AUSTRALIAN RAIL TRACK CORPORATION LTD

Discipline
Engineering Standard

Category
Rolling Stock

Locomotive Hauled Passenger Vehicle Specific Interface Requirements

WOS 01.500

Applicability

ARTC Network wide	
New South Wales	✓
Western Jurisdiction	
Victoria	

Primary Source
(RIC Standard RSU 500 Series Version 2.0)

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List of Amendments

Issue	Date	Clause	Description
1.0	07/12/2005	All	Reformatting to ARTC Standard and combining all 500 Series into one document

Contents

WOS 01.500 - Introduction

[1] General

1.1 The 500 series of Rolling Stock Operation Standards (WOS 01.500) contain specific interface requirements for locomotive hauled passenger vehicles operating on the Australian Rail Track Corporation network.

1.2 Requirements that are common with other types of rolling stock are included in the 200 series of Rolling Stock Operation Standards (WOS 01.200).

1.3 For the purposes of interpretation of this Rolling Stock Operation Standard, power cars which do not carry passengers shall be treated as a locomotive and meet the requirements specified in the 300 series of Rolling Stock Operation Standards (WOS 01.300). Dedicated trailer cars which operate in conjunction with the above mentioned power cars shall be treated as locomotive hauled passenger cars and meet the requirements of the 500 series of Rolling Stock Operation Standards (WOS 01.500).

[2] Authorisation of Vehicles

2.1 For all locomotive hauled passenger vehicles, the vehicle information pack in Appendix A3 (WOS 01.A3) shall be completed and submitted.

WOS 01.510 - Bogie Components

[1] Introduction

1.1 This section contains bogie related requirements which are specific to locomotive hauled passenger vehicles.

1.2 All requirements in WOS 01.200 which are common requirements also apply to locomotive hauled passenger vehicles.

[2] Wheels

2.1 Refer to WOS 01.210 for common wheel requirements.

WOS 01.211 Wheels, Design & Manufacture
WOS 01.212 Wheels, Minimum Operational Requirements

[3] Wheel Profiles

3.1 The standard ANZR profile is the base wheel profile. Refer to WOS 01.211.

3.2 The Intersystem profile depicted as WRP 2000 in Appendix G (WOS 01.G) of this manual is the recommended wheel profile for future wheel replacement and reprofiling on all passenger vehicles operating on the Australian Rail Track Corporation network.

3.3 Australian Rail Track Corporation reserves the right to request and have the owner/operator conduct an evaluation and/or tests to demonstrate the performance of any operator proposed alternate wheel profile, in accordance with WOS 01.288.

[4] Axles

4.1 Refer to WOS 01.220 for common axle requirements.

WOS 01.221 Axles, Design and Manufacture
WOS 01.222 Axles, Minimum Operational Requirements

[5] Wheel and Axles Assembly

5.1 Refer to WOS 01.230 for common wheel and axle assembly requirements.

[6] Axle Bearing Assemblies

6.1 Refer to WOS 01.240 for common axle bearing assembly requirements.

[7] Bogie Frames and Associated Componentry

7.1 Refer to WOS 01.250 for common requirements for bogie frames and associated componenetry.

[8] Vehicle Suspension

8.1 Refer to WOS 01.260 for common vehicle suspension requirements.

WOS 01.261 Suspension Springs
WOS 01.262 Suspension Damping
WOS 01.263 Resilient Suspension Components

WOS 01.520 – Brakes and Pneumatic Equipment

[1] Introduction

1.1 The braking systems fitted to locomotive hauled passenger vehicles must be compatible with the brake systems on locomotives to ensure that the brakes apply and release as required. Otherwise skidded or scaled wheels could occur.

[2] General Requirements

2.1 Locomotive hauled passenger vehicles shall generally comply with the requirements of the ROA Manual of Engineering Standards and Practices, Section 7.

2.2 Where specific requirements are provided in this manual that differ from the ROA requirements, then those contained in this manual take precedence.

2.3 Some older vehicles may not fully comply with these requirements but will be assessed considering the brake equipment fitted and the proposed use of the vehicle.

[3] Location of End Equipment

3.1 Terminal locomotive hauled passenger vehicles shall have coupling cocks located on the terminal ends as follows:

3.1.1 Brake Pipe: The brake pipe coupling cocks shall be located as shown in the ROA Manual of Engineering Standards and Practices, Diagram 7-12 (see Appendix G [WOS 01.G] of this manual).

3.1.2 Main Reservoir Pipe and Independent Brake Control Pipe (Optional): Main reservoir and independent brake control hoses and cocks shall be located such that they can couple to a locomotive or adjacent vehicle without causing damage or kinking hoses.

3.2 Vehicles not fitted with standard automatic couplers, shall have emergency couplers provided, with standard coupling hoses, which will couple with standard vehicles.

[4] Standard Pressures and Timings

4.1 Standard pressures shall comply with the requirements of the ROA Manual of Engineering Standards and Practices, Section 7.4.

[5] Brake Equipment

5.1 Refer to WOS 01.271 for common brake equipment.

[6] Identification of Cocks

6.1 All cut-out or isolation cocks shall be clearly identified and handles painted white, or other contrasting colour. Refer to the ROA Manual of Engineering Standards and Practices, Section 7.5.10.

WOS 01.530 – Body, Underframe and Appointments

[1] General

1.1 The vehicle body, underframe and appointments shall generally comply with the ROA Manual of Engineering Standards and Practices, Section 12.

1.2 Vehicle owners/operators shall have controlled rail industry accepted standards which govern the operation of a vehicle with a damaged body or structure.

1.3 Some earlier designs for passenger vehicles may not fully comply with these requirements but will be assessed considering the equipment fitted and the proposed use of the vehicle.

1.4 New special purpose designed passenger vehicles may not need to meet the requirements of the ROA Manual of Engineering Standards and Practices, but due regard shall be given to the application and the operation in which these vehicles are proposed to be used.

[2] Couplers and Draftgear

2.1 Automatic couplers and draftgear, where applicable, shall generally comply with the requirements of the ROA Manual of Engineering Standards and Practices, Section 12.2.3.

2.2 Coupler heights shall be within the following limits:

New condition	890 to 900mm
In Service condition	875 to 915mm

[3] Jacking and Lifting Points

3.1 Suitable jacking points shall be supplied at the junction of the underframe side sill and the bolster adjacent to each bogie centre and also under the drawgear pocket, as specified in the ROA Manual of Engineering Standards and Practices, Section 8.2.13.

3.2 Vehicles shall have suitable lifting points or brackets to insert lifting hooks and shackles, as specified in the ROA Manual of Engineering Standards and Practices, Section 8.2.14.

[4] Doors

4.1 Passenger entry doors shall be fitted with a positive latching system to prevent doors being opened accidentally whilst train is in motion.

[5] Marking

5.1 Each locomotive hauled passenger vehicle shall have a unique identification code/number clearly marked on each side of the vehicle.

5.2 The vehicle code and number shall be readable from trackside, on station platforms and from signal boxes.

5.3 To enhance visibility of passenger vehicles from the side at level crossings, all passenger vehicles shall be fitted with reflective delineators (reflectors). Refer to Appendix I (WOS 01.I).

5.4 All locomotive hauled passenger vehicles shall be fitted with standard AEI tags as specified in Appendix H (WOS 01.H) of this Manual.

[6] Wooden Bodied Vehicles

6.1 Wooden bodied vehicles shall be fitted with approved steel collision posts at each end of the underframe to provide protection against vehicle overriding and/or telescoping in the event of a collision.

6.2 Where possible it is recommended that double shelf couplers be provided as added protection against vehicle overriding and/or telescoping in the event of a collision.

6.3 Any wooden bodied terminal vehicle carrying passengers but not fitted with the above collision protection will only be permitted to move on the Australian Rail Track Corporation network under complete block working in accordance with SWU 155.

[7] Toilets

7.1 Toilet facilities on passenger vehicles shall have either holding tanks or decanting facilities, or, as a minimum, waste processing facilities. Refer to WOS 01.150 [5].

WOS 01.540 - Vehicle Performance

[1] Introduction

1.1 The performance of the vehicle shall be in accordance with the requirements of the ROA Manual of Engineering Standards and Practices Section 3, and any other requirements contained in this Rolling Stock Operation Standard Manual.

1.2 The performance specified in this Rolling Stock Operation Standard relates to the operation of the locomotive hauled passenger vehicle on the Australian Rail Track Corporation network.

[2] Test Requirements Summary

2.1 The following table summarises the test requirements for locomotive hauled passenger vehicles:

Compatibility Test	Reference
Static rolling stock outline test	WOS 01.281
Static vehicle weigh test	WOS 01.282
Static vehicle twist test	WOS 01.283
Vehicle/bogie swing test	WOS 01.284
Vehicle/vehicle swing test	WOS 01.285
Static brake test	WOS 01.286 and WOS 01.541
Ride performance test	WOS 01.288 and WOS 01.542
Kinematic rolling stock outline test	WOS 01.289
Pitch and bounce test	WOS 01.290
Rock and roll test	WOS 01.291
Environmental tests	WOS 01.292

2.2 **Jacking Point Vertical Load Test**.

It is recommended that the owner/operator conduct jacking point vertical load tests to ensure that the vehicle is capable of withstanding loads imposed during vehicle recovery. Refer to the ROA Manual of Engineering Standards and Practices section 3.3.7.

2.3 **Static End Compression Test**

It is recommended that the owner/operator conduct a static end compression test to ensure that the vehicle is capable of withstanding the loads imposed during operation. Loads shall be commensurate with the proposed maximum duty of the vehicle. Refer to the ROA Manual of Engineering Standards and Practices section 3.3.9.

2.4 **P2 force determination**

The P2 force shall not exceed the limits specified in WOS 01.120.

WOS 01.541 - Breaking Performance

[1] Introduction

1.1 Braking performance is specified to ensure that locomotive hauled passenger trains are able to stop within the current signalling system spacings.

[2] Net Brake Ratio

2.1 The net brake ratio is the ratio of the sum of the actual measured brake block forces in kilograms divided by the total vehicle mass at rail, in kilograms.

2.2 Brake block forces are measured for a brake pipe reduction of 150kPa. When measuring the brake block forces for the air brake, the rigging pins shall be tapped with a hammer to overcome static friction of the brake rigging.

2.3 Handbrake forces are measured at the brake block with a 560 Newton tangential force applied to the rim of the handbrake wheel, or the handbrake arm. When measuring the brake block forces for the handbrake or spring parking brake, the rigging pins must not be tapped.

[3] Air Brake

3.1 The following net brake ratios are recommended in order to provide effective braking without skidding the wheels.

3.2 Vehicles fitted with low friction brake blocks:

Vehicle Condition	Net Brake Ratio
At tare or empty	55% maximum
Fully loaded	28% minimum

3.3 Vehicles fitted with medium friction brake blocks:

Vehicle Condition	Net Brake Ratio
At tare or empty	55% maximum
Fully loaded	20% minimum

3.4 Vehicles fitted with high friction brake blocks:

Vehicle Condition	Net Brake Ratio
At tare or empty	35% maximum
Fully loaded	13% minimum

3.5 Vehicles fitted with cast iron brake blocks:

Vehicle Condition	Net Brake Ratio
At tare or empty	55% maximum
Fully loaded	20% minimum

[4] Spring Parking Brake or Handbrake

4.1 The spring parking or handbrakes shall be able to hold the loaded vehicle on a 1 in 30 grade indefinitely.

4.2 The following net brake ratios are recommended in order to provide an effective parking brake

4.3 Vehicles fitted with low friction brake blocks:

Vehicle Condition	Net Brake Ratio
Fully loaded	28% minimum

4.4 Vehicles fitted with medium friction brake blocks:

Vehicle Condition	Net Brake Ratio
Fully loaded	20% minimum

4.5 Vehicles fitted with high friction brake blocks:

Vehicle Condition	Net Brake Ratio
Fully loaded	13% minimum

4.6 Vehicles fitted with cast iron brake blocks:

Vehicle Condition	Net Brake Ratio
Fully loaded	13% minimum

[5] Disc Brakes

5.1 For vehicles fitted with disc brakes, the vehicle shall be tested in a train consist for stopping distance. Refer to WOS 01.160 [4].

[6] Single Car Air Test

6.1 Each locomotive hauled vehicle shall have a single car air test carried out prior to entering service. Refer to WOS 01.810 [6].

WOS 01.542 - Vehicle Ride Performance

[1] Introduction

1.1 The following bogie related performance parameters are the minimum requirement for the operation of locomotive hauled passenger cares on the Australian Rail Track Corporation network.

[2] Base Ride Performance Requirements

2.1 The base ride performance requirements are as specified for all vehicles in WOS 01.288.

2.2 For bogies equipped with air springs, the base ride performance also applies for vehicle with deflated air springs. A reduction in design speed may be required to achieve this.

[3] Recommended Ride Performance Requirements

3.1 In the interests of passenger/crew comfort and safety, the ride quality specified in the ROA Manual of Engineering Standards and Practices, section 12.10 is recommended for the applicable design speed. In addition, hunting is not permitted. Refer to clause 3.3 below.

Note: The ride index algorithm in section 12.10.5 of the ROA Manual of Engineering Standards and Practices shall be replaced with that shown in section 13.4.2.2. of the ROA Manual of Engineering Standards and Practices.

3.2 These ride index values are recommended for wheel profiles up to the fully worn condition.

3.3 Sustained hunting shall not be permitted. Hunting shall be defined as sinusoidal lateral oscillations of the wheelset resulting in greater than 0.5 Hz sinusoidal lateral body accelerations measured at the bogie centre of greater than 0.15 g sustained for 10 seconds or longer.

3.4 The recommended ride performance requirements are in addition to the base ride performance requirements.

3.5 For bogies equipped with air springs, the above ride performance also applies for vehicles with deflated air springs. A reduction in design speed may be required to achieve this.