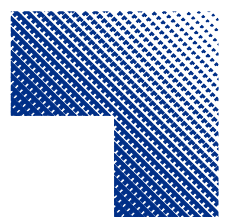




Options to harmonise rolling stock testing and test locations

Discussion paper



Report Outline

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| Title | Options to harmonise rolling stock testing and test locations – Discussion Paper |
| Type of report | Discussion Paper |
| Purpose | For public consultation |
| Abstract | The Infrastructure and Transport Ministers' Meeting (ITMM) has asked the NTC to investigate harmonising testing requirements and testing locations for rolling stock, which is a key project under the National Pathway to streamline rolling stock approvals. Feedback on this paper will inform the development of options to harmonise testing requirements and testing locations for registering rolling stock. |
| Submission details | The NTC will accept submissions until 17 July 2026 online at www.ntc.gov.au or by mail to: National Transport Commission Public submission – Options to harmonise rolling stock testing and test locations – Discussion Paper Level 3, 600 Bourke Street Melbourne VIC 3000 |
| Attribution | This work should be attributed as follows, Source: National Transport Commission 2026, Options to harmonise rolling stock testing and test locations – Discussion Paper. If you have adapted, modified or transformed this work in anyway, please use the following, Source: based on National Transport Commission 2026, Options to harmonise rolling stock testing and test locations – Discussion Paper. |
| Key words | Interface compliance testing, testing regimes, harmonisation, certification, registration, locations, rolling stock operators, rail infrastructure managers |
| Contact | National Transport Commission Level 3/600 Bourke Street Melbourne VIC 3000 Ph: (03) 9236 5000 Email: enquiries@ntc.gov.au www.ntc.gov.au |



Have your say

The Infrastructure and Transport Minister's Meeting (ITMM) has directed the National Transport Commission (NTC) to investigate options to harmonise testing requirements of Rail Infrastructure Managers (RIMs) and testing locations under the National Pathway for Streamlining Rolling Stock Approvals. Feedback on this discussion paper will identify feasible options to harmonise testing requirements.

What to submit

The NTC is asking for participants in the rail industry, specifically those involved in certifying and registering rolling stock, for their feedback on the options presented for harmonising testing requirements and locations.

When to submit

We are seeking submissions on this discussion paper by 17 July 2026.

How to submit

Any individual or organisation can make a submission to the NTC.

Making a submission

- Visit www.ntc.gov.au and select 'Have your say' on the homepage.
- Send a hard copy to:
National Transport Commission
Public submission – Options to harmonise rolling stock testing and test locations
Level 3, 600 Bourke Street
Melbourne VIC 3000.
- Email your submission to rollingstock@ntc.gov.au

Where possible, you should provide evidence, such as data and documents, to support the views in your submission.

Publishing your submission

Unless you clearly ask us not to, we publish all the submissions we receive online. We will not publish submissions that contain defamatory or offensive content.

The Freedom of Information Act 1982 (Cwlth) applies to the NTC.



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Executive summary

The NTC has been asked by Infrastructure and Transport Minister's to investigate harmonising testing requirements and locations for registering freight wagons and locomotives. This is a core project under the National Pathway to Streamline Rolling Stock Approvals.

Context

The current landscape of rolling stock approval and testing in Australia is characterised by complexity and fragmentation. Each Rail Infrastructure Manager (RIM) maintains its own registration processes, standards, and testing requirements, requiring Rolling Stock Operators (RSOs) to engage with multiple, network-specific rolling stock approval pathways.

This environment can result in duplicated effort, extended timeframes and uncertainty for operators seeking access to more than one network. In practice, RSOs may need to present similar information, adapt test evidence to meet different requirements, or undertake additional testing where outcomes are not accepted across networks. RIMs also incur effort by reviewing applications independently, even where safety assurance has been demonstrated elsewhere.

Previous work undertaken for the NTC suggested that, across the rolling stock approval system, these factors contribute to material costs for industry and regulators. While not all these costs are attributable solely to testing requirements, they contribute to the cumulative burden associated with fragmented and duplicated processes across networks.

Registration is required not only for new rolling stock, but also when vehicles are introduced to new networks, change ownership, are modified, or operate under changed conditions. Interface compliance testing is a critical element of this process, providing assurance that rolling stock can operate safely on a network. However, differences in test types, methodologies, acceptance criteria and documentation across networks can increase the administrative and financial effort required to achieve registration, particularly for multi-network operations.

Assessment of testing requirements

A preliminary assessment of published interface standards and supporting documents was undertaken across RIMs forming the National Network of Interoperability (NNI), which identified and assessed 31 test categories, spanning;

- static tests
- dynamic tests
- structural tests
- inspection-based items
- calculation-based assessments.

While the assessment considered factors including the relative feasibility of harmonisation, the review was not a full audit of testing practices, it is therefore indicative and intended to inform consultation. The assessment found that the majority of tests required across assessed networks are common in intent and scope. Most RIMs require the same suite of tests.

However, differences in how they are applied include acceptance criteria, methodological interpretation, documentation requirements and nominated or mandated testing locations. These differences may result in tests being repeated or re-presented to satisfy network specific requirements, particularly in



cases when seeking access to multiple networks. The review also noted that some of these differences reflect network-specific infrastructure.

The NTC is seeking feedback from the industry on the impacts of differences in testing arrangements and priorities and approaches for harmonisation.

Learnings from international approaches and options

International jurisdictions such as the United Kingdom, European Union, United States, and New Zealand may offer valuable lessons with simulation, centralised testing facilities, and protocols for data transfer.

To address the fragmentation, duplication and inefficiency that currently characterise current approaches to rolling stock testing in Australia, options for harmonisation have been identified that could create a more predictable, transparent and efficient environment for RSOs and RIMs. These options include:

- A test requirements matrix, consolidating all RIM test requirements into a single reference document, allowing RSOs and manufacturers to see where requirements align and where they differ. The matrix could also serve as a foundation for increasing mutual recognition.
- Harmonised acceptance criteria across key static and dynamic tests.
- Standardised test methodologies and documentation which involves aligning the procedures for conducting and documenting tests to ensure that results are comparable and acceptable across networks.
- Shared and recognised test locations, including establishing a register of approved test locations or one or more sections of line being agreed to, or even a national rail testing facility to streamline the logistics of dynamic testing.
- Consolidated Australian Standards with documented variations in test requirements for RIMs.

These options are not mutually exclusive and some or all could be implemented. Options could also be implemented by prioritising tests that have the biggest impact. Reforms would need to balance the objective of national consistency with network specific variations, and address challenges related to data ownership, consensus building and the accreditation of test locations.

Next steps

In summary, the current state of rolling stock approval and testing in Australia presents significant barriers to efficiency and innovation. Addressing these challenges through harmonisation and improved mutual recognition could foster a safer, more competitive, and future-ready rail industry.

The NTC is seeking the views of interested stakeholders on the following questions:

- Question 1:** To what extent do current rolling stock testing requirements and practices contribute to inefficiency and delay in certification and registration. How should efforts to address testing requirements be prioritised relative to other rolling stock approval elements of the National Pathway? 15
- Question 2:** Are there particular types of tests or approvals where harmonisation would be most effective? 15
- Question 3:** In rolling stock approvals, there are three stages: certification, registration and network approval. For Table 1 – on pages 21-22, could the various tests be identified as either belonging to certification, registration and network approval? For example,



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| Question 10: | Should harmonisation of testing requirements and locations be progressed as a separate, dedicated project, or could it be effectively managed by the Technical Working Group for a single registration application pilot during a future stage of the National Pathway? | 26 |
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1 Overview

Key points

- RIMs maintain their own unique registration processes for rolling stock, including testing regimes.
- The lack of harmonisation in testing regimes creates difficulties for RSOs operating across multiple networks leading to duplicated effort, increased costs and uncertainty regarding compliance.
- ITMM has requested the NTC investigate harmonising testing requirements and locations for registering freight wagons and locomotives. This is a core project under the National Pathway to Streamline Rolling Stock Approvals.

1.1 Project objectives

Infrastructure and Transport Ministers' Meeting (ITMM) has asked the National Transport Commission (NTC) to lead three rolling stock reforms under the National Rail Action Plan:

1. Delivering guidance on safety assurance processes clarifying the respective roles and responsibilities of Rail Infrastructure Managers (RIMs) and Rolling Stock Operators (RSOs) in the certification and registration steps of the approval process.
2. Developing and piloting a single registration form for freight wagons and locomotives.
3. Investigating harmonising testing requirements and locations for registering freight wagons and locomotives.

These projects form a core part of Stage One of the National Pathway to streamline rolling stock approvals, which ITMM has asked the NTC lead with Transport for New South Wales. The Pathway coordinates all rolling stock approval reforms currently undertaken by various stakeholders to reduce cost and regulatory burden, increase interoperability between networks, increase rail innovation and competition, and to improve and maintain rail safety. For further information on the National Pathway, please refer to [Appendix A](#).

The focus of this discussion paper is on Reform 3 – to investigate harmonising testing requirements and locations for registering freight wagons and locomotives. Work is currently progressing on Reforms 1 and 2 mentioned above.

A critical aspect of rolling stock approvals is interface compliance testing, which verifies that all rolling stock intended for operation meets the minimum standards for compatibility with the rail network and its infrastructure (Rail Confidence 2025:6). This process ensures that new or modified rail vehicles comply with requirements supporting safe operation and reducing the risk of infrastructure interference or safety incidents.

Currently, testing requirements for RSOs are set individually by each RIM and are not harmonised across networks, which can lead to inefficiencies, delays, higher costs, and potential safety gaps. It also impacts resourcing for RIMs in setting tests and reviewing test results.



The objective of the project is to assess the consistency of different testing processes for rail vehicles, and to identify opportunities to align testing types and suitable test locations across the national rail network. The long-term aim is to introduce harmonised testing requirements which will reduce inefficiencies, costs, time and duplication in undertaking similar tests for different RIMs.

1.2 Background

Australia's rolling stock approval framework operates across multiple rail networks, each managed by a RIM. To support certification and registration decisions, RIMs specify interface standards and associated testing requirements that Rolling Stock Operators (RSOs) must satisfy.

Based on previous consultation, the NTC analysed rolling stock approval processes across jurisdictions. That work identified that RSOs seeking access to multiple networks are required to engage with different documentation sets and testing approaches, even where the underlying safety objectives are broadly aligned. Stakeholder feedback highlighted that fragmented and inconsistent approvals can create complexity for multi-network operations.

Testing requirements play a critical role in providing assurance that rolling stock can operate safely and effectively within defined infrastructure and operating conditions. They support assessment of compatibility with track geometry, clearances, braking performance, ride behaviour and interactions with signalling systems. In many cases, differences in testing requirements reflect legitimate network-specific considerations, including infrastructure characteristics, operating environments and historic practices.

At the same time, stakeholders have noted that variation in testing methodologies, acceptance criteria, documentation requirements and testing locations can reduce efficiency for rolling stock intended for operation across more than one network, even where comparable safety assurance outcomes are achieved.

1.3 Approach

This discussion paper has been informed by a preliminary desktop assessment undertaken by rolling stock experts to identify and compare rolling stock testing requirements across RIMs within the National Network of Interoperability (NNI). The assessment reviewed published interface standards and supporting documentation.

The purpose of the assessment was not to undertake a detailed technical audit or to propose new standards, but to establish a high-level view of the types of tests commonly required, areas of alignment, and points of variation that may warrant further consideration.

These findings, together with earlier stakeholder consultation undertaken as part of rolling stock approval reform initiatives, identify potential reform options for consultation. This paper is intended to support informed discussion rather than prescribe outcomes, focusing on where harmonisation offers the greatest benefits and may be feasible.

Feedback on these options is being sought as part of this discussion paper.

Project timeline

The process of investigating how testing requirements and locations may be harmonised will follow the process outlined in Figure 1:



- Feedback on Discussion Paper
- NTC to develop preliminary advice on feasible options for harmonisation of testing based on feedback.

Figure 1: Project Timelines



2 The current state

Key points

- Interface compliance testing is linked to the Network Interface Standards produced by each RIM and verifies that all rolling stock intended for operation meets the minimum standards for compatibility with the rail network and its infrastructure (Rail Confidence 2025:6).
- Different Network Interface Standards across RIMs are not the only reason why testing regimes may vary. Other factors such as testing methodology, interpretation of risk, infrastructure characteristics, acceptance criteria and historical practices also play a role.
- The lack of consistency can make it difficult for RSOs and manufacturers to clearly identify and plan for certification expectations across multiple networks.

2.1 Testing requirements for rolling stock

Testing is a key step in certifying that a rail vehicle meets all necessary rolling stock and Network Interface Standards.

Certification does not guarantee unrestricted network access. Additional network-specific tests may be required to address unique infrastructure conditions and operational risks for some networks.

Registration is the process of assessing that a rail vehicle can operate safely on a specific network.

Tests associated with certification and registration address network specific risks such as unique track geometry, gradients, clearances or operational condition.

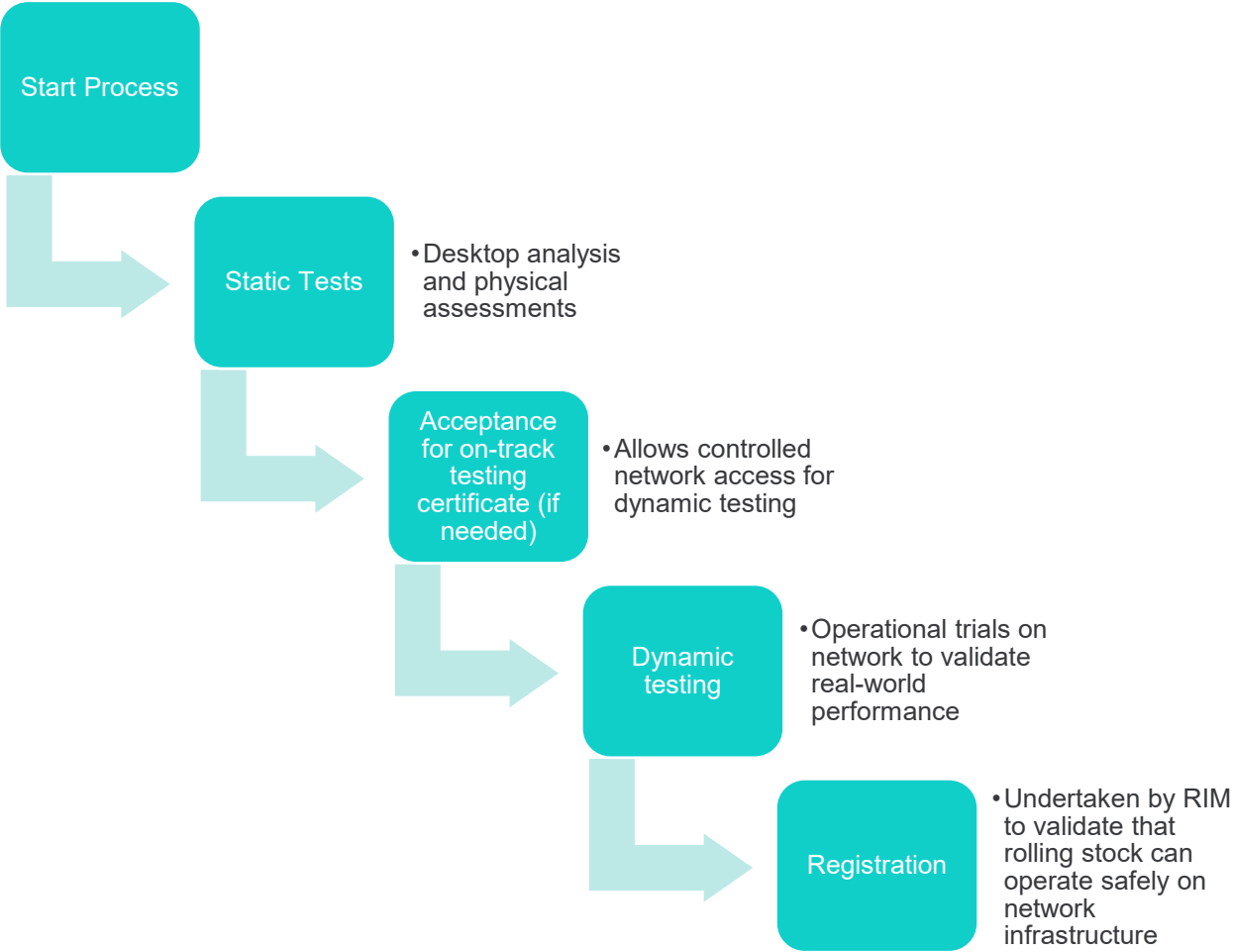
Registration is required for new rolling stock as well as when existing stock undergoes modifications and is introduced to a new network, or when there are changes to operating or network conditions. In some cases, registration processes may also be applied for the change of ownership of a rail vehicle if historical safety assurance records are not available.

Testing typically comprises both static and dynamic activities. As outlined in Figure 2, static tests involve desktop analysis and physical assessments conducted prior to network access. Static tests are always completed first, providing confidence that the vehicle can safely participate in dynamic trials.

Dynamic tests occur after preliminary approval has been granted, enabling the vehicle to operate on the network under controlled conditions to validate operational performance.



Figure 2: Typical structured testing process



Testing may comprise both type testing performed on a single vehicle representative of a class (demonstrating compliance of one vehicle against the specification) or routine testing required for every vehicle within a class (testing each vehicle against the specification) (ARISO 2019).

Interface compliance testing is linked to the Network Interface Standards applied by each RIM. These standards define the technical and operational requirements that rail vehicles must meet to operate safely and effectively on a given network. Both static and dynamic testing is undertaken to verify compliance with these standards. For example, confirmation of physical dimensions to pass by platforms, brake performance and vibration characteristics are tested to confirm that a vehicle meets the physical and dynamic performance criteria specified in the relevant interface documentation.

While testing is driven by standards, differences in testing requirements across networks are not solely the result of divergent standards. Other factors, such as testing methodology, interpretation of risk, infrastructure characteristics and historical practices, also play a role. For instance, two networks may require a particular test such as brake performance and stopping distance, but differ in how the test is conducted, the thresholds applied, or the documentation expected. In some cases, the same standard may be interpreted differently by different RIMs, leading to variation in testing scope and acceptance criteria.

Planning and executing interface compliance testing can be complex, time-consuming, and costly, especially when tests must be repeated to satisfy multiple RIMs.



2.2 Challenges

Recent analysis of testing practices has found that key challenges affecting testing include:

- fragmented and inconsistent testing requirements
- lack of centralised and up-to-date documentation
- variation in test types and acceptance criteria
- administrative burden and cost
- harmonisation of testing and standards

2.2.1 Fragmented and inconsistent testing requirements

Each RIM imposes its own set of testing requirements for rolling stock, which are often described across various standards and network-specific documents. There is no single, consolidated source of information on testing requirements, adding to difficulties for RSOs (and manufacturers) to have rail vehicles registered on multiple networks. This fragmentation leads to duplicated effort, increased costs, and uncertainty for operators (Rail Confidence 2025).

2.2.2 Lack of centralised and up-to-date documentation

Interface compliance documentation is sometimes unpublished or not centralised. This lack of transparency and consistency further complicates the process for RSOs who may need to seek out and interpret multiple, sometimes conflicting, documents to understand what is required for each network (Rail Confidence 2025).

2.2.3 Variation in test types and acceptance criteria

While many tests (such as static outline, weigh, twist, brake, and dynamic ride performance) are required by all RIMs, the methodologies, acceptance criteria, and even the definitions of certain tests can differ. For example, the calculation method for wheel unloading in twist tests or the acceptance limits for static outline can vary, requiring RSOs to repeat or adapt tests for each network (Rail Confidence 2025).

2.2.4 Administrative burden and cost

The need to repeat similar tests for different networks, often with only minor variations, imposes administrative and financial burden on RSOs. Duplication is a major source of inefficiency and a barrier to innovation and investment in new rolling stock.

Furthermore, test results and approvals are not routinely recognised across networks (ARISO 2024). When rolling stock changes ownership, the new owner can be required to repeat the entire application and testing process as historical test data is not always transferrable or locatable. This duplication and lack of mutual recognition not only increase costs but also discourages investment in new or innovative rolling stock. Operators frequently use older, already-approved vehicles rather than risking the delays and expenses associated with introducing new technology. The complexity of differing registration processes, and testing requirements that need to be met within these, present a significant barrier to innovation and competitiveness in Australia's rail sector.

2.2.5 Harmonisation of testing and standards

In many situations where standards between RIMs differ it is still possible to align testing methodologies and acceptance processes. This could simplify requirements for RSOs while work for harmonised



standards is progressed. For example, RIMs could agree to accept common test formats, simulation protocols, or shared test locations, even if their standards differ slightly. This approach could deliver short-term efficiencies and reduce duplication for RSOs and assist work to ultimately harmonise standards between networks.

However, progressing both testing and standards harmonisation together may offer greater long-term benefits. A coordinated approach would ensure that testing aligns with a consistent set of expectations, reducing ambiguity and improving mutual recognition. A potential disadvantage of a 'standards led' approach is that it is likely to require longer timeframes to implement, which may prevent shorter term improvements to test requirements.

- Question 1:** To what extent do current rolling stock testing requirements and practices contribute to inefficiency and delay in certification and registration. How should efforts to address testing requirements be prioritised relative to other rolling stock approval elements of the National Pathway?
- Question 2:** Are there particular types of tests or approvals where harmonisation would be most effective?
- Question 3:** In rolling stock approvals, there are three stages: certification, registration and network approval. For Table 1 – on pages 21-22, could the various tests be identified as either belonging to certification, registration and network approval? For example, 'Inspection based compliance checks' that are largely visual are related to certification.



3 International approaches to rolling stock testing

Key points

- International jurisdictions like the United Kingdom and European Union (EU) increasingly accept validated simulation models in place of physical testing.
- The United States of America (US) and EU benefit from dedicated, centralised test facilities (e.g. Transportation Technology Centre in Colorado, Velim Test Centre in Czech Republic, Rail Tec Arsenal in Austria).
- In Europe and the US, test data often “follows the vehicle,” enabling smoother transitions when ownership changes.

3.1 How Australia’s rolling stock testing requirements align with international approaches

A preliminary review of rolling stock testing practices found that Australia’s rolling stock testing requirements are broadly consistent with international practices in the United Kingdom (UK), European Union (EU), United States (US) and New Zealand. These jurisdictions typically require a combination of static and dynamic testing, supported by simulation and physical trials. However, Australia faces additional complexity due to its multiple track gauges and network-specific standards which complicate national harmonisation efforts.

For some types of rail vehicles, simulated testing is useful, avoiding the need for physical testing. Validated simulation models are increasingly accepted internationally as substitutes for physical testing, especially in the UK and EU. This approach reduces cost and time, provided the models are robust and recognised by regulators. In Europe, standards such as EN 14363 allow simulation to substitute for physical testing when validated against real-world data.

In Australia, some RIMs already accept simulation results for specific tests (e.g. pitch and bounce), provided that the models are validated. This may provide a pathway for broader acceptance, though consistency in validation protocols remains a challenge. Australia has begun to adopt this approach but broader acceptance hinges on consistent validation protocols.

Internationally, dedicated test tracks and facilities are common. These facilities support consistent testing environments and reduce the burden on operators by centralising infrastructure and expertise. However, dedicated test tracks are not without challenges including cost, replication of specific conditions to demonstrate equivalence and travelling to and from the track.

3.2 United Kingdom

The United Kingdom’s rolling stock testing regime is structured around a series of Railway Group Standards (RGS), developed by the Rail Safety and Standards Board (RSSB). These standards were



originally introduced to harmonise technical requirements across operators following the privatisation of British Rail. Rolling stock is certified against RGS requirements during design, construction, and testing stages—a process that has influenced Australian practices.

The types of static and dynamic tests conducted in the UK—such as weighing, twist, and ride performance tests—are broadly similar to those required in Australia. Specific testing protocols are detailed in standards such as RIS-2700-RST and GMRT2141 (Rail Confidence 2025), which outline requirements for dynamic performance and other critical safety assessments (Rail Confidence 2025).

The UK hosts several rolling stock testing facilities including the Old Dalby Test Track and Network Rail's Innovation & Development Centres (RIDCs) in Melton Mowbray and Tuxford. These tracks support dynamic testing at speeds up to 125 mph incorporating 13 miles of track as well as four miles of track capable of 60mph (UKRRIN n.d.) and include infrastructure such as overhead electrification and gradient variations. While the Railway Technical Centre (RTC) in Derby historically played a central role, its use declined following privatisation. Additional facilities like Spa Valley Railway offer lower-speed testing environments suitable for demonstration and light operational trials.

Despite the availability of these facilities, the UK's testing infrastructure is relatively fragmented, and access to high-speed, multi-condition testing remains limited.

3.3 United States

In the United States, rail safety is overseen by the Federal Railroad Administration (FRA) which publishes its regulatory framework in the Code of Federal Regulations (CFR). These regulations cover locomotives, freight wagons, and passenger cars, with specific parts of the CFR applying to each vehicle type. For locomotives, the CFR is the primary standard while freight and passenger rolling stock are also subject to additional industry standards.

The freight rail sector dominates the U.S. rail system, and interoperability across networks is supported by the Association of American Railroads (AAR) which publishes the AAR Manual. This manual sets out mandatory standards for freight rolling stock to ensure compatibility across member networks. It includes detailed testing and analysis requirements, such as dynamic performance assessments and provisions for using load-measuring wheelsets when needed.

The AAR Manual also introduces a categorisation system for new vehicles, ranging from Category A to D, based on how closely a new design resembles previously accepted rolling stock. The extent of required testing varies depending on the category, allowing for a more flexible and risk-based approach to certification.

Overall, the U.S. testing regime shares many similarities with Australian practices, particularly in the types of static and dynamic tests performed. However, the structured use of industry-led standards and categorisation frameworks provides a model for scalable and interoperable testing across a large and diverse rail network.

The Transportation Technology Centre (TTC) in Pueblo, Colorado, is the most comprehensive rail testing facility in North America. It includes multiple specialised test tracks for high-speed trials, transit systems, crash testing via a dedicated crash test wall, and accelerated service testing. TTC also houses simulation labs and maintenance centres, enabling full-spectrum evaluation of rolling stock and components. It includes 50 miles of test track with maximum speeds up to 165 mph (ENSCO n.d.b.).

Originally built in 1971 and now managed by ENSCO, the facility represents a significant investment. ENSCO assumed operations and maintenance of the facility via a US\$571 million contract awarded in October 2022 (ENSCO n.d.a). Its scale and diversity of testing environments make it a global benchmark for integrated rail testing.



3.4 European Union

The European approach to rolling stock testing is shaped by the Railways Interoperability Regulations (RIR) which introduced a structured hierarchy of standards across EU member states. Prior to the RIR, testing was governed by European Norms (EN standards), notably EN14363 and EN15827, which remain foundational (Rail Confidence 2025). Following the implementation of RIR, Technical Specifications for Interoperability (TSIs) were introduced to define the technical requirements for compliance. Separate TSIs exist for passenger and freight rolling stock, and these documents reference the relevant EN standards.

EN14363 outlines both a “normal method” and a “simplified method” for dynamic performance testing. The normal method requires extensive measurements using load-measuring wheelsets and long-distance track trials, particularly when the rolling stock differs significantly from previously accepted designs. These practices are well-established in Europe, where wheelset designs are more standardised and testing infrastructure is widely available.

The types of static and dynamic tests conducted—such as weighing, twist, bogie rotational resistance, and ride performance—are broadly similar to those used in Australia. However, the scale and consistency of European testing infrastructure provide greater efficiency and reliability.

Europe’s testing infrastructure includes advanced facilities such as Siemens’ Wildenrath Test Centre in Germany, Rail Tec Arsenal (RTA) in Austria for climatic testing and Velim Test Centre in the Czech Republic for dynamic trials. France’s CEF test centre offers over 20 km of track for urban and conventional rolling stock, including high-speed testing and signalling system validation.

These facilities support a wide range of rolling stock types and are often integrated with national rail networks. Development costs are substantial—RTA’s construction alone cost €65 million (RTA n.d.) (approx. €153 million in 2025)—with ongoing operational expenses.

3.5 New Zealand

New Zealand’s rail system is centrally managed by KiwiRail, a state-owned enterprise responsible for both infrastructure and operations. This unified structure contrasts with Australia’s multi-network environment and allows for consistent application of standards across the country’s narrow-gauge (1068 mm) network.

KiwiRail maintains a set of technical standards for rolling stock approval. Static testing requirements—such as weighing, twist, and kinematic assessments—are broadly comparable to those used in Australia.

In addition to physical testing, KiwiRail requires comprehensive dynamic simulation analysis before rail vehicles are permitted to operate. This simulation requirement, which is not uniformly applied in Australia, can represent a significant cost and technical barrier for operators seeking access to the New Zealand network.

New Zealand’s testing capabilities are modest but robust. Facilities such as the KiwiRail Testing Centre in Wellington and the Auckland Rail Dynamics Laboratory provide dynamic and simulated testing for safety, performance, and comfort. These are complemented by maintenance hubs like the Christchurch Rail Maintenance Centre.





Question 4: Are there additional learnings, or approaches from international jurisdictions that should be investigated to inform potential reforms to rolling stock testing requirements or locations in Australia?



4 Options for harmonisation

Key points

- Harmonisation of testing requirements could lead to more efficient rolling stock approval through reduced duplication and accelerated approvals while ensuring safety assurance is maintained.
- Testing requirements could be harmonised through establishing:
 - a test requirements matrix
 - harmonised acceptance criteria
 - standardised test methodologies and documentation
 - shared and recognised test locations
 - consolidated Australian standards with documented variations in test requirements for RIMs
- There are various challenges associated with harmonising test requirements including achieving consensus among RIMs. Each RIM's standards have evolved over time to reflect historic practices, local operating conditions, infrastructure constraints, and safety requirements.
- The incentive for RIMs to undertake the due diligence necessary to assure themselves that no additional risk is introduced may be limited by the absence of a central authority that is responsible for setting standards, limited resources and competing operational priorities.
- These issues will need to be considered in developing an approach to harmonisation

4.1 Benefits of harmonisation

The harmonisation options in this paper could address the fragmentation, duplication, and inefficiency that characterise current approaches to rolling stock testing in Australia.

Harmonisation could create a more predictable, transparent, and efficient environment for both RSOs and RIMs. Aligning testing requirements, standardising documentation, and promoting mutual recognition of test results could reduce unnecessary duplication, accelerating Certification and Registration processes. Ultimately, these reforms could help make rail more competitive, foster innovation, and ensure that safety assurance remains robust and consistent.

4.2 Relative feasibility of harmonising different tests

This paper includes a high-level assessment of the relative feasibility of harmonising different types of rolling stock tests across Australian rail networks. The assessment does not propose specific technical solutions or policy decisions. Instead, it groups common tests according to their expected ease or complexity of harmonisation. This is based on the degree of alignment in test intent, methodology, acceptance criteria and location requirements observed across networks, as well as experience from comparable international jurisdictions.



Table 1 illustrates the *relative feasibility* of harmonising common rolling stock tests across Australian rail networks based on alignment of test intent, typical methodology, acceptance criteria, and location requirements.

The indicative harmonisation difficulty ratings presented in this heat map are drawn from analysis undertaken by Rail Confidence. They are provided for consultation purposes only and are intended to support discussion rather than represent formal recommendations or decisions.

Table 1: Indicative harmonisation difficulty ratings

Key:

- Low feasibility difficulty (good candidates for early harmonisation)
- Moderate feasibility difficulty (harmonisation achievable with conditions)
- Higher feasibility difficulty (significant complexity or network specificity)

| Category | Typical examples | Indicative harmonisation difficulty | Rationale (high-level) |
|----------------------------------------------|--------------------------------------------|-------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| Static geometric and mass tests | Static outline, weigh, twist | Medium | Test intent and methods are broadly consistent, but differences exist in acceptance limits, calculation approaches or reference envelopes. |
| Clearance and swing assessments | Vehicle–bogie swing, vehicle–vehicle swing | Low | Methodologies are similar across networks and commonly supported by physical testing or simulation; differences are largely parameter based. |
| Basic brake function (static) | Static brake tests, SCAT | Low | Tests are widely required and undertaken using comparable methods; variation primarily relates to nominated gradients or thresholds. |
| Dynamic ride quality and stability | Ride performance, pitch and bounce | High | Greater sensitivity to track condition and location; some networks specify particular sites or methodologies, increasing complexity. |
| Dynamic brake performance | Stopping distance, deceleration | High | Acceptance criteria and test conditions vary, and tests may be waived or required depending on vehicle type and network risk posture. |
| Acoustic and visibility tests | Horn performance, signal visibility | Medium | Safety objectives are common but test conditions (e.g. distances, layouts) and acceptance criteria differ between networks. |
| Electrical and signalling interaction | Signal compatibility, interference | High | Highly network specific due to signalling technologies and infrastructure, limiting mutual recognition without additional safeguards. |



| | | | |
|-------------------------------------------|--------------------------------------------------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------|
| Inspection based compliance checks | Electrical safety markings, AEI tags, reflective delineators | Low | Largely visual or documentary checks with limited technical variability; strong candidates for standardisation. |
| Structural assessments | Jacking loads, end compression | Low | Commonly demonstrated via calculation or simulation against recognised standards; limited dependence on network characteristics. |
| Calculation based assessments | P2 force, P/D ratio | Medium | Calculation methods are consistent, but allowable limits are often linked to network specific track classes or infrastructure limits. |
| Environmental performance | Noise, vibration, emissions | High | Influenced by local environmental requirements, operating context and regulatory regimes outside rolling stock approval processes. |

(Rail Confidence 2025:16-24).

4.3 Options for harmonisation

The following options for harmonisation are discussed in the sub-sections below.

- Test requirements matrix.
- Harmonised acceptance criteria
- Standardised test methodologies and documentation
- Shared and recognised test locations
- Consolidated Australian Standards with documented RIM variations

These options are not mutually exclusive and some or all could be implemented. Options could also be implemented progressively through a reform program. The NTC is seeking views on how reforms could be best implemented.

4.3.1 Test requirements matrix

A test requirements matrix would consolidate all RIM test requirements into a single reference document. This would allow RSOs and manufacturers to clearly see where requirements align and where they differ making it easier to plan certification activities and avoid redundant testing. The matrix would also serve as a foundation for increasing mutual recognition where RIMs agree to accept certain tests or results performed for another network, provided the standards are equivalent.

The preliminary assessment of testing requirements for freight wagons and locomotives for RIMs that make up the NNI prepared for this paper could be used as a starting point for developing a test requirements matrix. If developed, a test requirements matrix would need to be regularly reviewed and updated to ensure that it reflects up to date requirements of RIMs and outcomes of work to harmonise standards.



4.3.2 Harmonised acceptance criteria

Developing harmonised acceptance criteria across key static and dynamic tests would provide a common reference for both RSOs and RIMs.

Rather than each RIM applying unique criteria or interpretations of test outcomes, a nationally agreed set of assessment standards would allow test results to be accepted across networks. This approach would reduce duplication, increase transparency, and provide a clear pathway for interface compliance for manufacturers and operators.

While there are clear implementation challenges (see Section 4.4), indicative examples of how harmonisation could be achieved include the following:

1. **Static outline** - Each RIM maintains its own (sometimes unique) static outline profile. Differences in this profile mean vehicles compliant on one network are not necessarily compliant elsewhere. By developing a harmonised outline - overlaying existing RIM profiles and adopting the most restrictive composite limits that remain - conforming vehicles would be compliant across all participating networks.
2. **Horn performance** - Testing is currently inconsistently applied. At present, sound-pressure levels are required to be measured at differing distances and the acceptance criteria varies across networks. Adoption of uniform test conditions and minimum performance thresholds based on industry accepted requirements (e.g. AS 7532:2025) would reduce the need for network-specific tests and ensure consistent public-safety outcomes.
3. **Ride performance** - Ride performance tests are required by most RIMs, but methodology and acceptance criteria can vary between them. Establishing common parameters, such as universally accepted test locations and agreed test methodology, would enable increased mutual recognition of results.

4.3.3 Standardised test methodologies and documentation

Aligning the procedures for conducting and documenting tests (e.g., twist tests, brake tests, dynamic trials) would ensure that results are comparable and acceptable across networks. This could include the adoption of common simulation models, validation protocols, and reporting templates, all referenced to national or international standards such as AS7501:2019 Rolling Stock Compliance Certification and relevant guidelines.

4.3.4 Shared and recognised test locations

Establishing a register of approved test locations, or even developing a national testing facility, could streamline the logistics of dynamic testing. RIMs could agree to recognise results from tests conducted at these locations, provided the conditions and methodologies meet agreed standards. This could reduce the need for RSOs to repeat tests on multiple networks and lower the cost and time required for approvals. The use of Independent Competent Persons (ICPs) to validate vehicles could make it easier for RIMs to certify rolling stock (as per AS7501) more consistently.

4.3.5 Consolidated Australian standards with documented RIM variations

Processes for developing and updating national rolling stock standards could include explicit requirements to analyse test requirements and clearly document RIM-specific variations needed to address network-specific risks or infrastructure constraints. The intent would be to establish a single, authoritative reference source that sets out both common national requirements and any agreed network variations in one place. Processes for developing and updating national rolling stock standards



could also include an explicit requirement to consider opportunities for harmonisation that could be implemented where variations exist.

4.4 Challenges associated with harmonisation

There are challenges associated with harmonisation:

- Network specific requirements
- Achieving consensus
- Data ownership and recognition

4.4.1 Network specific requirements

Some differences in testing requirements are justified by unique infrastructure, operational, or environmental conditions on particular networks. Harmonising requirements must balance the need for national consistency with the legitimate need for local variations in standards.

4.4.2 Achieving consensus

Aligning test methodologies, acceptance criteria, and documentation across all RIMs will require collaboration and negotiation.

Each RIM's standards have evolved over time to reflect local operating conditions, infrastructure constraints and safety requirements. RIMs may be reluctant to change these requirements, particularly where harmonisation is perceived to introduce risks that could compromise safety or operational integrity, or if the risks associated with change are unknown.

The incentive for RIMs to undertake the due diligence necessary to assure themselves that no additional risk is introduced to their networks may be limited in the absence of a central authority that is responsible for setting standards, limited resources and competing operational priorities.¹ In the current regulatory environment, building consensus will depend on demonstrating that harmonisation can maintain safety assurance while reducing duplication and improving efficiency.

Further complicating the process are the flow-on effects for RSOs. Using the static outline example from Section 4.3.2, while a harmonised 'worst-case' static outline may have minimal implications for RIMs, rail vehicles that are currently compliant and operating safely on certain networks may not conform to the harmonised outline. The cost implications of any modifications to existing fleets are likely to be significant and, in some cases, prohibitive. This underscores the need for a balanced approach that achieves consistency while recognising legacy infrastructure and operational realities.

4.4.3 Data ownership and recognition

Test results and compliance data are not always transferrable when rolling stock changes ownership, and there is no standard process for mutual recognition of test results. Establishing clear protocols for

¹ The NTC recently released a Consultation Regulatory Impact Statement (C-RIS) setting out proposed reforms to the *Rail Safety National Law*. The C-RIS looks at long-term governance issues. In relation to rolling stock approvals, it seeks feedback on a national coordinating function to administer the mandatory rolling stock process standard (once developed) to maintain and administer a national register of applications and approvals and administer a mutual recognition framework.

The C-RIS suggests a *provision could be included in the RSNL* that creates a function to administer the mandatory standard on rolling stock approvals, coordinates applications and maintains a system (such as a rolling stock registration system) that facilitates mutual recognition of approvals. This could be assigned to an agency or industry body independent of RIMs, such as ARISO or another non-RIM body.



data sharing and recognition will be essential. To support this, a recognised, harmonised standard would ensure that the requirements are nationally accepted.

4.5 Challenges of flexibility in testing locations

Challenges of flexibility in testing locations are:

- Consistency and reliability
- Acceptance by all RIMs
- Logistical and operational barriers
- Simulation and innovation

4.5.1 Consistency and reliability

Allowing greater flexibility in testing locations (e.g. accepting results from a wider range of approved track locations) could help reduce testing costs and shorten approval timeframes. However, this approach also raises concerns about the consistency and reliability of test conditions. Location-specific tests are typically limited to dynamic activities such as ride performance and dynamic kinematic assessments. These tests require specific track conditions, and outcomes may vary between locations with differing track geometry, wheel and rail profiles, line speeds, maintenance standards and environmental characteristics. Ensuring that results remain comparable and equivalent would therefore require clear accreditation criteria and periodic validation of approved test locations.

4.5.2 Acceptance by all RIMs

Even if a test is conducted at a technically suitable location, not all RIMs may be willing to accept the results unless they are confident that the conditions and methodologies match their own requirements. This could limit the practical benefits of flexibility unless there is a robust process for accrediting and monitoring test sites.

4.5.3 Logistical and operational barriers

Coordinating access to test tracks, arranging for the necessary personnel and equipment, and managing the associated permissions and paperwork can be complex, especially if multiple RIMs must be involved or if tests must be repeated to satisfy different requirements.

4.5.4 Simulation and innovation

While simulation offers potential for greater flexibility and efficiency, its acceptance depends on the development of validated models and agreed protocols for when simulation can substitute for physical testing. There may be technical and cultural resistance to relying on simulation in place of traditional on-track trials. Simulating testing may also have significant cost implications.



- Question 5:** To what extent is there a need for a national testing facility in Australia, and how could it deliver value to the industry?
- Question 6:** Are the options for harmonisation mentioned in section 4.3 better considered as standalone options, as a combination of options, or altogether? Which options should be implemented as a priority?
- Question 7:** Are there specific acceptance criteria or documentation requirements that could be quickly harmonised to delivery immediate benefits ('quick wins')?
- Question 8:** Would allowing greater flexibility in where dynamic and static tests are conducted (for example, recognising results from a wider range of approved sites or simulators) help reduce costs and improve timing?
- Question 9:** Is simulation testing a viable alternative to physical trials and, if so, what protocols would need to be adopted to validate simulation models? Are there specific tests that simulation testing could be used to demonstrate compliance?
- Question 10:** Should harmonisation of testing requirements and locations be progressed as a separate, dedicated project, or could it be effectively managed by the Technical Working Group for a single registration application pilot during a future stage of the National Pathway?
- Question 11:** Would a testing location register be useful?



5 Conclusion and next steps

Key points

- Recommendations on approaches for harmonising testing requirements and locations will be presented to ITMM for consideration and included in the next steps for the National Pathway and the associated work plan.

5.1 Next steps

Following the conclusion of consultation on this discussion paper, feedback will be considered by the NTC to identify feasible options for harmonising testing requirements and locations.

Outputs from this discussion paper may also inform the work plan for the National Pathway. Elements of this work could include:

- processes for harmonising testing requirements
- protocols for accepting simulation testing
- feasibility studies for a national testing facility
- a register of approved testing locations.

This paper, including the relative feasibility assessment of harmonising different rolling stock tests, will be discussed with Rail Transport Operators to identify next steps forward.



Appendix A. National Pathway

National Rail Action Plan

The National Rail Action Plan (NRAP) is improving the interoperability of people, technology and standards to support rail competitiveness and create one integrated, modern Australian railway system. Under NRAP, Infrastructure and Transport Ministers (Ministers) (ITMM) have tasked the National Transport Commission with enabling these outcomes through a four-year work program, with a focus on five key areas (DITRDCA 2022):

1. Locking in national rail standards to advance interoperability
2. Aligning train control and signaling technology on the eastern seaboard
3. Reducing the burden on drivers, crew and maintenance workers
4. Streamlining rolling stock approval processes
5. Creating workplace solutions to meet future rail skills demand.

Existing NTC streamlining rolling stock approvals projects (NRAP)

In alignment with Priority 4 of the above, in 2023/24 the NTC undertook preliminary work and industry/stakeholder consultation to define the problem/s, identify the issues, and propose options for rolling stock approval reform. These options for reform were submitted to Ministers in June 2024 for direction on next steps.

Following the June 2024 ITMM, Ministers requested that the NTC lead three rolling stock approval reforms namely:

1. Preparing written guidance to clarify roles and responsibilities in relation to rolling stock approvals (safety assurance guidance);
2. Developing and piloting a single application form for rolling stock; and
3. Investigating harmonising testing requirements and test locations for rolling stock with recommendations back to ITMM. (DITRDCA 2024).

What is the National Pathway?

In August 2025, Ministers endorsed the concept of a National Pathway (the Pathway) for streamlining rolling stock approvals. The aim of the National Pathway is to bring together existing rolling stock approval reform initiatives currently being undertaken by various jurisdictions and stakeholders to provide for greater coordination. Ministers requested that a Work Plan be developed for mid-2026 to set out in more detail the tasks that need to be undertaken, interdependencies to facilitate acceleration, project leads, and timeframes.

The Pathway consolidates existing NTC reform projects (i.e. safety assurance guidance, single application form and harmonising testing arrangements) as well as jurisdiction-related projects including harmonising network interface standards and the Australian Rail Industry Standards Organisation's (ARISO) (formerly Rail Industry Safety and Standards Board – RISSB) National Rolling Stock Register (NRSR) and registration system (RISSB 2021 and 2025).



Staged approach

As requested by ITMM, the Pathway starts with a small group of core-RIMs² (Stage 1) to work through reform initiatives for freight rolling stock initially. Lessons learnt from stage 1 will then be adapted and delivered nationally (Stage 2) for freight and widened to other rolling stock, such as passenger (where applicable) and rail maintenance vehicles.

Stage 3 will use the outputs of these initiatives and the lessons learned to inform and underpin a mandatory rolling stock approval process standard.

Mandatory Rolling Stock Approval Process Standard

The mandated *process* standard aims to ensure a common approach is followed in relation to rolling stock approvals. It should be noted that the mandatory rolling stock approval standard will be a process standard (not a technical or type approval assurance standard).

Outputs from the NTC's work and the National Pathway will assist in the development and specification of a mandatory standard for rolling stock approval. The lessons learned from the Pathway projects will be key to ensuring a fit for purpose standard. For example, a mandatory rolling stock process standard (noting that consultation will need to take place with industry first) could include:

- adherence to, and adoption of, the safety assurance guidance (to be released by ONRSR in 2026) outlining the roles and responsibilities of RIMs and RSOs in rolling stock approvals.
- use of a common/single registration form for wagons and locomotives (once developed).
- a harmonised assessment process.
- use of the National Rolling Stock Register (when developed) to facilitate mutual recognition.

Governance

Two governance groups have been established to oversee the Pathway work.

1. Rolling stock approvals reform sub-group (RSAR SG)

The RSAR SG is a policy group and oversees the Pathway and key projects. Membership is initially limited to Pathway partners (ARISO, TfNSW and NTC) along with a small group of RIMs as per stage 1. This group will be expanded to all jurisdictions and RIMs in Stage 2.

2. Technical Working Group (TWG)

Technical Working Groups (TWGs) will be formed for projects. A TWG has been set up to develop a single application form for freight wagons and then to test /pilot how it can reduce regulatory burden. Freight is the initial focus given industry's feedback that it has the most 'pain points'. The TWG is meeting every 2 to 3 weeks and has met regularly since August 2025.

Update on NTC projects

This section provides an update on NTC led rolling stock approval reforms:

1. Preparing written guidance to clarify roles and responsibilities in relation to rolling stock approvals (safety assurance guidance)

² The core group of RIMs are: Transport for New South Wales (NSW Metropolitan Rail Network); ARTC (interstate network); Arc Infrastructure (WA) and UGL Regional Linx (NSW Country Regional Network).



2. Developing and piloting a single application form for rolling stock
3. Investigating harmonising testing requirements and test locations for rolling stock.

1. Update on safety assurance guidance

ITMM requested the NTC develop written guidance to clarify roles and responsibilities for RIMs, RSOs and the Office of the National Rail Safety Regulator (ONRSR) on certification and registration of rolling stock. The NTC released a [consultation paper](#) in May 2025 seeking feedback from industry on ideas for reforms and improvements to clarify the rolling stock approval process. The NTC received 16 submissions (some confidential) from a wide range of stakeholders. A [summary](#) of submissions was published in November 2025. This consultation process informed an initial draft of guidance developed by the NTC.

In late 2025, ONRSR indicated it would like to take over the guidance work as it has agreed to develop a guideline on expectations for safety assurance for rolling stock approvals. As ONRSR is an independent regulator, it will need to undertake its own public consultation process. Consequently, the NTC has ceased work on its draft guidance and will provide the draft guideline to ONRSR. ONRSR will undertake broad consultation on a guideline, anticipated to be in mid-2026.

2. Update on developing a single application form for rolling stock approvals and piloting the application

This project is in progress and involves:

1. developing a common single application form for:
 - a. freight wagons; and
 - b. freight locomotives.
2. piloting (trial/test) the form with a small group of RIMS and RSOs.
3. ascertain lessons learned and modify the form.
4. test with all RIMS in stage 2

An NTC led Technical Working Group (TWG) comprising a small group of RIMs (TfNSW, ARTC, Arc Infrastructure and UGL Regional Linx), ARISO, two RSOs (Qube and Pacific National) along with ONRSR and Queensland Rail as observers, have been meeting regularly to develop a single registration form for freight wagons.

The NTC/TWG are focused on reviewing the requirements to be included in the wagon registration form. A draft of the freight wagon form has recently been completed, as well as a 'Freight Wagon Registration Application Procedure', which sets out the steps required to certify and register a freight wagon application. The locomotive registration form is scheduled to be completed by December 2026.

3. Investigating harmonising testing requirements and test locations for rolling stock

ITMM requested the NTC investigate options for harmonising rolling stock testing requirements and processes. This discussion paper seeks feedback from industry on practical steps towards harmonising these processes across the national rail network.



Glossary

| Term | Definition |
|-------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Certification | <p>Engineering safety assurance process to verify the design, construction and performance of rolling against a suite of rolling stock and network interface standards as per RIM requirements and RSO requirements.</p> <p>The signing of certification documents by qualified, competent persons attesting that the design, product or installation is in accordance with the specification requirements as verified by appropriate inspections and/or tests.</p> |
| Discussion Paper | A document developed to seek input from industry on ideas for reforms and improvements to rolling stock approval processes within the current regulatory framework. |
| Dynamic Testing | On-track testing conducted under controlled conditions to assess rolling stock performance, such as ride quality, braking, and curve negotiation. |
| Interface Compliance Testing | Testing to ensure rolling stock is compatible with the physical and operational characteristics of a rail network, including infrastructure and signalling systems. |
| Independent Competent Person (ICP) | A person accepted by the RSO and the RIM as having practical and theoretical knowledge and experience in specified areas to critically and capably examine, determine and record compliance of new or modified rolling stock against the referenced standards. |
| National Rail Action Plan | An Australian government initiative led by the National Transport Commission to create a modern, interoperable and standardised rail system across all states and territories. NRAP aims to improve safety, boost productivity, lower costs and enhance the digital capabilities of the national freight and passenger network. |
| National Rolling Stock Register | A proposed centralised database for recording rolling stock compliance, certification and registration details across Australian networks. |
| Office of the National Rail Safety Regulator (ONRSR) | The regulatory body responsible for overseeing rail safety in Australia, including the accreditation of RTOs and the provision of guidance on safety management systems. |
| Rail Infrastructure Manager (RIM) | <p>In relation to rail infrastructure of a railway, means the person who has effective control and management of the rail infrastructure, whether or not the person:</p> <p>(a) owns the rail infrastructure (b) has a statutory or contractual right to use the rail infrastructure or to control, or provide, access to it.</p> |
| Rail Safety National Law (RSNL) | Legislation that sets out the safety duties and responsibilities of parties involved in railway operations, including RIMs and RSOs. |
| Registration | Safety assurance process whereby the RIM reviews the vehicle compliance information supplied by the RSO and validates that a |



| | |
|-------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Rolling Stock Operator (RSO) | vehicle can operate safely on the infrastructure. The vehicle information is recorded on a rolling stock 'register'. The result of this step is that the vehicle is accepted by the RIM as safe and compatible with the network and recorded on a rolling stock 'register'. |
| | A person who has effective control and management of the operation or movement of rolling stock on rail infrastructure for a railway, but does not include a person by reason only that the person drives the rolling stock or controls the network or the network signals. |
| Routine Test | A test required to be performed on every individual vehicle within a class or series, rather than just a representative sample. |
| Simulation testing | The use of computer models to assess rolling stock performance, often used as a substitute or complement to physical testing. |
| Static Testing | Pre-operational testing of rolling stock, including physical measurements and desktop analysis, such as outline, weight, and twist tests. |
| Twist Test | A static test used to assess wheel unloading and vehicle stability when subjected to track twist or uneven geometry. |
| Type Test | A test performed on a single vehicle that is representative of an entire class or series of vehicles. Type testing demonstrates that the design meets specified requirements, allowing subsequent vehicles of the same type to be approved based on the results of the initial test. |



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