

Guideline

Road/Rail Vehicle Management & Operations

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1. Purpose

The purpose of this road/rail vehicle (RRV) guidance is to provide guidance on what to look for in developing and reviewing RRV related elements of a safety management system to achieve compliance with the *Rail Safety National Law* (RSNL).

2. Background

Since 2012, the Rail Industry Safety and Standards Board (RISSB) and the Office of the National Rail Safety Regulator (ONRSR) have worked with industry on identifying and managing risks associated with RRV operations. Several workshops were held, where participants identified key loss of control events associated with RRV operations and developed a method for risk management using 'bow tie' analysis.

Bow tie analyses are a useful guide for rail transport operators (RTOs) when evaluating risk assessments. They help gauge whether operators have identified known risks and have considered adequate controls to manage the rail safety risk in line with section 46 of the *Rail Safety National Law* (RSNL).

Bow tie analyses relating to RRV risks are available on the ONRSR website: www.onrsr.com.au by following the links to Road/rail vehicle safety under the Safety Improvement menu.

3. Scope

This guidance is based on material that has been developed to assist ONRSR Rail Safety Officers (RSOs) in the examination of RRV related systems and processes of operators or maintainers of RRVs. It contains a structured list of items that should be considered during audit or other review activities. **This guidance is intended to inform and guide compliance in relation to RRV activities but is not exhaustive in terms of issues that may need to be considered by operators.** The guidance covers the following broad areas:

- > **Risk assessments** are complete, thorough and address the hazards associated with RRV use in all modes of operation (i.e. on rail, on-off raiing, between worksites, degraded and abnormal operations). The organisation has considered the unique risks that the usage of this equipment involves and these risks are adequately captured within their risk register;
- > **Design, construction and commissioning processes;**
- > **Configuration management** includes recertification and part of a broader change management approach;
- > **Operating procedures** for the safe use of each type of RRV are documented, implemented and reviewed (procedures can be found in numerous documents including training manuals, competency assessments and owner's manuals);
- > **Inspection and maintenance procedures** include daily and periodic inspections and maintenance; and
- > **Competency assessments** are robust, comprehensive and documented to operate each type of RRV for particular environments as well as for personnel engaged in the maintenance of RRVs.

4. Definitions

RIM	rail infrastructure manager
RRV	road/rail vehicle
RRV type	RRV types are broadly defined as follows (note that RISSB guidelines, signposted in section 5.7 Guidance References, provide further detail):

- > Type I (9A): self-powered rail wheels, braking and traction directly on the rail wheels;
- > Type II (9B): high ride vehicles;
 - Traction indirect, from road wheels to rail wheels, braking direct on the rail wheel
 - Traction indirect, from road wheels to rail wheels, braking indirect from road wheel to extension hub; and
- > Type III (9C): low ride vehicles, braking and traction on road wheels.

RSO rolling stock operator

RTO rail transport operator

5. Guidance on the RRV management and operations compliance

The ONRSR will examine RRV related elements of a RTO's safety management system principally to check that the operator has assessed that the vehicle and its operator(s) is fit for its intended purpose. That is, that the vehicle will fulfil its operating requirements on or transitioning off the track, that it will stop (and will only move when under the control of a competent person), that operating risks have been considered and that the people who operate and maintain the equipment have been assessed as competent for the activity they are performing.

The following guidance is intended to direct attention to ensuring:

- > RRVs are robust and fit for purpose (i.e. the design and construction of the rail guidance equipment, suitability of the vehicle it is being fitted to, inspection and maintenance regimes);
- > RRVs are not susceptible to derailment and any increased risk of derailment has been considered, is captured through risk assessment and is managed accordingly;
- > The effectiveness of operational and park braking systems when the vehicle is operated on rail (effectiveness in stopping the vehicle, holding the vehicle against unintended movement and holding the vehicle during the transition between road and rail modes); and
- > The competence of people operating RRVs when on rail and those responsible for inspecting and maintaining the vehicle.

An RTO's organisational risk register, and any risk assessments, must consider the operation of the RRV under:

- > Emergency mode
- > Degraded mode
- > Normal mode
- > Abnormal mode

Some requirements such as: operation in worksites, possessions and across level crossings must be managed in conjunction with the Rail Infrastructure Manager (RIM), and risk assessments must take into account RIM rules and procedures. This guideline is also designed to test the process of acceptance of an RRV type by the RIM as suitable to the RIM's network, which will typically involve the RTO obtaining a track access agreement, or similar, from a RIM with the RIM undertaking an RRV registration process that includes a requirement that the RRV complies with the standards set by the RIM for operation on the network.

It is important that operators have at least assessed risks associated with the four major hazardous events known with the operation of RRVs when they are on rail:

- > runaway;

- > collision;
- > derailment (including rollover); and
- > fire.

People competent and experienced in the use of RRVs should be involved in conducting risk assessments with other relevant stakeholders (e.g. maintainers, protection officers, worksite supervisors).

Any equipment and personnel supplied by contractors (who do not have rail safety accreditation in their own right) must be considered and integrated within the Rail Transport Operator (RTO)'s safety management system. That is, the equipment is inspected and assessed as safe and drivers competent as if it were the accredited RTO's own equipment and personnel. This is managed through contractor management process.

The following sections are presented to assist in assessing compliance against requirements of the legislation by listing a set of criteria or issues that need to be considered in addressing the relevant parts of the RSNL and Regulations.

Further relevant reading material is also referenced in section 6 of this document.

5.1 Risk assessment

Compliance criteria

Rail Safety National Law

- > Section 46 Management of Risks
- > Section 99 Safety Management System

Rail Safety National Law National Regulations, Schedule 1

- > Clause 16 Risk Management

Compliance considerations

- > The risk assessment(s) / risk register should articulate the following RRV risks when the vehicle is used on rail or in the vicinity of the danger zone in all operating modes:
 - runaway
 - collision
 - derailment, including rollover (load lifting equipment such as RRV excavators, elevated work platforms, trucks fitted with tipping trays and cranes)
 - fire.
- > Have all operating modes been considered in the risk assessment? For example:
 - possession (authority to operate within worksite)
 - possession (running between worksites)
 - possession (track maintenance and inspection)
 - railing
 - off railing
 - stowage on rail
 - degraded / abnormal
- > Have all environmental factors been considered in the risk assessment? For example:
 - grades
 - visibility
 - sighting distance
 - wheel / rail interface and condition
- > Do the controls listed in the operator's risk assessment have a strong link to:
 - the design, construction, commissioning and maintenance of RRVs and are these aligned to the specific operating conditions for all networks on which they intend to operate
 - detailed operating procedures for RRVs. There should be separate operating procedures for each different type of RRV employed by the operator
 - training and assessing the competence of RRV drivers and maintainers
 - inspection and maintenance regimes which include both daily (pre-use) checks and periodic detailed inspections
 - emergency recovery procedures

5.2 Design, construction and commissioning processes

Compliance criteria

Rail Safety National Law National Regulations, Schedule 1

- > Clause 18 Procurement and Contract Management
- > Clause 19 General Engineering and Operational Systems Safety

Compliance considerations

Design Parameters: Has the RTO used or developed established design parameters when procuring RRVs or rail guidance equipment and the vehicles it is to be fitted to? Examples of design parameters include:

- > Rail braking systems, both operational brake and park brake. Is the braking independent of drive train?
- > Have braking performance criteria been established:
 - has the vehicle's braking system been designed and tested to ensure it can stop within the distance and maximum safe operating speed specified by the RIM and RRV standard criteria?
 - has the vehicle's park brake been designed and tested to ensure it will remain stationary indefinitely on the maximum grade it will encounter?
- > When operated on rail does the vehicle's braking rely on vehicle's drive train? Is there a means of braking on rail wheels if:
 - the vehicle's drive train fails
 - there is inappropriate load distribution between rail and road wheels which reduces braking effort on the drive tyres
 - tyre condition and incorrect inflation compromise braking effort
 - the only braked axle is raised off the rail (for example when placing the vehicle on track or removing it from the track)
- > The maximum grade it will operate on
- > The maximum speed it will operate at
- > Track geometry parameters the vehicle must be capable of negotiating (e.g. twist limits, minimum curve radius)
- > Insulation from track circuits
- > Wheel profile
- > Track gauge and back-to-back measurements
- > Tolerance for the alignment of rail guidance equipment
- > Design load (keep in mind the weight of the rail guidance equipment forms part of the vehicle's load)
- > Safe working loads of load lifting equipment when in rail mode:
 - is there a system of automatically limiting loads when in rail mode? (e.g. any RRV acting in a lifting mode should be fitted with a limit switch to ensure rail wheels to not lift when over-reaching occurs)?
 - is the operator provided with a safe working loads chart for when the vehicle is in rail mode?
- > Rolling stock outlines as specified by the RIM's Train Operating Conditions (TOC) or equivalent (i.e. Kinematic Envelopes)
- > Safety equipment to be fitted (e.g. flashing warning light, reversing camera, reversing beeper, horn, occupant restraint – seat belt, communications by way of radio, headlights, speed indicator –accuracy when on rail).
- > (**Note:** The ONRSR has developed guidelines regarding the safety related equipment to be fitted to RRVs that may be relevant).
- > Vigilance and data recording facilities
- > Driver incapacitation systems are fitted

- > Electrical safety (for use in electrified networks) – height restrictors fitted for vehicles with lifting equipment (cranes, elevated work platforms, excavators)

Engineering certification: Is the design and construction of the rail guidance equipment certified by an engineer – this is usually in the form of a certificate provided by the supplier of the rail guidance equipment and should confirm:

- > The RRV (i.e. the rail guidance equipment and the vehicle it is fitted to) is fit for the intended purpose and meets the specified design parameters
- > The rail guidance equipment is structurally sound
- > The rail guidance and associated equipment has been tested for correct operation and meets the design parameters
- > For vehicles that operate on the road, a current road vehicle registration and the appropriate roadworthy certification depending on the State or Territory
- > A risk assessment has been undertaken with controls in place for identified hazards

While the certificate may be provided by the supplier, take care that it has been prepared by qualified engineering personnel.

Note: Older RRVs may not have engineering certification provided by the supplier in which case they should have an engineering assessment conducted to confirm the condition of the vehicle is fit for purpose, which includes a recommended inspection and maintenance regime to monitor the condition of the vehicle so that faults are identified and rectified before they become critical.

Commissioning: There should be a record of static and dynamic testing which the RTO has conducted to confirm that the vehicle is able to safely negotiate the track on which it will operate. For example:

- > The RRV has been tested such that it does not cause damage to infrastructure (e.g. correct wheel / rail interface, power lines, trackside equipment etc.). Tested for all intended different vehicle loading / hauling scenarios
- > The RRV has been tested such that it does not interfere with safety critical rail systems (e.g. signals, level crossings etc.)
- > Fitted with a speedometer that is accurate during on-rail mode
- > Fitted with adequate braking systems that will stop the RRV within the specified distance given its maximum safe operating speed (including the towing of trailers when attached). Brakes tested for all intended different vehicle loading / hauling scenarios
- > A functional parking brake when the RRV is on the rails as well as off that will hold it at specified grade indefinitely (testing may require a hold of 15-20 minutes)
- > Fitted with all required communication systems
- > Appropriate warning systems such as head lights, flashing lights, audible sounds like the horn
- > Additionally for type II RRVs (in particularly purchased from the UK):
 - disc brakes have been fitted to the rail wheels of the vehicle and evidence that the vehicle will stop within a safe distance for all modes of operation
 - interlocking has been fitted such that there is braking capability for on and off track movements
- > Compliance to rolling stock outline as specified by the Network Owner – Kinematic Envelope
- > Twist test
- > Ride stability test

Decommissioning and re-use: There should be a means of identifying faulty or de-commissioned rail guidance equipment (or individual components) to prevent re-use without requalification. If previously used rail guidance equipment is to be fitted to another vehicle there must be robust engineering assessment/qualification of the old rail guidance equipment and the suitability of the vehicle it is being fitted to in order to ensure it is safe for use on the new vehicle.

5.3 Configuration management

The compliance criteria

Rail Safety National Law National Regulations, Schedule 1

- > Clause 7 Document Control and Information Management
- > Clause 12 Management of change
- > Clause 19 General engineering and operational systems safety requirements

Compliance considerations

- > Proof that the RRV is as safe or safer to use post modification:
 - a certificate stating that the RRV, after modification, still meets the standards for rail application
 - for vehicles that operate on the road, a current vehicle registration and the appropriate roadworthy certification depending on the State or Territory
 - a risk assessment detailing controls to risks associated with identified hazards in the current operating environment after modification
 - competent people have been involved in the above
- > Evidence that the RRV has been tested such that it does not cause damage to infrastructure (e.g. correct wheel / rail interface, power lines, trackside equipment etc.). Tested for all vehicle loading / hauling scenarios
- > Evidence that the RRV has been tested such that it does not interfere with safety critical rail systems (e.g. signals, level crossings etc.). Tested for all vehicle loading / hauling scenarios
- > Requalification certificate for purchased RRVs or rail guidance equipment that had been decommissioned

5.4 Operating procedures

Compliance criteria

Rail Safety National Law National Regulations, Schedule 1

- > Clause 19 General Engineering and Operational Systems Safety
- > Clause 10 Safety Audit Arrangements

Compliance considerations

Operating: The RTO should have detailed operating procedures for each type of RRV in use. It is particularly important these describe the type of rail braking system fitted to the vehicle and how it operates. The purpose of detailed operating procedures is to describe the correct way of operating the RRV (both on and off rail) covering:

- > Pre-use inspection procedures and evidence that these are carried out:
 - checking of braking system function
 - checking of speedometer where fitted
 - checking of stub axles, suspensions (visual only)
 - checking of horn and other annunciation systems
 - checking of headlights, windscreen wipers and other lighting systems
 - checking of communication equipment
- > Operational procedures describe safe use of RRVs for each type of rail activity in all operating modes:

- safe on and off rail movements
- safe gradient
- visibility
- brake interlocking
- runaway procedures
- > Safe Work Method Statement (SWMS) for each type of RRV and for all operating scenarios
- > Emergency procedures for each type of RRV in road and rail modes
- > Defect reporting and management system
- > Placing the vehicle on the track, ensuring:
 - the nature of the vehicle's braking system is appropriate to how the vehicle operates (and whether risk of runaway is being introduced) as each rail guidance axle is being lowered to the rail
 - there is a list of safe locations for placing and removing the vehicle from the track or that the features of appropriate on/off track points (e.g. gradient, road traffic volumes and traffic speed, visibility, surface condition) have been identified
- > Operating the vehicle when it is on the track, highlighting:
 - key differences in the handling characteristics of the vehicle when on rail compared to when they are on road or their 'normal' mode (and ensure these are captured through risk assessments)
 - significantly reduced braking performance when compared to operation on the road, which may be further deteriorated by wet rail and/or rail contaminated by other factors (e.g. grease, vegetation matter, ballast material)
 - vehicle stability (particularly important with load lifting equipment such as excavators, tip tray trucks and elevated work platforms)
 - safe working arrangements (noting RRVs are typically insulated from track circuits in signalled territory)
 - operating across level crossings (noting RRVs are typically insulated from track circuits)
 - operating on other track circuits (e.g. electronically operated points)
 - travelling mode (to ensure kinematic envelope is not infringed))
 - operating multiple vehicles in 'convoy', or under the one track authority to prevent collision between rail vehicles
 - governing and co-ordinating the movement of rail vehicles (including RRVs within worksites) to prevent collision
- > Road travel and checking the effect of road travel on rail components
- > Timing of rail component operational inspection
- > Securing the vehicle when it is on track against unintended movement (runaway)
- > Removing the vehicle from the track and clearing the danger zone, again observe how the vehicle operates (and whether the risk of runaway is being introduced) as each rail guidance axle is being raised from the rail
- > Procedures for safe removal of the vehicle from the track in the event of mechanical failure
- > Procedures for managing 'not safe to use' RRVs
- > Storage, security and post use inspection of the vehicle once finished work

Auditing: The effectiveness of procedures is reliant on people actually using them. The RTO's audit program should involve:

- > Checking RRV drivers are correctly operating RRVs
- > Assessing that worksites are being managed in line with the RTO's operating procedures
- > Audit and review of populated worksheets (e.g. daily pre-use inspections, defect reports) and maintenance records

5.5 Inspection and maintenance regimes

Compliance criteria

Rail Safety National Law National Regulations, Schedule 1

- > Clause 19 General engineering and operational systems safety requirements
- > Clause 20 Process control

Compliance considerations

- > The RTO should have an inspection and maintenance regime for RRVs which includes:
 - daily inspection checklist that covers the safety critical systems (e.g. braking systems, speedometer, stub axle, suspension, horn, lights, rail guidance systems, tyre tread)
 - maintenance is performed as per technical maintenance plan (or its equivalent)
 - records showing that maintenance of safety critical equipment on the RRV are up to date and complete. Independent checking and / or sampling of these (e.g. populated worksheets completed, defects addressed and signed off by appropriate persons)
 - defect reporting during service and corrective action records are up to date and complete and independent checking of this
 - periodic detailed maintainer inspection

Examples of the types of compliance checks to undertake are contained in RISSB *Guideline for the Safe Operation of Road-Rail Vehicles* (Version 1 May 2006) located at www.rissb.com.au. Section 3 (pages 16 – 25) outlines the checks to included in pre-use inspections (see example 1 and 2) and periodic detailed maintainer inspection (see example 3).

- > The results of all inspections should be recorded
- > There should be a system for reporting defects so they are rectified. This should include a method for reporting, tagging and isolating unsafe equipment
- > Any operating restrictions should be communicated to subsequent users of the equipment
- > The frequency of the periodic detailed maintainer inspection should be determined based on the Original Equipment Manufacturer (OEM)'s recommendations (or engineering condition assessment where this is not available) and the amount of use of the vehicle. The period should be re-assessed in light of emerging issues or rate of degradation being detected during the life of the vehicle

5.6 Competency assessments

Compliance criteria

Rail Safety National Law

- > Section 117 Rail Safety Worker Competence

Rail Safety National Law National Regulations

- > Regulation 30 Records of Competence

Rail Safety National Law National Regulations, Schedule 1

- > Clause 15 Training and Instruction
- > Clause 18 Procurement and Contract Management
- > Clause 24 Rail Safety Worker Competence

There is a specific Australian Qualifications Framework (AQF) competency for use in assessing the competence of people to operate RRVs:

TLIC3045A Operate Road/Rail Vehicle.

http://training.gov.au/TrainingComponentFiles/TLI10/TLIC3045A_R1.pdf

Compliance considerations

- > There must be a strong link between the performance criteria described in the unit of competence (see the above internet link) and the detail provided in the RTO's RRV operating procedures. Competency assessment tools must clearly document how each candidate understands and has the ability to apply the RTO's RRV operating procedures
- > If an RTO is relying on the portability of AQF competencies, they must still have a process to 'verify the competence' of the individual to apply those skills to the operator's specific RRV equipment and operating environment (e.g. a valid Australasian Railway Association Rail Safety Worker ID card)
- > In the absence of the RTO using the AQF competency, they must have established their own system for assessing the competency of people driving RRVs. This must at least consist of:
 - training Material (likely be the operating procedures referred to above)
 - assessment tools which document a combination of written and oral responses and practical demonstration, ideally using the performance criteria listed in TLIC3045A (see link above) as a guide to assess the rigour of the RTO's assessment tools
 - competency assessments must be undertaken by someone qualified and experienced in the use of RRV equipment and should preferably hold Certificate IV in Workplace Training and Assessment
- > RRV drivers should also hold:
 - a current licence for the class of vehicle being operated
 - competency for the operation of the type of machinery being used
 - relevant workplace safety authority High Risk Work Licence, if required
 - a form of identification required under s118 of the *Rail Safety National Law* that is sufficient to enable the type of competence of the worker to operate the RRV

6. Guidance references

- > Safety bulletin - Managing the risks associated with road/rail vehicles
 - http://www.onrsr.com.au/_data/assets/pdf_file/0013/3271/Safety-Bulletin-Managing-the-risks-associated-with-roadrail-vehicles-no.-1-28-August-2013.pdf
- > RRV safety improvement workshop presentation
 - http://www.onrsr.com.au/_data/assets/pdf_file/0005/8582/RRV-Safety-Improvement-Workshops-OctNov-13-v5-photos.pdf
- > RRV safety – follow up workshops May/June 2013
 - http://www.onrsr.com.au/_data/assets/pdf_file/0017/3266/Presentation-RRV-May-June-Workshops-May-2013.pdf
- > PHA results and bow tie
 - http://onrsr.com.au/_data/assets/pdf_file/0014/3029/Presentation-PHA-results-and-bow-tie-RRV-workshop-31-October-2012.pdf
- > Rail Industry Safety Standards Board
 - <http://www.rissb.com.au/products/published-products/#>
 - search for the following published products:
 - > Guideline - Safe Operation of Road Rail Vehicles; and
 - > Guideline - Checklist Road-Rail Vehicles
- > Australian Qualifications Framework Unit of Competency TLIC 3045A Operate Road/Rail Vehicle
 - http://training.gov.au/TrainingComponentFiles/TLI10/TLIC3045A_R1.pdf