated capacity.

Each drawbar shall be fitted with a compliance plate detailing the following:

- manufacturer
- serial or model number
- date manufactured
- engineering certificate number (unless the drawbar serial or model number is included in the engineering report)
- maximum safe hauling load
- date inspected and crack tested (NDT)

NOTE:

The NDT date is left blank to be stamped with the NDT date after 10 years of service. It is not stamped with the date the vehicle was NDT as part of its manufacture, nor is it stamped with the expected future date of NDT.

7.12 Maximum speed

The maximum speed of a trailer hauling vehicle combination shall be determined based on the lowest maximum speed of the individual vehicles.

No trailer shall be permitted to exceed 50 km/h when on rail. Any trailers exceeding 15 km/h shall require a ride test. Refer to AS 7502 and AS 7509 for ride test details.

Driver safety system requirements might need to be reviewed for the hauling vehicle with the increased mass of trailer and trailer load.

7.13 Trailer – Marking and identification

All trailers shall have a distinct identification code or number clearly visible on each side of the vehicle. The distinct identification code or number shall be 125 mm in height or as high as possible if the body does not allow 125 mm.

All trailers shall be marked with the tare mass and either the maximum loaded mass or the maximum carrying capacity.

All trailers should be marked with the accepted hauling vehicle or vehicles plant, registration or VIN numbers.

All trailers shall have reflective tape on both sides and at the trailing end. The side reflective tape shall be reflective zebra striping as follows:

- Vehicles with body lengths less than 2,500 mm shall have continuous striping. Vehicles greater than 2,500 mm may have spot striping at a maximum spacing of 1,000 mm between stripes.
- Placement of spot stripes shall highlight the extremities of the vehicle.
- The width of the continuous reflective zebra stripe material shall nominally be 100 mm (with a minimum of 50 mm). Spot striping shall have a minimum area of 0.025 m^2 and a minimum length of 250 mm.
- The zebra stripes shall be at 45^o to the horizontal and a minimum width of 50 mm.
- Zebra stripes shall be of a reflective material of Class 1A in compliance with AS/NZS 1906.1.
- Zebra stripes shall consist of any contrasting colours but shall not include the colours red or green.

Reflective tape at the trailing end shall be red and either yellow or orange reflective zebra striping.

In addition to the requirements in this section, outriggers, support legs, stabilizer legs and similar, which have the potential to protrude outside of the rolling stock outline, shall be highlighted with yellow and black reflective striping.

7.14 Trailer – Lights

Trailers shall be fitted with automotive tail and stoplights compatible with the towing vehicle, comprising two tail and two stoplights, arranged at the trailing end and on either side of the vehicle.

The tail-lights shall function at all times when the vehicle is in rail mode, and the stoplights shall function when the brake is applied when in rail mode.

7.15 Trailer – Compliance plates

All trailers shall be fitted with a compliance plate.

Compliance plates shall be permanently fitted to the vehicle in a low-stress area.

The compliance plates shall be embossed or stamped with the following information:

- manufacturer
- model number (if applicable)
- serial number or VIN
- date manufactured
- tare mass
- maximum loaded mass
- approved hauling vehicle plant or registration number or VIN (recommended)
- date vehicle inspected and crack tested (NDT test).

NOTE:

The NDT date is left blank to be stamped with the NDT date after 10 years of service. It is not stamped with the date the vehicle was NDT as part of its manufacture nor is it stamped with the expected future date of NDT.

If a trailer has been operating but is not fitted with a compliance plate, a compliance plate shall be fitted and embossed or stamped with the following information:

- manufacturer (if known)
- model number (if applicable)
- serial number or vehicle identification number (VIN) (generate a number if necessary)
- date manufactured (if known)
- tare mass
- maximum loaded mass
- date vehicle inspected and crack tested (NDT test)
- approved hauling vehicle plant or registration number or VIN.

If the date of fitment is not known, the date is deemed to be greater than 10 years and a 10 year crack test shall be conducted and stamped as having been conducted on the compliance plate.

7.16 Trailer - Requirements for transporting personnel

Trailers can and are used to transport personnel. This occurs most commonly for track construction work or in remote or otherwise inaccessible areas such as major flood zones.

Where trailers are to be used to transport personnel they are required to meet all of the requirements described above and in addition will require a specific risk assessment and clearly identified engineering controls to ensure the safety of personnel being transported.

7.17 Requirements for hauling multiple trailers

The historical norm and the standards to date have been established with hauling a single trailer with an appropriate road/rail vehicle. Hauling more than a single trailer with an appropriate road/rail vehicle may be acceptable if the following aspects are met:

- Braking – compliant with the braking requirements for all empty and all loaded trailers (refer to Section 8.10).
- Speed – limited to 15 km/h, no higher speeds permitted even with appropriate ride testing.
- Engineering:
    - Loading – Any GCM limits associated with the hauling vehicle shall be met or an engineering assessment provided to show acceptable/safe operation at higher GCM limits.
    - Hauling vehicle design – The vehicle structure and towing points shall be shown to be acceptable/safe for all consist configurations, all loading combinations, under worst case traction or braking.
    - Drawbar – Acceptable/safe for all consist configurations, all loading combinations, under worst case traction or braking.
    - Trailer design – The trailer structure and the towing points shall be shown to be acceptable/safe for all consist configurations, all loading combinations, under worst case traction or braking.
    - Brake design (trailer and hauling vehicles) shall be shown to adequately apply and release for all vehicles in the consist and able to meet the failsafe brake requirement for all vehicles in the consist.
    - Derailment risk (L/V) shall be shown to be acceptable/safe for all consist configurations, all loading combinations, under worst case traction or braking.

7.18 Trailers – Hauling vehicle traction

The hauling vehicle shall have sufficient traction to haul the loaded trailer under all loading condition, all weather conditions, and all network curve and grade geometry including up to the steepest grade for the network on which it shall operate or as otherwise specified by the RIM.

Section 8 Elevated work platform units

8.1 EWP General

This section applies to elevating work platforms (EWPs), including telehandlers, boom lifts, cherry pickers and scissor platforms mounted to road/rail vehicles. In addition, this section also applies to EWP vehicles fitted with rail guidance gear.

Some vehicles do not meet the definition of EWPs in accordance with work safety authorities (e.g. Worksafe NSW/Qld/Vic, etc.) for design registration, for example vertical lifting platforms or vehicles with slide-out side platforms. These vehicles shall be treated as EWPs and meet the EWP engineering, stability and test requirements in this CoP.

All EWPs shall meet the requirements of AS/NZS 1418.10. The requirements in this section are not the only requirements for EWPs.

Some points to note in relation to EWP operation on rail are as follows:

- EWPs mounted to road/rail vehicles shall be permanently mounted on the road/rail vehicle in accordance with the base vehicle manufacturer's chassis and sub assembly mounting specifications. EWPs chained to flatbed trucks are prohibited from use on Rail Networks.
- The minimum braking performance of EWPs differs to that of the brake functionality performance detailed in this standard and requires a higher performance.

- The maximum allowable speed of EWPs is lower than those permitted within a worksite (normally 15 km/h) and more than likely lower than the base vehicle speed.
- EWPs require additional features to the rail guidance system to provide obstacle deflection for the rail wheels (rail guards) and derailment containment to provide guidance and promote stability in the event of derailment (derailment containment devices).
- EWPs with pivoting axles shall be adequately interlocked to ensure stability is maintained for EWP operation and wheel unloading performance is maintained for vehicle travel on rail.
- EWPs shall ensure its operation is restricted if it exceeds the maximum allowable conditions that the EWP can operate on (for example excessive grade or superelevation).
- Static work mode EWPs shall ensure its vehicle travel on rail operation is restricted if the EWP is not locked in the stowed travel position.

Some aspects of the rail guidance system may require additional features or functions that are required for EWP vehicles. For example, hydraulic cylinders used in rail guidance system or pivoting axle lockouts may require additional features to form part of the EWP load holding or support system.

Stability testing is detailed in Section 8.3 (and in the subsequent Section 2) which details minimum network fore/aft slope and side slopes, additional stability requirements, and operational limits associated with these.

The operation of road/rail vehicles whilst the EWP is deployed outside of the stowed travel position (Mobile Work Mode) shall be subject to compliance of the twist test requirements and maximum wheel unloading (under super, grade, and worst-case loading conditions). If the wheel unloading limits are exceeded, the vehicle shall be restricted from movement, or the EWP limited such that the wheel unloading is within limits. See Section 8.3 for further details.

8.2 EWP operations

8.2.1 Travel mode only (no EWP use)

Travel mode only is defined as no EWP use when the vehicle is on rail.

The EWP operation has not been designed or tested (e.g. stability tested) to operate on rail. For use of the EWP, the vehicle shall be removed from rail or the vehicle supported by stabilizers such that the wheels are lifted off rail.

This shall be appropriately noted in operating restrictions as part of the network acceptance.

The vehicle shall meet all other aspects of this code to allow travel mode on rail.

8.2.2 Static work mode

Static work mode is defined as EWP use on rail when vehicle is stationary on rail, travel of the vehicle whilst the EWP is in use (out of its stowed position) is not permitted

The vehicle shall undergo a stability test that complies with AS/NZS 1418.10 at the maximum grade and superelevation as outlined in Section 8.3 and meet its requirements for static work mode.

NOTE:

Lifting of rail wheels during the stability test is not permitted.

The vehicle shall meet all other aspects of this standard to allow travel mode on rail.

The vehicle interlocking shall be confirmed to only allow EWP use when the vehicle is stationary and for vehicle travel only when the EWP is locked in the stowed travel position.

This shall be appropriately noted in operating restrictions as part of the network acceptance.

8.2.3 Mobile work mode

Mobile work mode is defined as EWP use (out of its stowed position) whilst the vehicle is travelling on rail (vehicle in motion with rail wheels rotating)

The vehicle shall undergo a stability test that complies with AS/NZS 1418.10, at the maximum grade and superelevation as outlined in Section 8.3 and meet its requirements for static work mode.

NOTE:

Lifting of rail wheels during the stability test is not permitted.

The vehicle shall undergo a twist test at the maximum grade, superelevation, and most unfavourable EWP slew or reach as outlined in Section 8.3 and meet its requirements for mobile work mode.

It is expected that the reach or loading (or both) of the EWP will need to be reduced to meet these requirements for mobile work mode compared to the static work mode.

The vehicle shall meet all other aspects of this standard to allow travel mode on rail.

If the EWP has different range or loading conditions for static and mobile work modes, then the vehicle's interlocking, to only allow vehicle travel when the EWP is restricted to the mobile loads and ranges, shall be confirmed.

EWP vehicles meeting the mobile work mode requirements are described as MEWP and shall be appropriately noted in operating restrictions/conditions as part of the network acceptance.

8.2.4 EWP design considerations

The addition of an EWP to a road/rail vehicle can impact its design in terms of loading the vehicle chassis, guidance gear and components, both in travel mode and in work mode. The loads due to the EWP shall be taken into account in the design of the vehicle, including the maximum worst case loading of the EWP in any possible loading and position.

The engineering assessment shall include an assessment of all relevant load cases including offset loadings applied when the EWP is deployed.

This requirement is applicable to all road/rail vehicles fitted with EWPs.

If the requirement in this section is not met, but the vehicle meets all other respects, then the vehicle may continue to operate on the rail network. However, the EWP shall not be used on rail. This is identified and published appropriately in network acceptance conditions.

8.3 EWP testing requirements

8.3.1 General

This section covers the stability and wheel unloading requirements of EWP road/rail vehicles. A report shall be prepared which provides evidence of compliance. A copy of this report shall be submitted to the RIM as part of the engineering report requirements.

8.3.2 Stability testing for static work mode EWP

All road/rail EWPs or road/rail vehicles fitted with EWPs shall be tested for stability on rail.

Testing shall be in accordance with the requirements in AS/NZS 1418.10.

The test track conditions shall be as follows:

- Minimum fore/aft slope shall be 1-in-30 grade.
- Minimum side slope shall be 160 mm super elevation.

1:30 and 160 mm testing limits are generally used on standard gauge networks and represent the limits of network geometry that these vehicles would operate over. These may be amended to the actual network limits and shall be confirmed with the RIM prior to testing

Alternate side slope and gradient limits enforced by load/moment sensing systems may be used in the stability test, provided that the load/moment sensing system is permanently activated in rail mode and cannot be turned off or bypassed.

The testing shall include the EWP or specific road/rail vehicle fitted with an EWP on test track conditions with the EWP loaded in accordance with AS/NZS 1418.10, with the EWP extended and positioned in an arrangement that would give the worst stability.

AS/NZS 1418.10 shall be complied with regarding requirements of additional inclination of the test track in general, additional inclination of the test track based on the type of suspension fitted, and additional testing when using pneumatic tyres.

NOTE:

Consideration should be given to all working positions, such that the vehicle centre of gravity is closest to the theoretical tipping point. This position may be with the boom fully extended in a vertical position so that the basket load and vehicle's counterweight are on the same side of the rail centreline.

Although the lifting of wheels or stabilizers alone does not indicate a condition of instability, as detailed in AS/NZS 1418.10, the loss of contact between rail and rail wheels during the stability test is regarded as a failure of the test.

EWP vehicles that have not carried out a stability test but meet all other requirements may operate on the rail network. However, the EWP shall not be used on rail. This shall be appropriately published as part of the network acceptance operating conditions.

8.3.3 Twist test for EWP – Mobile work mode

The EWP vehicle shall meet the requirements for static work mode in accordance with Section 8.3.1 of this document.

The mobile EWP twist test is regarded as a type test that is carried out similarly to the EWP stability type testing. This only applies if all vehicles are the same type (including any base vehicles).

EWP vehicles operating on rail in a mobile work mode shall undergo a twist test in accordance with AS 7502 and AS 7509. However, the normal level test track and vehicle travel/loading condition shall be replaced with the following test track and vehicle conditions for each test wheel/corner:

- Minimum fore/aft slope shall be 1-in-30 grade.
- Minimum side slope shall be 160 mm super elevation.
- EWP loaded (per stability testing in AS/NZS 1418.10) and positioned in reach/slew/elevation to minimize test wheel load.

1:30 and 160 mm testing limits are generally used on standard gauge networks and represents the limits of network geometry that these vehicles would operate over. These may be amended to the actual network limits and shall be confirmed with the RIM prior to testing.

The addition of twist packing to the specific test track geometry may exceed network limits, although conservative may excessively restrict vehicles, with RIM agreement, the maximum test super may be

reduced by the maximum twist test packer height. For example, 160 mm super may be reduced to 120 mm where the maximum twist test packer of 40 mm is used.

For example, a vehicle which requires 40 mm of twist test packing may be tested on a test track with only 120 mm of super elevation (instead of 160 mm) for a total of 160 mm superelevation and twist test packing.

Alternate side slope and gradient limits enforced by load/moment sensing systems may be used in the stability test provided that the load/moment sensing system is permanently activated in rail mode and cannot be turned off or bypassed.

The packing for the fore/aft slope (grade) and the packing for the side slope (super elevation) shall be arranged/oriented to minimize the wheel load on the test wheel.

The EWP shall be loaded in compliance with the test requirement specified in AS/NZS 1418.10 for stability testing and the EWP extended and positioned (reach, slew, and elevation) in such a position as to minimize the wheel load for the test wheel.

NOTE:

Consideration should be given to all working positions such that the vehicle wheel loading is minimized at the test wheel.

The twist test shall then follow as normal with the static wheel load recorded, required track twist profile (packing) applied and wheel unloading measured and assessed in accordance with AS 7502 and AS 7509. The test is then repeated at all four corners.

NOTE:

The mobile EWP twist test follows the standard twist test closely. However, the intent of the addition of grade packing, super elevation packing and loaded EWP positioning prior to twist testing is to minimize the static wheel load on the test wheel/corner (or wheel of interest).

Wheel unloading performance is at its worst when the static wheel load is minimized and is therefore the intent behind the additional grade packing, super elevation packing and EWP loading/position. The orientation of packing may not coincide with expected track curvatures and transitions on the network.

Each test corner/wheel will have associated grade packing, super elevation packing, and loaded EWP position oriented specifically to minimize the static wheel load. In general, it is expected the wheel load is minimized when the test wheel is on the high side for grade, the high side for super elevation, and loaded EWP positioned at maximum reach in the opposite direction to the test wheel, although counterbalances may dictate a different position).

AS 7502 contains a diagram in Section 10.5 that illustrates the expected packing (grade and super elevation) and position of the EWP such that the test wheel load is minimized prior to twist testing.

Section 9 RRV with lifting equipment

9.1 General

This section applies to all infrastructure maintenance vehicles that are fitted with cranes, or capable of lifting loads as either a primary or secondary function (for example truck mounted cranes, earthmoving equipment, telehandlers, rail cranes and similar).

Due to the fitment of rail guidance gear and vehicle operation on track geometry, tipping lines, the centre of mass of machines and the resultant rated capacity can possibly change from the original base vehicle. This section provides requirements for the stability testing of infrastructure maintenance vehicles capable of lifting loads.

9.2 Stability testing

This test is regarded as a type test. This only applies if all vehicles are the same type (including any base vehicles).

To determine the rated capacity in rail mode, the vehicle shall undergo a stability test in compliance with the relevant part of AS 1418: or AS 10896.1 (for telescopic handlers).

1:30 and 160 mm testing limits are generally used on standard gauge networks and represents the limits of network geometry that these vehicles would operate over. These may be amended to the actual network limits and shall be confirmed with the RIM prior to testing

NOTE 1:

Dependent on the primary and secondary functions of the vehicle, different parts of AS 1418 may be applicable. This may result in either a rated capacity chart (with associated maximum rated capacity) or a singular rated capacity being determined for the machine.

NOTE 2:

For multi purpose mobile plant fitted with a work platform attachment, the plant needs to be complaint for this function (i.e. EWP requirements).

Alternate side slope and gradient limits enforced by load/moment sensing systems may be used in the stability test, provided that the load/moment sensing system is permanently activated in rail mode, and cannot be turned off or bypassed.

During stability testing, lifting of rail wheels during the test is not permitted. This contrasts with the content in AS 1418. As such, the wheel load on the rail wheels may require monitoring during the test.

Multi gauge vehicles shall be tested in the gauge configuration for the network gauge it is operating on.

The working load limit rated capacity may be defined for slewed over the side positions and slewed forward/aft position.

P/D limits shall be met with the rated load as defined in 7502.

Results of the testing shall be included in the Engineering report.

9.3 Marking and identification

Rated capacity charts shall be fitted to the vehicle in the drivers cab (and included in the operations manual).

Rated capacity charts shall display information in accordance with the relevant part of AS 1418 or AS 10896.1.

In addition to the requirements in AS 1418 and AS 10986.1, the following shall also be displayed on the rated capacity chart:

- the rail track gauge relevant to the rated capacity
- the maximum permitted side slope (superelevation) of the rated load
- whether stabilizers require deployment to meet the rated capacity.

Section 10 RRV fitted with pantograph

This section is specific to vehicles fitted with pantographs for non-current collecting purposes on isolated OHW, such as for OHW measurement, and other vehicle mounted devices used to contact or manipulate OHW. Vehicles fitted with pantographs as current collection devices shall comply with the pantograph requirements detailed in relevant RIM interface standards.

Pantographs which meet the requirements for current collecting pantographs are acceptable for non-current collecting purposes. Pantographs may be accepted if they do not meet all of the requirements in this section. However, the pantograph details shall meet key specific requirements in the cited standards in this section that are associated with the following:

- pantograph shape/dimensions (dimensioned diagrams/drawings)
- pantograph contact material (material data and compatibility with OHW and to minimize OHW wear)
- pantograph uplift force (compliance with contact forces)
- maximum intended operating speed of the pantograph
- pantograph mounting to vehicle (assurance that mounting can withstand forces experienced by pantograph).

These pantograph characteristics shall be provided as an engineering report and reviewed by the RIM to confirm acceptability.

Vehicle mounted devices that contact or manipulate OHW shall be assessed on a case-by-case basis by the RIM to confirm acceptability.

If a vehicle can be driven in rail mode with such a device deployed, and the device can bring a radial load on the vehicle (from OHW) therefore subsequently impacting wheel loads, the vehicle shall pass the twist test in that configuration.

Pantographs and vehicle mounted devices that contact the overheard wire shall be fully within the rolling stock outline when in the stowed position and shall be locked in the lowered position (or raising controls isolated) to protect against inadvertent use/raising.

The use of pantographs and vehicle mounted devices that contact the overheard wire shall only be in worksites within WoTA protected areas with isolated overhead power and shall be appropriately detailed in published operating conditions.

Section 11 RRV with tanks

This section is specific to vehicles that are fitted with tanks for water, fuel or other liquids. Vehicles fitted with water or other fluid tanks (other than the vehicle's fuel tanks) shall have those tanks designed and fitted to vehicles appropriately. Vehicles fitted with tanks shall comply with appropriate standards and guidelines; these include AS 2809.1:2020 and *National Transport Commission (NTC) Load Restraint Guide 2004 and 2018.* The requirements shall include the following:

- Tank width and length shall be greater than 50% and 80% of the tank height respectively.
- Where tanks are used in partially filled states, tanks shall be fitted with baffles and compartments (to prevent movement of contents and vehicle instability).
- Tanks shall be permanently fitted to cradles/skids unless they are of rigid construction and have inbuilt mounting/attachment points.
- Tank volume shall not exceed the maximum carrying capacity of the vehicle when on rail.
- The height from rail level to bottom of the tank, measured when fully laden, shall not exceed 1100 mm.
- The stability angle (angle between horizontal and line between the tank centre of gravity and the rail wheel tread centre) shall not exceed 64 degrees.
- Tanks shall be restrained to prevent unacceptable movement during all expected conditions of operation (including maximum grade, superelevation, speeds,

dynamic nature of contents). The restraint points shall be able to resist the forces based on these conditions for both the tank and the vehicle.

- Method of restraint shall be by direct restraint. Preferably by twist locks; however, bolts, chains and straps can be used with additional engineering assurance. Friction restraint is not permitted for tank restraint (for example, tie downs thrown over the tank body).
- Operations and maintenance manuals updated to include the operation of the tank and vehicle with tank, and the maintenance of the tank and associated hardware.
- Where accepted vehicles are modified with tanks, the performance characteristics of the vehicle shall be confirmed. For example, twist test, brake test, maximum loading as required.

A report shall be provided detailing the tank and tank fitment to the vehicle as a modification or as part of the engineering report for new vehicles. Where the tanks do not comply with the listed requirements in this section, the engineering report shall provide justification that the alternate tank configuration provides safe performance on rail.

Section 12 Pre-start checks

Pre-start checks shall be carried out on all RRVs prior to use. This also includes contractor supplied and operated vehicles. Incidents have occurred because of poor or non-existent checking of the RRV prior to use. The pre-start check is a visual check of key aspects of the RRV, done by the operator and includes the host vehicle and the rail guidance system.

Pre-start checks do not substitute or replace routine maintenance activity which shall be done by a suitably competent person at scheduled intervals (see Section 13, Maintenance and Modification).

In general, there are two types of pre-start check done on the RRV. The first check normally comprises of two sub-parts. The first sub-part is carried out prior to driving the vehicle at the start of the shift and before on-tracking the RRV. The second sub-part is carried out after on-tracking the RRV but before on-rail travel/use.

The second pre-start check is a check which has to be done after having been used on the track but before going on to normal road-going use off track (e.g. post rail operations use). This is because the railway track travelling and working aspects can result in damage to the vehicle, especially tyres, which can then result in risk once travelling on-road or other normal off-track operational use of the RRV.

In addition to the above, the suspended mass of the road rail equipment imposes substantial stresses on the vehicle when having been used in off-rail conditions, especially for motor vehicles travelling along access tracks and other challenging terrain. Whenever such activity has been carried out, the RRV operator should again visually check the road rail equipment and connection points to the host vehicle for signs of obvious damage before setting out again for normal on-road operations.

As the pre-start is being done by the vehicle operator, it is necessary to have documentation which is written in plain English and suitable for use by a non-technical person. In addition, it needs to be sufficiently detailed to be able to capture any discrepancies that arise during the pre-start to enable appropriate response in terms of further investigation, repair and/or removal from service.

All operators conducting pre-start checks shall be provided with suitable and sufficient training to carry out the pre-start checks. This will ensure the checks are done competently and efficiently.

The pre-start process shall be supported by a suitable and responsive maintenance and repair regime such that any defects are captured and dealt with expediently. If the pre-start checks do not get to the

person/department with responsibilities for overseeing the maintenance and repair, then it will not occur, and damage or injury can result.

The pre-start check record should not only record the inspection, it should also enable the person carrying out the check to make clear decisions regarding the suitability of the vehicle being used if a defect is identified. Certain defects will immediately render a vehicle unfit for use on the railway, and in some cases, also on road, and this shall be clearly identified.

Appendix A of this document includes a sample master checklist to help users create their own checklists.

Section 13 Operations

13.1 On-tracking

On-tracking is a time of increased risk, with the potential for runaways or collisions with vehicles or other rail traffic.

The principle features and requirements for safe on-tracking are as follows:

(a) Permission from Train Control or person in charge of worksite/occupation.

(b) Although there are some vehicles that can on-track almost anywhere, such as loaders excavators and similar, in general a suitable location requires a firm level surface.

(c) Ensure adequate sighting distance all around for the track and the road at level crossings, with special care to consider the road and railway speed limits and density of traffic.

(d) Sufficient room for the size and operating parameters of the vehicle.

(e) For older vehicles that are not compliant with AS 7502, some method or means for the prevention of uncontrolled movement (runaway) as the vehicle transitions to its on-track mode is required.

After the RRV has been on-tracked it shall be verified that it is correctly on the track before attempting to travel and commence working. Before carrying out further checks, the operator shall ensure the vehicle's parking brake is applied. Then the operator shall alight from the vehicle and visually check, or where available, have a suitable competent colleague visually check the vehicle. Items to check are as follows:

(f) Verify that the flanges of the rail wheels are correctly engaged with the rail head.

(g) For vehicles with over-centre RRV systems, it shall be verified they are fully over-centred and on the stops.

(h) All lights and other warning systems shall be fully functional and turned on as required.

(i) A check of the whole vehicle to ensure that there are no obvious signs of hydraulic leaks from any of the systems, or any other evident defect with the vehicle.

(j) Ensure vehicle configuration including suspension is correctly set prior to departure.

(k) A low speed rolling brake check shall be performed to verify that the vehicles brakes are functioning correctly before setting off.

(l) Check the security of any loads being carried.

13.2 Track travelling/operating

13.2.1 General

For all operations including track travelling the vehicle and/or worksite operations there are other requirements that need to be assessed and applied as appropriate. These can include the following:

(a) The first and most important requirement and a statement that needs to be at the forefront of every operator's mind, i.e. drive to the conditions. This is the most important factor of all. As RRVs are principally road/non-rail bound vehicles, they do not perform as well on the track as they do on road/off rail with braking, traction and other vehicle functions compromised.

(b) Condition of the rail being travelled on. Consider weather effects on the rail, e.g. rain/ice/snow, track under construction and/or maintenance, mud, ballast and so on impacting on braking and traction performance.

(c) Communications requirements, e.g. to train control, between machines in convoy and/or worksite communications.

(d) Route knowledge requirements.

(e) Compliance with all relevant safeworking rules as required by the RIM.

(f) The RIM's requirements for setting back operations (i.e. reversing).

(g) Use of cameras, particularly reversing cameras, can also be used to show the rail wheel interface if not readily visible to the operator.

(h) Use of lookouts in vehicle and on-site including the use of pilots.

(i) Out of gauge (rolling stock outline) machines.

(j) Machines that become out of gauge when operating (work mode), e.g. infringing adjacent tracks, striking trackside infrastructure.

(k) Potential for road wheels to cause derailment as a result of contact with raised ground at crossings for all RRV types (especially Type 3 units and excavators with solid tyres subject to rail head wear) and at switches on those vehicles with twin rear wheels.

(l) Adequate space for clearance under overhead traction wiring equipment in live electrified territory.

These items and their circumstances are discussed further in the sections below.

13.2.2 Operations under overhead line equipment (OLE)

In all cases where RRVs are required to operate in electrified territory, the RRV will have to comply with the requirements of AS 7502 and the RIM's safeworking rules and procedures for RRVs operating in such areas.

RRVs which have attachments that can elevate and infringe OLE clearances such as load shifting equipment and EWPs, which work or travel under live overhead power lines should be fitted with a height limiting system(s) approved by the relevant RIM (see Section 13.2.6, Movement limiting devices).

13.2.3 Speed limits

Track vehicles are particularly at risk of derailment and speed is often a major factor in these events. When travelling, key factors relevant to speed include:

(a) the RIM's defined track speed requirements;

(b) the vehicles maximum speed as against the permitted speed including in reverse (including work and travel modes);

(c) all RIMs have speed restrictions on RRVs transiting across a level crossing and points, while towing and when travelling behind trains;

(d) the operator of the RRV should ensure there is a process for proportional operating speed reduction when the infrastructure they are operating on has a track speed restriction (TSR) in place. Appendix C provides a table of suggested speeds in such circumstances. Note that this is a suggestion only and users of this guide should assess it for their own circumstances. Where an RRV is also towing a trailer, the speed should be reduced/controlled to account for increased braking distances; and

(e) local environmental conditions including such conditions as topography, track geometry, high superelevation, sighting distance because of fog, rain, time of day. Rain in particular has a significant effect on Type 3 vehicles.

13.2.4 Convoy operations

In general, RIMs will have convoy operations addressed in their safeworking rules. Broadly, they are all very similar with their requirements. The main features are identified below:

(a) Before setting off, the track vehicle operator in control of the convoy shall perform a pre-start briefing to instruct all other operators in the convoy of the rules of the convoy and actions to be taken in the event of an incident.

(b) Ideally the convoy should be structured such that the heaviest vehicle is the lead vehicle. This will set the pace for the convoy and reduce the risk of rear end collisions.

(c) Vehicles with lesser brake performance to operate in the lead positions whilst vehicles with superior brake performance to be in trailing position. The track vehicle operator in charge of the convoy shall always travel in the lead vehicle.

(d) In all circumstances, the operators shall drive to conditions.

(e) Ensuring that the vehicle separation distances are sufficient to minimize collision risk and not to have excessive distance to ensure that no vehicle gets separated from the others.

(f) Control of speed between all the vehicles shall be maintained and managed to minimize collision risk.

(g) Communications within convoy shall be maintained and effective. If communications are lost, then the convoy shall take appropriate action such as reducing speed, stopping or other agreed action decided upon before the convoy sets out or as instructed by the RIM's safeworking rules. It is good practice for communications checks/tests to be regularly carried out at pre-agreed intervals between all members of the convoy.

(h) In the event that the operator of a vehicle in the convoy loses sight and/or contact of the vehicle that was ahead, once the operator reaches the last confirmed location of the leading vehicle, that operator shall slow down and travel at restricted speed.

(i) All vehicles in a convoy shall close-up together but maintain effective minimum safe separation distance when requiring transit over a level crossing and comply with any other specific requirements in the RIM's safeworking rules.

(j) It is highly desirable for RRVs to be fitted with collision avoidance systems, where reasonably practicable which can assist in reducing the risk of incidents particularly under poor visibility conditions and where it can be necessary for the vehicles to close up on each other such as at level crossings.

(k) Where any leading vehicle needs to stop, the track vehicle operator of that vehicle shall warn the vehicle(s) behind of the need to stop. This should be done in accordance with the safeworking rules.

13.2.5 Worksite operations

Worksites are an area where there are significant risks and incidents can occur involving RRVs. This is also an area where there are relatively few specific safeworking rules. The most important considerations for safe worksite management of RRVs include the following:

(a) The most important document for ensuring safe worksite management is the site/project safety management plan. It should be a comprehensive document describing how rolling stock activities and RRV operations will be controlled within the worksite;

(b) Crucial to the creation of an effective and valid site safety management plan is the development of a comprehensive project/site risk register. This should be carried out in accordance with the organisation's procedure for risk management;

(c) Having carried out the risk assessment process, there will be a need to have and/or develop work method statements (WMSs) (sometimes also referred to as SWMS/MCPs/SWPs etc.). These shall be developed in response to the outcomes of the risk assessment. Alternatively, where an organisation has such processes, they will require to be amended to suit the outcomes of the risk assessment;

(d) An often-overlooked aspect of operating vehicles within worksites is that there still a requirement for operators to have a good knowledge of the site as with route knowledge on the open network. This is arguably more important as worksites are often crowded and have many activities taking place simultaneously and other vehicle movement both on and off track. Added to this is the dynamically evolving nature of the worksite which changes very quickly as work progresses. This makes the need to constantly review the site and activities a crucial aspect in maintaining site and operational safety;

As noted above, the evolving and dynamic nature of worksites presents a continually changing risk which increases the potential for collisions to occur. Such collisions can be vehicle to vehicle or vehicle to work group. Generally, vehicle-to-vehicle collisions in a worksite do not cause serious harm as they are normally at low speed, but they can still cause substantial damage.

Collisions with personnel or plant within worksites or between multiple worksites is another consideration and one which is always serious. In these circumstances, more active controls need to be taken into account and selected based on the principle of so far as is reasonably practicable (SFAIRP).

Examples of processes used for such works include:

(e) physical barriers between worksite personnel and operating RRVs;

(f) defined maximum speed limits (which can possibly be less than the worksite speeds) which are enforced. This will also apply to any crossings and points within the WoTA limits;

(g) maintenance of suitable and sufficient separation distances between operating vehicles and others and from work teams is a common approach. However, where used there needs to be some form of control to warn the operators of the RRVs

that they are getting too close. Examples include physical barriers, lights and lookouts with warning devices such as horns;

(h) the use of pilots to move the RRV(s) within the worksite bounds;

(i) use of IT systems coupled with on-vehicle cameras and/or other detectors to detect/mitigate the risk of plant to plant or plant to personnel interactions;

(j) use of suitable audible warning systems including automatic movement alarms. Note however that in congested worksites with multiple operating machines both on and off-track, too many vehicles with audible alarms sounding can cause a sensory overload and persons cease to notice and respond to the alarms;

(k) Systems and procedures to prevent movable parts of RRVs exceeding the structure clearance and impacting adjacent infrastructure or track(s). Examples include height restrictors, slew locks (see Section 13.2.6) and similar;

(l) Systems and procedures to control the lateral and/or vertical forces impacting on RRVs using attachments such as sleeper grabs, tamp heads and similar which can cause derailment, overturning or other incident.

13.2.6 Movement limiting devices

Where RRV's have attachments that can infringe into adjacent operational tracks, damage lineside infrastructure or contact overhead traction wiring, such as loaders, cranes and similar, movement limiting devices (MLD) may need to be used on the machine for its operations.

MLDs come in a variety of forms which include:

(a) devices that permit the limits of movement to be variable – usually electronic and programmable; or

(b) have one or more pre-set positions – generally by means of limit switches, fixed stops or even physical chains can be used.

MLDs need to ensure that the machine cannot move in an unsafe direction when the machine is stopped at its limit(s). This is particularly important if the machine has been stopped and then is restarted or is in a powered down condition.

The selection and type of MLDs to be used needs to consider the potential forces and momentum encountered as a result of the machines operations such as speed of movement or when slewing or lifting/placing loads which results in over-run the limits set.

MLDs need to be designed so that they are not easily tampered with or over-ridden by unauthorized personnel. This includes such actions as disconnection or tying down switches or other interference.

Wherever MLDs are required to be used the operator of the RRV needs to carry out a limit test in a safe location to prove the system is fully functional prior to carrying out any work in an area where there is any risk.

13.2.7 Use of stabilizers on RRVs

Where an RRV is being used to shift loads, such as cranes, or to extend parts of the vehicle such that there is a potential risk of overturning, such as EWPs, excavators etc, controls shall be implemented to prevent the risk of overturning occurring.

Where the primary control is the use of stabilizers, the stabilizers cannot be placed onto the ends of the sleepers on which the vehicle is sitting or on the sleepers of any adjacent track.

In addition, a suitable quantity and type of dunnage should be used under the stabilizer foot if it has to land on the ballast shoulder to minimize disturbance of the shoulder.

13.2.8 Off-tracking

The off-tracking process is a reversal of the on-tracking process. However, there are additional requirements that need to be taken into account. These include:

(a) Except in cases of emergency, off-tracking should always be done at a suitable location as described in Section 10.1, Off-Tracking.

NOTE:

If it is necessary to off-track at a location other than where the RRV on- tracked, the operators should ensure that the location is one where the road wheels/tracks are firmly on the ground before retracting the rear wheels. If this cannot be achieved, an alternate location should be sought or there can be a potential risk of runaway if also on a grade.

(b) Processes are required to ensure that once off-tracked, action is taken to ensure that the rail gear is fully stowed and where necessary safety restraining chain(s) or other locking systems are engaged to prevent any risk of equipment movement during road travel/off-track operations;

(c) The operator should ensure the vehicle is checked for any signs of damage that can possibly have occurred whilst operating on track, as described in Section 12, Pre-start checks. Specific attention should be given to the tyres, on those vehicles that have them, for any damage or cuts; and

(d) Turn off all non-road related lights and other warning systems, also stow any deployed steps, brackets etc. that were in use on-track before setting off on the road.

Section 14 Stabling and securing RRVs

When RRVs are to be stabled, the specific requirements required for the safe stabling will depend on where they are to be stabled, e.g. on an operating network or on a construction/project site.

Considerations include:

(e) The application of RRV owner and/or RIMs Security Management Plan;

(f) The RIMs Safeworking Rules requirements. In many cases, there are restrictions on where vehicles can be stabled on tracks;

(g) Processes to ensure the RRV cannot roll-away such as wheel chocks or the dropping of working parts onto the track, e.g. excavator buckets or tamp heads; and

(h) ensuring there is no risk of raised parts or equipment failing and potentially fouling adjacent running lines, e.g. locking pins, chains or lower in a safe location.

RRVs shall be secured to prevent runaway, unauthorized use and/or vandalism. As with stabling above there are specific considerations depending on where the vehicle is and for how long the vehicle is to be there.

Controls will be subject to consideration of the risk in the local environment, e.g. in remote areas as compared to suburban areas. Potential controls to be taken into account include:

(i) establishment of secure compounds;

(j) disablement of the RRV to prevent unauthorized use either electrically or isolation of the fuel system;

(k) engagement of security services in high risk areas;

(l) removal of valuable/desirable equipment from vehicles or removal from sight including tools, radios, phones etc.;

(m) removal of items which might be used to cause vandalism including paint cans, fire extinguishers, etc.; and

(n) fitment of vehicle tracking systems.

Section 15 Emergency response and equipment

Before any RRV can operate on track it has to meet the RIMs basic requirements for emergency equipment as specified under their Safeworking Rules for their network. Again, each RIM has their own specific requirements, but in general the following are common:

(a) Requisite warning flags.

(b) Approved track shorting clips.

(c) Track warning signals as per the local requirements.

(d) Emergency off-tracking systems such as hand pumps.

In addition to this, all RIMs have in place emergency management plans and incident response processes which detail specifically how an emergency or a non-emergency type incident is to be managed, this includes failed rail traffic. The operator(s) of the RRV shall ensure that they know and understand these requirements and comply with them.

Notwithstanding these plans, there are some general common considerations to have in place by all RRV operators. These are:

(a) an effective and comprehensive risk register detailing the potential risks and controls for potential RRV emergencies;

(b) emergency reporting and response protocols;

(c) roles and responsibilities for all personnel relevant to the RRV emergency;

(d) communications requirements;

(e) emergency off-tracking items and associated equipment, e.g. pump handles; and

(f) emergency supply requirements, particularly for remote area working.

Section 16 Incident response

16.1 General

If an incident occurs, suitable processes are required to be in place to respond correctly and to ensure recovery processes are implemented promptly.

Notwithstanding these processes, there are some general common considerations that should be in place by all RRV operators. These include some of the following:

(a) An effective and comprehensive risk register detailing the potential risks and controls in the RRV recovery/breakdown.

(b) Incident reporting protocols.

(c) Clear instructions covering the recovery and breakdown of the relevant machine.

(d) Specific requirements in the event of an RRV derailment/collision including quarantine of vehicle until inspected by a competent engineer.

(e) Communications requirements and action to be taken in the event of loss of communication.

(f) Emergency off-tracking items and associated equipment, e.g. pump handles.

(g) Towing and removal requirements for broken down RRVs. This may include requirements for craneage to lift vehicles off track.

(h) Towing equipment and clear identification of towing points and vehicle recovery points (refer to OEM and/or owner's manual).

(i) Emergency supply requirements, particularly for remote area working.

(j) Specific requirements in the event of an RRV derailment, e.g. quarantine of vehicle until inspected by a competent engineer.

(k) Degraded operations such as a minor defect occurring whilst operating on track which does not disable the machine, but which reduces the level of safety, e.g. headlight or warning light failure. This will normally be done in accordance with the RIMs Safeworking Rules.

In consideration of derailment events, it is important to understand the nature of the derailment and its severity. It is common for minor derailments to occur to such RRVs as excavators, backhoes and similar, being used in track construction and/or maintenance activities which might be regarded as trivial and not require the invocation of the incident response and reporting processes.

In the event that there is any doubt as to the severity of the incident, it should be treated as significant and responded to accordingly as per the RIM's requirements.

16.2 First aid equipment

All RRVs should to be carrying a readily available and suitable first aid kit which has been selected and maintained in accordance with the national WHS regulations and relevant Code of Practice.

These should be regularly checked as part of routine operations to check for items that need to be replaced or out of date items.

Section 17 Modification

Modification of RRVs and units directly related to the operational use of the RRV, such as trailers or other attachments, shall only be done under the direct authority of a suitably competent and qualified engineer or the OEM. AS 7502 contains important information in this respect. All proposed changes shall be subject to a suitable risk assessment as part of the process.

Any change that is, or can be deemed to be, a safety critical change as prescribed by the Rail Safety National Regulations is required to be notified to the ONRSR at least 28 days before implementing the change.

Where vehicles are modified, or the operating conditions of the vehicle are modified, the vehicle shall be removed from operation and reapply for operation with the RIM.

This can require additional testing and engineering assessment of the modified vehicle. Refer to AS 7502 for further information.

In addition to the above, detailed records of any changes/modifications shall be kept and made available. Similarly, any OEM documentation shall be updated to accurately reflect the changes or modification to the vehicle before returning the vehicle to service and relevant personnel are to be advised and/or trained as necessary.

Section 18 Maintenance

Maintenance requirements of RRVs are of importance to their safe and continued effective operation.

A maintenance plan should be developed for all RRVs. The maintenance plan should consider the environmental conditions and processes that the RRV will operate in. This may require variance from the OEM information.

AS 7502 contains important information that will assist operators of RRV to develop suitable and sufficient maintenance plans and procedures relevant to their machines and their operating environments. The Master Checklist at Appendix D will also assist users of this guideline to develop their maintenance schedules and requirements.

Non-Destructive Testing (NDT)of the Rail Guidance Equipment frame and other key structural components shall be carried out in accordance with the OEM requirements as a minimum. In the event that the OEM is silent or deficient in this aspect, the owner should develop their own schedule based on good practice in the industry for similar vehicles, usage levels and other maintenance information. If the RRV has been subject to a derailment or other incident, such testing should be carried out prior to any further use.

Similarly, if the RRV has been subjected to unusually high use and/or loading, more frequent NDT will be required.

Owners of RRVs also need to know that fitting a rail guidance system can change the host vehicle's routine maintenance schedule. This system fitment imposes significant additional stresses on the vehicles structure and there can possibly also be considerations in terms of the operating environment.

Additionally, any changes to the vehicle as described in Section 5.8 that have the potential to directly impact on the vehicle's maintenance requirements has to be assessed and changes made as necessary.

Section 19 Auditing and review

Operators of RRVs need to have in place suitable and sufficient processes for the auditing and monitoring of their RRV operations and supporting management processes in addition to the routine items under the SMS including fatigue, medical fitness, alcohol & other drugs etc. This should include, as a minimum, the following aspects:

(a) Selection and monitoring of suppliers and sub-contractors, including the formal review of selected contractors' performance on a regular basis.

(b) Training and competence including refresher/familiarisation training and contractors.

(c) Maintenance performance.

(d) In-field operations including communications.

These audits should be formal, planned and scheduled based on a risk review of such items as:

(e) current operations including environment and workload;

(f) incidents; and

(g) vehicle failure rate and/or maintenance demand and cost.

The formality of the audit should be aligned to the owners/RTO's auditing procedure as appropriate with a supporting process for correction of non-conformances with responsibilities allocated for corrective actions assigned and regular reviews to ensure progress.

In addition to formal audits, there should also be a regime of random inspections carried out. These do not require the level of formality of an audit and should be done randomly or in response to perceived performance concerns and/or incidents.

Inspections should be able to be done quickly and effectively and by local management/supervision in addition to any safety support operatives. This ensures the application of specific local knowledge to safety and operational management as well as high level safety management processes such as audits.

Regular inspections are also very useful aids in ensuring that bad habits being picked up by regular operators are rectified quickly before becoming established poor practice.

Appendix A Example Pre-start Checklist

✓ = Satisfactory ✕ = Unsatisfactory or N/A = Not Applicable

Item	1. Daily Checks	Mon	Tue	Wed	Thu	Fri	Sat	Sun
1	Check engine oil levels (insert amount added if applicable)	ltr	ltr	ltr	ltr	ltr	ltr	ltr
2	Check engine coolant levels (insert amount added if applicable)	ltr	ltr	ltr	ltr	ltr	ltr	ltr
3	Check vehicles brakes and park brakes							
4	Seat belts in good condition							
5	Check emergency safety equipment (inc. Hand Pump Handle present)							
6	All vehicle instruments functional and no warnings present							
7	Check rail warning items operational (lights, horns, beacons etc)							
8	Check reverse alarm and reverse camera are functioning (where fitted)							
9	Check communications radio / telephone is functioning							
10	Windscreen wipers functional and washer full							
11	Check vehicle loading is evenly distributed and not overloaded & secure							
12	Check hi-rail suspension units for wear / damage							
13	Check rail wheel flanges & tread for abnormal wear/damage							
14	Check rail wheel bearings for play, noise or roughness							
15	Check rail wheel studs/nuts and sandwich wheel rubber for damage							
	Driver to initial after inspection →							
	2. Once On Track (Daily):	**Mon**	**Tue**	**Wed**	**Thu**	**Fri**	**Sat**	**Sun**
1	Check front and rear rail equipment over centre after lowering							
2	Ensure the rail wheels are correctly on track							
3	Test brake performance & stopping distance on track including Park Brake							
4	Check vehicle for correct on-rail operation – no 'hunting' or noises							
5	Vigilance control is operational and responding to inputs (where fitted)							
6	If using a trailer - Check towing points and anti-runaway safety devices e.g. safety chains/drawbars/failsafe brakes and similar							
	Driver to initial after inspection →							
WARNING! – Any defects in items 1.3 -1.11 or any in items 2.1-2.6 vehicle MUST NOT BE USED until repaired. All other defects – authority required from supervisor/manager								

	3. After On-Track or Rough Terrain (e.g. off-road) working	Mon	Tue	Wed	Thu	Fri	Sat	Sun
1	Visually check the rail gear for signs of damage							
2	Visually check the vehicles tyres for signs of damage							
3	Ensure that the rail gear/steps etc are fully retracted and secured							
	Driver to initial after inspection →							
	4. Weekly checks: (only record these on the day they were performed)	**Mon**	**Tue**	**Wed**	**Thu**	**Fri**	**Sat**	**Sun**
1	Check road-rail power units & fluid levels							
2	Check for any leaks e.g. hydraulic/engine oil, coolant							
3	Check hydraulic hoses for damage / chaffing							
4	Check general condition of all mechanical hi-rail items							
5	Check vehicle suspension is not damaged or sagging							
6	Ensure rail kit locks & safety chains are serviceable							
7	Check road tyre pressures are correct & tread wear is ok							
8	Check road wheel rim condition & wheel nuts are secure							
9	Check road-rail owners' operation manual is in vehicle							
10	Check emergency equipment e.g. First Aid kit/ Fire Extinguishers charged and in date.							
11	Check all warning plaques & labels are present and readable							
12	Check & test emergency hand pump operation (retract gear)							
	Driver to initial after inspection →							
	5. Once On Track (Weekly):	**Mon**	**Tue**	**Wed**	**Thu**	**Fri**	**Sat**	**Sun**
1	Check front rail sweeps are in place & adjusted							
2	Check derail skid plates are operational and not damaged							
3	Check rail wheel back to back dimension with gauge provided							
	Driver to initial after inspection →							

Defects – Note below any defects identified during the inspection that require repair

Item Ref	Defect Description	Reported To	Reported Date	Completed By	Comments	Closed Date

Appendix B Example Pre-start for Contract Vehicle Checklist

1. Road Rail Vehicle/Machine Description			
1. Vehicle/Machine Description (inc Manufacturer and model)		2. Supplier Details	
3. Serial/Identification Number		4. Project/Work Title	

✓ = Yes/Satisfactory ✕ = No/Unsatisfactory or N/A = Not Applicable

Item	2. Minimum Vehicle/Plant Requirements	Supplier Verified	Company Approved
1	Interlocking system to prevent simultaneous raising or lowering of rail wheels (type 1 and 2)		
2	Indication to show the rail wheel equipment status e.g. Fully raised or lowered. (Not applicable for machines that have 360-degree rotation capability)		
3	The RRV braking systems are fail-safe or has suitable back up system(s).		
4	All wheels in contact with the rail have braking on them including in 'power loss' condition e.g. hydro-static and friction drive systems.		
5	Where applicable, the park brake system is fail-safe and holds vehicle on 1:30 grade		
6	Emergency off-tracking system has interlocking to prevent simultaneous raising of rail wheels to prevent runaway condition occurring.		
7	RRV equipment hydraulic systems are fitted with suitable burst protection devices e.g. check and metering valves, as appropriate.		
8	All relevant warning and advisory signage affixed in the vehicle e.g. Vehicle height in travel mode maximum travel speed (forward and reverse). Note – ensure no visual obstruction to operator.		
9	All relevant warning devices fitted and functional e.g. horn(s), beacons, headlights etc.		
10	All Rail Guidance Equipment operating controls clearly marked and in English.		
11	The control(s) for Rail Guidance Equipment are operated from the operators position e.g. in vehicle cab or scissor lift platform.		
12	All vehicle Rail Guidance Equipment identification plaques fitted and legible.		
13	Suitable rail guidance equipment securing systems fitted for road travel/off-track operations.		
	Initial and date after inspection →		
	3. Maintenance and General Condition	**Supplier Verified**	**Company Approved**
1	Rail Guidance Equipment functions correctly e.g. smooth operation, no unusual noises etc.		
2	Visually verify Rail Guidance Equipment in good condition e.g. no leaks, damaged hoses, obvious wear, rail wheels damaged or worn.		
3	Check Rail Guidance Equipment bolts, pins, pivots etc. for wear or damage.		
4	Any existing damage to any part of the vehicle including the Rail Guidance Equipment.		
5	All fluid levels are satisfactory including hydraulics, brakes and coolant levels.		
6	Verify that all vehicle tyres, brakes, interlocks, indicators and other warning systems are functioning and suitable and vehicle identification signage clean and legible.		
	Initial and date after inspection →		

	4. Vehicle Documentation Requirements	Supplier Provided	Company Received
1	Operators Manual specific to the Rail Guidance Equipment fitted to machine/vehicle.		
2	Pre-start book available for the machine/vehicle with key rail components included.		
3	Risk assessment for the specific machine/vehicle type.		
4	Rail infrastructure manager (RIM) rolling stock registration sticker, certificate or equivalent for the applicable railway.		
5	Rail Guidance Equipment maintenance records.		
6	Change management documents available for any modifications as applicable.		
7	Detailed design specification available (must be developed by competent person/organisation)		
	Initial and date after inspection →		
	5. Comments		
1			

6. Supplier Pre-Mobilisation Certification		
I/We certify that this vehicle/machine is free from defect and is safe and fit for purpose		
Name	**Title**	**Signed**

7. Company/Project Acceptance		
I/We certify that the vehicle/machine has been reviewed and is accepted for use by the company/project.		
Name	**Title**	**Signed**

Appendix C Table of Suggested Proportional Speed Reduction for RRVs

	80km/hr Rated Vehicle		70km/hr Rated Vehicle		50km/hr Rated Vehicle		30km/hr Rated Vehicle	
Freight Vehicle Line Speed (km/hr)	Calculated	**Permitted**	Calculated	**Permitted**	Calculated	**Permitted**	Calculated	**Permitted**
115	80	**80**	70	**70**	50	**50**	30	**30**
110	80	**80**	70	**70**	50	**50**	30	**30**
105	76	**80**	67	**70**	48	**50**	29	**30**
100	73	**70**	64	**60**	45	**50**	27	**30**
95	69	**70**	60	**60**	43	**40**	26	**30**
90	65	**70**	57	**60**	41	**40**	25	**30**
85	62	**60**	54	**50**	39	**40**	23	**20**
80	58	**60**	51	**50**	36	**40**	22	**20**
75	55	**60**	48	**50**	34	**30**	20	**20**
70	51	**50**	45	**40**	32	**30**	19	**20**
65	47	**50**	41	**40**	30	**30**	18	**20**
60	44	**40**	38	**40**	27	**30**	16	**15**
55	40	**40**	35	**30**	25	**20**	15	**15**
50	36	**40**	32	**30**	23	**20**	14	**15**
45	33	**30**	29	**30**	20	**20**	12	**15**
40	29	**30**	25	**20**	18	**20**	11	**10**
35	25	**30**	22	**20**	16	**10**	10	**10**
30	22	**20**	19	**20**	14	**10**	8	**10**
25	18	**20**	16	**10**	11	**10**	7	**10**
20	15	**20**	13	**10**	9	**10**	5	**10**

Appendix D Example Master Checklist for RRV Inspection and Maintenance

In all cases where a specification is stated, the actual measured result should be indicated in the relevant location. Where it is for correct function, OK or Not OK, may be inserted. Alternatively a checkmark or cross is acceptable.

	Hazards	Category	Item	End User	Maintainer	Maintainer	Maintainer	Standard	Who Specifies Standard?
				Before On-Track	3 Month or 5,000 km	6 Month or 10,000 km	12 Month or 20,000 km		
1	Operational instability	Alignment	Back to back gauge					to specification	Manufacturer
2			Rail wheels					for correct gauge	
3			Rail guidance suspension units					flexitor arms to specification when on track	
4			Body lift					to specification	
5			Rail wheel alignment					to specification	
6			Rail wheel, bolts, nuts, split pins					replaced following alignment	
7			Flexitor arms					for play	
8			Over centre distance					to specification	
9			Axles and high rail gear					for parallel	
			Rail wheel to road wheel/chassis alignment					To specification on track at Tare Condition	

	Hazards	Category	Item	End User	Maintainer	Maintainer	Maintainer	Standard	Who Specifies Standard?
				Before On-track	3 Month or 5,000 km	6 Month or 10,000 km	12 Month or 20,000 km		
10	Brake failure. Reduced braking capability	Brakes	Foot, park, road rail (if fitted)	Check				for correct function	Manufacturer
11			Hose damage					for damage	
12			Pads					for wear	
13			Calipers					for security	
14			Fluids					for level/leaks	
15			Adjustment					to specification	
16			Brake lines					for damage	
17			Stopping distance when on track					to specification	

	Hazards	Category	Item	End User	Maintainer	Maintainer	Maintainer	Standard	Who Specifies Standard?
				Before On-track	**3** Month or **5,000 km**	6 Month or **10,000 km**	12 Month or **20,000 km**		
18		Controls/lights	Electric	Check				for correct	Track Manager/ Owner
			controls					function	
			Head, tail,						
19	Approach not seen		flashing, spot and hazard lights	Check				for correct function	
20	Approach not heard		Proximity	Check				for correct	
	Overspeed		switches					function	
21	operation Operational failure		Warning devices, horn, sirens	Check				for correct function	
22	Unable to remove		Speedometer	Check				for correct	
	from track							function	
			Wiring, limits,						
23			buttons,	Check				for damage	
			lamps						
24	Faults Unreported	Documentation	Inspection Log	Check				for correct use, faults reported, repaired	Track Manager/ Owner
25			Rail Guidance Equipment Manual	Check				for manual in vehicle and current	

	Hazards	Category	Item	End User	Maintainer	Maintainer	Maintainer	Standard	Who Specifies Standard?
				Before On-Track	3 Month or 5,000 km	6 Month or 10,000 km	12 Month or 20,000 km		
26	Operational failure Unable to remove from track	Fluid Levels	Engine oil	Check				for correct level	Manufacturer
27			Radiator coolant	Check				for correct level	
28			Fluids	Check				for condition, leaks	
29	Unfit for operation	Following Derailment	Road Rail Vehicle	Check				for damage, correct function	Track Manager/Owner
30	Operational failure Unable to remove from track	Hydraulic System	Hydraulics	Check				for correct function	Manufacturer
31			System pressure					to OEM specification	
32			Emergency hand pump					for correct function	
33			Valves and hose condition					for condition	
34	Overloaded, Unsecured Load, Uneven Load, Out of Gauge	Loading	Fuel level	Check				is fully fueled	Owner
35			Load	Check				is secure, within GMV, evenly loaded	
36			Load	Check				is in gauge, within outline	
37	Unfit for operation	Manufacturers checklist item	Manufacturers recommendations	Check	Service		Service	Are followed	Manufacturer

	Hazards	Category	Item	End User	Maintainer	Maintainer	Maintainer	Standard	Who Specifies Standard?
				Before On-Track	3 Month or 5,000 km	6 Month or 10,000 km	12 Month or 20,000 km		
38	Unfit for operation	Modification	Road Rail Vehicle	Check				For correct function, for continuing Road Rail category compliance. Owner's Manual updated	Track Manager/Owner
39	Abnormal on-track operation	Operation	On track operation	Check after placing on track				for correct function, for unusual noises, crabbing and alignment problems	Owner
40	Unfit for operation	Operators checklist items	Owners recommendation	Check				are followed	Owner
41	Loss of traction	Rail sweeps	Rail sweeps	Check				are in place	Owner
42			Rail sweeps	Check				are correctly adjusted	Owner
43	Loss of rail wheel contact. Out of gauge	Rail wheels	Lock pins	Check				for ease of operation	Manufacturer/ Owner
44			Locking mechanisms	Check				for ease of operation	
45			Pivot points					lubricated	
46			Rail wheel pairs					are matching pairs	

	Hazards	Category	Item	End User	Maintainer	Maintainer	Maintainer	Standard	Who Specifies Standard?
				Before On-Track	3 Month or 5,000 km	6 Month or 10,000 km	12 Month or 20,000 km		
47	Loss of rail wheel contact. Out of gauge	Rail wheels	Road and rail wheel studs	Check				for security, damage	Manufacturer/ Owner/ track Manager
48			Sandwich wheel rubber	Check				for separation	
49			Stub axles					for cracks	
50			Web, flange and tread	Check				for cracks	
51			Wheel bearings					For wear, damage (re- pack)	
52			Wheel bearings	Check				for play/noise	
53			Insulation					for security	
54			Wheel flange wear	Check				to specification	
55	Reduced braking capability. Brake failure. Loss of traction	Road wheels/tyres including spare	Operations on track	Check				for correct function	Manufacturer/ Owner
56			Rims	Check				correct for vehicle	
57			Rims	Check				for cracks, signs of fatigue	
58			Studs and nuts	Check				for security, damage	
59			Tyre pattern	Check				same for all tyres	
60			Tyre pressure	Check				to specification	

	Hazards	Category	Item	End User	Maintainer	Maintainer	Maintainer	Standard	Who Specifies Standard?
				Before On-Track	3 Month or 5,000 km	6 Month or 10,000 km	12 Month or 20,000 km		
61	Reduced braking capability. Brake failure. Loss of traction	Road wheels/tyres including spare	Tyre rubber	Check				for cracks and damage	Manufacturer/ Owner
62			Tyre treads	Check				to specification	
63			Tyres, rims, wheels	Check				are secure & all to specification	
64	Communications system failure. Unable to clear RRV from track. Vigilance systems failure.	Safety equipment in vehicle	Communications (primary/backup)	Check				for correct function	Owner/Track Manager
65			Vigilance control unit (VCU)	Check				or correct function	
66			1st Aid	Check				provided	
67			Emergency off-tracking equipment	Check				provided	
68			Emergency towing	Check				provided	
69			Fire extinguishers	Check				provided	
70			Per way protection items	Check				provided	
71			VCU tamper proof seal	Check				is sealed	
72			Warning decals	Check				are fitted	

	Hazards	Category	Item	End User	Maintainer	Maintainer	Maintainer	Standard	Who Specifies Standard?
				Before On-Track	3 Month or 5,000 km	6 Month or 10,000 km	12 Month or 20,000 km		
72	Structural integrity failure. Loss of gauge. Operational instability. Loss of traction. Loss of rail/wheel contact.	**Structure**	Mechanical safety latches	Check				for correct function	Manufacturer
73			Rail kit (RGE) locks	Check				for correct function	
74			Front axle lockout	Check				for correct function, adjustment damage and wear	
75			Rail guidance frame	Check				is secure	
76			Rail guidance frame	Check				for damage	
77			Anti-derail frame	Check				for condition	
78			Grease points/ nipples, and as specified by manufacturer					for grease/lubrication	
79			Rail kit swinging frame bolts	Check				for position and tightness	
80			Over centre condition	Check				is maintained	
81			Pivot bolts and retaining bolts	Check				for security and wear	
			Frame areas,					for looseness and	

82			welds, mounting points	Check				cracks	
83			Rail guidance suspension arm bolts	Check				in place and Secure	

	Hazards	Category	Item	End User	Maintainer	Maintainer	Maintainer	Standard	Who Specifies Standard?
				Before On-Track	3 Month or 5000 km	6 Month or 10000 km	12 Month or 20000 km		
84	Structural integrity failure. Loss of gauge. Operational instability. Loss of traction. Loss of rail/wheel contact.	**Structure**	Flexitore splines	Check				for wear and deterioration	Manufacturer
85			Swinging frame	Check				for cracks and damage	
86			Chassis where road rail frame is connected					for cracks and wear	
87			Rail assemblies					for wear cracks, damage and lubrication	
88			Rail assemblies					bolts tightness	
89			Pivot points and ram mountings	Check				for wear and lubrication	
90			Front and rear suspension					for wear and damage	
91			Pivot points and ram mountings	Check				for wear to specification	
92			Pivot points lubrication					for grease and lubrication	
93			Frame mount bolts	Check				for tension	
94	Loss of traction. Loss of rail/wheel contact	**Suspension**	Front vehicle springs	Check				for sagging and damage	Manufacturer
95			Rear vehicle springs	Check				for sagging, damage	