



Requirements for Road-Rail Vehicles Accessing and Operating on the AMPRN

Engineering Standard

Rail Commissioner

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1. Introduction

The Department for Infrastructure and Transport (The Department) manages and operates the Adelaide Metropolitan Passenger Railway Network (AMPRN) under the Rail Accreditation assigned to The Rail Commissioner (RCom). Rail Safety National Law (RSNL) (South Australia) Act 2012 requires RCom to have a structured and disciplined approach to the management of the asset lifecycle. This standard, forms part of the engineering management system used to ensure safety and customer service levels are efficiently and effectively supported.

The Department of Infrastructure and Transport owns the Adelaide Metropolitan Passenger Rail Network (AMPRN) currently operated and maintained under the Rail Accreditation of third party. This standard is intended to ensure that the introduction of road-rail vehicles onto the AMPRN does not create any safety risks.

The requirements are applicable to DIT owned and Contractor supplied road-rail vehicles accessing and operating on the AMPRN under DIT Rail Accreditation. Where an Access Agreement is in place, enabling a third party to undertake work on the AMPRN under their own rail accreditation, the third party is fully responsible for ensuring that any road-rail vehicles used for the work comply with all applicable legislative requirements, DIT Rail Access Procedures, and all relevant standards.

A “road-rail vehicle” is a road vehicle fitted with retractable rail wheels that enable it to be driven along the track. It can be moved on or off the track at level crossings or other suitable places and can also operate as a road vehicle.

This standard provides the minimum requirements for road-rail vehicles to access and operate on the AMPRN. It does not obviate the need for a site-specific Safety Management Plan or Work Instruction to ensure that the road-rail vehicle can undertake its work tasks safely at the worksite.

Road-rail vehicles that do not meet the minimum requirements in this standard are not permitted to access and operate on the AMPRN. Approval may be granted by service provider under specified conditions, for a road-rail vehicle to access the AMPRN for the purpose of vehicle examination and testing.

Note: the terms ‘hi-rail vehicle’, ‘hy-rail vehicle’, ‘road/rail vehicle’ and ‘road-rail vehicle’ have all been used to describe this type of vehicle. In this standard the term ‘road-rail vehicle’ is used exclusively.

2. Purpose

The purpose of this standard is to specify the minimum certification requirements for road-rail vehicles to access and operate on the AMPRN. The standard AS/RISSB 7502 Road Rail Vehicles shall be used for the safe design, construction, testing, maintenance, decommissioning and modifications of road-rail vehicles.

3. Scope

This standard applies to all road-rail vehicles, including DIT owned vehicles, accessing and operating on the AMPRN broad gauge (1600mm) train, mainlines, depots, sidings and worksites.

Refer to *TC4-DOC-000362 Requirements for Rail Trolleys and Trailers Accessing and Operating on the AMPRN* for certification of rail trolleys and trailers on the AMPRN.

Refer to *RS4-DOC-000885 Requirements for Track Machines Accessing and Operating on the AMPRN* for the track machines certification process.

4. Related Documents

DOCUMENT NAME	DOCUMENT NUMBER
Road-Rail Vehicle and Rail Trolley & Trailer Certification Application Form	EN-OSP-FO-01093
Infrastructure Maintenance Rolling Stock Certificate Template	EN-OSP-CE-00049
Road-Rail Vehicle Document Review Checklist	EN-OSP-FO-01095
Road-Rail Vehicle General Condition Examination	EN-OSP-FO-01094
Assessment for on Track Plant in 25kV/600V OHW Areas	EN-OSP-FO-01092
DIT Infrastructure Maintenance Rolling Stock Register	KDA Share point 153307711
DPTI Rolling Stock Examiners Register (Internal Use Only)	KDA Share point 10790167
DPTI Approving Engineers Register (Internal Use Only)	KDA Share point 12942824
Warning Stickers for Vehicles in a 25kV Overhead Wiring System	TP4-DRG-000025
Infrastructure Maintenance Rolling Stock Annual Confirmation	EN-OSP-FO-01096

5. References

- Rail Safety National Law (SA) Act 2012
- Rail Safety National Law National Regulations 2012
- Work Health and Safety Regulations 2012 (South Australia)
- 200-A3-82-1658 Maximum Outline for Metropolitan Rolling stock and Equipment - 1600 mm gauge
- AS2550.10 Cranes, hoists and winches - Safe use – Mobile elevating work platforms
- AS/NZS 1418.10 – Cranes, hoists and winches - Mobile Elevating Work Platforms
- AS/RISSB 7501 Railway Rolling Stock - Rolling Stock Compliance Certification
- AS/RISSB 7502 Road-Rail Vehicles
- AS/RISSB 7505 Railway Rolling Stock – Signalling detection interface
- AS/RISSB7531 Rolling stock – Lighting & Visibility – Part 4 – Infrastructure Maintenance Rolling Stock.
- AS/NZS1841 Portable Fire Extinguishers
- AS 1171 Non-destructive Testing – Magnetic Particle Testing of Ferromagnetic Products, Components and Structures
- EN13309 Construction Machinery – Electromagnetic Compatibility of Machines with Internal Power Supply
- EN50121-3-1 Railway Applications – Electromagnetic Compatibility – Part 3-1: Rolling Stock – Train and Complete Vehicle
- EN50121-3-2 Railway Applications – Electromagnetic Compatibility – Part 3-2: Rolling Stock – Apparatus
- RIS-2715-RST Rolling Stock Subsystem and Interfaces to AC Energy Subsystem
- GM/RC2514 Recommendations for Equipotential Bonding of Rail Vehicles to Running Rail Potential
- ISO11451 Series Road Vehicles – Vehicle Test Methods for Electrical Disturbances from Narrowband Radiated Electromagnetic Energy
- ISO11452 Series Road Vehicles – Component Test Methods for Electrical Disturbances from Narrowband Radiated Electromagnetic Energy
- ISO 9712 Non-destructive Testing – Qualification and Certification of NDT Personnel
- European Automotive EMC Directive 2004/104/EC
- RISSB Glossary of Railway Terminology - Guideline
- DIT Mass and Dimension Limits for General Access Heavy Vehicles Operating in South Australia.
- PTS-MS-10-TR-STD-00000047 Structural Clearances – Design and Rating – Train
- PTS-MS-10-XM-STD-00000084 Rail car wheel inspection and defects standard
- 243-A3-96-054 MP2 Tread Profile - Rail car wheel

- TC4-DOC-000362 Requirements for Rail Trolleys and Trailers Accessing and Operating on AMPRN
- RS4-DOC-000885 Requirements for Track Machines Accessing and Operating on the AMPRN
- RS4-DOC-001299 Static Twist Test for Rolling Stock

6. Acronyms

ACRONYM	FULL NAME
ADR	Australian Design Rules
AMPRN	Adelaide Metropolitan Passenger Rail Network
DC	Direct Current
DIT	Department for Infrastructure and Transport
EMC	Electromagnetic Compatibility
MP2	Modified Profile 2
NDT	Non-destructive Testing
OHW	Overhead Wiring
PM	Project Manager
PRW	Person Responsible for the Works
PRES	Person Responsible for Electrical Safety
RISSB	Railway Industry Safety and Standards Board
SWMS	Safe Work Method Statement

7. Definitions

TERM	DEFINITION
Gross Mass	Total mass of road-rail vehicle including tare mass, maximum load, maximum service capacity of crew and passengers.
Infrastructure Maintenance Rolling Stock ¹	Track machines and road-rail vehicles. Also known as on 'track vehicles'.
Rolling Stock ¹	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 Mass ¹	The mass of road-rail vehicle in the lightest condition under which it will be operated. This includes provisioning with sand and water but fuelled to no more than one-third of capacity.
Train	The broad-gauge tracks on the AMPRN.
Travel Mode	Where the road-rail vehicle is travelling to and from the worksite
Work Mode	Where the road-rail vehicle is performing its work function within the worksite and under an authorised work possession/authority.

¹ RISSB National Guideline Glossary of Railway Terminology

8. Roles and Responsibilities

8.1. General

There are generally two ways in which a road-rail vehicle can be introduced onto the AMPRN:

- Through planned construction or maintenance works where an external contractor, who owns or hires a road-rail vehicle, is engaged by DIT or the service provider for the works.

For construction and maintenance works it is the responsibility of the DIT Project Manager (PM) or Person Responsible for the Work (PRW) to ensure that all road-rail vehicles to be used for their works are certified before accessing and operating on the AMPRN.

It is not intended that external contractors apply directly to DIT to have their road-rail vehicles certified in anticipation of work on the AMPRN.

For DIT owned vehicles the Service provider for Rail Fleet Manager/Maintainer is responsible for ensuring that all road-rail vehicles are certified before accessing and operating on the AMPRN.

8.2. DIT or Service Provider Project Manager/Person Responsible for the Works (PM/PRW)

It is the responsibility of the DIT PM/PRW or the service provider to obtain all the documentation and information required for certification from the Applicant/Owner, follow the process described below:

- Ensure that completed *EN-OSP-FO-01093 Road-Rail Vehicle and Rail Trolley & Trailer Certification Application Form* is obtained and forwarded to the Rolling Stock Engineering Group.
- Ensure all required supporting documentation as required in accordance *EN-OSP-FO-01095 Road-Rail Vehicle Document Review Checklist* is obtained and forwarded to the Approving Engineer for review.
- Ensure that completed *EN-OSP-FO-01095 Road-Rail Vehicle Document Review Checklist* and all supporting documentation are obtained and forwarded to the Rolling Stock Engineering Group.
- Ensure that completed *EN-OSP-FO-01092 Assessment for on Track Plant in 25kV/600V OHW Areas* is obtained and forwarded to the OHW Electrical Engineer for review.
- Ensure that the road-rail vehicle to undergo the general condition examination by an approved Rolling Stock Examiner and ensure *EN-OSP-FO-01094 Road-Rail Vehicle General Condition Examination* is completed and forwarded to the Service providers Rolling Stock Engineering Group.
- Ensure that completed *EN-OSP-FO-01096 Infrastructure Maintenance Rolling Stock Annual Confirmation* is obtained and forwarded to the Service providers Rolling Stock Engineering Group; and
- Ensure that any issues arising from the document review and general condition examination are addressed

8.3. Applicant/Owner

For planned construction and maintenance works the application form *EN-OSP-FO-01093 Road-Rail Vehicle and Rail Trolley & Trailer Certification Application Form* and *EN-OSP-FO-01096 Infrastructure Maintenance Rolling Stock Annual Confirmation* is to be completed by the external contractor engaged for the works and forwarded to the PM/PRW. The form has provision for supply of the road-rail vehicle owner details where the contractor is hiring the vehicle.

For DIT owned road-rail vehicles both the application form and annual confirmation are to be completed by the DIT Rail Fleet Manager/Maintainer.

8.4. DIT Rail Fleet Manager/Maintainer

It is the responsibility of the DIT Rail Fleet Manager/Maintainer to obtain all of the documentation and information required for certification and:

- Ensure that *EN-OSP-FO-01093 Road-Rail Vehicle and Rail Trolley & Trailer Certification Application Form* is completed and forwarded to the Rolling Stock Engineering Group.
- Ensure all required supporting documentation in accordance with *EN-OSP-FO-01095 Road-Rail Vehicle Document Review Checklist* is obtained and forwarded to the Approving Engineer for review.
- Ensure that completed *EN-OSP-FO-01095 Road-Rail Vehicle Document Review Checklist* and all supporting documentation are obtained and forwarded to the Rolling Stock Engineering Group.
- Ensure that completed *EN-OSP-FO-01092 Assessment for on Track Plant in 25kV/600V OHW Areas* is obtained and forwarded to the OHW Electrical Engineer for review.
- Ensure that the road-rail vehicle to undergo the general condition examination by an Approved Rolling Stock Examiner and ensure *EN-OSP-FO-01094 Road-Rail Vehicle General Condition Examination* to be completed and forwarded to the Rolling Stock Engineering Group.
- Ensure that *EN-OSP-FO-01096 Infrastructure Maintenance Rolling Stock Annual Confirmation* is to be completed and forwarded to the Rolling Stock Engineering Group; and
- Ensure that any issues arising from the document review and general condition examination are addressed

8.5. Approving Engineer

A New Approving Engineer shall be appointed jointly by the Rolling Stock Engineering Manager and Manager Track & Civil Engineering. The Approving Engineer is responsible for carrying out the assessment in accordance with *EN-OSP-FO-01095 Road-Rail Vehicle Document Review Checklist*. The Approving Engineer shall have:

- Experience in assessing rolling stock against standards.
- Demonstrated knowledge and experience of the RISSB rolling stock and road-rail vehicles standards.

- Demonstrated knowledge and experience of the Rail Safety National Law (SA) Act 2012.
- No undeclared conflicts of interest.
- Knowledge of risk management.

The Approving Engineer may be from the DIT Rolling Stock Engineering Team as nominated by the Rolling Stock Engineering Manager.

It is the responsibility of the Approving Engineer to review the documentation provided by the PM/PRW or DIT Fleet Manager/Maintainer against the requirements of this standard and complete *EN-OSP-FO-01095 Road-Rail Vehicle Document Review Checklist*. For documentation relating to track engineering the Approving Engineer shall consult with the Manager Track & Civil Engineering.

If the Approving Engineer determines that the documentation provided is not satisfactory the PM/PRW or DIT Fleet Manager/Maintainer is to be advised and requested to update and resubmit. If the documentation is satisfactory the completed checklist is to be forwarded to the PM/PRW. The Approving Engineer shall provide recommendations on restrictions or limitations for the operation of road-rail vehicles on the AMPRN.

8.6. Rolling Stock Engineering Manager and Manager Track & Civil Engineering

It is the responsibility of the Rolling Stock Engineering Manager and Manager Track & Civil Engineering to:

- jointly ensure all applications for certification of road-rail vehicles are assessed in accordance with this standard.
- jointly appoint a New Approving Engineer.
- jointly sign all approval certificates with any restrictions or limitations.

The Rolling Stock Engineering Manager or delegate shall:

- receive the application pack for the certification or re-certification of the road-rail vehicles via rolling stock engineering mailbox:
- kda-assetmanagement@keolisdowner.com
- approve the appointment of the Rolling Stock Examiners undertaking the general condition examinations.
- select an Approving Engineer from the Register.
- determine the expiry date and inserting expiry date on the certificate.
- ensure that the certificate is prepared and arrangements made for the certificate and labels to be displayed on the road-rail vehicle. A copy of certificate is to be forwarded to the PM/PRW or DIT Fleet Manager/Maintainer
- maintain a register of all Infrastructure Maintenance Rolling Stock, this register shall contain details of road-rail vehicle type, owner, certification/recertification dates.

- ensure that the Infrastructure Maintenance Rolling Stock Register is updated at every new certification or re-certification; and
- maintain a register of all Rolling Stock Examiners and Approving Engineers

8.7. OHW Electrical Engineer

It is the responsibility of the OHW Electrical Engineer to:

- Ensure that all applications for certification of road-rail vehicles are assessed for operation under live 25kV electrified train lines.
- Review and sign the assessment form *EN-OSP-FO-01092 Assessment for Track Plant in 25kV/600V OHW Areas* and provide the conditions under which the road-rail vehicle may access and operate under live 25kV electrified train.
- ensure that the signed form is forwarded to the Rolling Stock Engineering Group for preparation and issuing of the certificate
- arrange for issuing and displaying, in prominent positions on the road-rail vehicle, of the appropriate labels that detail the conditions for operating on 25kV electrified train lines.

8.8. Manager Rail Technical and Operational Assurance

The Manager Rail Technical and Operational Assurance shall:

- maintain this standard and all associated forms and checklists.
- update this standard or associated form or checklist when required.
- ensure that the current standard and all associated forms and checklists are available via intranet/internet to internal staff and external contractors; and
- advise to internal staff and external contractors on interpretation of the standard and requirements for road-rail vehicles to access and operate on the AMPRN under this standard

8.9. Rolling Stock Examiner

The Rolling Stock Examiner is responsible for carrying out the general condition examination in accordance with *EN-OSP-FO-01094 Road-Rail Vehicle General Condition Examination* and assessment in accordance with *EN-OSP-FO-01092 Assessment for on Track Plant in 25kV/600V OHW Areas*.

Only Rolling Stock Examiners approved by DIT are permitted to undertake the general condition examination.

The roles of Rolling Stock Examiner and the Approving Engineer cannot be performed by a same person.

9. General

The Railway Industry Safety Standards Board (RISSB) has developed and issued *AS7502 Road-Rail Vehicles* for the design, construction, testing, maintenance, decommissioning and modification of road-rail vehicles.

DIT adopts all mandatory requirements as specified in *AS/RISSB7502 Road-Rail Vehicles* unless modified as shown in the following sections.

DIT adopts all recommended requirements as specified in *AS/RISSB7502 Road-Rail Vehicles* as mandatory unless modified as shown in the following sections. If the applicable clause contains the word 'should', it is to be read as the word 'shall'. This is to eliminate any doubt as to the requirements of the clause.

The certification process for road-rail vehicles shall be in accordance with Section 31 of this standard.

10. Road-Rail Vehicle Classification

AS/RISSB7502 Road-Rail Vehicles provides the method for classification of road-rail vehicles.

Type 2 – friction drive road-rail vehicles are not preferred for operation on the AMPRN however they may be permitted under special conditions.

10.1. Road-rail Guidance System Identification

All new road rail guidance systems, both front and rear, shall be identified with a unique identification number and shall be fitted with identification plate displaying the information in accordance with *AS/RISSB 7502 Road Rail Vehicles*.

11. Maintenance Schedule and Service History

Each road-rail vehicle shall be maintained in accordance with the manufacturer's requirements or as per *AS/RISSB 7502 Road-rail vehicles*.

A maintenance schedule and service history of a road-rail vehicle shall be provided for any certification or re-certification application for access and operation on the AMPRN.

12. Crack Testing - Rail Guidance Equipment

For road-rail vehicles that have been in service for more than 10 years, the axles, rail wheels and structural elements of the rail guidance equipment, including the mounting on the vehicle chassis shall be inspected using appropriate NDT methods. The procedure used for inspection shall be determined by an inspector certified to ISO 9712 Level 3 or equivalent. This procedure shall be conducted by an inspector certified to ISO 9712 Level 1 or higher for the applicable method(s) at 10 years and every two years thereafter. Evidence of the crack testing in the form of a certificate along with relevant photographs and the procedure used shall be provided.

Notwithstanding the above, the stub axles on all road-rail vehicles accessing and operating on the AMPRN shall be inspected using the magnetic particle method in accordance with the requirements of *AS 1171 Non-destructive Testing – Magnetic Particle Testing of Ferromagnetic Products, Components and Structures* at certification and annually thereafter. Evidence in the form of a testing certificate along with relevant photographs shall be provided.

13. Vertical Load

Road-rail vehicles have three (3) possible loading configurations:

- Complete vehicle loading is carried on the rail wheels.
- Complete vehicle loading is shared between the front rail wheels and the rear road wheels with the rear rail wheels providing guidance only.
- Complete vehicle loading is carried on the road wheels and the rail wheels providing guidance only.

Details of the manner in which the loading is configured shall be provided. The vertical load on any fully load supporting rail wheel will be based on the maximum permitted road loading as shown in following tables².

AXLE/TYRE CONFIGURATION AND ROAD VEHICLE MASS LIMITS PER AXLE			
Single axle or single axle group fitted with single tyres with a section width of:	Road vehicle mass limits for single axles and axle groups in tonnes	Tandem axle group fitted with single tyres with section width of	Road vehicle mass limits for single axles and axle groups in tonnes
1. Less than 375 mm	6.0	1. less than 375 mm	11
2. 375 mm or more but less than 450 mm	6.7	2. 375 mm or more but less than 450 mm	13.3
3. 450 mm or more	7.0	3. 450 mm or more	14
Single axle fitted with dual tyres	9.0		

Table 13.1 Road Vehicle Mass Limits Per Axle

² DIT Mass and Dimension Limits for General Access Heavy Vehicles Operating in South Australia

AXLE/TYRE CONFIGURATION AND PERMITTED VERTICAL LOAD PER RAIL WHEEL			
Single axle or single axle group fitted with single tyres with a section width of:	Permitted vertical load per rail wheel in tonnes	Tandem axle group fitted with single tyres with section width of	Road vehicle mass limits for single axles and axle groups in tonnes
1. less than 375 mm	3.0	1. less than 375 mm	5.5
2. 375 mm or more but less than 450 mm	3.35	2. 375 mm or more but less than 450 mm	6.65
3. 450 mm or more	3.5	3. 450 mm or more	7
Single axle fitted with dual tyres	4.5		

Table 13.2 Road Vehicle Mass Limits Per Axle

13.1. Safe Working Loads for Road-Rail Cranes and Excavators / Backhoes / Front end loaders

Details of the safe working loads for cranes and excavators / backhoes / front end loaders on road-rail vehicles shall be provided and a sign or placard displayed on the vehicle in such a way that it is visible to operators.

14. Travel & Work Modes

Road-rail vehicles have two modes of operation:

- Travel mode – where the vehicle is travelling to and from the worksite with all componentry fully retracted and secured.
- Work mode – where the vehicle is performing its work function within the worksite under an authorised work possession/authority.

15. Road-Rail Vehicle Outline

The static profile of the road-rail vehicle shall not exceed the limits shown in the following diagrams under any condition of loading or wear:

- 200-A3-82-1658 'Maximum Outline for Metropolitan Rolling Stock & Equipment – 1600mm Gauge'

The above profile does not take account of the dynamic and kinematic effects associated with the movement of the road-rail vehicle and reference should be made to *PTS-MS-10-TR-STD-00000047 'Structural Clearances – Design and Rating – Train*. The kinematic envelope of the road-rail vehicle can be determined using one of the following methods:

- Full application of the above standards.
- A combination of the application of the above standards and, where available, actual performance and measurements of the dynamic behaviour of the road-rail vehicle.

Details of the road-rail vehicle kinematic envelope shall be provided.

The road-rail vehicle componentry, when in work mode within a controlled worksite, may exceed the permissible outline, but must be retracted and securely locked within the maximum

rolling stock outline when in travel mode. A diagram or illustration shall be supplied clearly defining the retracted positions of the components in travel mode.

The road rail vehicle with road tyres that infringe the maximum outline for metropolitan rolling stock may create a risk of derailment when travelling in reverse or through level crossing, pedestrian crossing, points & crossing and high ballast shoulder track areas. To mitigate this risk for a new road-rail vehicle it is recommended to consider fitting a suitable alternate compliant road tyres or use of pressure/load sensors to ensure that the required contact pressure between rail wheels and rails is maintained. To mitigate this risk for an existing road-rail vehicle the PM/PRW shall ensure

- that a Safety Management Plan or Safe Work Method Statement is developed that demonstrates that all risks have been identified and control measures put in place so far as is reasonably practicable.
- that the speed of the road-rail vehicle does not exceed 5 km/hr when travelling in reverse or through level crossing, pedestrian crossing, points & crossings and high ballast shoulder track areas.
- that a spotter is available to check that rail wheels are always in contact with rails when travelling in reverse or through level crossing, pedestrian crossing, points & crossings and high ballast shoulder track areas

16. Speed and Ride Performance

The maximum speed for road-rail vehicles on the AMPRN is 40 km/hr or reduced speed under special conditions. This speed shall be clearly displayed in the cab and be visible to the operator.

At level crossings, facing switches, V and K crossings the speed shall be reduced to 10 km/hr.

The maximum reversing speed is 20 km/hr.

Notwithstanding the above all posted track speeds shall be strictly observed.

17. Wheels

The following rail wheel profiles are used on the AMPRN:

- Train – Modified Profile 2 (MP2)

The use of wheel profiles other than the above may be permitted under special conditions. Details of the alternative profile shall be provided.

The back-to-back measurement for each wheel set shall be measured at three different locations around the wheel (120 degrees apart). For broad gauge the back-to-back measurement shall be within the range of 1522-1525mm and for standard gauge 1387 -1389 mm.

The wheel alignment “toe in” shall be measured for the front and back wheel set and shall not exceed 3mm.

The rail wheels on the road-rail vehicle shall comply with all of the requirements of *PTS-MS-10-XM-STD-0000084 Rail car wheel inspection and defects standard* for Train.

A twist test shall be carried out in accordance with *Engineering Instruction RS4-DOC-001299 Static Twist Test for Rolling Stock or AS7502 section 10.5.1 Twist test whichever is the more onerous requirement.*

The maximum wheel unloading permitted is 60%. A value for wheel unloading exceeding 60% will mean the road-rail vehicle has failed the twist test and is not permitted to access or operate on the AMPRN.

18. Traction Drive

The road-rail vehicle traction system shall be independently capable of moving the road-rail vehicle in both tare and gross laden conditions in a smooth manner without wheel spin on dry level track.

Details of the traction system shall be provided.

Traction systems using a friction drum roller or friction drive applied directly to the rail wheels may be permitted on the AMPRN under special conditions. A braking system independent of the friction drive and applied to the rail wheels shall be fitted.

19. Signal Detection Interface

Road-rail vehicles have much lower wheel loads than conventional rolling stock which makes their ability to 'short circuit' or 'shunt' track circuits unreliable and introduces the risk that they will not consistently activate signals or level crossings or show up on the network control system.

Accordingly, it is preferred for non-electrified lines that road-rail vehicles have electrical isolation between the wheels on adjacent rails to ensure that they cannot activate track circuits and associated signals. Evidence shall be provided that the isolation will be effective and that the direct current (DC) electrical resistance between the rail contact surfaces of wheels on the same axle is greater than 20,000 ohms in accordance with *AS/RISSB7505 Signalling Detection Interface*.

For non-insulated road-rail vehicles evidence shall be provided to show that resistance between the wheels on the same axle is less than 1 milliohm (0.001 ohm) at 1 volt in accordance with *AS/RISSB7505 Signalling Detection Interface*.

Both insulated and non-insulated road-rail vehicles are only allowed to operate under appropriate track possession authorities and are not permitted to run as a 'train' operating under signal indication.

20. Operation on 25kV Electrified Lines

This section sets out the requirements for a road-rail vehicle to operate on 25kV electrified lines on the AMPRN, for the purpose of:

- Reducing the risk of electric shock
- Controlling any current flow through mechanical components to ensure safety

20.1. Equipotential Bonding

Road-rail vehicles must be correctly bonded if they are to travel under live 25kV OHW. This is to prevent dangers of touch potential to personnel from different voltages and to provide a suitable short circuit path in the event of contact with live OHW equipment.

Any road-rail vehicles not correctly bonded are not permitted to travel or work under 25kV OHW unless:

- OHW equipment is isolated and earthed.
- a Person Responsible for Electrical Safety (PRES) accompanies the road-rail vehicle and holds an Electrical Work Permit; and
- a Warning Notice (*TP4-DRG-000025*) stating this restriction shall be placed in front of the operator's position and on all access points to the vehicle.

Rail wheel axles shall not be insulated if a road-rail vehicle is travelling or working under live 25kV OHW equipment.

Road-rail vehicles shall have equipotential bonding in accordance with the requirements of Group Standard RSSB standard RIS-2715-RST Rolling Stock Subsystem and Interfaces to AC Energy Subsystem.

Group Standard *GM/RC2514 Recommendations for Equipotential Bonding of Rail Vehicles to Running Rail Potential* sets out good practice for compliance with *RIS-2715- RST* Iss 1 AC Energy Subsystem (Part 2). The accepted figures for non-insulation are listed below.

- A maximum rms. fault current of 15kA for 1 second, and a peak current of 37.5kA in the first half-cycle.
- The strategy for re-closing of the traction supply circuit breakers after a fault has occurred is of one immediate re-closure, followed by an investigation if further tripping occurs.

20.1.1. Testing

The safety bond continuity tests shall be carried out on each vehicle to check a conductive path exists between all external conductive parts of the vehicle and each rail. The maximum impedance between any such part of the vehicle and each rail shall not exceed 0.15 ohms. This testing will be carried out annually as part of the road-rail vehicles maintenance and servicing regime.

The maximum impedance between any external conductive part of the vehicle and each rail should be such that no dangerous touch potentials exist in the event of an electrical fault on the vehicle or a fault where live OHW comes into contact with the vehicle.

20.2. Electromagnetic Compatibility

Road-rail vehicles can be affected by the electromagnetic interference produced by OHW equipment. Likewise electrical equipment fitted to road-rail vehicles can generate electromagnetic interference that could affect railway signalling and communication equipment including that of other adjacent railway infrastructure owners i.e. ARTC.

Road-rail vehicles not complying with the directions below are not permitted to travel or work under 25kV OHW unless the OHW equipment is isolated and earthed and a Person Responsible for Electrical Safety (PRES) accompanies the road-rail vehicle and holds an Electrical Work Permit. A Warning Notice (*TP4-DRG-000025*) stating this

restriction shall be placed in front of the operator's position and on all access points to the vehicle.

20.2.1. Emissions from Vehicles

Except where the original road vehicle is already stated to be compliant with European Automotive EMC Directive 2004/104/EC, vehicles shall meet the requirements of *EN 13309.2017 Construction Machinery – Electromagnetic Compatibility of Machines with Internal Power Supply* or *EN 50121-3-1 Railway Applications – Electromagnetic Compatibility – Part 3-1: Rolling Stock – Train and Complete Vehicle Clause 6*.

Any electrical component that is added to a vehicle that has already been tested shall either be assessed as a component for its potential to affect railway signals, or the whole vehicle shall be re-assessed.

20.2.2. Immunity of Vehicle from an Electrified Environment

The component and sub-component parts of each vehicle shall be assessed for susceptibility and immunity to electromagnetic induced currents. Each electrical or electronic circuit box shall be assessed for the potential to malfunction under an induced current, and the effect such a malfunction would have on safety or intended operation of the equipment.

Any electrical or electronic circuit which is considered vulnerable to EMC shall comply with the requirements of *EN 50121-3-2 Railway Applications – Electromagnetic Compatibility – Part 3-2: Rolling Stock – Apparatus, clause 8, tables 7, 8 and 9*, or equivalent.

- Where a vehicle is a conversion of an existing road vehicle which had its own Conformité Européenne marking (or equivalent road vehicle acceptance) and an electrical system of 28V or less, providing no electrical equipment is added, no further EMC testing is required.
- If electrical equipment is added to, or removed from, an electrical system of 28V or less, then provided this equipment has already been separately tested further testing is not required.
- Where electrical equipment of 28V or less requires testing, the equipment can be tested to the *ISO11452 Series Road Vehicles – Component Test Methods for Electrical Disturbances from Narrowband Radiated Electromagnetic Energy* of standards or the complete vehicle tested to *ISO11451 Series Road Vehicles – Vehicle Test Methods for Electrical Disturbances from Narrowband Radiated Electromagnetic Energy*.
- Where a previously untested vehicle exists with an electrical system of 28V or less, then the vehicle should be tested to automotive EMC tests set out in *ISO11451* series.
- Where a previously untested vehicle exists with an electrical system of greater than 28 V then the vehicle should be tested to *EN50121-3-1*.
- If electrical equipment of greater than 28V is to be added to an existing design, then the equipment must be tested to *EN50121-3-2* or the complete vehicle be tested to *EN50121-3-1*.

- Demonstration of compliance with *EN50121-3-1* or *EN50121-3-2* may either be by testing or a letter of compliance signed by a technically competent electromagnetic compatibility engineer.

20.3. Protection from Overhead Line Equipment

Any road-rail vehicle not complying with the directions below is not permitted to travel or work under 25kV OHW unless the OHW equipment is isolated and earthed and a Person Responsible for Electrical Safety (PRES) accompanies the road-rail vehicle and holds an Electrical Work Permit. A warning notice stating this restriction shall be placed in front of the operator's position and on all access points to the vehicle.

- All fixed platforms or work surfaces on road-rail vehicles where personnel might reasonably be present under OHW, including all normal and emergency access and egress routes, shall be covered by a metallic framed roof. The roof cover is permitted to be a mesh or fibre reinforced plastic. The mesh size shall be a maximum of 25mm.
- Exceptions to the requirement for the platforms and surfaces to have a roof are permitted with respect to areas that are locked out of use, or have a locked physical barrier, during normal operation, and have OHW Warning Notices and display a notice forbidding access/use under live OHW.
- Warning Notices shall be displayed at the access point to each platform or surface not fitted with a roof. They shall state "No access under live electrical wires" and be visible and readable from a distance of 2m.
- All roofing materials shall be shatter proof.
- OHW Warning Notices shall be fixed adjacent to all access points to the superstructure, cab, platforms, work surfaces, footboards and steps.

20.4. Working and Travelling Under Live Overhead Equipment

A vehicle fitted with a roof over the whole vehicle within the AMPRN rolling stock maximum outline as defined in Section 15 suitably bonded to running rail potential, shall be deemed acceptable for use in work and travel modes under live OHW.

The vehicle certification and instruction shall be endorsed "*This vehicle is suitable for use under Live OHW when used in conjunction with a safe system of work*".

Corresponding signage shall be fitted to the vehicle at all access points and in front of the operator's position.

Road-rail vehicles fitted with equipment capable of extending beyond the Maximum Rolling Stock Outlines, including cranes, excavators, backhoes, front end loaders and personnel baskets, are not to travel or work under live OHW equipment unless the extendable equipment is locked in the stowed position.

20.5. On and Off Tracking Vehicles

If a vehicle authorised to travel under live OHW exceeds 3800mm above rail head level during on - or off-tracking, it is not to be on - or off-tracked under live OHW.

20.6. Assessment

All road-rail vehicles shall be assessed using the criteria detailed in *EN-OSP-FO-01092 Assessment for on Track Plant in 25kV/600V OHW Areas*.

21. Lighting

The lighting on road-rail vehicles shall fully comply with ADR regulations.

Where a road-rail is required to reverse any greater than 500 metres it shall be fitted with headlights, stop lights, taillights and marker lights at both ends. Under these circumstances the headlights, stop lights, taillights and marker lights shall be suitably interlocked to provide clarity of direction of travel and avoid contravention of the ADR regulations while on road.

The road-rail lighting shall comply with all of the requirements relevant to road-rail vehicles in *AS/RISSB7531 Rolling stock – Lighting & Visibility – Part 4 – Infrastructure Maintenance Rolling Stock*.

22. Vigilance System

A vigilance system shall be installed on the road-rail vehicle.

The vigilance system shall periodically alert the driver with a flashing light and auditory alarm which requires acknowledgement to prevent an emergency brake application and loss of traction power/engine cut-out.

The time from reset to the first vigilance system alarm shall not be less than 25 seconds nor more than 90 seconds. The time from reset to the emergency brakes application shall not be less than 30 seconds nor more than 110 seconds. The total time from reset to the emergency brakes application, including the first vigilance system alarm, shall not be more than 110 seconds.

The over speed function shall prevent the road-rail vehicle from over speeding by applying the emergency brakes. The maximum allowable speed on the AMPRN shall be in accordance with Section 16. The threshold speed limits at which the emergency brakes apply shall be no greater than 5km/hr above the maximum allowable speed for both the forward and reverse directions.

The road-rail vehicle shall have provision for isolation of the vigilance system should the vigilance unit become inoperable due to a malfunction. The isolation switch/mechanism shall have a permanent seal that is required to be broken to affect the isolation. The vigilance isolation shall only be used to enable travel of the road-rail vehicle to an on-off tracking point for removal to depot for repair of the vigilance malfunction. Under these circumstances driver only operation is not permitted – a second person must be present on the road-rail vehicle as it travels to the on-off tracking point. Where the vigilance system is isolated, a visual indication shall be provided to the driver. Road-rail vehicles with a broken vigilance seal are not permitted to access or operate on the AMPRN.

The road-rail vehicle shall be configured to ensure that the vigilance system can automatically distinguish between travel and work modes. When in travel mode the vigilance system shall be fully operational. When in work mode the road-rail vehicle shall be configured to enable the vigilance system to be suppressed – the sealed isolation switch is not permitted to be used for this purpose. Suppression of the vigilance system is required to enable the road-rail vehicle driver to concentrate on work activities. The configuration shall ensure that the suppression of the vigilance is automatically cancelled when work mode is terminated. Where the vigilance system is suppressed, a visual indication shall be provided to the driver.

Details of the type, operation and configuration of the vigilance system shall be provided.

23. Event Recorders

An event recorder shall be fitted to all road rail vehicles.

An event recorder shall be able to record the data in accordance with *AS 7502 Road Rail Vehicles*.

24. Communications

The road-rail vehicle shall have a communication system that is compatible with the AMPRN communication system.

25. Safety and Emergency Equipment

The road-rail vehicle shall be fitted with the following safety and emergency equipment:

- First aid kit
- Fire extinguisher compliant with *AS/NZS 1841 Portable Fire Extinguishers*
- Torch
- At least two (2) red and one (1) white signalling flags
- Jack

26. Emergency Stop³

If the road-rail vehicle is designed to be operated or attended by more than one (1) person and more than one (1) emergency stop control is fitted, it must ensure that the multiple emergency stop controls are of the "stop and lock-off" type so that the road-rail vehicle cannot be restarted after an emergency stop control has been used unless that emergency stop control is reset.

27. Elevated Work Platforms (EWPs)

All elevated work platforms shall comply with:

- *AS2550.10 - Cranes, hoists and winches - Safe use – Mobile elevating work platforms*
- *AS1418.10 - Cranes, hoists and winches - Mobile elevating work platforms*

Refer to Safework SA guideline for elevating work platforms.

In travel mode all EWP componentry shall be fully retracted and secured. It is acknowledged, however, that where an EWP is working on successive overhead wiring electrification poles (nominally 60 metres apart) or progressively inspecting overhead wires that it is impractical to retract the platform to move the EWP from pole to pole or work point to work point. In addition, it may also be necessary for the platform to move while outside of the minimum structure clearance. Moving the EWP under these circumstances carries the risk of the platform striking structures in the corridor.

To manage this risk the PM/PRW shall ensure:

- that a Safety Management Plan or Safe Work Method Statement is developed that demonstrates that all risks have been identified and control measures put in place so far as is reasonably practicable.
- that the speed of the EWP does not exceed 6 km/hr or that specified by the EWP manufacturer if this is less.

³ Work Health and Safety Regulations 2012 (South Australia)

- that the EWP is of a Type 3 design as defined in *AS1418.10* i.e. the control of the movement of the EWP is from the platform only for the duration of the work

The EWP shall be fitted with track clearers at the leading and trailing ends to remove any obstacles on the track that may cause a derailment.

Workers are not permitted to occupy the work platform during travel mode.

28. Height, Slew and Reach Restrictors

Road-rail excavators, elevated work platforms (EWP's), backhoes, front end loaders and cranes shall have all lifting equipment capable of elevating above the vehicle or slewing fitted with restrictors to automatically prevent over travel and ensure stability.

Where the vehicle is operating on electrified lines it shall be fitted with height restrictors.

29. Towing

Where a road-rail vehicle is used to tow a trailer, the arrangement shall comply with engineering standard *TC4-DOC-000362 Requirements for Rail trolleys and Trailers accessing and operating on the Adelaide Rail network*.

30. Derailment Catch System

A derailment catch system shall be installed on the road-rail vehicle in accordance with *AS/RISSB7502*. The distance from the engagement surface of the catch system to the back of the nearest wheel shall be no greater than 270mm to ensure the derailed wheel does not travel beyond the sleeper end.

31. Certification and Recertification

31.1. Certification

To be certified all road-rail vehicles shall comply with all of the requirements of this standard. The Road-rail Vehicle Certification Application Form, *EN-OSP-FO-01093 Road-Rail Vehicle and Rail Trolley & Trailer Certification Application Form*, must be completed by the applicant/owner to enable the vehicle to be assessed.

The process to be followed as stated in the following steps for certification of RRV's:

The Application Form, *Document Review Checklist, General Condition Examination, 25kV/600V Assessment and all associated test documentations* shall be provided by the PM/PRW or DIT Rail Fleet Manager/Maintainer. For identification purposes photographs of the front, back and sides of the road-rail vehicle shall be provided. If elements of the required evidence are missing the PM/PRW or DIT Rail Fleet Manager/Maintainer will be requested to supply the missing information for further review.

Once certified the road-rail vehicle shall be issued with a certificate, *EN-OSP-CE-00049 Infrastructure Maintenance Rolling Stock Certificate Template*, and a certification label. The expiry date on a certificate shall be inserted by the Rolling Stock Engineering Manager. Any restrictions or limitation on the certificate are applied by Rolling Stock Engineering Manager and/or Manager Track and Civil Engineering following the recommendations provided by an Approving Engineer.

DIT Infrastructure Maintenance Rolling Stock Register shall be updated at every new certification or re-certification.

Road-rail vehicles may be certified for a maximum 1-year period or period determined by the Rolling Stock Engineering Manager. Following the first year of certification an annual automatic renewal for a maximum of 2 further years (i.e. total 3 years including first certification year) may be granted in accordance with the Section 31.3.

Both the certificate and the label must be always retained on the vehicle when accessing and operating on the AMPRN. The road-rail vehicle driver must follow all restrictions or conditions as shown on the certificate and/or label. DIT reserves the right to request the certificate for audit purposes at any time. The label must be attached to the vehicle in a prominent position.

31.1.1. Certification of Gauge Convertible Road-Rail Vehicles

The general condition examination in accordance with *EN-OSP-FO-01094 Road-Rail General Condition Examination Checklist* shall be required for both standard gauge and broad-gauge configurations for the application of a gauge convertible road-rail vehicle to access and operate on the AMPRN.

For any subsequent gauge conversion on the AMPRN during the certificate validity period, a detailed inspection by an approved Rolling Stock Examiner is required to ensure that the gauge conversion has been carried out correctly. A record of this inspection may be requested by DIT at any stage during the operation on the AMPRN for auditing purposes.

31.2. General Condition Examination

The general condition examination, *EN-OSP-FO-01094 Road-Rail General Condition Examination Checklist*, is not intended to be an exhaustive assessment of all of the

operating systems, components and sub-components of the road-rail vehicle. The examination enables DIT to assess the road-rail vehicle to determine if its general condition is consistent with the level of compliance attributed by the PM/PRW or DIT Rail Fleet Manager/Maintainer in the document review. The examination is primarily visual in nature, with some checking, measuring and testing of critical functions and structural elements.

31.2.1. External Contractor Supplied Road-Rail Vehicles

All External Contractor supplied road-rail vehicles are required to undergo the general condition examination. Any issues arising from the examination will need to be corrected before the road-rail vehicle can be certified.

31.2.2. DIT Owned Road-Rail Vehicles

DIT has contracted out the maintenance of its road-rail vehicles, and it is an expectation that the contractual arrangement will include a maintenance regime that ensures that the requirement for a general condition assessment is satisfied by regular assessments and examinations. The Rolling Stock Engineering Manager and the Manager Track & Civil Engineering shall determine the requirement for a general condition assessment.

31.2.3. Rolling Stock Examiner

Only companies approved by DIT are permitted to carry out the general condition examination. The companies must demonstrate the following competencies:

- Qualified in a relevant trade with knowledge of the purpose and safety requirements applicable to rail equipment fitted to road-rail vehicles.
- Complete understanding of the construction, functionality, maintenance and inspection requirements of rail guidance, traction and braking equipment fitted to road-rail vehicles.
- Competent in assessing and identifying rail wheel damage and profile condition.
- Familiarity with all operating controls and safety functions installed on road-rail vehicles.
- Familiarity with all interface requirements related to DIT's overhead wiring system.
- Familiarity with *RISSB AS 7502 Road Rail Vehicles*.
- Capable of competently checking the operation of the rail guidance equipment.
- Competent in carrying out the testing requirements necessary to establish compliance with the specified acceptance criteria.

31.3. Recertification and Decertification

Where the certification is required to be extended past the initial 1-year period the Applicant / Owner, may use the form, *EN-OSP-FO-01096 Infrastructure Maintenance*

Rolling Stock Annual Confirmation, to confirm annually (on the initial certification anniversary) the following:

1. That regular servicing has been carried out and includes all of the check items detailed in the General Condition Examination form used at the initial certification.
2. No modifications have been undertaken to the vehicle since the initial certification.
3. The vehicle has not been involved in any accidents or incidents since the initial certification.
4. A twist test has been carried out annually since the initial certification.
5. Crack testing of the stub axle has been carried out annually since the initial certification.
6. Equipotential bonding testing has been carried out annually since the initial certification.
7. All records are available for audit.
8. The vehicle is fit for purpose.

On receipt of the completed form the certification of the road-rail vehicle will be carried over for a further 1 year or period determined by the Rolling Stock Engineering Manager and the vehicle owner advised accordingly. A 4-week grace period may be granted for the submission of the annual confirmation following the initial expiry date. During this period the road-rail vehicle shall not be allowed to access and operate on the AMPRN. Unless directed otherwise by the Rolling Stock Engineering Manager there is no requirement for a new Application Form, Documents Review Checklist or General Condition Examination Checklist to be submitted with the Annual Confirmation Form.

A full recertification will be required at the end of the 2 automatic renewals period. Full recertification will require submission of a new Application Form; Documents Review Checklist and General Condition Examination Checklist in accordance with Section 31.1.

The road-rail vehicle may be decertified at any time at the discretion of DIT. Typical circumstances where this may occur include, but are not limited to:

- Failure to provide the annual confirmation at the end of full certification period.
- A safety incident e.g. runaway, collision etc.
- Evidence of lack of maintenance.
- Substantial modification without notification to DIT.

In the event of decertification, the certificate and certification label will be removed from the road-rail vehicle, and it shall not be permitted to access or operate on the AMPRN.

Following a safety incident (e.g. runaway, collision, derailment) the road-rail vehicle shall be removed from the AMPRN until an inspection has been carried out. Any identified issues shall be addressed before the road-rail vehicle is allowed to resume access and operation on the AMPRN.

31.4. Pre-work Inspection

Evidence must be if there is a pre-work start checklist for the vehicle. It is a requirement that the pre-work inspection be carried out daily or before the vehicle

commences any operation on the AMPRN. All defects noted during the inspection must be recorded, reported and rectified before work commences.

DIT reserves the right to audit the pre-work inspection records and logbooks at any time the road-rail vehicle is operating on the AMPRN.

31.5. Modifications

Where substantial modifications are made to a road-rail vehicle it will require recertification. A modification is considered substantial if it impacts in any way on the ability of the road-rail vehicle to operate safely on the AMPRN. Where there is doubt as to the whether the modifications are substantial clarification shall be sought from the Rolling Stock Engineering Manager.

All modifications made to the road-rail vehicle that have the potential to affect its ability to be fit for purpose shall be notified to DIT for assessment.

31.6. Submission Time Frame

All submissions related to certification or recertification of road-rail vehicles are to be emailed to the following email address:

kda-assetmanagement@keolisdowner.com

Submission of all documentation in a single emailed pack at least 10 working days prior to any planned work on the AMPRN is essential for an efficient and smooth certification process.