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Track Maintenance Vehicle Registration and Operation

EPP-32-01

Applicability

Network Wide

Publication Requirement

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3.0	19 Jun 23	Operation Standards Team	Stakeholders	Operations Standards Manager	Head of Operations Standards 22/06/2023

Amendment Record

Amendment Version #	Date Reviewed	Clause	Description of Amendment
3.0	19 Jun 23		Document significantly changed to represent changes to registration process. Name change of ARTC Track Maintenance Vehicle Register. from PlantGUARD to “Aquipa”. Addition of Type Approvals for Trolleys. Inclusion of safety equipment and use of lights on the network. Inclusion of TMP examples

Table of Contents

1 Introduction

1.1 Purpose

This document outlines the processes for obtaining and maintaining registration for track maintenance vehicles (TMVs), as well as operational requirements for different vehicle types.

The purpose of registration is to provide a formal process to demonstrate and record that TMVs are designed, manufactured, commissioned, and maintained in a safe and railworthy condition.

Vehicle owners/operators must have a current registration and warrant that TMVs are in a railworthy condition to be able to operate on the ARTC Network. If a vehicle will not be operating on the ARTC Network for a given period, it does not need to be registered or warranted during that time.

1.2 Scope

This procedure applies to the following categories associated with operation of track maintenance vehicles on the ARTC Network:

- Initial registration,
- Assessment of new and modified track maintenance vehicles (including exchange of rail guidance equipment), and allocation of operating restrictions,
- Annual registration and warranty,
- Management of incidents associated with track maintenance vehicles,
- Decommissioning, and
- Exchange of ownership.

A listing of track maintenance vehicles registered for operation on the ARTC Network is managed through the Aquipa system. This procedure will outline when and for what purposes Aquipa needs to be used, however it will not detail step-by-step processes on how to navigate and operate the Aquipa system. Helpful articles and tutorials on how to use Aquipa can be found at: https://help.aquipa.com/support/solutions.

When referencing the ARTC Network, the application of this procedure is valid for both operating corridors and corridors in the process of construction.

Quadricycles and trikes are prohibited from operation on the ARTC Network.

This process excludes federal, and state based WH&S regulations.

1.3 Procedure Owner

The Head of Operation Standards is the Procedure Owner and is the initial point of contact for all queries relating to this procedure.

1.4 Responsibilities

Corridor Managers, Project Managers and the Plant Manager are responsible for ensuring the requirements of this procedure are communicated to vehicle owners/operators as part of contracts.

The Operations Standards Manager or delegate is responsible for maintaining track maintenance vehicles registration records, maintaining the Aquipa system and authorising registrations of new or modified track maintenance vehicles.

Vehicle owners/operators are responsible for:

- ensuring that, in accordance with ARTC Network Rules and Procedures, only qualified and competent operators are to operate on-track plant & equipment.
- assessing and registering track maintenance vehicles for compatibility to the ARTC Network Route Access and Interface Standards.
- Ensuring that all vehicles have been accepted and can operate under the protection that they have proposed.

Network Control and Planning have the facility to check that vehicles are registered. It is recognised that they will not need to do this for every occasion but have the facility to do so should the need arise.

1.5 Reference Documents

The following documents support this procedure:

- ARTC Route Access Standards (RAS)
- ANWT 316 Track Vehicles, NSW. The Code of Practice SA, WA and Western Victoria, and the TA 20, VIC
- WOS standards as replaced by the ARTC Series of ERP-32 and EPP-32 rollingstock and plant standards and procedures.
- EPP3201F-01 (former WOS01.A5) Application Pack for Registration of Rail-Bound Track Maintenance Vehicles
- EPP3201F-02 (former WOS01.A6) Application Pack for Registration of Road/Rail Vehicles
- EPP3201F-03 Application Pack for Registration of TMV – Trailers, Trolleys and Support Frames
- EPP3201F-04 Assessment of Track Maintenance Vehicle Independent Competent Person
- ESS-32-01 Rolling Stock Signalling Interface
- ESM-07-04: Unreliable Track Circuit due to Infrequent Train Operations
- AS7500 Series of Rolling Stock Standards

1.6 Definitions

For the purposes of this document, the term “vehicle” is used as a substitution for the term “track maintenance vehicle” or “on-track plant”.

Throughout this document the term ‘railworthy’ will be used, the definition of this is:

- The rolling stock, plant and equipment complies with the relevant standards,

- Maintenance of the rolling stock, plant and equipment complies with the relevant standards, and is maintained to a technical maintenance plan (TMP),
- Evidence of the compliance with the relevant standards shall be available to submit for annual renewal.

The following terms and acronyms are used within this document:

Term or acronym	Description
ADR	Abbreviation for 'Australian Design Rules' applied to motor vehicles
Aquipa	Online track maintenance vehicle register - Formally PlantGUARD
ARTC	Australian Rail Track Corporation
Classified heavy weight rail-bound vehicles	Vehicles certified to reliably operate track circuits and permitted to work under the control of signals.
Heavy weight rail-bound vehicles	Vehicles > 5 tonne gross weight and not certified for operation under the control of signals.
ICP	Independent Competent Person
Heavy weight RRV	Vehicles with a retractable rail guidance equipment, able to be removed from the track at some locations and weighing > 5 tonne gross
Light weight RRV	Vehicles with retractable rail guidance equipment, able to be removed from the track at most locations and weighing < 5 tonne gross.
Light weight rail-bound vehicles	Vehicles weighing < 5 tonne gross and not able to be readily removed from track except at siding or specifically designed "take-offs" or lifted off by another vehicle
May	Advised for vehicles operating on the ARTC Network.
OEM	Original Equipment Manufacturer
Quadricycles and trikes	Small self-propelled vehicles for conveying personnel, tools or equipment along the track. They can be either engine or manually powered and are able to be lifted from the track by two people. Quadricycles and Trikes are NOT permitted on the ARTC Network.
Rail-bound vehicles	Track maintenance vehicles that only operate on track. These are also referred to as 'on-track' vehicles/machines.
RAS	ARTC Route Access Standard
Registration Label	Linking the vehicle to the Aquipa Register, a Quick Response (QR) label (machine readable optical label) will be printed and attached to vehicles and read on site via a mobile phone application to verify the equipment's details. When scanned, it provides information such as the status of the Track Vehicle, restriction codes and any information used during the assessment of the Track Vehicle.
RIM	Rail Infrastructure Manager
RISSB	Rail Industry Safety and Standards Board
RRV	Road/Rail Vehicle: A vehicle that can run in both road and rail configurations. These are also referred to as 'hi-rail' vehicles.

Shall	Mandatory for vehicles operating on the ARTC Network.
Should	Recommended for vehicles operating on the ARTC Network.
Substantially modified vehicle	Vehicles modified to accommodate their use for a different purpose. Vehicles undergoing major refurbishment with updated equipment that alters the braking, traction or suspension systems. Vehicles with altered equipment resulting in a reduction of vehicle mass that could alter the vehicle performance. Vehicles modified such that it may be incompatible with the infrastructure. Includes fitment of new or exchanged rail guidance equipment between vehicles.
Track Machine Operator (TMO)	Track Machine Operator: A Competent Worker controlling the movement of a track vehicle **without** safeworking competencies
Track Vehicle Operator (TVO)	Track Vehicle Operator: A Competent Worker controlling the movement of a track vehicle **with** safeworking competencies
TMP	Technical Maintenance Plan
TMV	Track Maintenance Vehicle: A vehicle, usually self-propelled, used for inspecting and / or maintaining infrastructure.
TOC Manual / Waiver	ARTC Train Operating Conditions Manual TOC Waivers were previously issued to the vehicle owner to supersede specific entries and conditions in the TOC Manual.
Trailer	Non-powered vehicles designed to be moved while attached to a powered vehicle. Must be equipped with a self-actuating brake which will hold the vehicle stationary when disconnected from the towing vehicle.
Transit	Through-movement along a portion of line.
Trolley	A small non-powered infrastructure maintenance vehicle used for conveying tools and equipment along the track, which is normally pushed by workers. Release of the operator “control” shall automatically apply a brake capable of holding the vehicle stationary. This includes but is not limited to: Support Frames, Laser Trolleys, Flat Top Trolleys and Measuring Trolleys.
Trolley (Motorised)	Small, powered vehicles with operator walking, used for conveying tools and equipment. Release of the operator “control” shall automatically apply a brake capable of holding the vehicle stationary.
Working Mode	When track maintenance vehicles have their infrastructure maintenance equipment deployed or operational and are able to travel at their working speed.
Worksite only vehicle	Vehicle is restricted to operation within a protected worksite only. Not permitted to travel outside of a protected worksite.

2 Registration and Warranty

2.1 Initial Acceptance into the ARTC Aquipa Register for Operation on the ARTC Network

Track Maintenance Vehicle owners/operators currently operating or intending to operate TMVs on the ARTC Network must formally register each vehicle with ARTC through the Aquipa Register. ARTC uses Aquipa online software and applications to manage the track maintenance vehicle registration process.

ARTC will review the electronic application upon submission. ARTC may assign corridors on which the TMV is permitted to operate, as well as any operating conditions that may apply to that TMV while operating on the ARTC Network.

Each vehicle must be individually registered in the system. TMVs that are not holding current registration with ARTC shall not be permitted to operate on the ARTC Network. The registration status of each vehicle can be found on Aquipa.

Track Maintenance Vehicles, where applicable, must conform to the following standards as stated:

- Australian Railway Standard AS 7502 Road Rail Vehicles
- The ARTC standards for WOS, EPP and ERP series of interface and minimum operating Standards for Rolling Stock and Track Maintenance Vehicles
- ARTC Route Access Standard (RAS)

ARTC may consider equivalent requirements published by other Australian RIMs through a derogation process. Where this is applied, each requirement is to be listed as a non-compliance in the EPP-32-01 forms submitted in the application process.

2.2 General Overview

The following diagram, Figure 1, depicts the general workflow of an application for track maintenance vehicle registration on the ARTC Network. Refer to Figure B.1 in Appendix B for a detailed workflow of the overall registration and warranty process.

Figure 1 – ARTC Registration Workflow

2.3 Accessing and Creating a Company Profile in the Aquipa System

All vehicle owners/operators intending to operate their vehicles on the ARTC Network must have an account on the Aquipa system. To sign up for an account, refer to https://app.aquipa.com.

Once an account has been created, vehicle owners can begin to add their plant into the system and apply to connect these vehicles to ARTC for registration approval.

A series of online articles and tutorial videos that can support users in gaining access, as well as uploading and managing their plant, can be found at https://help.aquipa.com/support/solutions.

Aquipa can also be accessed via the Aquipa mobile application, which is downloadable via respective Application Stores.

2.3.1 Creating Additional Users for your Company:

All vehicle owners/operators can set up differing levels of access for their employees. The account permissions for each user will determine what each user will see within the system.

ARTC employees can request a user login by contacting Aquipa@artc.com.au .

2.4 Vehicles Requiring Registration

Categories of track maintenance vehicles requiring registration are as follows:

- Road/rail vehicles,
- Rail-bound vehicles,
- Trolleys (inclusive of support frames) **greater than 100kg Gross Vehicle Mass**, both push-along and motorised (eg, Spike pullers, clippers, grinder support trolleys, track-pack system support frames, etc), and
- Trailers.

Heavy weight vehicles are any vehicle with a gross vehicle mass of 5000kg or greater.

2.5 Vehicles Not Requiring Registration

Powered and unpowered trollies capable of being removed from the track by two people and weighing **less than 100kg** Gross Vehicle Mass do not require registration.

2.6 ARTC Track Maintenance Vehicle Independent Competent Person (ICP)

ARTC maintains a register of ARTC Independent Competent Persons (ICP) that can:

- Certify new vehicles
- Certify vehicles that are substantially modified and/or have new or exchanged rail guidance equipment
- Recertify vehicles involved in significant incidents.

The ICP register in “Appendix F – ARTC Track Maintenance Vehicle ICP Register” identifies the classifications and activities of track maintenance vehicles that each ICP is competent to assess and verify. Where the ICP is not competent for a specific activity or life cycle assessment, they shall assure that the appropriate certification is obtained from a person who is competent in those areas. E.g. Engaging a signalling ICP may be required. Refer to ESS-32-01 Rolling Stock Signalling Interface for all signalling requirements.

The vehicle owners shall use one of ARTC's listed ICPs to certify compliance to ARTC and AS7500 series standards. The certifying ICP shall also be recorded in the electronic application form within Aquipa.

The process for becoming an ARTC ICP is detailed in Appendix A. The ARTC Track Maintenance Vehicle ICP status is awarded to an individual and not to a company. The ICP will have practical and theoretical knowledge, and experience in track maintenance vehicles or rolling stock. The ICP will critically and capably examine, determine and record compliance of rolling stock or track maintenance vehicles against ARTC's route access and interface standards, as well as the applicable AS7500 series.

The ICP is responsible for endorsing and issuing the certificate of standards compliance, the certificate design compliance, and where necessary, the certificate of acceptance for on track testing in accordance with AS7501 Rolling Stock Compliance and Certification.

The ICP may be from the same organisation that is registering the TMV. However, the ICP must remain sufficiently removed from the acquisition, design, construction, testing, and commissioning of the vehicle being assessed, demonstrating independence in line with the requirements of AS7501 Rolling Stock Compliance and Certification.

The assessment of the ICP is via EPP3201F-04 Assessment of Track Maintenance Vehicle Independent Competent Person.

2.7 New or Substantially Modified Vehicles

Vehicle owners/operators intending to operate new or substantially modified track maintenance vehicles on the ARTC Network must formally register each vehicle with ARTC using the following methodology:

1. The owner of the TMV shall engage an ARTC approved ICP to endorse (or if required, verify) that the specification, design, construction and testing of the TMV meets all requirements of the applicable standards. Evidence of compliance shall be submitted to ARTC in the form of an engineering compliance certificate, verified by the ICP. The Engineering Certificate shall confirm the vehicle design has been assessed, as a minimum:
    a. for the gross vehicle mass in all modes of operation and configurations;
    b. in accordance with the referenced standards;
    c. for the vehicle trailing load (for vehicles operating in a consist, or operating with trailing loads (towing)).

    Additionally for RRVs, the following shall be covered as a minimum in the engineering certificate:

    d. 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;
    e. the rail guidance equipment is structurally sound;
    f. the rail guidance and associated equipment has been tested for correct operation and meets the design parameters;
    g. For vehicles that operate on the road, a current road vehicle registration and the appropriate roadworthy certification depending on the State or Territory;

h. Where applicable, a risk assessment has been undertaken with controls in place for identified hazards.

2. The owner of the TMV shall develop and maintain the vehicle's Technical Maintenance Plan (TMP) with due consideration of OEM guidelines and engage an ARTC approved ICP to assess the TMP. Where the TMP is amended, the owner of the TMV shall engage an ARTC approved ICP to reassess the TMP to ensure that it is appropriately addressing the maintenance requirements of the current configuration of the vehicle. See Appendix F for examples of suitable TMP structures.

3. The owner of the TMV shall engage an ARTC approved ICP to validate the completion of the applicable information pack for registration of vehicles (EPP3201F-01 to F-03). (Type approved vehicles excluded). These packs shall be submitted to ARTC for authorisation and potential assignment of operating conditions. Rail-bound vehicles that are intended to operate under signalled authorities shall gain an ICP engineering certificate to show compliance to ARTC's Signalling Interface Standards. This certificate shall be submitted with the application. A list of signalling ICP's can be obtained by contacting ARTC at Aquipa@artc.com.au.

   Once the vehicle owner/operator has obtained the ICP endorsed engineering certificate, TMP and information pack as outlined above, the owner/operator will connect the vehicle to ARTC on the Aquipa system. All relevant information is to be uploaded to the Aquipa system.

2.7.1 Type Approved Trolleys and Trailers

ARTC has completed type approval of certain off-the-shelf trolleys and trailers that can be registered on Aquipa using an automation-assisted process. This process aims to improve accuracy of data and reduce the workload for vehicle owners. Provided these vehicles have not been modified from their original build, these vehicles do not require an information pack for registration (EPP3201F-03), nor any registration documentation from other RIM's. Most of the specification data will also be automatically filled during registration.

These vehicles include are shown in the table below:

Vehicle Type	Make	Models
Trolley	Permaquip	Link Trolley (1250 kg), Type B Trolley (2 tonne)
Trolley	Robel	51.12
Trolley	Varley	Hercules
Trolley	Melvelle	Machine Trolleys: (1067-1435), (1435), (1435-1600), (1600)

Owners will only need to complete the information in the online register that is unique to that vehicle. Eg. Serial number, internal plant number.

Further type approvals for trolleys or trailers can be applied for via request to Aquipa@artc.com.au.

2.7.2 Modified Vehicles

Any vehicle which has undergone modification shall be reassessed against the most up-to-date standards, following the same methodology outlined in above in Section 2.7.

Modified vehicle examples include, but are not limited to:

1. Vehicles modified to accommodate their use for a different purpose.

2. Vehicles with modifications resulting in a change in configuration.
3. Vehicles undergoing major refurbishment, with updated equipment that alters or could potentially alter any of the following systems
    a. braking
    b. traction
    c. vehicle outline
    d. suspension
    e. load share control (for hi-rail)
    f. operator safety systems
    g. structure
4. Vehicles with equipment removed or added, resulting in a redistribution of vehicle mass that could alter the vehicle performance.
5. Vehicles modified such that they may be incompatible with the infrastructure.
6. Vehicles with software additions or modifications where the software performs safety critical functions.
7. Vehicles that have had their rail guidance equipment exchanged with new or another vehicle's equipment.

Depending on the modification, additional tests may be required for assessment. Refer Appendix C – Matrix of Modifications and Associated Tests.

2.8 Existing Vehicles

Unless a vehicle meets the requirements outlined in Section 2.8.2, existing vehicles must be registered following the process outlined in Section 2.7; as if it was a new vehicle. If the existing vehicle has been modified, the application will be undertaken as detailed above in Section 2.7.2.

2.8.1 Vehicles Previously Registered to ARTC by TOC Manual / TOC Waiver or PP124.1F-01 Registration Form

Vehicles previously registered to ARTC in NSW via TOC Manual or holding a TOC Waiver, or outside of NSW through a PP124.1F-01 Registration Form are required to be assessed as a new vehicle if not already transferred into Aquipa (the transfer period allowance has expired). Any existing vehicle that is not currently registered with another Rail Infrastructure Manager is required to follow the process outlined in Section 2.7, as if it were a new vehicle.

2.8.2 Vehicles Currently Registered with Another Rail Infrastructure Manager (RIM)

Vehicles registered with another RIM may not use that registration to operate on the ARTC network, the vehicle MUST be registered with ARTC directly.

Vehicles currently registered for operation with any of the following RIMs may be considered for registration:

- ARC Infrastructure

- Metro Trains Melbourne
- Sydney Trains
- John Holland Group
- V/Line
- Country Rail Network (CRN) – UGL Regional Linx
- Transport for NSW
- Aurizon

For registration to occur, the vehicle owner/operator shall warrant vehicles for compliance to relevant standards. The vehicle must still comply with ARTC's Route Access and interface standards. The vehicle owner/operator shall provide information that was submitted for approval to the RIM, as a minimum, including the following:

- Evidence of current registration
- Engineering Certificate,
- Technical Maintenance Plan(s) (TMP)
- Application forms submitted to the RIM,
- Assessment forms,
- Approved operating speed and any other operating conditions applied to the vehicle.

Once the vehicle owner/operator has collected all the above documentation, they connect to ARTC on the Aquipa system. This will involve uploading all relevant documentation for review.

ARTC may seek additional information if what is provided is not sufficient for consideration. Additional information relating to vehicle testing can be uploaded in Aquipa within each vehicle's General Documentation.

2.9 Assessment Non-Compliance

Where any item is non-compliant with any part of the applicable standards the applicant must highlight the vehicle's deficiency in the vehicle registration pack. Track Maintenance Vehicles with non-compliances to ARTC Route Access or interface standards may be given concessions to operate, however they may be subject to operating conditions or restrictions in areas of operation.

2.10 Supporting Documentation

In addition to the required documentation outlined in Sections 2.7 or 2.8.2 (whichever is applicable), the following shall be uploaded into Aquipa when registering a vehicle:

- The vehicle details (notations are provided where the information is compulsory to enter)
- Where applicable, the twist test documentation completed by a qualified competent maintainer and endorsed by an ARTC ICP
- Safe-working method statements where applicable

- Relevant operating manuals (inclusive of off-tracking and recovery procedures)
- Any supporting services or maintenance documentation to support that the vehicle has been maintained in a railworthy condition (Use of Aquipa online electronic forms is up to the discretion of the vehicle owner).

2.11 Operating Conditions and Restrictions

Vehicles registered on the ARTC network shall display in detail any operating conditions that may be applicable. The operating conditions will be visible against each individual vehicle in Aquipa. A full list of operating condition codes and applicability notes are detailed in Appendix D - List of ARTC TMV Operating Condition Codes. Additional operating restrictions may be applied further to this list.

2.12 Confirmation of Registration

Once registration has been approved by ARTC, the vehicle owner shall print off a Vehicle Data Sheet from Aquipa and affix a Registration Label to the vehicle. The vehicle data sheet must always be stored with the vehicle to provide proof of registration as well as details of vehicle characteristics and operating restrictions. The vehicle data sheet is to be used in scenarios where the Aquipa system cannot be accessed.

2.12.1 Registration Label Display and Printable Documentation

2.12.1.1 Registration Label (QR Code sticker)

Following initial registration, a “Registration Label” is generated that is unique to the vehicle, listing the owner’s internal Plant ID and the Aquipa unique ID.

The Vehicle Registration Label will be emailed in a confirmation letter. At this point, the label sticker can be ordered through Aquipa for a fee or alternately, the owner can print the label, then laminate or place in a clear plastic sleeve. The process shall result in a waterproof, non-perishable label. Trolleys and trailers may use a tag to affix the label.

The label shall be affixed in a visible position on the plant windscreen or other accessible position where the QR code can be scanned by a person on the ground.

NOTE: Exchange of labels between vehicles IS NOT PERMITTED. The registration label is only valid for use by the actual vehicle that is registered. If the vehicle operator or owner is found to have exchanged the labels, the vehicles will be red flagged until a resolution is found.

An example of the Registration Sticker is in Appendix E.

2.12.1.2 Vehicle Data Sheet

A printout of the vehicle data sheet from Aquipa shall always be maintained with the vehicle, detailing the vehicle characteristics, attributes and operational restrictions. This is required in the event that the Aquipa system cannot be accessed. An example of the Data Sheet is in Appendix E.

2.12.2 Scanning Vehicle Status and Vehicle Site Attendance Log

By scanning the registration label QR code, the user will be able to read the vehicle compliance registration status, restriction codes, attributes, and supporting documentation, such as inspection

and maintenance checklists (if used within the application). The user's visibility has security and permissions access, so only specific users can see allowable information.

The site manager has the ability within Aquipa to record what vehicles have attended a location in the daily site log attendance form. At this time, the visibility of the use of electronic pre-start checklists and any maintenance activities can be accessed/witnessed. Use of hard copy pre-start checklists should be noted as being witnessed if no electronic versions were completed.

2.12.3 In the Event Aquipa is not Accessible on Site

In the unlikely event that the Aquipa application cannot be accessed, the following process shall be undertaken:

1. The printout of the vehicle data sheet shall be used to verify the vehicle characteristics, operating conditions, and restrictions.
2. A verbal confirmation that the pre-start checklist has been completed shall be given to the site representative that would normally check Aquipa (i.e. Protection Officer, Site Controller).
3. The occurrence of Aquipa not being able to be accessed shall be reported into the project / site records.
4. If there has been an Aquipa application failure, the incident shall be reported by email to Aquipa@artc.com.au.

2.13 Annual Registration Renewal

Initial registration for vehicles on the ARTC Network lasts for 12 months. If the vehicle owner/operator wishes to continue operation after this period, they will need to renew the vehicles registration for a further 12 months.. If a vehicle will not be operating on the ARTC Network for a given period, it does not need to be registered or warranted during that time.

To renew registration, the vehicle owner shall nominate representatives authorised to warrant and declare the compliance of the track maintenance vehicle to ARTC standards and railworthiness. On the Aquipa system, this representative shall complete the electronic registration renewal form, declaring that the vehicle:

- is still owned or contractually leased by the registering company
- has not been modified since initial registration
- has been and shall continue to be maintained to an ICP endorsed and ARTC approved technical maintenance plan
- is still compliant with the applicable operational and interface standards
- Is in "Railworthy Condition" to operate on the ARTC Network

Nearing expiry of the existing registration, the vehicle representative will be electronically notified via email with instructions for renewal. Using the link provided or logging on to Aquipa, the owner can complete the registration renewal process to renew the registration for a further 12 months.

If the registration expires the system will automatically change the operational status, indicating that the vehicle is no longer approved for use on the ARTC network. See Section 2.16.

2.14 Change of Identification Details

If there is a change in identification details for a vehicle (i.e. internal Plant I.D., road registration number or state of registration), it is the responsibility of the vehicle owner to update the vehicle details in Aquipa, print the applicable data sheet and organise a new registration label with the updated vehicle details.

2.15 Change of Ownership

At all times, the accuracy and validity of information for a vehicle in Aquipa is the responsibility of the current registered owner. As such, if a vehicle has a change of ownership, it is the responsibility of the current ARTC registered owner to change the ownership of the vehicle in Aquipa.

The vehicle shall be directly transferred to the new owner on the Aquipa system without deleting the existing vehicle, nor creating a new one for the new owner.

Refer to the Aquipa Knowledge Base, which contains detailed instructions on how to transfer vehicle ownership: https://help.aquipa.com/support/solutions.

2.16 Operational Status

The Aquipa system indicates operational status through flagging the equipment with representative symbols.

	Green tick: Indicates that the plant is registered and compliant
	Warning symbol: Indicates the plant is nearing due date for renewal of registration. This will trigger at 30 days prior to expiry of registration
	Red flag: Indicates the plant is unregistered, is currently non-compliant, decommissioned or has been involved in an incident

If a vehicle has a red flag against it, a corresponding “case” is raised within Aquipa. While a red flag is current against a vehicle, this vehicle cannot be operated on the ARTC Network. Once the case has been closed within Aquipa, the vehicle status will revert to green tick and operational. For all cases where a red flag has been created against the vehicle, the owner will receive an electronic notification of change of condition. Where a red flag was created for a compliance issue, only the ARTC Operations Standards Manager or delegate can approve the red flag removal.

2.17 Incidents Involving TMV

Where a Track Maintenance Vehicle has been involved in a rail safety incident (whether on ARTC’s Network or that of another RIM), has sustained damage to the road/rail equipment or has been involved in an accident off track, the owner/operator shall immediately red flag the vehicle in Aquipa through raising a case.

Dependant of the nature of the incident or the extent of the damage, ARTC may request that the vehicle is inspected by an ICP. The inspection:

- where possible, shall be carried out by a different assessor (ICP) to the assessor who is responsible for the vehicle's current assessment, unless otherwise approved by ARTC.
- should result in the submission of a complete report and assessment document to ARTC, indicating that the vehicle is fit for operations post incident..

Dependent on the extent of damage, the operation of the vehicle may be compromised and permission to move any rail-bound vehicle on rail may be required from ARTC under an Operational Notice.

2.18 Decommissioning and Disposal

Where a track maintenance vehicle has been decommissioned, disposed of, or had rail guidance equipment removed, the vehicle shall be deactivated by the vehicle's owner in Aquipa through using the online tools.

2.19 Gauge Configuration

On registration, the vehicle will be noted as to what gauge configurations (i.e., gauge convertible) the vehicle has been previously registered or assessed as.

If the vehicle is intended to be operated in differing gauge configurations, the vehicle shall be assessed by an ICP in all gauge configurations, then registered as these gauges in Aquipa. Supporting documentation on the assessment and maintenance of the vehicle in the varying gauge configurations shall be loaded into Aquipa to support differing gauge configurations. If additional gauges are to be used for the plant after it has been assessed and registered, then this shall be treated as a substantial modification.

2.20 Vehicle Configuration

Track Maintenance Vehicles that are capable of being configured in several different configurations must have each configuration assessed by the ICP. For example, a Flatbed Truck (RRV) can be stand alone and can be configured with an Elevated Work Platform or Ballast Hopper fitted. Permitted Configurations will be recorded with the vehicle in Aquipa.

Variations to the vehicle configurations after assessment and registration will be treated as substantial modification.

3 Procedures

3.1 Registration and Warranty Notification

The vehicle owner/operator demonstrates vehicle compliance to all interface standards as follows:

- The vehicle owner/operator completes an initial application in Aquipa
- The vehicle owner/operator uploads the appropriate supporting documentation and submits this within Aquipa

The Operation Standards Manager or delegate will assess the submitted assessment and apply operating restrictions where applicable. Upon acceptance, the applicant will receive a notification with instructions on how to download the Vehicle Registration Label.

3.2 Track Maintenance Vehicle Operation

3.2.1 General Operation

Track maintenance vehicle operation shall be conducted in compliance with the relevant rules and procedures for the area of operation. These include:

• NSW Rules and Procedures, ANWT316 Track Vehicles

• The Code of Practice for the DIRN Volume 3, Part 1, 6.4 Track Vehicles and Machines

• TA20 - ARTC Code of Practice for the Victorian Main Line Network, Section 30, Infrastructure Works

Track maintenance vehicles shall be maintained to meet ARTC's Route Access and Interface standards and operate on the ARTC Network within all applicable operating conditions, which are including but not limited to;

- Operate at the maximum allowable vehicle operating speed listed in the operating conditions approved in Aquipa, or speeds as defined in ARTC Rules and Procedures, whichever is the lesser. Otherwise, operate at a maximum speed of 15km/h for all road/rail vehicles,
- Comply with any other speed restrictions related to the nature and characteristics of the vehicle as determined by the constructor, maintainer or vehicle manufacturer,
- Comply with operating conditions assigned by ARTC while operating on the ARTC Network,
- All safety operational lights and audible warning devices shall be used where required when operating on ARTC track in accordance with ARTC Rules and Procedures, and
- Data loggers, event recorders, vigilance systems and speedometer / audible overspeed warning devices will be used in accordance with ARTC Interface Standards, where applicable.

3.2.2 Emergency Equipment

Track maintenance vehicles must carry the minimum following emergency equipment:

- A device displaying the time,
- Safeworking keys,
- Radios and mobile phones (fixed or mobile),

- Emergency equipment for train protection including enough detonators / audible warning devices, red and green flags, hand lamps / torches, a minimum 3 approved track circuit shorting clips,
- Fire extinguisher,
- Personal protective equipment for normal and emergency use for all conditions of the Network,
- Safeworking forms applicable to areas of operation.

3.2.3 Lights on Track Maintenance Vehicles

Use of vehicle lights shall be in accordance with ARTC Rules and Procedures.

Trolleys need not display any lights during daylight. When operating at night, in heavy fog, or in tunnels, suitable front and rear lights (e.g., hand lamps) shall be displayed in accordance with ARTC Rules and Procedures.

3.2.4 Transfer of Track Maintenance Vehicles

3.2.4.1 Vehicles Marshalled in a Locomotive Hauled Train Consist

TMV owners shall provide the Rolling Stock Operator the following documentation prior to being loco hauled:

- Aquipa proof of current registration,
- Permitted operating speed when locomotive hauled,
- Block working requirements if applicable,
- A copy of the latest loaded “TMV Special Operating Conditions” if applicable,
- Information for rail crew on braking systems, including handbrakes.
- Permitted hauling capacity of the TMV for consist placement.

Some track maintenance vehicles are fitted with automatic couplers and automatic air brakes which will allow them to be coupled to a train and transferred within a train consist. Such vehicles are identified with note “T2” in Appendix D.

When a track maintenance vehicle is marshalled within a train consist, the vehicle must operate in a position consistent with its draw capacity (Which may be expresses as a trailing mass limit). Such vehicles are identified with note “T17”, in Appendix D. Additional operating conditions for trailing load capacity may be noted.

The automatic air brake must be connected throughout the train including the track maintenance vehicle. The track maintenance vehicle must be inspected as part of the train consist.

If a track maintenance vehicle is not fitted with an external handbrake or spring parking brake and is marshalled as the last vehicle in the train consist, an operator must travel in the vehicle at all times. Some track maintenance vehicles are fitted with a spring parking brake and therefore do not require an operator on board. Rail crew should be familiar with TMV braking systems, procedures to apply hauled TMV handbrakes and how to wind off the spring park brake if required.

When track maintenance vehicles that are not approved to operate track circuits are attached to the rear of a train consist, the train must be operated under block working. Such vehicles are identified with note “BW” in Aquipa, refer to detailed operating conditions in Appendix D.

3.2.4.2 Operating Track Circuits

Some vehicles have been tested for operation of track circuits, and are approved to operate under track signals, and not under block working. Those vehicles will have been reviewed by ARTC under the requirements of ESS-32-01 Rolling Stock Signalling Interface. (formally ESD-32-01). However, these vehicles must operate under block working when operating in areas of infrequent train operations. Refer to ESM-07-04: Unreliable Track Circuit due to Infrequent Train Operations.

3.2.4.3 Vehicles Coupled Together

Some track maintenance vehicles can be coupled together and operated as a multi-unit consist. In this case, the operator in the leading vehicle must have full control of the air brakes for all vehicles in the consist.

3.2.5 Rail Trolleys

All rail trolleys shall be braked to prevent runaways and potential injuries. Overriding the brake system is a safety breach and is not permitted on the ARTC Network.

Examples of modifications include but are not limited to;

- Deactivating the brake handle/level using mechanical means (e.g. cable ties, tape),
- Overriding, disabling or removing the brake system.

Rail trolleys should be inspected prior to and during use, and when viewed operating on the ARTC Network to ensure the braking system has not been tampered with.

Any vehicles that are identified as being modified, in that the brake is deactivated, shall be deregistered until rectifications are completed and reported to Aquipa@artc.com.au.

Appendix A – Independent Competent Person (ICP) Competency Unit Requirements

A2.1 Unit descriptor

This unit describes the knowledge, skills and experience necessary to undertake the certification of rolling stock, plant, and equipment operating on ARTC tracks under ARTC's rail safety accreditation. The certification is to be in accordance with Australian Standard AS 7501, as published 2013.

A2.2 Application of the Unit

This unit shall apply to internal ARTC staff and external persons certifying rolling stock, plant and equipment for operation on ARTC track under ARTC's rail safety accreditation. The competency may be restricted to certifying a limited range of items that operate on ARTC tracks.

The ICP shall be sufficiently removed from the rolling stock acquisition, design and construction process, but it is not a requirement that they are employed from an external company (third party) (AS 7501 clause 4.1).

A2.3 Pre-Requisites

Qualifications which satisfy the criteria for membership of a Professional Engineering Body (AS 7501).

- Certified Practicing Engineer with 5 years relevant experience
- Professional Engineers holding an Engineers Australia accredited or recognised four-year professional engineering degree or equivalent qualification with a minimum of seven years relevant experience
- Engineering Technologists holding an Engineers Australia accredited or recognised three-year engineering technology degree or equivalent qualification with a minimum of ten (10) years relevant experience
- Engineering Associates hold an Engineers Australia recognised advanced diploma or associate degree of engineering or equivalent qualification with a minimum of ten (10) years relevant experience

A2.4 Employability Skills Information

The person must have sufficient skill in the English language to be able to converse with technical staff regarding railway rolling stock, and plant and equipment, and to be able read technical information and to write technical reports.

The person needs to be physically able to climb onto and down from mobile plant and equipment on rail.

The person needs to pass the medical examination for a Rail Industry Worker.

A2.5 Elements and Performance Criteria

The ICP will endorse the completed certification documentation if acceptable, irrespective of the source of their authorship (AS 7501 clause 4.1).

The ICP can perform their duties for the certification using documentation and supporting data provided by the operator or owner of the rolling stock, plant or equipment (AS 7501 clause 4.1).

If a non-conformance to the standard utilised is recorded, the operator may propose control measures to the ICP that will be implemented to verify the use of other standards for certification process, with or without conditions. The approval of these control measures rests with the Operator or Owner and with ARTC. The use of other standards should be endorsed by the ICP (AS 7501 clause 4.3).

The ICP will be issued with all standards that are required for the certification process by the Operator or Owner (AS 7501 clause 4.1).

The ICP will request the Operator or Owner to provide the relevant Certification Documentation submission, as well as any supporting information, and may request additional information for clarification, if required (AS 7501 clause 4.1).

The ICP shall have responsibility for recording the completeness, evaluation, accuracy and content of the Data Register, Standards Compliance Register, Risk Assessment, Design Compliance Certificate, Certificate of Standards Compliance and, if required, Certificate for On Track Testing (AS 7501 clause 4.1).

The ICP shall endorse the Certification Documentation by signing where required (AS 7501 clause 4.1).

A2.6 Required Knowledge and Experience

The ICP shall have required knowledge and experience for the railway rolling stock, plant or equipment that they assess, in accordance with the following:

- Experience in assessing rolling stock, plant or equipment against standards (AS 7501 cause 4.2a)
- Knowledge of rolling stock, plant or equipment Standards (AS7501 clause 4.2b)
- Knowledge of the relevant rail safety legislation (AS 7501 clause 4.2c)
- Knowledge of AS 4292 (AS 7501 clause 4.2d)
- No undeclared conflicts of interest (AS 7501 clause 4.2e)
- The ability to demonstrate independence (AS 7501 clause 4.82)
- Knowledge of risk assessment (AS 7501 clause 4.2g)
- Knowledge and experience in the testing of rolling stock (AS7501 clause 4.2h)
- Knowledge and experience in the interfaces with other disciplines, including civil, signalling electrical and environmental (AS 7501 clause 4.2i)
- Demonstrated experience in the areas in which they are undertaking certification, such as design, manufacture, testing, operations and maintenance (AS 7501 clause 4.3c)
- Ability to demonstrate knowledge of the life cycle of track maintenance vehicles and suitability of technical maintenance plans
- Demonstrated experience in assessing the railway plant, equipment or rolling stock that they will be assessing

A2.7 Evidence Guide

The applicant shall prepare a submission addressing each of the points listed in the section on required knowledge and experience.

Attested CV demonstrates relevant experience.

If required an interview may be held to clarify the applicant's knowledge and experience.

A2.8 Range Statement

Types of railway plant, equipment and rolling stock:

The assessment may be for:

- Small items able to be removed from the track by two people
- Rail Guidance equipment, such as commercial road vehicles or earthmoving plant
- Medium and large size rail-bound track maintenance and construction machines
- Items of rolling stock that are locomotive hauled

The area of assessment may be:

- Design
- Construction
- Testing
- Commissioning
- Operation
- Maintenance

Specialist support:

- The Certifying ICP may seek specialist assistance for any aspect of the certification process.
- The ICP may also rely on written reports.

Assessment process:

The ICP may use a range of methods for assessing an item. This may include but is not limited to visual observation, measurement, testing, review of reports or verbal questioning.

Differing standards:

A range of standards may be used for the assessment. These may be specified by the owner or the ICP may be required to select the appropriate standard.

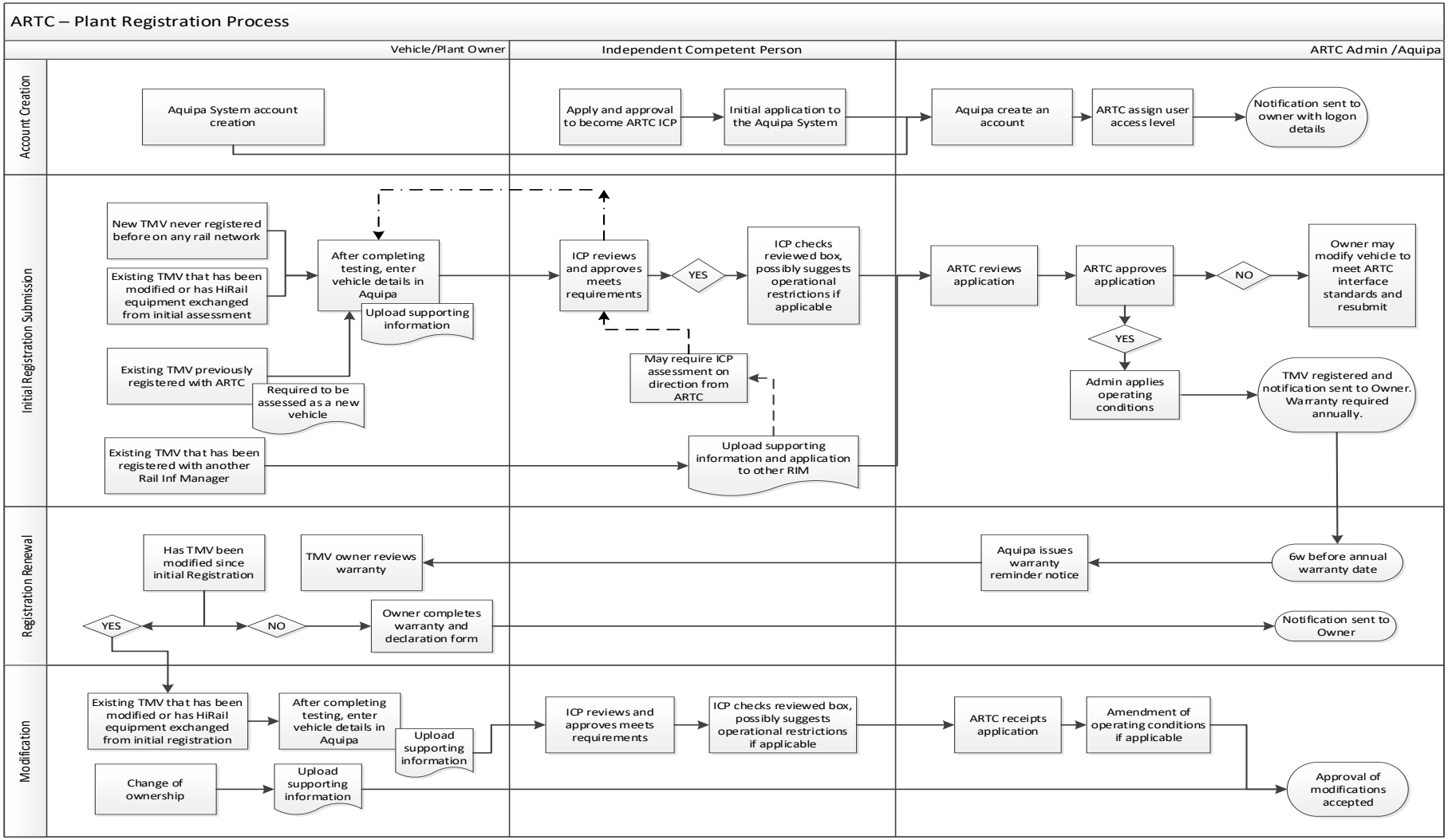
Standards that are commonly used by ARTC are:

- The ARTC plant and rolling stock Standards
- The RISSB Australian standards
- Overseas standards such as the UIC standards

Requirement for Certification:

The items requiring certification are specified in ARTC Standards and Procedures EPP-32-01, Section 2.4.

Appendix B – Flow Charts



Appendix C – Matrix of Modifications and Associated Tests.

	ASSESSMENT REQUIRED?											
	STATIC TESTS								DYNAMIC TESTS			
When compared to existing Complying Rolling Stock, does the Modified Rolling Stock have a:	Static Rolling Stock Outline Test	Measured Vehicle Mass Test	P2 Force Assessment	Static vehicle twist test	Static vehicle/bogie swing test	Static vehicle/vehicle swing test	ARTC Bridge assessment	Static brake test	Ride performance test	Park Brake performance test	Kinematic rolling stock outline test	Environmental tests
Lighter tare mass?	♦	✓		✓				✓	✓			
Heavier tare mass?		✓						✓		♦	♦	
Increased gross mass	✓		✓				✓	✓		✓	✓	
Higher or more off-centre Centre of Gravity?				✓					✓		✓	
Additional / removal of body features	✓	✓		✓					♦		✓	
Change in Configuration	✓			✓					♦			
More torsionally rigid underframe?				✓								♦
Different spacing between axles of a bogie or between bogies?					✓	✓	✓					
Different coupler length or different spacing between or drawbar pins?					✓	✓						♦
Larger Rolling Stock outline?	✓			♦		✓					✓	
Stiffer bogie springs?				✓					✓			♦
Less stiff (softer) bogie springing?									✓		✓	
Change in bogie damping?									✓		✓	♦
Fitment of constant contact side bearers?				✓					✓		✓	♦
Change to clearance of gapped side bearers?				✓							✓	
Smaller wheel diameter?	✓	✓	✓		✓				♦			
Larger wheel diameter	✓		♦		♦				✓			
Change to centre bearing design?				✓					✓		✓	
Change to air brake system								✓		♦		
Change to park brake										✓		
Higher speed			✓						✓		✓	

♦ may be required in some cases

Appendix D – List of ARTC TMV Operating Condition Codes

Code	Description	Criteria Applied
T1	Vehicle can be removed from rail using portable take off	
T2	Vehicle can be coupled into a train consist. Refer to specified maximum trailing load.	
T3	Vehicle permitted to operate under the control of track signalling and not under block working conditions.	Must be certified by a signalling ICP
T4	Maximum speed on a 1 in 30 grade 10 km/h	
T5	Maximum speed on a 1 in 30 grade 20 km/h	
T6	Maximum speed of vehicle when coupled in a train consist 80 km/h	
T7	Maximum speed of vehicle when coupled in a train consist 50 km/h	
T10	Maximum speed of vehicle when coupled in a train consist 60 km/h	
T12	This vehicle is restricted to a maximum speed of 20 km/h in the forward direction (or maximum speed of the vehicle, whichever is the lowest), and 5 km/h in the reverse direction when traversing track fitted with check rails or guard rails such as at points, crossings, bridges and level crossings.	R-R vehicle with wheels /tracks between 1100 –1365mm and/or 2160 - 2260mm from CL
T13	This vehicle is restricted to non-train stop areas and speed is restricted to 20 km per hour in the forward direction and 5 km per hour in the reverse direction when traversing track fitted with check rails or guard rails such as at points, crossings, bridges and level crossings. Care must be taken in areas where there is high ballast shoulders, sleepers laid out, rail lubricators, etc.	R-R vehicle with wheels /tracks between 2260 – 2440mm from CL
T14	This vehicle is restricted to operation within a possession area / worksite only. All movements shall be controlled by the possession officer. No other vehicles will be permitted to pass these vehicles on any adjacent lines until the possession officer / safe-working officer has been advised that these vehicles have come to a stand and are clear of the adjacent line. Transit on rail between worksites is not permitted.	R-R vehicle with wheels /tracks between 2260 – 2440mm from CL Also applies to excavators and other plant which can slew and foul adjacent tracks.
T15	These vehicles Exceed the Rollingstock Outline Plate A and are not permitted to operate on the Moss Vale to Unanderra Line.	
T16	This vehicle is fitted with an automatic coupler and air brake coupling hoses on the rear end and air compressor. This vehicle can be used to shunt rail vehicles.	Caution with this type of vehicle as it may require Train Driver equivalent qualifications to operate.
T17	This vehicle can be marshalled within a train consist in a position consistent with its draw capacity and the train can operate under the control of track signalling and not under block working conditions. The train conveying these vehicles must operate under block working conditions when these vehicles are in the rear of the train.	
T18	Vehicle identified with this note shall operate in travel mode with a driver safety system incorporating two independent safety features. The two independent safety features shall consist of a vigilance system (task linked preferred) plus a suitable authorised person OR alternatively, a task linked vigilance system plus a driver enabling device (Deadman). The latter is a mandatory requirement for driver only operation. An authorised person in this case, is a second person, accompanying the vehicle driver/operator, with sufficient knowledge of the vehicle to take control and bring the vehicle to a stand in the case of an emergency.	

Code	Description	Criteria Applied
T19	Special care must be taken when traversing track fitted with check rails or guard rails such as at points, crossings bridges, and at level crossings and in areas where there are high ballast shoulders, sleepers laid out, rail lubricators etc – maximum speed 3 km/h per hour. Special care to be taken when travelling on un-tamped /skeleton track to prevent guide wheel lift or climb. When travelling boom must be centred in line with travel direction and placed low as safely possible. Do not carry loads on boom when travelling using road-rail guide wheels. Extra care to be taken in areas such as high embankments, bridges and curved track when using road-rail guide wheels to ensure units remain on rail at all times. Operators daily inspection regime particularly noting guide wheel condition and operation applies. All operators of the unit to be competent and fully aware of the above details and any other operator requirements relating to use of the unit on track.	
T20	This vehicle is restricted to a maximum speed of 5 km/h in both directions when traversing track fitted with check rails or guard rails such as at points, crossings, bridges and level crossings. Care must be taken in areas where there is high ballast shoulders, sleepers laid out, rail lubricators etc.	Same as T13 but for vehicles more susceptible to wheel lift over obstructions, e.g. outside wheel track >2440mm.
T24	This vehicle is fitted with an elevated work platform (EWP) that shall not be utilised when the vehicle is on rail. Travel of the vehicle on rail, with the EWP stowed in the travel position, is permitted. For road/rail vehicles, the EWP may be used if the vehicle is in road mode not utilising the rail wheels.	
T25	This vehicle is fitted with an elevated work platform (EWP) that is permitted to be utilised when on rail. The EWP is not permitted to be utilised while the vehicle is in motion (vehicle shall be stationary for EWP use). Travel of the vehicle on rail, with the EWP stowed in the travel position, is permitted.	
T26	Dump trucks, tilting trucks or other similarly configured vehicles are not permitted to travel in working mode (i.e. Tilting) while in motion. If required to move while dumping clearances to all structure shall be confirmed before commencement of motion.	
BW	Vehicle Must be Block Worked - Vehicles That cannot activate track circuits reliably and are not signal compliant and must operate under alternate safeworking methods i.e. Block Working, a Proceed Authority, Track Occupancy Authority or Track Warrants as applicable by the safeworking rules.	
Trailer and Trolley Specific		
TR1	Gross mass of trailer shall not exceed the tare mass of the hauling vehicle.	
TR2	Plant must always be accompanied by an excavator or crane capable of lifting the trailer off the track.	
TR3	Trailer must be coupled to an excavator fitted with a compatible brake system to operate the fail-safe brake system. All operators of the combined excavator and trailer unit are to be competent and fully aware of the above details and any other operator requirements relating to use of the combined trailer and tow unit on track.	
TR4	This trailer may only be towed by listed approved vehicles	
TR5	Trailer pre-start, Plant Hazard Risk Assessment and operating instructions must be kept on the hauling vehicle at all times	
TY1	Trolleys do not require lights during daylight operation, however during conditions of poor visibility, night operations within tunnels, suitable front and rear lights must be fitted.	

Code	Description	Criteria Applied
TY2	Vehicle can be removed from the track by hand in tare condition.	
TY3	Trolley to be always attached to tow vehicle when on track	

Appendix E – ARTC Aquipa Registration Label and Data Sheet Example

Appendix F – Technical Maintenance Plan (TMP) Examples

A TMP should include a table or matrix outlining the following:

- Key timeframes and activities for the vehicle – e.g., pre-starts, twist test
- Tick boxes with headings. These should be based on:
  - Lifetime of vehicle,
  - Active hours,
  - Distance travelled (i.e., twist test annually), and/or
  - Yearly inspection (other RIM yearly inspections are acceptable).

If the vehicle has multiple service documents, list them in the schedule and state when these activities would be completed. The service/maintenance/inspection document should detail all the inspection requirements with methodology on the activity and limits for that activity (if applicable).

Example 1: Maintenance at specified frequencies

Maintenance / Inspection Activity	Document Number	**Daily (on use)**	**Monthly**	**100 hours / 15,000km**	**Yearly**
Perform Hi-rail Inspection					y
Pre-Start Inspection		y			
Twist Test					y
Inspection of Rail Guidance Equipment and Hydraulic System			y		
Safety System / Operational Check			y		
Vehicle Service				y	
Yearly Road/rail vehicle certification and recertification					y

Note: TMPs will differ to suit vehicle and business needs. However, TMPs must include the rail guidance equipment, safety systems, rail wheel inspections.

Example 2: Maintenance before specified frequency limits

The machine is to be examined at frequencies no greater than the limits set out below:

Type of Exam	Frequency Rate per Exam Activity		
	Working Hours [EXAMPLES]	**Calendar Time [EXAMPLES]**	**Km [EXAMPLES]**
A	10	Daily	20
B	30	Weekly	100
C	200	Monthly	400
D	2,500	Yearly	4,000
E	25,000	10 Yearly	40,000

Example3 – Schedule by Activity

Rail Brakes Systems Inspections		Exam Code						
Inspection / Maintenance Activity	**Document Reference**	**A**	**B**	**C**	**D**	**E**	**F**	**G**
1. Rail Brake Inspection		✓	✓	✓	✓	✓	✓	
2. Service Rail Brake – Test								
…….. etc								
Rail Wheels & Rail Guidance Equipment Inspections		Exam Code						
Inspection / Maintenance Activity	**Document Reference**	**A**	**B**	**C**	**D**	**E**	**F**	**G**
1. Rail Wheels Gauging inspection			✓	✓	✓	✓		
2. Rail Wheels rotation and bearings								
3. Rail Wheels Back to Back								
4. Rail Wheels tread defects								
5. Twist Test								
6. Wheel Alignment								
7. etc								