RISSB

RAIL INDUSTRY SAFETY AND STANDARDS BOARD

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Operating Road Rail Vehicles

Guideline



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Cover image by David Sutherland – Two RRV Utes on a Track Inspection near Katherine, NT.

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Operating Road Rail Vehicles

1 Introduction

This guideline has been developed for all those who use or have responsibility for, either directly or through contracting arrangements, the operation of Road Rail Vehicles (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 guideline will provide all users with relevant information and guidance on RRVs and their management. This will aid 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 present concerns for users. Principal concerns here have been in relation to 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 guideline also provides some basic tools, such as example forms, to assist in the establishment of baseline processes that can be utilised in the user's own operations and/or be applied to other parties to enable an acceptable minimum standard and ensure consistency.

1.1 Purpose

The railway industry has had a number of road rail vehicle incidents resulting in death or serious injury. As a consequence of this, the industry, together with the Office of the National Rail Safety Regulator (ONRSR) have made it a priority to improve the safety of RRVs and their associated operations.

The industry and ONRSR have identified four risk categories of concern when it comes to road rail vehicle safety:

- Derailment
- Collision
- Runaway
- Fire

This Guideline offers Rail Transport Operators and their contractors controls which, when implemented, may assist to reduce risks when operating RRVs.

It includes:

- Risk assessment and task planning;
- Considerations for selection of road rail vehicles appropriate for the task;
- Registration of the RRV as required for the infrastructure where it will be utilised;
- Competence of operators;
- Working both within local possession authorities, and open line running;

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- Environmental factors;
- Safe mobilisation to site, including travelling in convoy and suitability of on- and off-tracking sites;
- Loading and securing loads;
- Pre-start checks;
- Maintenance and Change Management
- Operation, including
  - Level crossing safety
  - Operation under emergency, degraded or other abnormal conditions, including the use of emergency equipment
  - Towing and lifting
  - Incident response and reporting.

1.2 Scope

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

This guideline does not apply to the Work Health and Safety aspects of the operation of the RRV host vehicle. It only applies to the operation, use and maintenance of the rail wheel guidance system when being utilised on the railway track.

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

1.3 Objectives

The objectives of this guideline are as follows:

- Provide users with the necessary information and guidance on 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; and
- To assist in providing a clear standardised approach for all RRV operations across Australia and New Zealand.

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

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1.4 Definitions

Dry Hire: The hiring of a vehicle or plant without an experienced operator from the supplier.

Host Vehicle: The road based vehicle which has been modified to operate on railways.

Original Equipment Manufacturer: An original equipment manufacturer (OEM) is a company whose products are used as components in the products of another company, referred to as the value-added reseller (VAR). The OEM generally works closely with the company that sells the finished product and customises designs based on that company's needs.

On-Tracking: Process whereby an RRV changes from off-rail operations to on-rail operation. 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.

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.

Owner: The person or body with legal title to the road rail vehicle;

Road Rail Vehicle Operator: Generic term for a person who is in direct control of the RRV and its operations

Rail Infrastructure Manager: 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

Rail Guidance Equipment: Structures and equipment enabling a road vehicle to mount and travel on rail.

Road Rail Vehicle: A road vehicle that is fitted with retractable rail wheels (also often referred to as Hi-Rail or High Rail)

Rail Transport Operator: means -

- A rail infrastructure manager;
- A rolling stock operator; or
- A person who is both a rail infrastructure manager and a rolling stock operator

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. 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.

Tare: The unladen weight of the vehicle.

Track Vehicle: A vehicle, usually self-propelled, used mainly for inspecting and maintaining infrastructure.

Track Vehicle Operator: A competent worker controlling the movement of a track vehicle.

Wet Hire: The hiring of a vehicle or plant with an experienced operator from the supplier.

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User: The organisation, entity or individual who has the responsibility for the overall decision making in relation to the management and strategic operation of RRV's.

1.5 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:

- Procurement;
- Commissioning;
- Operations;
- Maintenance;
- Modification; and
- Disposal.

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

1.6 References

All Rail Transport Operators are to ensure that relevant standards, OEM documentation and other relevant guidance are taken into account when establishing safe systems for RRV operations. This should include as a minimum the following documents:

- The Rail Safety National Law;
- Railways Act (NZ)
- AS 7501 – Railway Rolling Stock Compliance Certification;
- AS 7502 – Road Rail Vehicles;
- AS/NZSISO 31000 – Risk Management;
- ONRSR Guideline – Road Rail Vehicle Management and Operations and
- Relevant Network Owner Safeworking Rules.

Other references should be applied as appropriate for the operations and activities to be conducted.

2 Types of Road Rail Vehicles

AS 7502 classifies Road rail vehicles into 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 road rail vehicles may fall into two or more classification types. Typically, the difference in classification type may be between travel and work modes.

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2.1 Type 1 - Self Powered Rail Wheels

Braking and traction is provided exclusively through the rail wheels. All road wheels (or crawler tracks etc.) are lifted fully clear of the rails when in rail mode, and there is no contact between road wheels (or crawler tracks etc.) and rail wheels.

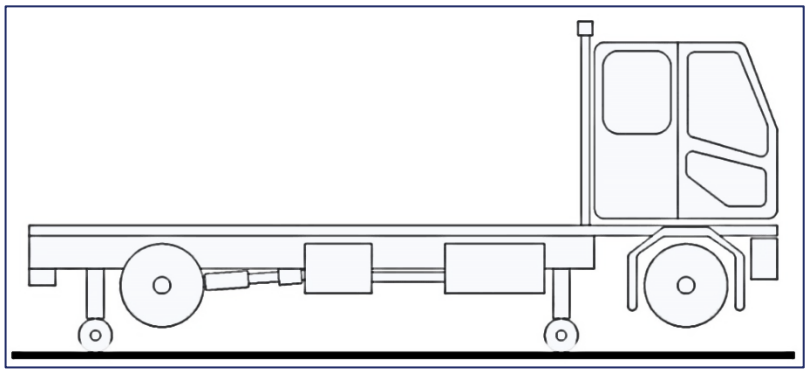


Figure 1- Type 1 vehicle

2.2 Type 2 - Friction Drive

Braking and traction is provided indirectly, from the road wheels to the rail wheels.

Braking and traction is achieved through one of three methods as follows:

Type 2(a) - Contact from the road wheel onto the rail wheel tread and/or rail wheel flange.

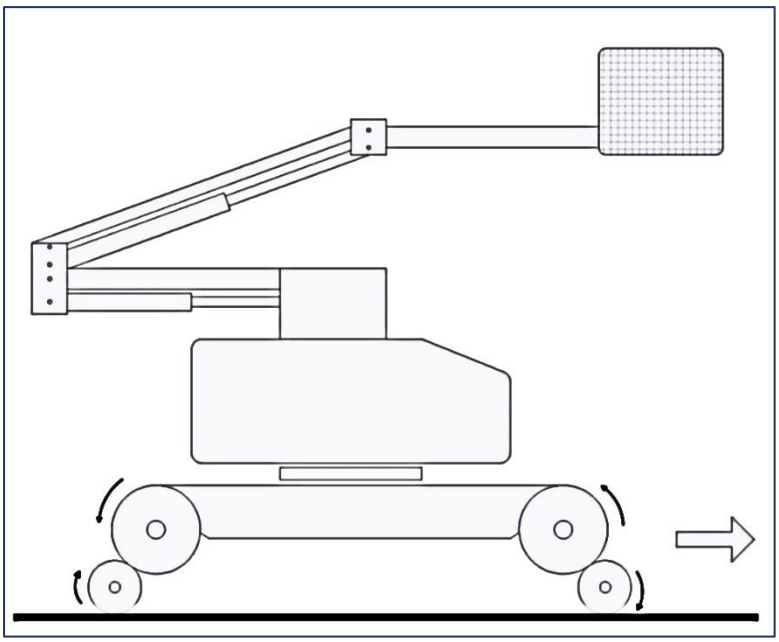


Figure 2 – Type 2(a) vehicle

Type 2(b) - Contact from the road wheel onto a rail wheel axle extension hub.

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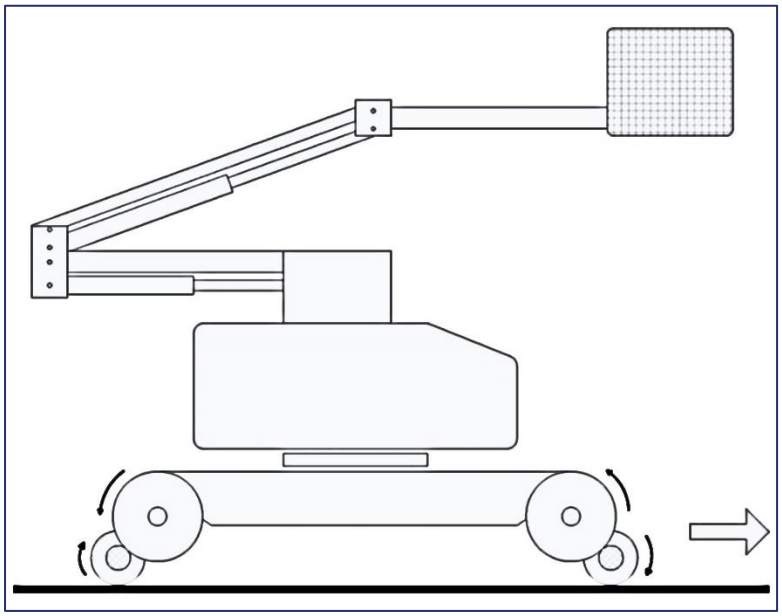


Figure 3 – Type 2(b) vehicle

Some Type 2(b) Vehicles incorporate epicyclic, or planetary gearing systems, such that forward gearing of the host vehicle results in forward rotation of the rail wheels, without use of an intermediate idler wheel. In this manner, the full forward gearbox speed range of the host vehicle can be translated as forward motion at the rail wheels.

Type 2(c) - Contact from the road wheel onto the rail wheel via an intermediate "idler" wheel.

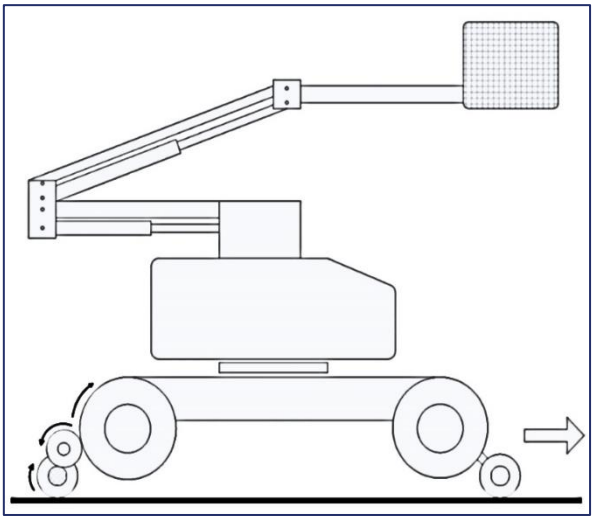


Figure 4 – Type 2(c) vehicle

2.3 Type 3 - Direct Drive

Braking and traction is provided by at least one pair of road wheels remaining in direct contact with the rail when in rail mode. Some road wheels may be lifted clear of the rail by rail wheels (front elevated), or all road wheels may remain in contact with the rail.

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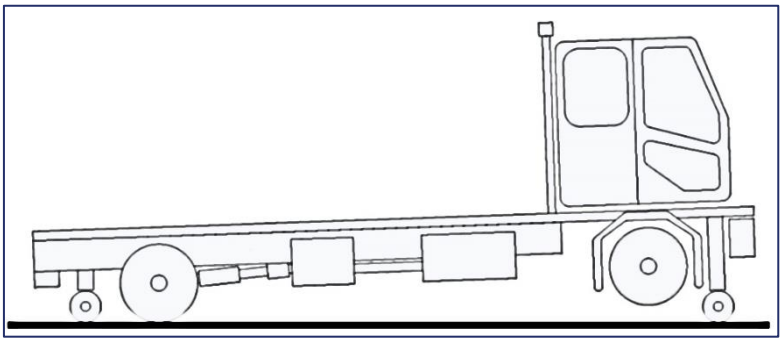


Figure 5 – Type 3 vehicle (front elevated)

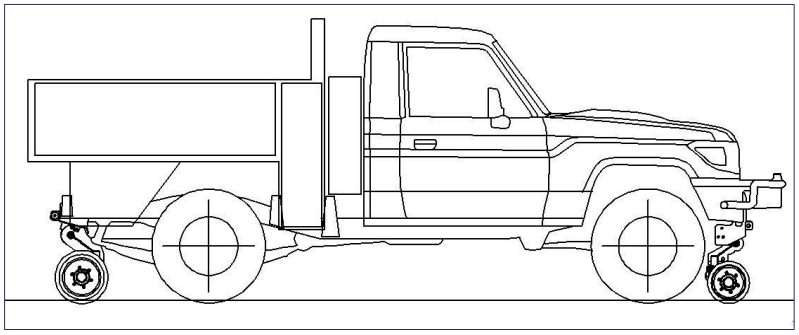


Figure 6 – Type 3 vehicle

3 Rolling Stock (RRV) Registration

All RRVs are classed as rolling stock. Before any item of rolling stock is permitted to operate on a Rail Infrastructure Manager's (RIM) infrastructure it must be registered for use on that infrastructure.

The railway operations to be performed by the RRV Operator must be conducted under a Rail Transport Operators (RTO) accreditation. This is also required on private siding where although the RIM may have a lawful exemption from accreditation such an exemption is only in relation to the infrastructure, not the rolling stock operations. Note also that the private siding owner may elect to adopt similar conditions as an accredited RIM.

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

Once the RRV has been formally assessed and approved under the RIMs or RTOs registration process, the RRV will be permitted to operate on that infrastructure. It should be noted that the process may result in the imposition of certain operating 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 may also require recertification’s annually or at other timescales they define, in order to ensure compliance of the RRV is maintained.

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4 Safeworking

RIMs have specific rules and procedures for the operation of RRVs on their network. In most cases this tends to only relate to operation on the open network and not within possessions or other worksites.

These rules cover a variety of aspects, but in general the following items will always be dealt with:

- Level crossing protocols detailing how the RRVs are to approach and travel over these;
- Communication protocols including loss of communication;
- Operation in convoy on open track;
- 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; and
- Breakdown or other emergency.

All persons who are operating or controlling the operation of RRVs on the network must be fully trained and competent in these rules.

5 General Safety and Risk

A risk assessment must be carried out on all types of RRVs and the operations that they are going to undertake. Such a risk assessment must 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 must 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, within possessions and 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.

5.1 Documentation

5.1.1 Operator's Manual

All vehicles must have an operator's manual. In some cases, there may be two manuals, the first for the host vehicle and the second for the rail guidance equipment. It is required to be kept in a suitable weather proof stowage on board the vehicle. It should be noted that there is a growing move towards such information to be kept and managed electronically. Should the owner or user of an RRV choose 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.

The content of the Operators Manual is described in AS 7502 Road Rail Vehicles, and this is the minimum that should be supplied.

5.1.2 Other Documentation

Other documentation relevant to RRVs can include:

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- Vehicle log book;
- 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 vehicle. This will be dependent on the specific owner's/RTO's procedures;
- Pre-start inspection record documents;
- RIMs registration documentation requirements;
- Engineering and design documents as applicable; and
- 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 the state of maintenance and upkeep.

Documentation produced by the owner relevant to the RRV and its operations, and documentation/information produced by the Original Equipment Manufacturer (OEM) must support and/or augment each other. This means there must be no 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.

5.2 Tyres and Wheels

A very important area for ensuring safety and safe operations are the tyres and wheels. Aspects to be managed include:

- The tyres on the vehicles must be of the correct type specified by the OEM. Correct tyre types, pressures and even tread pattern are essential to the safe operation of the RRV.
- Only those tyres recommended by the OEM or alternatively as the owner has specified, following appropriate change and risk management processes, may be fitted to vehicles.
- The tread patterns on both wheels of the same axle in contact with the rail head must be the same, otherwise there is a risk of unbalanced braking and acceleration as the tyre on one side can outperform the other. This can lead to derailment;
- Security of the wheels and torque of the wheel nuts;
- General condition of the rail wheels including flange and tread condition e.g. no sharp flanges or steps, thin flanges, tread hollowing, evidence of spalling and similar;
- 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;
- The use of recap type tyres is not permitted on RRV's; and
- Condition of the rail wheel bearings, studs, nuts and sandwich rubber (where used).

For further information on tyres refer to section 13 Maintenance and Modification below.

5.3 Rail Guidance Equipment - General

The rail guidance equipment must be regularly inspected for general wear and tear to, suspension hydraulic systems and hoses, structural damage to the frame etc. (see Section 9 Pre-Start Checks, and Section 13 Maintenance and Modification and appendices A & D below)

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5.4 Vehicle Information Systems

The amount and type of information that is to be provided to the operator of the RRV must 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 minimised.

Unnecessary distraction, particularly within operating worksites may 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 may be used for operational activities. Use of these should be minimised and designed to be integrated with the vehicle operations and connected to the vehicles own on-board system where practical.

The aspect of in-cab signage also needs to be carefully considered. These should be kept to the minimum necessary. The placement of significant numbers of signs/stickers inside on the vehicles dashboard/control panel and windows ceases to have any impact to the operators and does not achieve the required outcome of providing task relevant information.

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.

5.5 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:

- 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;
- The track conditions including track grades, curves and cant;
- General environment factors including remote areas, extremes of cold and heat, wet conditions vegetation, fauna etc.;
- Working under live overhead traction wiring equipment, and
- 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 utilise 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.

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5.6 Contract RRVs

Where RRVs are being used under contract conditions there are specific factors that the RIMs must be aware of and verify before accepting the RRV for use on their infrastructure. This includes the following items:

- The RIM must be satisfied that the supplier of the RRV understands what is required from that RRV and the operating conditions on the RIMs track and the planned activities;
- That the supplier of the RRV has a suitable and sufficient maintenance management and repair regime in place and that it is suitably documented;
- That records of repair, modification etc. are available for the RRV including its maintenance history;
- Where dry hiring, that suitable and sufficient information and records are provided for the RIM/RTO to be able to safely and correctly use the RRV for the task(s) required;
- When dry hiring that a competent person provides any necessary formal and/or familiarisation training to the RIM/RTOs personnel as necessary;

When wet hiring, in addition to the compliance with contractual conditions and fitness for work aspects including fatigue medical fitness etc. evidence is to be provided which demonstrates that the person operating the RRV is suitably trained and competent. In addition, that the person has evidence of recent activity with the specific vehicle and can demonstrate currency of capability in its operation. For further information on training and competence aspects see Section 6 Training and Competence below.

5.7 Change Management

Where changes, including engineering modifications, as described under AS 7502 are deemed necessary or desirable to an RRV, the modification must 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 must be kept and made available along with risk assessment of the change(s). Similarly, any vehicle operating manuals must be updated to accurately reflect the changes or modification and all personnel suitably trained and familiarised with the change as necessary.

This aspect is described in more detail below at Section 13 Maintenance and Modification below.

5.8 Transfer of RRVs

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

- Provide suitable and sufficient information on the hazards of the RRV and its use;
- 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;
- Provide the full available history of the RRV including its maintenance history, defects or other out of course faults and any changes/modifications; and
- 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.

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The owner of the RRV must also advise the RIM(s) of the intended disposal to allow for the removal/transfer of the vehicles registration on the RIM's rolling stock register.

6 Training and Competence

All RTOs that utilise 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:

- Track Vehicle Operators;
- RRV Operators
- 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 must ensure the contractor has:

- Suitable and sufficient processes for training and assessment of competencies of the operators of the specific RRVs;
- Evidence that such training and assessment has been done;
- Ongoing training and refresher/ familiarisation processes in place and delivered; and
- Evidence of maintenance/utilisation 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.

In addition to this formal qualification there is other training required for the safe operation of the RRV on the railway system. The principal item here is the Network Safeworking Rules. Most of these are based on the Australian National Rules, however some RIMs have unique differences to these rules for their networks and the operator must have the correct Safeworking competence for the respective network.

Note that some RIMs may have additional specific training requirements for their networks and these must be established and undertaken in advance of any operations.

In addition to the foregoing, all road rail vehicle 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 localised 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

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

Familiarisation training must be given by a competent person in the specific type of vehicle in question. This may be in relation to such factors as 'changes', operations or technology as may be appropriate.

Owners of RRVs should consider the 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 bad habits being picked up by regular operators are rectified. The frequency of such refresher training should be established on a risk based decision, which should include consideration of:

- The number and type of RRVs being used;
- Frequency of operations;
- Operating environment(s);
- Incidents

Persons who are required to perform maintenance on an RRV must be suitably competent 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.

7 Road Rail Vehicle – Loading

An incorrectly loaded or overloaded RRV is a vehicle in a hazardous condition.

Because of this, the dynamics imparted to the vehicle whist travelling, are significant and if not properly managed and maintained, will result in derailment or other incidents.

Loading considerations to include:

- The additional weight of the road rail unit increases the TARE weight of the vehicle and must be included when determining the vehicle capacity (payload).
- The effect on the vehicle's load tolerance (Wheelbase Load Limit) and stability from attachments that may be fitted such as tamping heads on excavators, sleeper grabs and similar;
- Load distribution. If the load being carried on the RRV is not correctly distributed with respect to the vehicle type and its operations, it can cause traction and braking problems and may also cause dynamic instability leading to derailments;
- Many RRVs in common use have significant reductions in their lateral stability due to the often narrower track gauge when in the on-track configuration. This results in reduction of safe operating limits including lifting capacity, stability etc.
- RRV's that have load movements, such as that experienced by excavators with bucket attachments rotating and cherry picker type units as they extend and slew or move with loads, must have interlocks or other devices to prevent operation outside the safe limits;
- The operator and any crew or passengers and their ancillaries such as tools, fuel, food, water etc.;
- Many RRVs are available which are gauge convertible units. With these units, the effect of transitioning from one gauge to another on the wheelbase and the subsequent effect on loading capacities must be identified with suitable warning information clearly displayed/available. Where practicable engineering systems such as interlocks and engineered warning systems should be utilised;

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- Any RRVs that are fitted with Roll Over Protection Systems (ROPS) and Falling Object Protection Systems (FOPS) have significant additional weight and must be considered in the tare and GVM capacity;
- The use of loaded trailers. Where trailers are utilised they will significantly impact on the vehicles acceleration and braking performance. All RRV operators need to be separately assessed on their competencies to drive with trailers or other attachments.

7.1 Loading and Tyres

There are specific requirements in relation to tyred vehicles and loading aspects. The tyres recommended for the vehicle, or as otherwise prescribed by the equipment owner, and their "on rail" pressures must be defined in the rail guidance equipment OEM manual or other suitable instructions when changed from the OEM recommendations.

Loads on rubber tyres in contact with the rail must not exceed the manufacturer's load rating under any condition of loading. It is recommended that at maximum vehicle load, the maximum load on the tyre is limited to 90% of its load rating.

It is also necessary to ensure that sufficient load is carried on the tyres to provide adequate grip for traction and braking and remembering that a significantly reduced contact pattern is available from the rail head as compared to 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, must also be considered in terms of loading, braking performance and uneven wear which then impacts on safe operations on road.

8 Road Rail Vehicles – Trailers

It is not uncommon for trailers to be used with an RRV. Some trailers can be basic rail bound trailers i.e. no road wheels, and others can also have road rail equipment like the normal RRV units. No matter which is used, the basic requirements for their use remain the same:

- The trailer should be registered with the RIM for it to be operated on their infrastructure;
- Only vehicles capable of controlling the operating dynamics of the trailer may be used for towing;
- Braking performance will be reduced on the towing vehicle so greater separation between vehicles in convoy will be necessary and/or a reduction in travelling speed;
- All towing points must be clearly identified and suitably rated for the vehicle and its maximum loading;
- The load being carried in the trailer must be suitably secured to prevent load shift and subsequent dynamic forces impacting the trailer and/or the towing vehicle:
- Secondary securing systems such as chains must be used at all times: and
- All trailers to have failsafe braking systems that activate automatically in the event of a break away.

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9 Pre-Start Checks

Pre-Start checks must be carried out on all RRVs prior to use, this also includes contractor supplied and operated vehicles. Many 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 must be done by a suitably competent person at scheduled intervals (see Section 13 Maintenance and Modification below).

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

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

Additional 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, including access tracks and also in other challenging terrain. Whenever such activity has been carried out, the RRV operator should again visually check the road rail equipment 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 must 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. This means that the record document must avoid a simple tick box approach as much as possible and require a positive response from the person completing the form.

All operators conducting pre-start checks must 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 must 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 may 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 must be clearly identified.

To assist users, this Guideline has a sample Master Checklist at **Error! Reference source not found.** to a ssist in the development of their own checklists.

10 Operations

10.1 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:

- Permission from Train Control or person in charge of worksite/occupation;
- 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;
- 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;
- Sufficient room for the size and operating parameters of the vehicle; and
- For older vehicles that are not compliant with AS7502, 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 is important to verify it is correctly on the track before attempting to travel or commence working. Before carrying out further checks, the operator must ensure the vehicles parking brake is applied. Then the operator must alight from the vehicle and visually check, or where available, have a suitable competent colleague visually check the vehicle. Items to check are:

- verify that the flanges of the rail wheels are correctly engaged with the rail head;
- For vehicles with over-centre RRV systems, it must be verified they are fully over-centred and on the stops;
- All lights and other warning systems must be fully functional and on as required;
- 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 defect with the vehicle;
- Ensure vehicle configuration including suspension is correctly set prior to departure; and
- A low speed rolling brake check must be performed to verify that the vehicles brakes are functioning correctly before setting off.

10.2 Track Travelling/Operating

10.2.1 General

For all operations including track travelling the vehicle and/or worksite operations there are other requirements that must be considered and applied as appropriate. These may include the following:

- The first and most important requirement and a statement that needs to be at the forefront of every operator's mind – 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.
- Communications requirements – to Train Control, between machines in convoy and/or worksite communications with the occupation/possession;
- Route knowledge requirements;
- Compliance with all relevant safeworking rules as required by the RIM;
- The RIM's requirements for setting back operations (reversing);
- Use of cameras, particularly reversing cameras, but consideration may also be given to cameras that can show the rail wheel interface if not readily visible to the operator;
- Use of lookouts in vehicle and on-site including the use of pilots;

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- Out of gauge (rolling stock outline) machines;
- Machines that become out of gauge when operating e.g. infringing adjacent tracks, striking trackside infrastructure;
- Potential for road wheels to cause derailment as a result of contact with raised ground at crossings for all RRV types and at switches on those vehicles with twin rear wheels; and
- 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.

10.2.2 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:

- The RIM's defined track speed requirements;
- The vehicles maximum speed as against the permitted speed including in reverse;
- All RIMs have speed restrictions on RRVs requiring to transit across a level crossing and points, while towing and behind trains.
- The operators of the RRV should ensure there are processes for proportional operating speed reduction when the infrastructure they are operating on has a Track Speed Restrictions (TSR) in place. As a guide, this should be approximately 25-30% reduction from the posted speed for mainline train traffic. A table of suggested speeds in such circumstances is at Appendix C. 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.
- 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.

10.2.3 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:

- 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.
- 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.
- The track vehicle operator in charge of the convoy shall always travel in the lead vehicle.
- In all circumstances, the operators must drive to conditions.
- Ensuring that the vehicle separation distances are sufficient to minimise collision risk and not to have excessive distance to ensure that no vehicle gets separated from the others.
- Control of speed between all the vehicles must be maintained and managed to minimise collision risk.

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- Communications within convoy must be maintained and effective. If communications are lost then the convoy must take appropriate action such as reducing speed, stopping or other agreed action decided upon before the convoy sets out or as instructed by the RIMs 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.
- 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 must slow down and travel at restricted speed.
- All vehicles in a convoy must close-up together, but maintain effective minimum safe separation distance when requiring to travel over a level crossing and comply with any other specific requirements in the RIM's Safeworking Rules.
- 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 may be necessary for the vehicles to close up on each other such as at level crossings.
- Where any leading vehicle needs to stop, the track vehicle operator of that vehicle must warn the vehicle(s) behind of the need to stop. This should be done in accordance with the Safeworking Rules.

10.2.4 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:

- 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;
- 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 organisations procedure for Risk Management;
- 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 must 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;
- 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 the still cause substantial damage. Collisions with work groups is another

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consideration and one which is always serious. In these circumstances, more active controls need to be considered and selected based on the principle of So Far As Is Reasonably Practicable (SFAIRP). Examples of processes that may be of use and considered for such works include:

- The use of reverse cameras on the RRVs. This will depend on the type and nature of the vehicle;
- In very congested sites it may be necessary to consider piloting the RRV within the site bounds;
- All worksites should have defined maximum speed limits which are enforced. This will also apply to any crossings and points within the worksite;
- The maintenance of suitable and sufficient separation distances between operating vehicles and others and from work teams is a common approach. However, where used there must 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;
- All vehicle working within the work site must have all the requisite lighting/hi-visibility systems as described within AS 7502. In addition to this is the regular pre-start checks of RRV systems and repair in line with the requirements of the RIM;
- Similar to the above, the vehicles must all have suitable audible alarm systems. Note however that in congested sites with multiple operating machines 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;
- When working RRVs within worksites, given the wide variety there are including EWPs, excavators, tractors, loaders etc., a point of concern is operations that exceed the rolling stock outline. Many of these vehicles have parts that can extend out for considerable distances easily infringing any adjacent track or other track infrastructure. This is a risk if working adjacent an operational track with passing traffic or where there are other RRVs/track vehicles such as tampers etc. working. The risk for impact/collision is significant and effective steps must be taken to ensure this risk is mitigated by means of such items as height restrictors, slew locks and similar;
- Similarly, where personnel are working with RRV EWPs, boom lifts, cranes etc., effective means must be implemented to ensure the risk of infringing over adjacent operational track is controlled. Scissor type EWPs that have no outward reach capacity from the base vehicle are an effective solution, however if reach is necessary then effective means to protect from passing traffic must be implemented, even closing the track if necessary; and
- Potential for significant lateral and/or vertical forces impacting on the RRV using special attachments such as sleeper grabs, tamp heads and similar which may cause derailment or overturning or other incident.

10.3 Off-Tracking

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

- Except in cases of emergency, off-tracking must always be done at a suitable location as described in Section 10.1 Off-Tracking above.
  Cautionary Note: If it is necessary to off-track at a location other than where the RRV on-tracked, the operators must 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 and alternate location should be sought or there may be a potential risk of runaway if also on a grade;

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- 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 these falling during road travel/off-track operations;
- As described in Section 9 Pre-Start Checks (above) the operator should ensure the vehicle is checked for any signs of damage that may have occurred whilst operating on track. Attention should be taken of the tyres, on those vehicles that have them, for any damage or cuts; and
- 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.

11 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:

- Application of RRV owner and/or RIMs Security Management Plan.
- RIMs Safeworking Rules requirements. In many cases, there are restrictions on where vehicles can be stabled on tracks;
- 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;
- Consideration must be given to ensuring there is no risk of raised parts or equipment can fall and foul adjacent running lines e.g. locking pins, chains or lower in a safe location,

RRVs must be secured to prevent runaway, unauthorised 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 considered include:

- Establishment of secure compounds;
- Disablement of the RRV to prevent unauthorised use either electrically or isolation of the fuel system;
- Engagement of security services in high risk areas;
- Removal of valuable/desirable equipment from vehicles or removal from sight including tools, radios, phones etc.;
- Removal of items which may be used to cause vandalism including paint cans, fire extinguishers etc.
- Fitment of vehicle tracking systems.

12 Emergencies and Incidents

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

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Before any RRV can operate on track it must 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:

- Requisite warning flags;
- Approved track shorting clips;
- Track warning signals as per the local requirements, and
- Emergency off-tracking systems such as hand pumps.

In addition to this, all RIMs have in place emergency management plans which detail specifically how an emergency is to be managed, this includes failed rail traffic. The operators of the RRV must 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 as follows:

- An effective and comprehensive risk register detailing the potential risks in the RRV use;
- Incident reporting protocols;
- Communications requirements and action to be taken in the event of loss of communication;
- Emergency off-tracking items and associated equipment e.g. pump handles;
- Towing and removal requirements for broken down RRVs. This may include requirements for craneage to lift vehicles off track;
- Towing equipment and clear identification of towing points and vehicle recovery points – refer to OEM and/or Owner's Manual;
- Emergency supply requirements, particularly for remote area working;
- Specific requirements in the event of an RRV derailment e.g. quarantine of vehicle until inspected by a competent engineer;
- 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.

13 Maintenance and Modification

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

All suppliers of RRV equipment will provide the basic minimum information relevant to the maintenance of the rail guidance system. However, this may often be insufficient as the supplier has no direct knowledge of the specific operating environment and usage that each machine will be subjected to during its life and operations.

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.

Modification of RRVs must never be done except 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 must be subject to a suitable risk assessment as part of the process. Note also that any

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modification may also require that the RRV be re-registered for on-road and on-rail use. Any change that affects the registration criteria requires notification to the RIM through the owners' change management process.

In addition to the above, detailed records of any changes/modifications must be kept and made available. Similarly, any vehicle operating manuals must 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. Non-Destructive Testing (NDT)of the Rail Guidance Equipment frame and other key structural components must 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 need to also be aware that the host vehicle may require the routine maintenance schedules adjusted because of the rail guidance system fitment. This system fitment imposes significant additional stresses on the vehicles structure and there may also be considerations in terms of the operating environment. Additionally, any changes to the vehicle as described in Section 5.7 may also directly impact on the vehicles maintenance requirements. This must be considered and changes made as necessary.

14 Auditing and Review

Operators of RRVs must 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

- Selection and monitoring of suppliers and sub-contractors. This should include formal review of selected contractors' performance on a regular basis;
- Training and competence – including refresher/familiarisation training and contractors;
- Maintenance performance;
- In-field operations including communications;

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

- Current operations including environment and workload;
- Incidents;
- 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.

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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.

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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

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Appendix B. 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

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Appendix C. Table of Suggested Proportional Speed Reduction for RRV's

	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**

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Appendix D. Master Checklist for RRV Inspection and Maintenance

	Hazards	Category	Item	End User	Maintainer	Maintainer	Maintainer	Auditor	Standard	Who Specifies Standard?
				Before On-Track	3 Month or 5000 km	6 Month or 10000 km	12 Month or 20000 km	Condition Assessment		
1	Operational instability	**Alignment**	Back to back gauge			service		audit	to specification	Manufacturer
2			Rail wheels			service		audit	for correct gauge	
3			Rail guidance suspension units			service		audit	flexitor arms to specification when on track	
4			Body lift			service		audit	to specification	
5			Rail wheel alignment			service		audit	to specification	
6			Rail wheel, bolts, nuts, split pins			service		audit	replaced following alignment	
7			Flexitor arms			service		audit	for play	
8			Over centre distance			service		audit	to specification	
9			Axles and high rail gear			service		audit	for parallel	
			Rail wheel to road wheel/chassis alignment			Service		audit	To specification on track at Tare Condition	

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	Hazards	Category	Item	End User	Maintainer	Maintainer	Maintainer	Auditor	Standard	Who Specifies Standard?
				Before On-Track	3 Month or 5000 km	6 Month or 10000 km	12 Month or 20000 km	Condition Assessment		
10	Brake failure. Reduced braking capability	**Brakes**	Foot, park, road rail (if fitted)	Check	service			audit	for correct function	Manufacturer
11			Hose damage		service			audit	for damage	
12			Pads		service			audit	for wear	
13			Callipers		service			audit	for security	
14			Fluids		service			audit	for level/leaks	
15			Adjustment		service			audit	to specification	
16			Brake lines		service			audit	for damage	
17			Stopping distance when on track		service			audit	to specification	

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	Hazards	Category	Item	End User	Maintainer	Maintainer	Maintainer	Auditor	Standard	Who Specifies Standard?
				Before On-Track	3 Month or 5000 km	6 Month or 10000 km	12 Month or 20000 km	Condition Assessment		
18	Approach not seen Approach not heard Overspeed operation Operational failure Unable to remove from track	**Controls/lights**	Electric controls	Check		Service		Audit	for correct function	Track Manager/ Owner
19			Head, tail, flashing, spot and hazard lights	Check		Service		Audit	for correct function	
20			Proximity switches	Check		Service		Audit	for correct function	
21			Warning devices, horn, sirens	Check		Service		Audit	for correct function	
22			Speedometer	Check		Service		Audit	for correct function	
23			Wiring, limits, buttons, lamps	Check		Service		Audit	for damage	
24	Faults Unreported	**Documentation**	Inspection Log	Check				Audit	for correct use, faults reported, repaired	Track Manager/ Owner
25			Rail Guidance Equipment Manual	Check				Audit	for manual in vehicle and current	

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	Hazards	Category	Item	End User	Maintainer	Maintainer	Maintainer	Auditor	Standard	Who Specifies Standard?
				Before On-Track	3 Month or 5000 km	6 Month or 10000 km	12 Month or 20000 km	Condition Assessment		
26	Operational failure Unable to remove from track	**Fluid Levels**	Engine oil	Check		Service		Audit	for correct level	Manufacturer
27			Radiator coolant	Check		Service		Audit	for correct level	
28			Fluids	Check		Service		Audit	for condition, leaks	
29	Unfit for operation	**Following Derailment**	Road Rail Vehicle	Check		Service		Audit	for damage, correct function	Track Manager / Owner
30	Operational failure Unable to remove from track	**Hydraulic System**	Hydraulics	Check		Service		Audit	for correct function	Manufacturer
31			System pressure			Service		Audit	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				Audit	is fully fuelled	Owner
35			Load	Check		Service		Audit	is secure, within GMV, evenly loaded	
36			Load	Check		Service		Audit	is in gauge, within outline	
37	Unfit for operation	**Manufacturers checklist item**	Manufacturers recommendations	Check	Service	Service	Service	Audit	Are followed	Manufacturer

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	Hazards	Category	Item	End User	Maintainer	Maintainer	Maintainer	Auditor	Standard	Who Specifies Standard?
				Before On-Track	3 Month or 5000 km	6 Month or 10000 km	12 Month or 20000 km	Condition Assessment		
38	Unfit for operation	**Modification**	Road Rail Vehicle	Check				Audit	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		Service			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		Service		Audit	are in place	Owner
42			Rail sweeps	Check		Service		Audit	are correctly adjusted	Owner
43	Loss of rail wheel contact. Out of gauge	**Rail wheels**	Lock pins	Check		Service		Audit	for ease of operation	Manufacturer/ Owner
44			Locking mechanisms	Check		Service		Audit	for ease of operation	
45			Pivot points			Service		Audit	lubricated	
46			Rail wheel pairs			Service		Audit	are matching pairs	

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	Hazards	Category	Item	End User	Maintainer	Maintainer	Maintainer	Auditor	Standard	Who Specifies Standard?
				Before On-Track	3 Month or 5000 km	6 Month or 10000 km	12 Month or 20000 km	Condition Assessment		
47	Loss of rail wheel contact. Out of gauge	**Rail wheels**	Road and rail wheel studs	Check		Service		Audit	for security, damage	Manufacturer/ Owner/ track Manager
48			Sandwich wheel rubber	Check		Service			for separation	
49			Stub axles			Service			for cracks	
50			Web, flange and tread	Check		Service		Audit	for cracks	
51			Wheel bearings			Service		Audit	For wear, damage (re-pack)	
52			Wheel bearings	Check				Audit	for play/noise	
53			Insulation			Service		Audit	for security	
54			Wheel flange wear	Check		Service		Audit	to specification	
55	Reduced braking capability. Brake failure. Loss of traction	**Road wheels/tyres including spare**	Operations on track	Check		Service		Audit	for correct function	Manufacturer/ Owner
56			Rims	Check		Service		Audit	correct for vehicle	
57			Rims	Check		Service		Audit	for cracks, signs of fatigue	
58			Studs and nuts	Check		Service		Audit	for security, damage	
59			Tyre pattern	Check		Service		Audit	same for all tyres	
60			Tyre pressure	Check		Service		Audit	to specification	

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	Hazards	Category	Item	End User	Maintainer	Maintainer	Maintainer	Auditor	Standard	Who Specifies Standard?
				Before On-Track	3 Month or 5000 km	6 Month or 10000 km	12 Month or 20000 km	Condition Assessment		
61	Reduced braking capability. Brake failure. Loss of traction	**Road wheels/tyres including spare**	Tyre rubber	Check		Service		Audit	for cracks and damage	Manufacturer/ Owner
62			Tyre treads	Check					to specification	
63			Tyres, rims, wheels	Check		Service		Audit	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				Audit	for correct function	Owner/Track Manager
65			Vigilance control unit (VCU)	Check				Audit	or correct function	
66			1st Aid	Check				Audit	provided	
67			Emergency off-tracking equipment	Check				Audit	provided	
68			Emergency towing	Check				Audit	provided	
69			Fire extinguishers	Check				Audit	provided	
70			Perway protection items	Check				Audit	provided	
71			VCU tamper proof seal	Check				Audit	is sealed	
72			Warning decals	Check				Audit	are fitted	

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	Hazards	Category	Item	End User	Maintainer	Maintainer	Maintainer	Auditor	Standard	Who Specifies Standard?
				Before On-Track	3 Month or 5000 km	6 Month or 10000 km	12 Month or 20000 km	Condition Assessment		
72	Structural integrity failure. Loss of gauge. Operational instability. Loss of traction. Loss of rail/wheel contact.	**Structure**	Mechanical safety latches	Check		Service		Audit	for correct function	Manufacturer
73			Rail kit (RGE) locks	Check		Service		Audit	for correct function	
74			Front axle lockout	Check		Service		Audit	for correct function, adjustment damage and wear	
75			Rail guidance frame	Check		Service		Audit	is secure	
76			Rail guidance frame	Check		Service		Audit	for damage	
77			Anti-derail frame	Check				Audit	for condition	
78			Grease points/ nipples, and as specified by manufacturer			Service		Audit	for grease/lubrication	
79			Rail kit swinging frame bolts	Check		Service		Audit	for position and tightness	
80			'Over centre' condition	Check		Service		Audit	is maintained	
81			Pivot bolts and retaining bolts	Check		Service		Audit	for security and wear	
82			Frame areas, welds, mounting points	Check		Service		Audit	for looseness and cracks	
83			Rail guidance suspension arm bolts	Check		Service		Audit	in place and secure	

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

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