



Rolling Stock Compliance Certification



Rolling Stock Standard

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This Australian Standard® AS 7501 Rolling Stock Compliance Certification was prepared by a Rail Industry Safety and Standards Board (RISSB) Development Group consisting of representatives from the following organisations:

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Bombardier

Central Queensland University

Rio Tinto

Monash University

Select Plant Hire

Downer Group

ARTC

SNC-Lavalin

PTA WA

Specialised Force

The Standard was approved by the Development Group and the Rollingstock Standing Committee in **Select SC approval date**. On **Select Board approval date** the RISSB Board approved the Standard for release.

This standard was issued for public consultation and was independently validated before being approved.

Development of the Standard was undertaken in accordance with RISSB's accredited process. As part of the approval process, the Standing Committee verified that proper process was followed in developing the Standard

RISSB wishes to acknowledge the positive contribution of subject matter experts in the development of this Standard. Their efforts ranged from membership of the Development Group through to individuals providing comment on a draft of the Standard during the open review.

I commend this Standard to the Australasian rail industry as it represents industry good practice and has been developed through a rigorous process.

Paul Daly

Chief Executive Officer

Rail Industry Safety and Standards Board

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AS 7501:2019

Rolling Stock Compliance Certification

Document details

First published as: AS 7501:2013

ISBN [Enter ISBN](#).

Document history

Publication Version	Effective Date	Reason for and Extent of Change(s)
2019	Select Board approval date	
2013	20 March 2013	First Published

Draft history (Draft history applies only during development)

Draft version	Draft date	Notes
1.1	20/03/2019	Prior to PC review
1.2	04/04/2019	Prior to PC review
1.3	23/04/2019	Prior to PC review

Approval

Name	Date
Rail Industry Safety and Standards Board	Select Board approval date

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This Standard was prepared by the Rail Industry Safety and Standards Board (RISSB) Development Group AS 7501 Rolling Stock Compliance Certification. Membership of this Development Group consisted of representatives from the organisations listed on the inside cover of this document.

Objective

The objective of this Standard is to provide a standard method for certifying rolling stock compliance to the issued RISSB Rolling Stock series of Australian Standards.

The certification documentation is intended for use facilitating network registration of rolling stock.

While this standard was developed for RISSB Rolling Stock Standard compliance, the process is suitable for use in obtaining compliance with any standards.

This standard has several notable changes from AS 7501:2013. Changes include but are not limited to revised responsibilities and definitions applicable to rolling stock operators, owners and independent competent persons. Changes to the overall certification process have been implemented and additional example parameters added to the data register.

Compliance

There are two types of control contained within Australian Standards developed by RISSB:

1. Requirements.
2. Recommendations.

Requirements – it is mandatory to follow all requirements to claim full compliance with the Standard. Requirements are identified within the text by the term 'shall'.

Recommendations – do not mention or exclude other possibilities but do offer the one that is preferred. Recommendations are identified within the text by the term 'should'.

Recommendations recognise that there could be limitations to the universal application of the control, i.e. the identified control is not able to be applied or other controls are more appropriate or better.

For compliance purposes, where a recommended control is not applied as written in the standard it could be incumbent on the adopter of the standard to demonstrate their actual method of controlling the risk as part of their WHS or Rail Safety National Law obligations. Similarly, it could also be incumbent on an adopter of the standard to demonstrate their method of controlling the risk to contracting entities, or interfacing organisations where the risk may be shared.

Controls in RISSB standards address known railway hazards are addressed in an appendix.

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1 Scope and general

1.1 Scope

This document applies to new rolling stock, modified rolling stock and existing rolling stock being proposed for operation on a Network on which the class of rolling stock has not previously operated.

The document covers the design, construction and testing of rolling stock. Certification of individual units of rolling stock or those which are coupled to operate is included, but not of trains.

Operation of rolling stock in regard to network safe working rules and route standards is not covered. Rolling stock used on light rail, cane railway and monorail networks are not covered.

The scope of AS 7501 Rolling Stock Certification ends with the issuing of certification documentation and does not cover network registration which is managed by the RIMs.

1.2 Normative references

The following referenced documents are indispensable for the application of this Standard:

- (a) AS/NZS ISO 31000 Risk management – Principles and guidelines.

1.3 Terms and definitions

For the purposes of this document, the following terms and definitions apply:

- (a) **acceptance for on-track testing certificate**
The type certificate issued by the independent competent person following an assessment process on the rolling stock, and on which limitations applying to on-track testing are recorded. For more details refer to Section 11.
- (b) **AW0**
Load condition of a vehicle carrying no passengers in a serviceable condition. Also referred to as tare mass.
- (c) **AW1**
AW0 plus load (or simulated load) of crew and seated passengers only.
- (d) **AW2**
AW0 plus load (or simulated load) of crew and includes a combination of both seated and standing passengers.
- (e) **AW3**
AW0 plus load (or simulated load) of crew and the maximum possible number of passengers both seated and standing. Also referred to as crush load.
- (f) **certificate of standards compliance**
The overarching certificate confirming that a unit of rolling stock has been designed, constructed and tested in accordance with the AS 7500 series of Standards.
- (g) **certification**
The process of certifying the compliance of the design and construction of rolling stock against the AS 7500 series of Australian Standards and other Standards where allowed by the AS 7500 series. Certification culminates

with the issuing of the certificate of Standards compliance supported by the design compliance certificate, construction conformance certificate and the acceptance for on-track testing certificate.

- (h) **class**
A class of rolling stock is a group of vehicles built to the same design.
- (i) **construction**
The processes of fabrication, manufacture, and assembly (includes installing components, connecting sub-systems), and the required quality control activities that generate construction records.
- (j) **construction conformance certificate**
The routine document issued for each unit following a verification process on rolling stock, and on which compliance of the vehicle(s) to the certified design is recorded.
- (k) **data register**
The list of key characteristics of a particular (class of) rolling stock as listed in the AS 7500 series of Australian Standards. See Appendix B.
- (l) **derogation risk assessment**
A document used to assess and mitigate the risks arising as a result of non-compliance with mandatory requirements.
- (m) **design compliance certificate**
The type certificate issued by the ICP following an assessment process on rolling stock, and on which compliance of the design to the AS 7500 series of Australian Standards and other applicable standards as identified within AS 7500 series, and/or conditions relating to certification, are recorded.
- (n) **existing rolling stock**
Rolling stock which is approved and/or registered to operate on the Network concerned prior to the implementation of this standard.
- (o) **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 RISSB Rolling Stock Standards or other applicable standards and specification requirements.
- (p) **modified rolling stock**
Rolling stock altered in such a way that the declared compliance status for one or more MAN or REC clauses in the Standards Compliance Register is as a consequence affected.
- (q) **network registration**
The process, used by the RIM, by which rolling stock is recorded as a vehicle that can operate on their network.
- (r) **network**
A combination of track and other infrastructure controlled by a Rail Infrastructure Manager.
- (s) **overhang**
Distance from last detectable axle to end of vehicle.
- (t) **owner**
The person or body with legal title to the rolling stock.

- (u) **rail infrastructure manager (RIM)**
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—
 - i. owns the rail infrastructure; or
 - ii. has a statutory or contractual right to use the rail infrastructure or to control, or provide, access to it.
- (v) **Office of the National Rail Safety Regulator (ONRSR)**
The Office of the National Rail Safety Regulator (ONRSR) is an independent body corporate established under the Rail Safety National Law (South Australia) ACT 2012.
- (w) **registration notification**
A confirmation from a RIM that rolling stock has been registered on the network under their responsibility. Registration can be conditional.
- (x) **RISSB**
The Rail Industry Safety and Standards Board (RISSB) is wholly owned by its funding members and is responsible for the development and management of rail industry Standards, rules, codes of practice and guidelines, all of which have a national application.
- (y) **RISSB rolling stock standards**
Standards for rolling stock operating in Australia. These standards, produced by RISSB, are a part of the Australia Code of Practice. Certification of the rolling stock, as covered by this standard is a part of the approval process necessary to reach the access agreement.
- (z) **rolling stock**
Any vehicle that operates on or is intended for operation on or uses a railway track, including any loading on such a vehicle, but excluding a vehicle designed for both on- and off-track use when not operating on the track. Rolling stock is a collective term for a large range of rail vehicles of various types, including locomotives, freight wagons, passenger vehicles, track machines and road-rail vehicles.
- (aa) **rolling stock operator (RSO)**
A person who has effective management and control 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.
- (bb) **schedule of standards**
A list of all applicable issued standards against which the rolling stock should be assessed for compliance in accordance with the AS7501 process.
- (cc) **Standards compliance register**
A list of compliance and controls against the requirements contained in RISSB Rolling Stock Australian Standards. See Appendix C.
- (dd) **supplier**
The manufacturer of rolling stock or rolling stock equipment.
- (ee) **tare mass**
The mass of the rolling stock in the lightest condition under which it will be operated. This includes provisioning with sand and all fluids but fuelled to no

more than one-third of capacity. Tare Mass applied to the stock in its new condition hence no allowances for wear or corrosion is to be made.

- (ff) **track access agreement**
A formal agreement between a RSO and a RIM allowing the RSO to operate on the RIM's network under agreed commercial, technical and operational conditions.
- (gg) **unit**
The smallest number of vehicles that can be considered a single independent entity for the purpose of certification.
- (hh) **verification checklist**
A checklist produced by the supplier listing the features of the design that need to be verified, and how they will be verified.

General rail industry terms and definitions are maintained in the RISSB Glossary:
<https://www.rissb.com.au/products/glossary/>

1.4 Abbreviations

- (a) **AEI**
Automatic equipment identification
- (b) **ATP**
Automatic train protection
- (c) **AWS**
Automatic warning system
- (d) **CBTC**
Communications based train control
- (e) **ETCS**
European train control system
- (f) **TPWS**
Train protection & warning system

2 General

This Standard provides a generic process for assessing rolling stock compliance with the RISSB Rolling Stock series of Australian Standards and other applicable standards.

The issuing of a certificate of Standards compliance shall be used by rolling stock operators (RSOs) to confirm certification of a unit of rolling stock to a rail infrastructure manager (RIM) or other interested party.

The certification documentation can be required by RIMs when an RSO seeks to have rolling stock operate on the network managed by the RIM.

The certification documentation may be used to demonstrate how risks related to rolling stock are being managed by the RSO under the accreditation requirements of ONRSR.

This Standard includes the definition of certification documentation that the RSO of the rolling stock is to prepare and present when the rolling stock is submitted for network registration.

The ICP is responsible for endorsing and issuing the certificate of standards compliance, the design compliance certificate and, where necessary, an acceptance for on-track testing certificate for the RSO.

Certification to AS 7501 can be required for existing rolling stock to continue to be operated on a network if it has been modified and/or operation is proposed on a network where the same class of rolling stock has not previously operated.

The RSOs own change management process will establish whether a change to the design or operation of a unit of rolling stock requires certification.

This Standard describes the following phases relating to the certification process using the certification documentation produced as an output of this AS 7501 Standard:

- (a) Design compliance certificate - see Section 5.
- (b) Construction conformance certificate - see Section 8.
- (c) Acceptance for on-track testing certificate - see Section 11.
- (d) Certificate of Standards compliance - see Section 12.

The RSO is responsible for the appointment of the ICP and to gain the agreement of the RIM.

The RSO shall define the class of rolling stock to be described by the certification documentation which is endorsed by the ICP.

A schedule of standards shall be developed by the RSO at the time of the agreement. It is important that the standards upon which assessment and certification is required to be based are agreed at the beginning of a contract.

The ICP shall review the schedule of standards and is responsible for advising the RSO of any omissions and errors. The ICP shall verify that the schedule of standards against which the rolling stock is to be assessed is complete and accurate. It is accepted that the ICP need not be appointed at the start of the contract when the schedule of standards is established and agreed.

The RSO should undertake a derogation risk assessment for the impact of any changes to the schedule of standards advised by the ICP. Where changes to the schedule of standard are identified by the ICP, the RSO has an opportunity to undertake a derogation risk assessment to highlight the potential impact of such changes.

The flowchart in Figure 1 shows the typical entities involved in the RISSB certification process.

3 Certification documentation prerequisites

3.1 General

The flowcharts showing the certification processes are shown in Appendix A.

The RSO shall be responsible for obtaining the endorsement of the certification documentation from an ICP, where required by this standard.

The owner shall be responsible for supplying certification documentation to the RIM of the network(s) where the rolling stock is proposed to operate, and as required under the operational framework of the network.

3.2 Certification documentation mandatory requirements

Certification documentation:

- (a) Shall contain a certificate of Standards compliance as per section 12.
- (b) Shall contain a design compliance certificate as per section 5.
- (c) Shall contain a data register as per Appendix B.
- (d) Shall contain a standards compliance register as per section 7.
- (e) Shall contain a construction conformance certificate as per section 8.
- (f) Shall contain a derogation risk assessment as per section 10 where applicable.
- (g) Shall contain an acceptance for on-track testing certificate as per section 11 where applicable.

A data register, standards compliance register and derogation risk assessment pertaining to the rolling stock being certified shall all be approved by the ICP before a design compliance certificate is issued.

The rolling stock's construction shall be complete and a data register, standards compliance register, derogation risk assessment and design compliance certificate pertaining to the rolling stock shall all be approved by the ICP before a construction conformance certificate is issued.

An acceptance for on-track testing certificate shall not be approved by the ICP until up to date versions of the data register, standards compliance register, derogation risk assessment and design compliance certificate are approved by the ICP.

The derogation process shall not be concluded until a construction conformance certificate and acceptance for on-track testing certificate (where applicable) have been issued.

The certificate of standards compliance shall not be endorsed and issued until the derogation process is concluded.

It is the responsibility of the RSO and RIM to determine if recertification is required for modified rolling stock.

3.3 Certification of modified, same class or existing class rolling stock

3.3.1 General

In the case of modifications to certified rolling stock, or rolling stock which the RSO presents as being of the same class as either certified rolling stock or existing rolling stock the following applies:

- (a) The ICP shall confirm the class of the rolling stock presented by the RSO and provide an endorsement if there is no discrepancy.
- (b) The ICP shall examine a statement provided by the RSO identifying the extent of the modification work and the relevant standard(s) to be used for the new certification documentation if certification is necessary and provide an endorsement if in agreement with the statement.
- (c) The RSO may supply only the data for the parameters and areas of the rolling stock which have been deemed to have been affected by the modification and missing data requested by the ICP.
- (d) Pre-existing certification documentation, where applicable and up to date, can be used if the relevant standards have not been updated since the last certification was issued.

3.3.2 Requirements for certification

The following requirements for certification apply for modifications to certified rolling stock, or rolling stock which the RSO presents as being of the same class as either certified rolling stock or existing rolling stock:

- (a) Certification shall be required for the areas of the rolling stock affected directly or indirectly by differences in design to existing rolling stock or modifications, to confirm compliance with the mandatory and recommended requirements of the RISSB Rolling Stock series of Australian Standards.
- (b) If certification documentation does not exist for the existing rolling stock which the ICP confirms as being of the same class as the rolling stock presented by the RSO for certification then it need not be necessary to produce certification documentation unless required by clause 3.3.2(a).
- (c) Certification shall be required if the change of design or operation could result in a sub-class.
- (d) Certification shall be required if the relevant Standards as identified in 3.3.1(b) have been updated since the last certification was issued.
- (e) In the case where rolling stock is transferred to a different RSO but continues running on the same network, it need not be necessary to undergo the certification process providing that the new RSO does not have different controls for non-conformances.
- (f) Providing that the rolling stock design remains unchanged, the network that the rolling stock is operating on remains unchanged and the RSO and RIM's controls for non-conformances remain unchanged it shall not be necessary for the rolling stock to undergo the certification process.

3.3.3 The use of alternative standards

An RSO and/or ICP may elect to use other standard/s (e.g. international standards), where specifically called up by RISSB Rolling Stock Standards, or where an RISSB Rolling Stock Standards has not been issued.

Relevant certification documentation should be issued according to the alternative standard(s) proposed. Any contradiction(s) with the RISSB Rolling Stock Standards Series, should be clearly stated within this documentation.

4 Independent competent person

4.1 General

The independent competent person (ICP) endorses the completed certification documentation, if acceptable, irrespective of their source or authorship.

The ICP may be employed internally and need not be an external third party, provided they can demonstrate that they are removed from the rolling stock acquisition, design and construction process.

The ICP can perform their duties for the certification using documentation and supporting data provided by the RSO.

If a non-conformance to the Standard utilised is recorded, the RSO may propose to the ICP control measures to be implemented to verify the use of other standards for certification process, with or without conditions.

The approval of these control measures shall rest with the RSO and/or the RIM.

The use of the other standards shall be agreed with the ICP. It is at the discretion of the ICP, in consultation with the RSO and RIM, to determine whether the other standards are acceptable.

The ICP shall be issued with a list of the standards and specification requirements that are required for the certification process by the RSO.

The ICP shall request the RSO to provide the relevant certification documentation submission, any associated supporting information, and can request additional information for clarification, if required.

An ICP shall have responsibility for recording the completeness, evaluation, accuracy and content of the data register, standards compliance register, derogation risk assessment, design compliance certificate, certificate of standards compliance and, if required, certificate of acceptance for on-track testing.

The ICP shall endorse that the certification documentation is compliant with the agreed standards by signing where required.

An ICP can undertake any or all of the activities described in sections 5 to 12 on behalf of the RSO.

4.2 ICP mandatory requirements

An ICP:

- (a) shall have experience in assessing rolling stock against standards;
- (b) shall have demonstrated experience and knowledge of the RISSB rolling stock standards;
- (c) shall have demonstrated experience and knowledge of rail safety national law;
- (d) shall have demonstrated experience and knowledge of the requirements of relevant rail safety legislation;
- (e) shall have demonstrated experience and knowledge of the requirements of AS 4292;
- (f) shall declare any conflicts of interest;
- (g) shall have the ability to demonstrate that they are removed from the rolling stock acquisition, design and construction process to verify their independence
- (h) shall have knowledge of risk management;
- (i) shall have knowledge and experience in the testing of rolling stock; and
- (j) shall have knowledge and experience in the rail interfaces which the RSO has deemed relevant at the time of the ICP's appointment.

4.3 ICP recommendations

An ICP:

- (a) should have qualifications and experience which satisfy the criteria for membership of a professional engineering body acceptable to the owner/RSO and/or RIM;
- (b) should have knowledge of ONRSR processes; and
- (c) should have demonstrated experience in the areas in which they are undertaking certification, such as rolling stock commissioning, design, manufacture, testing, operations and maintenance.

5 Design compliance certificate

5.1 General

The design compliance certificate formally records that the rolling stock design has been:

- (a) assessed for compliance against RISSB series of Australian Standards;
- (b) assessed for compliance against standards supplementing the RISSB series of Australian Standards (e.g. international Standards) if deemed appropriate by the ICP;
- (c) verified by the designer who holds suitable qualifications and experience acceptable to the owner/RSO and/or RIM.

The design compliance certificate should document aspects of the design that will not be part of the process.

5.2 Design compliance certificate mandatory requirements

The design compliance certificate shall contain the following information:

- (a) Unique design compliance certificate number consisting of the vehicle code, date and other numbers/characters that the RSO wishes.
- (b) The rolling stock class and model ID being covered by the certificate.
- (c) Designer approval.
- (d) Name of the designer's organisation.
- (e) The reason for the certificate.
- (f) Signature of the designer endorsing the certificate.
- (g) Name of the designer.
- (h) Title of the designer.
- (i) Date of endorsement signature.
- (j) Contact details for the designer, address, phone number, email.
- (k) Owner.
- (l) RSO (if different to owner).
- (m) Expiry date for the design compliance certificate of design life.
- (n) Data register identification number.
- (o) Standards compliance register identification number.

- (p) Derogation risk assessment identification number.
- (q) A summary sheet of any non-conformances and mitigating statements, conditions, novel and critical design features, limitations and restrictions for the rolling stock, as identified in the standards compliance register and derogation risk assessment.

For on track testing an interim design compliance certificate should be used.

Design compliance certificates shall be amended prior to the conclusion of the overall certification process and document:

- i. changes that have been made due to results obtained from on track testing;
- ii. changes that have been made for any other reason and relate to design aspects within the design compliance process.

The overall certification process in Section A.2 of Appendix A shall be followed to attain a design compliance certificate.

Section A.3 of Appendix A provides an example design compliance certification process.

6 Data register

6.1 General

The RSO shall undertake or arrange for the compilation of the data register which contains specific identification and safety-related parameter values of the particular vehicle, or class of rolling stock, being offered up for certification according to the RIM requirements.

The RSO should ensure sufficient technical information is supplied to allow the ICP to endorse the data register.

6.2 Data register mandatory requirements

Data registers shall contain:

- (a) signature of the ICP endorsing the data register;
- (b) name of ICP organisation;
- (c) contact details for ICP organisation;
- (d) name of the ICP;
- (e) a data register identification number, unique to the assessing body;
- (f) the applicable and available data for the parameters;
- (g) data register date;
- (h) data register version number; and
- (i) copies of any documentation referenced in the data for Appendix B, especially the general arrangement drawing corresponding to the drawing number as advised in the data for Appendix A.1.

Appendix B details a list of examples of applicable parameters for the data register for certain rolling stock types.

Where the data is yet to be verified (e.g. requires on-track testing), then it is acceptable to state this to obtain a temporary data register necessary to allow the on-track testing to occur and make a reference to the number of the acceptance for on-track testing certificate that shall be issued to justify the tests necessary to verify the data (see Section 11).

Where the method used for calculating passenger loading factors is other than AW0, AW1, AW2 or AW3 as defined by this Standard, then it is acceptable to state the alternative method used and provide a detailed description in the data register.

7 Standards compliance register

7.1 General

A Standards compliance register is a list of compliance and controls against the requirements contained in the RISSB Rolling Stock Standards as shown in the example in Appendix C and other standards as permitted.

The RSO shall submit the Standards compliance registers against each RISSB Standard and other standard as specified by the RSO for rolling stock being assessed to the ICP for appropriate verification and endorsement.

The Standards compliance register records compliance of the rolling stock with the RISSB Rolling Stock Standards series and other standards allowed by the RISSB Rolling Stock Standards.

7.2 Standards compliance register mandatory requirements

The standards compliance register shall contain the following:

- (a) signature of the ICP endorsing the Standards compliance register;
- (b) name of the ICP;
- (c) standard compliance register number, unique to the assessing body;
- (d) a statement of compliance to the relevant RISSB Rolling Stock Standards and other applicable standards, including a listing of the usage of any non-Australian Standards (or stated equivalents, as specified by the RSO) of the rolling stock and general non-conformances to the relevant Standard; and
- (e) a statement of overall compliance, including non-conformances, with supporting documentation which includes:
 - i. for any non-conformances recorded against a recommended requirement, there shall be a corresponding statement detailing either the alternative control measure to be implemented, or the endorsement of the ICP of a statement from the owner and/or RSO that no control measure is required for the non-conformance; and
 - ii. for any non-conformances recorded against a mandatory requirement, detail of the derogation process in Section 10 that shall be followed.

Each of the standards in the RISSB Rolling Stock series shall have its own section in the standards compliance register, arranged in numerical order.

Any documentation supporting the standards compliance register should be made available to the RIM on request.

An interim Standards compliance register should be used in the initial stages of the overall certification process until it has been confirmed that all required design, construction, modification or test activities have been successfully concluded.

The Standards compliance register shall be finalised and amended to document any changes relating to aspects of the Standards compliance register after all design, construction, modification and all required test activities have been successfully concluded.

If compliance cannot be promptly determined, then a temporary registration, if required by the RIM, may be granted by the ICP to enable the certification process to be completed.

Table C1 shows an example standards compliance register layout using the Australian rolling stock standards.

8 Construction conformance certificate

8.1 General

The construction conformance certificate formally records that each unit of rolling stock has been:

- (a) Assessed for compliance against the certified design.
- (b) Endorsed by the supplier.

8.2 Supplier's representative mandatory requirements

The person completing the construction conformance certificate could be an employee of the supplier and is referred to as the "supplier's representative" on the construction conformance certificate.

The person completing the construction conformance certificate does not need to be an ICP but:

- (a) shall have demonstrated experience and knowledge of RISSB Rolling Stock Standards and a level of experience and knowledge acceptable to the RSO and RIM;
- (b) shall have demonstrated experience and knowledge of the construction requirements;
- (c) shall declare any conflicts of interest;
- (d) shall have the ability to demonstrate that they are removed from the rolling stock acquisition, design and construction process to verify their independence; and
- (e) shall have the ability to inspect vehicles and records and assess their compliance with the standards.

8.3 Supplier's representative recommendations

The person completing the construction conformance certificate:

- (a) should have qualifications and experience acceptable to the RIM and owner (or RSO).

- (b) should have demonstrated experience in the areas in which they are undertaking conformance such as rolling stock manufacture, testing, inspection and quality assurance.
- (c) Should have knowledge of risk management.

8.4 Verification checklist

The supplier shall prepare a verification checklist of the features of the design that need to be verified and provide details of how they shall be verified.

The verification checklist can include, for example, visual inspections, dimensional checks, NDT of critical welds, tests and reports, component records or other appropriate means.

During production of a class of vehicles the supplier shall keep the verification checklist up to date with, for example, any changes in the design or personnel, and experience of the process.

The supplier shall inspect each vehicle to assess compliance of the vehicle to the certified design using the verification checklist.

The inspection and verification shall include novel and critical design features identified by the ICP in addition to the usual safety critical design features inherent for rolling stock.

The inspection and verification activities shall include vehicle and component inspections.

The supplier should consider the systems and subjects:

- (a) structural strength
- (b) bogies including wheelsets
- (c) ride performance
- (d) couplers
- (e) brakes
- (f) electrical equipment
- (g) crashworthiness
- (h) cab equipment
- (i) engines
- (j) generators
- (k) transmissions
- (l) safety systems
- (m) visibility/audibility systems
- (n) noise and vibrations
- (o) derailment performance
- (p) fire performance
- (q) wheelset gauge
- (r) electro-magnetic compatibility (EMC)
- (s) signalling interface
- (t) doors
- (u) windows

- (v) toilets
- (w) interior finishing
- (x) seating
- (y) rolling stock outline
- (z) provide list of software and version levels used for operations of any systems of the vehicle

8.5 Construction conformance certificate mandatory requirements

The construction conformance certificate shall contain the following information:

- (a) Unique construction conformance certificate number consisting of the vehicle code, date and other numbers/characters that the RSO wishes.
- (b) The rolling stock class, name and running numbers, if such numbers exist for that unit of rolling stock, being covered by the certificate.
- (c) The reason for the certificate.
- (d) Signature of the person endorsing the certificate.
- (e) Name of the person endorsing the certificate.
- (f) Title of the person endorsing the certificate.
- (g) Date of signature.
- (h) Contact details for the person endorsing the certificate: address, phone number, email.
- (i) Owner.
- (j) RSO (if different to owner).
- (k) The conditions, including expiry date for the construction conformance certificate, if relevant.
- (l) Data register identification number.
- (m) Standards compliance register identification number.
- (n) Derogation risk assessment identification number.
- (o) A summary sheet of any non-conformances, conditions, limitations and restrictions for the rolling stock, as identified in the standards compliance register and derogation risk assessment.
- (p) The number of the design compliance certificate.

For on track testing an interim construction conformance certificate should be used.

Construction conformance certificates shall be amended prior to the conclusion of the overall certification process and document:

- i. Changes that have been made due to results obtained from on track testing.
- ii. Changes that have been made for any other reason and relate to aspects within the construction conformance process.

The overall certification process in Section A.2 of Appendix A shall be followed to attain a design compliance certificate.

Section A.4 of Appendix A provides an example construction conformance certification process.

8.6 Vehicle construction non-conformance

If the vehicle construction does not conform to the certified design, the following shall apply:

- (a) The supplier shall issue the ICP with a list detailing the ways that the vehicle's construction does not follow the certified design.
- (b) If the ICP determines that the rolling stock's construction does not comply with one or more mandatory clauses of the standards used, the rolling stock shall be modified to achieve compliance or the derogation process in Section 10 shall be followed before a construction conformance certificate can be issued.
- (c) If the ICP determines that the non-conformances to the certified design has caused the rolling stock to not comply with one or more recommended clauses but remains compliant to the mandatory clauses of the standards used, a derogation risk assessment shall be undertaken to determine the necessary controls that need to be applied.

If the ICP determines that none of the changes to the certified design relate in any way to recommended clauses of the standards used, it is not necessary to perform a new derogation risk assessment or issue a new design compliance certificate.

If there is any design feature that has not been validated and is not detailed on the most recent risk assessment, an updated risk assessment shall be issued before the construction conformance certificate is issued.

The overall certification process in Section A.2 of Appendix A shall be followed to attain a construction conformance certificate.

Section A.4 of Appendix A provides an example construction conformance certification process.

9 Rolling stock class type test compliance certificate

9.1 General

The rolling stock class type test compliance certificate formally records that the rolling stock presented for first article testing is a true representation of the stated rolling stock class and has:

- (a) a standards Compliance Register;
- (b) all design and construction of new or modification of rolling stock completed;
- (c) completed all required type tests;
- (d) a construction compliance certificate;
- (e) been endorsed by the designer who holds suitable qualifications and experience acceptable to the owner/RSO and/or RIM.

9.2 Rolling stock class type test compliance certificate mandatory requirements

The rolling stock class type test compliance certificate shall contain the following information:

- (a) Unique rolling stock class type test compliance certificate number consisting of the vehicle code, date and other numbers/characters that the RSO wishes.

- (b) The rolling stock class and model ID being covered by the certificate.
- (c) Supplier.
- (d) Name of the designer's organisation.
- (e) The reason for the certificate.
- (f) Signature of the designer endorsing the certificate.
- (g) Name of the designer.
- (h) Title of the designer.
- (i) Date of endorsement signature.
- (j) Contact details for the designer, address, phone number, email.
- (k) Owner.
- (l) RSO (if different to owner).
- (m) Construction conformance certificate.
- (n) Design compliance certificate identification number.
- (o) Data register identification number.
- (p) Standards compliance register identification number.
- (q) Derogation risk assessment identification number.

For on track testing an interim design rolling stock class type test certificate should be used.

Rolling stock class type test certificates shall be amended prior to the conclusion of the overall certification process and document:

- i. Changes that have been made due to results obtained from on track testing.
- ii. Changes that have been made for any other reason and relate to aspects within the rolling stock class type test compliance process.

The overall certification process in Section A.2 of Appendix A shall be followed to attain a design compliance certificate.

10 Derogation process

10.1 General

In the event that non-conformance(s) to mandatory requirement(s) is identified and it is deemed not practicable to change the design in order to comply, it shall be necessary to follow the derogation process in this section.

10.2 Derogation risk assessment scope

The RSO shall undertake or arrange a derogation risk assessment for endorsement by the ICP and the relevant RIM(s) that covers:

- (a) details of non-conformance(s) to a mandatory requirement identified in the standards compliance register;
- (b) construction conformance certification process;

- (c) acceptance for on-track testing certification process; and
- (d) provide the method of mitigation of the hazard(s) posed by the non-conformance.

The derogation risk assessment shall be consistent with the process outlined in AS 31000.

10.3 Derogation risk assessment mandatory requirements

The derogation risk assessment:

- (a) shall contain a unique identification number;
- (b) shall contain the name of the derogation risk assessment's author;
- (c) shall contain the signature of the derogation risk assessment's author;
- (d) shall contain the name of the ICP endorsing the derogation risk assessment;
- (e) shall contain the signature of the ICP endorsing the derogation risk assessment; and
- (f) shall contain the ICP's contact details.

Prior to the finalization of the Standards compliance register an interim derogation risk assessment should be used.

The derogation risk register shall be amended prior to the conclusion of the overall certification process and document changes made for any reason that relate to aspects within the derogation risk process.

The overall certification process in Section A.2 of Appendix A shall be followed to attain a design compliance certificate.

The RSO is responsible for ensuring that the relevant RIM(s) endorse the derogation risk register.

This derogation risk assessment shall not override, or otherwise negate, the requirement for a risk assessment to be performed by the RSO for the purposes of gaining access to the network from a RIM under rail safety legislation.

11 Acceptance for on-track testing certificate

11.1 General

Certification of vehicles for on-track testing shall follow the processes for certification of the design and conformance of the construction of individual vehicles. For on-track testing it is the first vehicle being type tested that would be the focus of certification.

11.2 Issuing an acceptance for on-track testing certificate

For an Acceptance for On-Track testing certificate to be issued:

- (a) The ICP shall review the verification checklist and determine which parts shall be completed before each test and which parts of the verification checklist can be completed after testing.
- (b) The ICP shall review the records of construction of the vehicle and determine which parts of the construction of the vehicle shall be completed before each test and which can be completed after testing.

- (c) The ICP shall review the signed off design compliance certificate.
- (d) The ICP shall review the signed off construction conformance certificate against which the rolling stock has been assessed for conformance.

The ICP shall not issue the acceptance for on-track testing certificate until the necessary vehicle static tests are completed.

11.3 Inclusion of conditions, restrictions and imposed requirements

The certificate shall include any necessary conditions detailed by the ICP and requirements imposed by the RIM on the operation of the vehicles during the test having reviewed the derogation risk assessment.

These conditions could include, for example:

- (a) restrictions on the movement of a vehicle outside a possession/occupation;
and
- (b) restrictions on the operating speed or maximum loading of the vehicles

For each condition the ICP shall specify the actions that the supplier is required to take to remove it.

The supplier shall not lift the conditions until they complete the corresponding actions.

Normally, it should not be necessary for the ICP to recertify the vehicles as the conditions are lifted, although they are permitted to impose the condition that recertification is necessary, if it is appropriate.

11.4 Acceptance for on-track testing certificate mandatory requirements

The acceptance for on-track testing certificate shall contain the following information:

- (a) Unique acceptance for on-track testing certificate number consisting of the vehicle code, date and other numbers/characters that the RSO wishes.
- (b) The rolling stock class, name and running numbers, if such numbers exist for the relevant rolling stock, being covered by the certificate.
- (c) The reason for the certificate.
- (d) Signature of the ICP endorsing the certificate.
- (e) Name of the ICP endorsing the certificate.
- (f) Title of the ICP endorsing the certificate.
- (g) Date of signature.
- (h) Contact details for the ICP endorsing the certificate: address, phone number, email.
- (i) Owner.
- (j) RSO (if different to owner).
- (k) The expiry date for the acceptance for on-track testing certificate, if relevant.
- (l) Data register identification number.
- (m) Standards compliance register identification number.
- (n) Derogation risk assessment identification number.

- (o) Rolling stock class type test certificate number.
- (p) A summary sheet of any non-conformances, conditions, limitations and restrictions for the rolling stock, as identified in the standards compliance register and derogation risk assessment.

The overall certification process in Section A.2 of Appendix A shall be followed to attain an acceptance for on-track testing certificate.

Section A.5 of Appendix A provides an example acceptance for on-track testing certificate process.

The results of the on-track testing would need to be assessed by the RSO and endorsed by the RIM and ICP with the aim of verifying the design.

12 Certificate of standards compliance

12.1 General

There shall only be one current certificate of standards compliance for a vehicle that formally records that:

- (a) the unit of rolling stock has been designed in accordance with the RISSB Rolling Stock Standards;
- (b) the unit of rolling stock has been constructed in accordance with the RISSB Rolling Stock Standards;
- (c) the unit of rolling stock has completed all testing and verification activities;
- (d) the derogation process has been undertaken and concluded to mitigate any non-conformances to mandatory clauses;
- (e) the certification documentation has been endorsed by the ICP if acceptable.

12.2 Certificate of standards compliance mandatory requirements

The certificate of standards compliance shall contain the following information:

- (a) Unique certificate of standards compliance number consisting of the vehicle code, date and other numbers/characters that the RSO (or owner) wishes.
- (b) The rolling stock class and running numbers (or name if such numbers do not exist for the relevant rolling stock), being covered by the certificate.
- (c) Name of the ICP's organisation.
- (d) The reason for the certificate.
- (e) Signature of the ICP endorsing the certificate.
- (f) Name of the ICP.
- (g) Title of the ICP.
- (h) Date of endorsement signature.
- (i) Contact details for the ICP, address, phone number, email.
- (j) Owner.
- (k) RSO (if different to owner).

- (l) The expiry date for the certificate of standards compliance if applicable.
- (m) The design compliance certificate number.
- (n) The construction conformance certificate number.
- (o) Acceptance for on-track testing certificate number.
- (p) Rolling stock class type test compliance certificate number.
- (q) The derogation risk assessment identification number.

The process to attain a certificate of standards compliance shall follow the overall certification process shown in section A.2 of Appendix A.

13 Hauled movement of vehicles on a rail network

The movement of incomplete vehicles on the rail network is not part of the scope of AS 7501 but should follow similar engineering principles and derogation risk assessment.

Completed vehicles requiring movement on a rail network shall have a current acceptance for on-track testing certificate confirming that all static tests are completed as required by Section D.2.3 of Appendix D.

Self-propelled vehicles that have not completed the appropriate dynamic tests are to be hauled.

Approval from the RIM and RSO as required by the local network registration process is necessary to allow movement on the rail network.

Appendix A Certification process flowcharts

A.1 Certification process entities

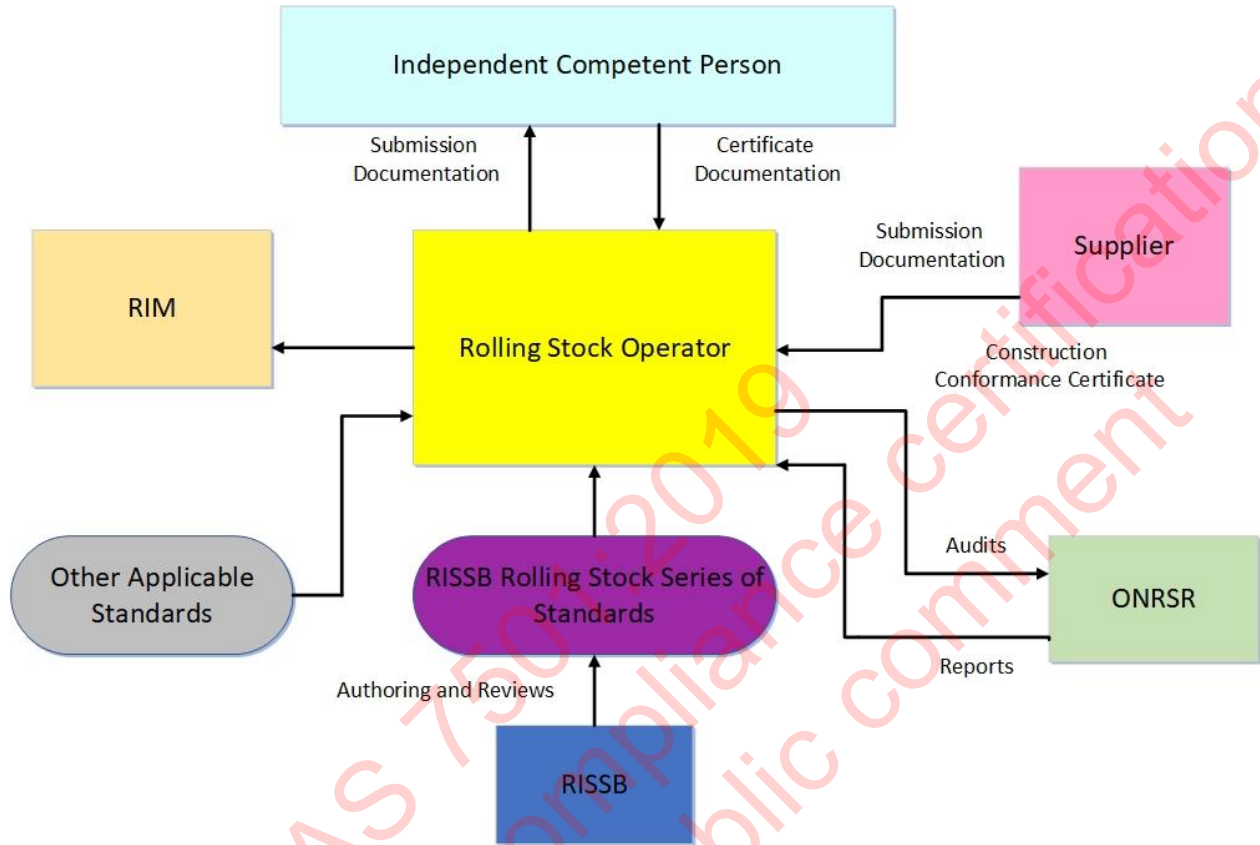


Figure 1 – Certification process entities

A.2 Overall certification process

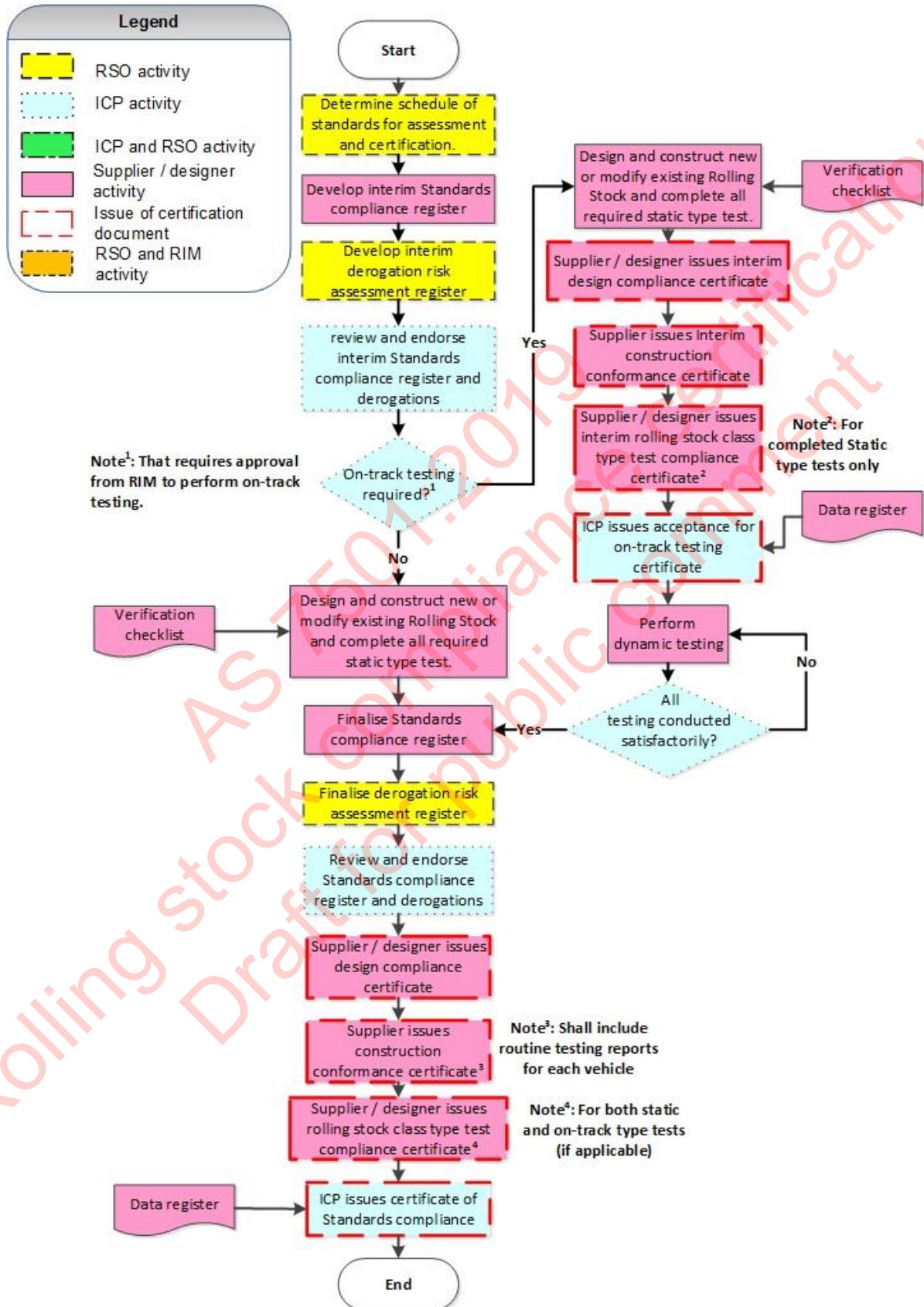


Figure 2 – Overall certification process

A.3 Example design compliance certificate process

The following certification documentation is produced in this process:

- (a) Design Compliance Certificate.
- (b) Standards Compliance Register.
- (c) Data Register.
- (d) Derogation risk Assessment.

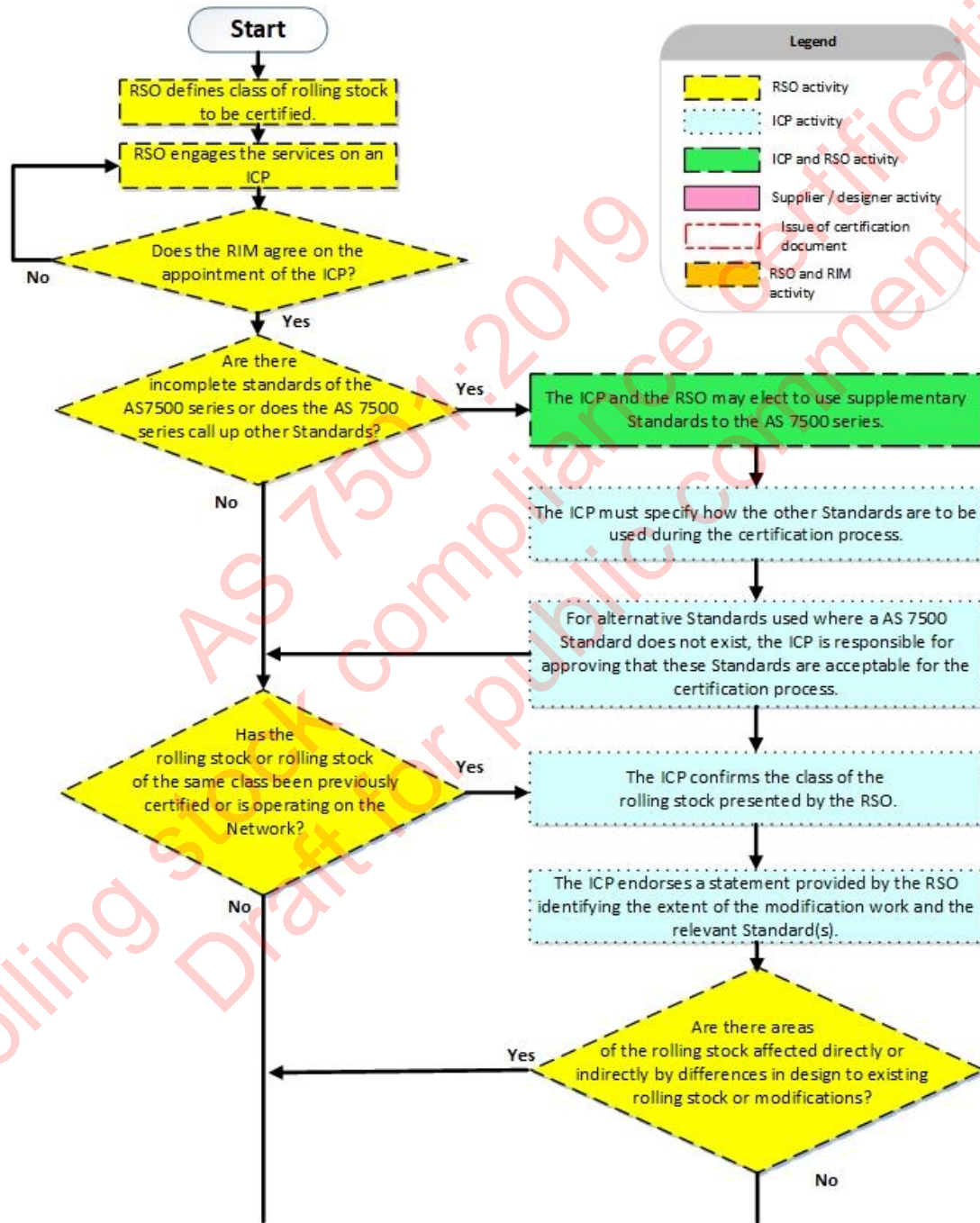


Figure 3 – Example design compliance certificate process (1 of 2)

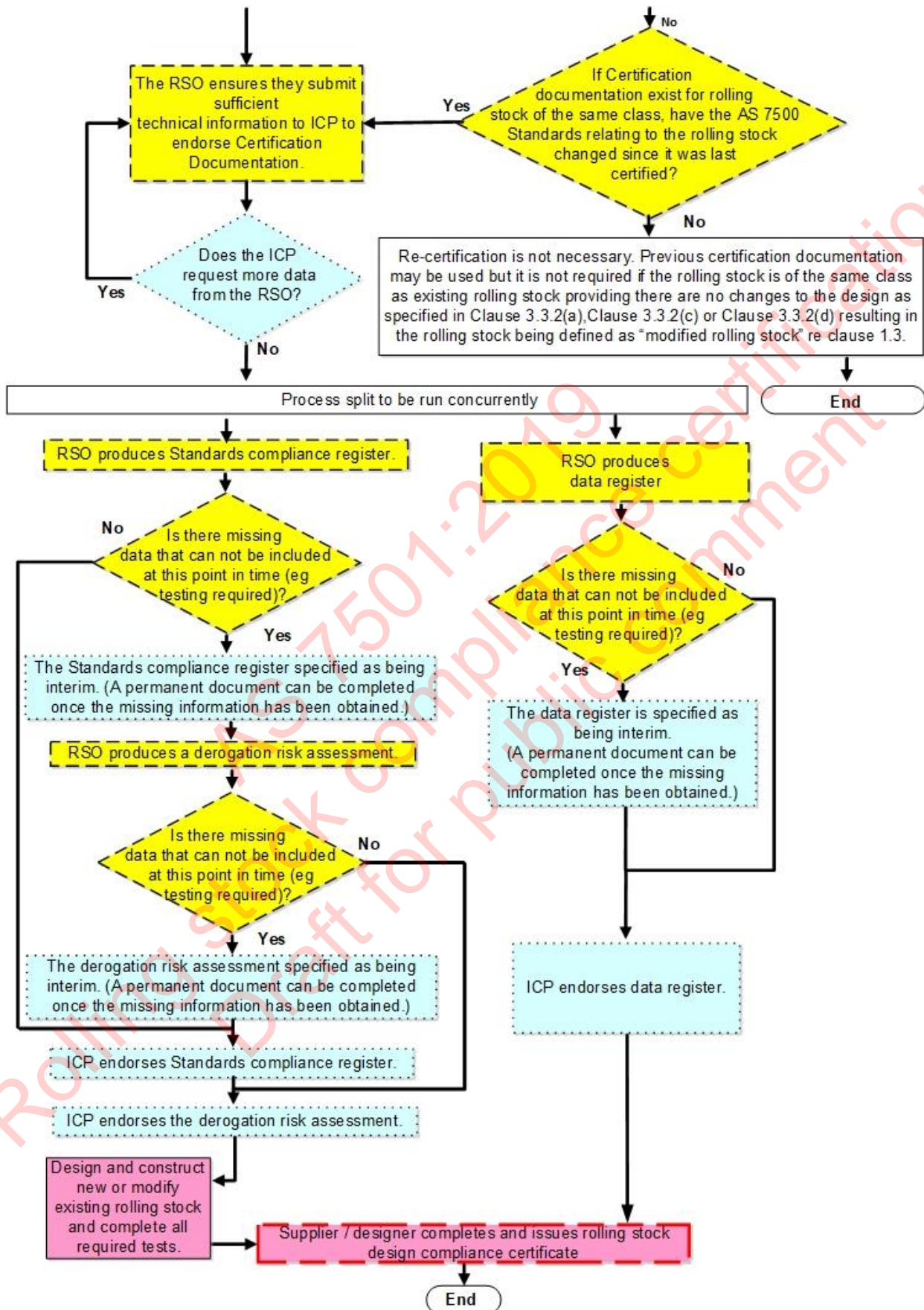


Figure 4 – Example design compliance certificate process (2 of 2)

A.4 Example construction conformance certification process

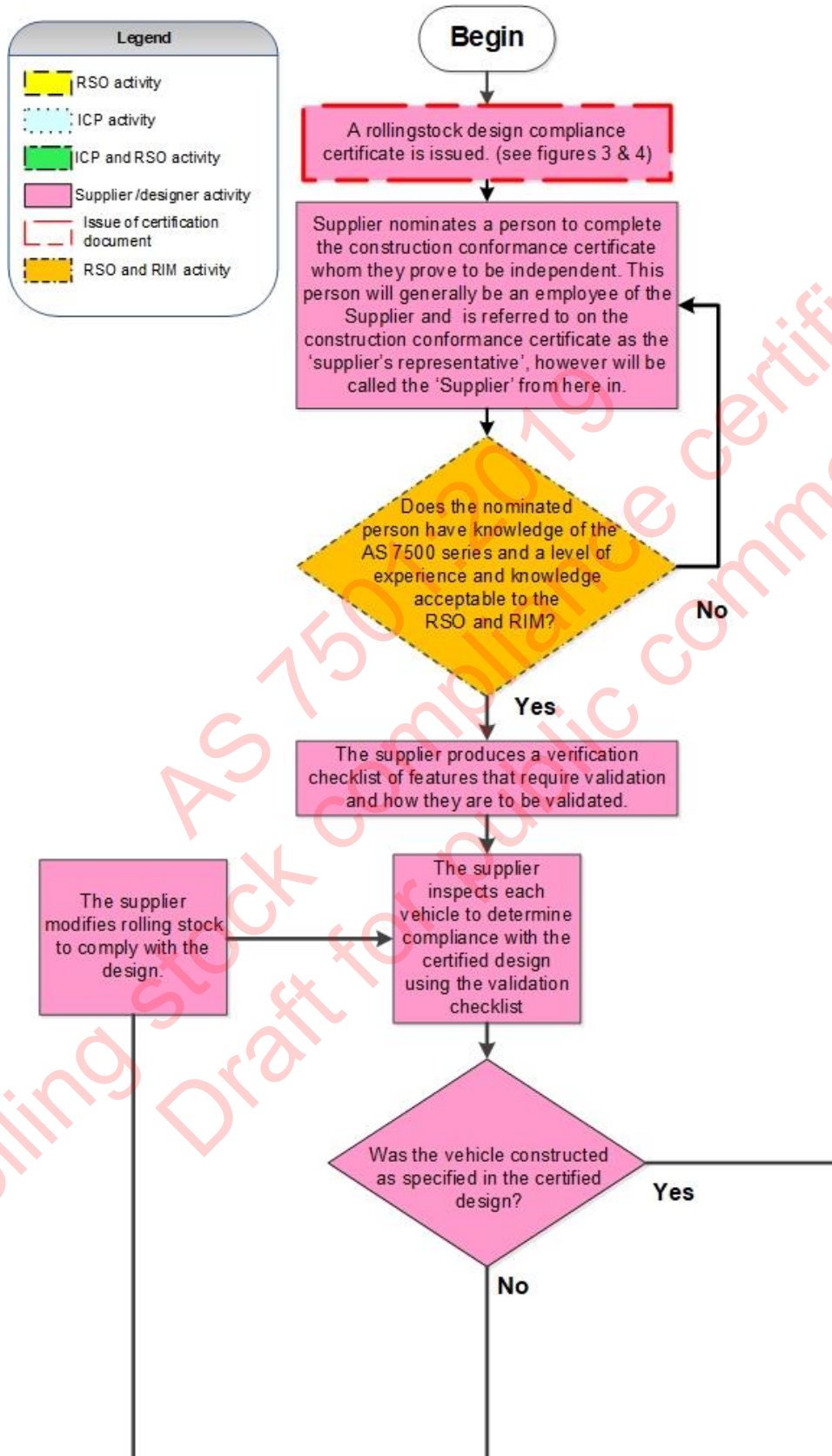


Figure 5 – Example construction conformance certificate process (1 of 2)

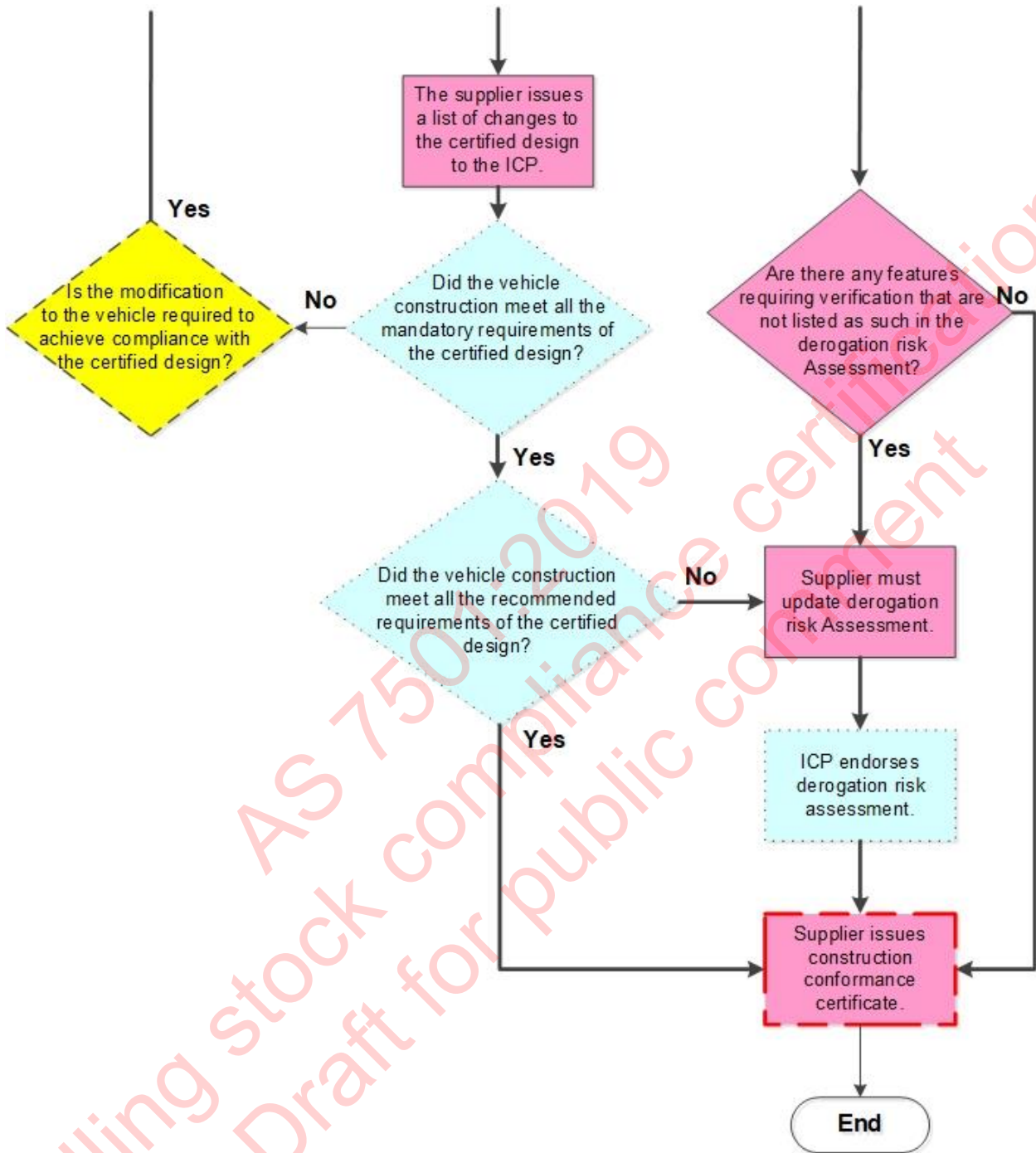


Figure 6 – Example construction conformance certificate process (2 of 2)

A.5 Example acceptance for on-track testing certificate process

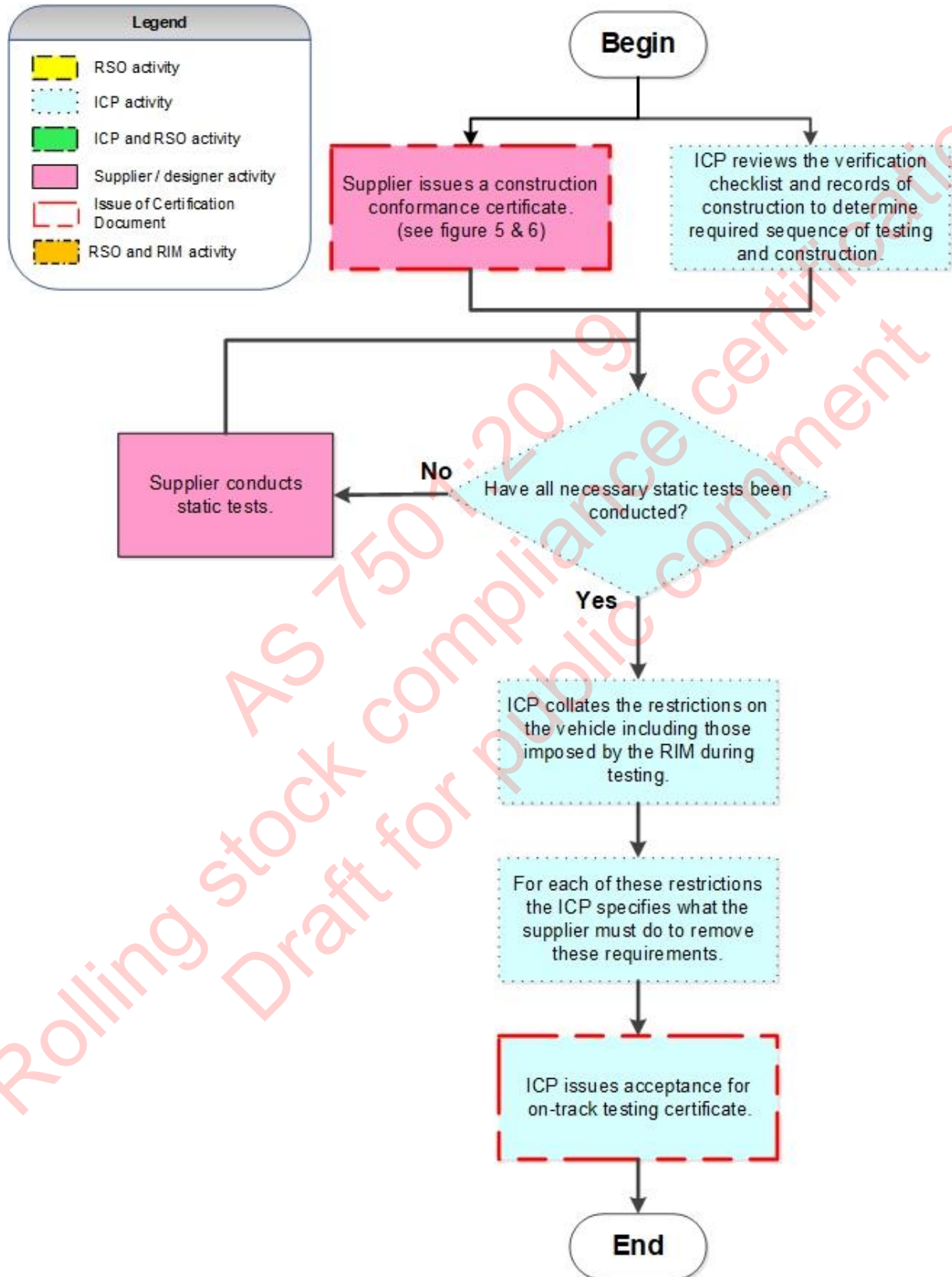


Figure 7 – Example acceptance for on-track certificate process

Appendix B Data register

B.1	Identification	Data registration identification number (if such a number exists).			
		Rolling stock owner.			
		Rolling stock RSO(s).			
		Name of the ICP's organisation.			
		Signature of the ICP.			
		Name of the ICP.			
		Contact details for the ICP's organisation.			
		Rolling Stock Type (please tick as applies):	locomotive, diesel electric.		
			locomotive, diesel hydraulic.		
			locomotive, electric.		
locomotive, steam.					
freight, hopper.					
freight, gondola.					
freight, flat.					

B.1	Identification (Con't)	freight, box.	
		freight, open.	
		freight, tank.	
		freight, livestock.	
		freight, container.	
		freight, pneumatic discharge.	
		passenger types hauled carriage.	
		passenger types, electric multiple unit.	
		passenger types, diesel multiple unit.	
		maintenance, rail road vehicle.	
		maintenance, tamper.	
		maintenance, grinder.	
		maintenance, ballast regulator.	
		maintenance, section car.	
		Trolley.	
		Other (please specify).	
Class			
Previous class(es)			
Running number(s)			
Year(s) of vehicle manufacture			
Vehicle Manufacturer			

B.1	Identification (Con't)	General arrangement drawing no.	
		No. of vehicles in a rake/consist	
		AEI tags fitted	
		Vehicle number displayed	
		Layout of Axles	
		Networks Certification Assessed Against	
B.2	Size	Length over couplers [mm]	
		Length over body [mm]	
		Number of Bogies and distance between bogie centres [mm]	
		Overall width [mm]	
		Overall height (tare on new wheels) [mm]	
		Rolling stock outline	
		Floor/deck height (new wheels in tare condition and worn wheels in loaded condition) [mm]	
		Container mounting height (new wheels in tare condition and worn wheels in loaded condition) [mm]	
		Bogie wheelbase [mm]	

B.3	Mass	Tare mass (empty or AW0 for passenger vehicles) [tonnes]	
		Gross mass (at maximum load or AW3 for passenger vehicles) [tonnes]	
		No. of axles	
		Max axle load on each and every axle [tonnes]	
		Tare axle load at each and every axle [tonnes]	
		Max unsprung mass [tonnes]	
		Highest centre of gravity (fully loaded conditions, new wheels of largest possible diameter) [mm]	
		Other (where applicable)	
B.4	Track forces and stresses	P2 force [kN]	
		Max lateral wheel to rail force [kN]	
B.5	Traction	Max engine/motor power [kW]	
		Engine / motor configuration	
		Max tractive effort [kN]	
		Continuous tractive effort [kN at X km/h]	
		Tractive effort drawing no.	
		Dynamic brake effort vs speed curve	
		Wheelslip / slide control fitted	
		Max no. of locos/sets can operate together in multiple unit operation	

B.6	Electrical Characteristics	Incoming supply voltage [V AC/DC]	
		Maximum current draw from supply [A]	
		Nominal control battery voltage [Vdc]	
		Standby time on batteries [Mins]	
		Main power supply	
		Auxiliary power supply	
		Shore supply	
		Alternator Power [kW]	
		Engine / Alternator Configuration	
B.7	Signaling detection interface	Rail wheels insulated	
		Tread cleaning on extremity axles	
		De-sanding equipment fitted	
		Overhang [m]	
		Inner axle spacing [m]	
		Outer axle spacing [m]	
		EMI test report no.	
		Shunting test report no.	

B.8	Braking	Brake system type(s): (please tick as applies)	Automatic air	
			Independent air	
			Dynamic	
			Electro pneumatic with backup automatic air	
			Electro pneumatic only	
			Electric	
			Hydraulic	
			Electronically controlled pneumatic	
			Other (please specify)	
		Control system apply and release types: (please tick as applies)	Graduated or direct application.	
			Graduated or direct release.	
			Electro pneumatic.	
			Vacuum.	
			Other (please specify).	
		Dynamic brake type: (please tick as applies)	Nil.	
			Rheostatic.	
			Regenerative.	
			Hydrodynamic.	
			Other (please specify).	
		Max dynamic brake effort [kN at X km/h]		
		Dynamic brake curve drawing no.		

B.8	Braking (Con't)	Total brake force empty - Full Service Brake Application [kN]	
		Total brake force at maximum load - Full Service Brake Application [kN]	
		Total brake force empty - Emergency Brake Application [kN]	
		Total brake force at maximum load - Emergency Brake Application [kN]	
		Total brake force empty - Independent [kN]	
		Total brake force maximum load - Independent [kN]	
		Brake block/pad manufacturer and part no.	
		Brake block/pad dynamic coefficient of friction	
		No. of brake blocks/pads	
		Brake block/pad rigging type	
		Method of brake force determination	
		Braking stopping distance curve conforming to	
		Type of hand/park brake	
		Hand/park brake force [kN]	
		Method of hand/park brake force determination	
		No. of axles hand/park brake operates on	
		Type of load compensation equipment	
		Grade control valve fitted	
Choke fitted			

B.8	Braking (Con't)	Main reservoir pipe fitted		
		Main reservoir pipe use to recharge brake system		
		Emergency cock fitted in cab		
B.9	Crew	No. of cabs.		
		Driver supervisory systems: (please tick as applies)	Nil	
			ATP	
			Vigilance	
			TPWS	
			AWS	
			Train stop	
			Deadman	
			Station protection	
			ETCS	
			CBTC	
		Other (please specify)		
		Event recorder type: (please tick as applies)	Nil.	
			Hassler	
			Fischer	
Other (please specify)				
Speedo fitted				
Confirm exterior visibility compliant with AS 7533 - state any limitations.				

B.10	Coupler and Drawgear	Coupler type identify	Automatic knuckle	
			Draw hooks and screw	
			Chopper	
			Multi-function	
			Rigid drawbars	
			Articulated connectors	
			Back-up coupling device.	
			Other (please specify).	
		Coupler manufacturer/model		
		Coupler/drawgear buff capacity [kN]		
Coupler/drawgear draft capacity [kN]				
Coupler height range [mm]				
Emergency coupler max speed [km/h]				
B.11	Body Structure	Body structure buff capacity [kN]		
		Body structure draft capacity [kN]		
		Collision columns fitted		
		Main body structure materials		
B.12	Communications	Types of Cab voice communication systems fitted.		

B.13	Payload	Useable fuel capacity [litres]	
		Sand capacity [litres]	
		Fresh water [litres]	
		Payload volumetric capacity [litres or m ³]	
		Payload type(s)	
B.14	Bogie	No. of bogies	
		Bogie type	
		Primary suspension type	
		Secondary suspension type	
		Axle configuration	
		Wheel base [mm]	
		RRV inside width of road wheels [mm]	
		RRV outside width of road wheels [mm]	
		Wheel diameter - new [mm]	
		Wheel diameter - condemned [mm]	
		Wheel rim width [mm]	
		Wheel profile	
		Wheel material grade	
		Track gauge [mm]	
		Side bearer type	
Centre bearing liner material			

B.14	Bogie (Con't)	Standard three piece bogie centre pin without retaining devices top and bottom	
		Axle bearing type	
		Axle bearing size [mm]	
		Earthing fitted	
B.15	Dynamic behavior	Max operating speed - at maximum load [km/h]	
		Max operating speed - empty [km/h]	
		Max operating speed with deflated airbags [km/h]	
		Max cant deficiency [mm or m/s ²]	
		Max average peak ride lateral acceleration [g]	
		Max peak ride lateral acceleration [g]	
		Max average peak ride vertical acceleration [g]	
		Max peak ride vertical acceleration [g]	
		Maximum wheel unloading [%]	
		Min centre bearing engagement [mm]	
		Minimum horizontal radius of curvature (m)	
		Minimum vertical radius of curvature (m)	
B.16	Toilet	Toilet fitted	
		Toilet waste handling	
B.17	Visibility & audibility	Headlight fitted	
		Tail light fitted	
		Visibility lights fitted	

B.17	Visibility & audibility	Flashing beacon fitted	
		Stop light fitted	
		End facing high visibility areas fitted	
		Reflective delineators fitted	
		Horn types fitted	
B.18	Passengers	No. of seated passengers (AW1)	
		No. of standing passengers (max service)	
		No. of passengers at service loading (AW2)	
		No. of passengers at crush loading (AW3)	
		No. of berths	
		No. of passenger side doors	
		Type of passenger side doors	
B.19	Exterior environment	Wayside noise - stationary [X dBA at Ym]	
		Wayside noise - moving [X dBA at Ym & Z km/h]	
B.20	Non compliances	List of non-compliances.	

Appendix C Example standards compliance register

Standard	Section	Clause	Requirements	Type	Applicable (yes/no)	Compliant (yes/no/in part)	Justification (where clause /section has been deemed not applicable)	Design Stage (compliance statements and evidences)	Construction Stage (compliance statements and evidences)	Test & Commissioning Stage (compliance statements and evidences)
AS 7531.1	<i>Railway Rolling Stock - Lighting and Rolling Stock Visibility - Part 1 : Locomotive Rolling Stock</i>									
	11	<i>Reflective Delineators</i>								
		1	Reflective delineators shall be fitted to vertical surfaces on each side of all locomotives.	MAN	YES	YES				
		2	Reflective delineators should be mounted between 800mm and 2000mm above rail.	REC	NO	NO	No actions proposed. Decals used are five	Minimum height of 750mm		
		3	Each reflective delineator shall have a minimum area of 0.025 square metres.	MAN	YES	YES				
		4	At least two delineators per side shall be fitted, with one mounted near each end of the vehicle.	MAN	YES	YES				
		5	Additional delineators should be fitted every 2.5 to 5 metres between the end mounted delineators.	REC	NO	NO	No actions proposed. Decals used are five times as large as required by 11.3	One additional decal mounted at the centre of the vehicle		
		6	Class 1A reflective material compliant with AS/NZS 1906.1 shall be used.	MAN	YES	YES			Test report from Supplier	
		7	The colour of reflect delineators should be white or yellow.	REC	YES	YES				

Table C1 – Example Standards Compliance Register Layout for Australian Rolling Stock Standards

Appendix D Guidance on structure testing

D.1 Introduction

This appendix gives a typical set of test requirements for vehicle compatibility.

D.1.1 This is a list of typical static tests:

- (a) Static rolling stock outline test.
- (b) Static vehicle weigh test.
- (c) Static vehicle twist test.
- (d) Static vehicle/bogie swing test.
- (e) Static vehicle/vehicle swing test.
- (f) Static brake test.
- (g) Safety equipment function test.
- (h) Signal visibility test.
- (i) Electrical safety inspection.
- (j) Environmental tests.
- (k) Kinematic rolling stock outline test.
- (l) Fitment of AEI tags.
- (m) Fitment of reflective delineators.
- (n) Pantograph tests.

D.1.2 This is a list of typical dynamic tests:

- (a) Brake performance test.
- (b) Ride performance test.
- (c) Kinematic rolling stock outline test.
- (d) Pitch & bounce performance test.
- (e) Environmental tests.
- (f) Signal compatibility test.
- (g) Signal & communication system interference test.
- (h) Vehicle structural tests.
- (i) Curve stability test.
- (j) Traction performance test.

D.2 Sequencing of tests

D.2.1 General

The tests are prescribed in the following sequence to ensure that all necessary pre-requisite tests have been performed before subsequent testing is carried out.

Static tests are typically completed before any dynamic tests are undertaken.

D.2.2 Static tests

The following static tests would be successfully carried out prior to any movements of the vehicle on the network:

- (k) Static rolling stock outline test.
- (l) Static vehicle weigh test.
- (m) Static vehicle twist test.
- (n) Static vehicle/bogie swing test.
- (o) Static vehicle/vehicle swing test.
- (p) Static brake test.
- (q) Kinematic rolling stock outline test (static part).
- (r) Signal visibility test (self-propelled vehicles only - not necessary for locomotive hauled movement of the vehicle).
- (s) Electrical safety inspection.
- (t) Safety equipment function (self-propelled vehicles only - not necessary for locomotive hauled movement of the vehicle).
- (u) Pantograph tests.
- (v) Fitment of AEI tags.
- (w) Fitment of reflective delineators.
- (x) Environmental tests.

Following successful completion of these tests, appropriate parts of data register would be submitted as confirmation of vehicle's compliance.

D.2.3 Loco hauled movement of the vehicle network

Before any movement of a completed vehicle on the network, a certificate of an acceptance for on-track testing would be issued.

A certificate of acceptance for on-track testing should not be issued until all the above static tests have been successfully completed.

Until the appropriate dynamic tests have been completed, the following requirements might apply for the movement of these vehicles:

- (a) Self-propelled vehicles are to be locomotive hauled in the unpowered state.
- (b) The maximum speed for the movement is not exceed 70% of the maximum designed operating speed for the vehicle.
- (c) The ride performance is to be monitored in real time to the requirements specified in the appropriate standard.
- (d) The maximum speed in curves is to be limited to 10% below the normal speed board.

D.2.4 Dynamic tests

The following dynamic tests are typically required before full operating approval is granted for the vehicle.

These tests would typically only be commenced after successful completion of all the static tests and a certificate of acceptance for on-track testing has been issued:

- (e) Signal compatibility test.
- (f) Signal & communication system interference test.
- (g) Brake performance test.
- (h) Ride performance test.
- (i) Kinematic rolling stock outline test.
- (j) Pitch & bounce test.
- (k) Environmental tests.
- (l) Traction performance test.

D.2.5 Monitoring tests

When commencing a brake performance test, ride performance test or kinematic rolling stock outline test, the other two performance parameters, brake performance, ride performance and/or kinematic rolling stock outline compliance, would be monitored to check that the vehicle's performance remains within allowable limits.

The allowable limits for these monitoring tests are the same as those which would apply for the particular performance parameter if it were the prime test.

The prime test would be undertaken starting at a low speed and increasing the speed in appropriate increments, whilst monitoring the other performance parameters, and only increasing the speed where all performance parameters are within the allowable limits specified for each particular parameter.

Once the appropriate monitoring tests have been undertaken for a particular vehicle configuration, successive testing can be undertaken without monitoring tests.

In this case the maximum vehicle speed would be limited to 10% below the maximum speed at which the allowable limits were maintained during the ride performance monitoring tests.

For example, if a vehicle's ride is monitored to a maximum speed of 110 km/h, and its performance is within the limits specified in the appropriate standard, then that vehicle's speed will be limited to a maximum of 99 km/h for operation without monitoring.

As an alternative to monitoring the kinematic rolling stock outline compliance, the vehicle speed can be limited to 10% below the normal speed boards, provided that the ride performance is satisfactory at 10% above this limited speed.

For example, the vehicle in the above example would be operated up to a maximum speed of 90 km/h in an area where the speed board is 100 km/h, when the kinematic rolling stock outline compliance is not being monitored, provided the static part of the kinematic rolling stock outline test has been performed and meets the requirements of the appropriate standard.

If the vehicle configuration has changed since the last monitoring test, then further monitoring tests will be required, to establish that the performance change resulting from the configuration change has maintained the vehicle's performance within allowable limits for all parameters.

These further monitoring tests are only required for the particular performance parameters which would have been affected by the configuration change.

Appendix E Hazard References

Clauses in this Standard respond to items in RISSB's Hazard Register. The RISSB Hazard Register is based on qualitative analysis and breaks down data associated with known hazards, risks and their potential causes within the rail industry. The actual linkages between hazards and clauses in this Standard are complex so these are presented more simply than they might be in other RISSB Standards. The following hazard contexts applicable to this Standard as identified within the Hazard Register are:

- (a) 2.0 Accreditation.
- (b) 3.0 Security.
- (c) 4.0 Environment.
- (d) 5.0 Rolling Stock.
- (e) 6.0 Infrastructure.
- (f) 7.0 Human Factors.
- (g) 8.0 Operations.
- (h) 9.0 Signals Infrastructure.
- (i) 10.0 Degraded Working.

The HRG retains the legacy RISSB hazard tree (as well as references) previously utilized by RISSB in the production of rollingstock Standards. The Hazard Register is a living document and will undergo further development at both micro and macro levels.

Appendix F Bibliography

The following referenced documents are used by this Standard for information only:

- (a) AS 4292 Railway Safety Management.
- (b) AS 7502 Road Rail Vehicles.
- (c) AS 7503 Train operation interface.
- (d) AS 7504 Brake Blocks.
- (e) AS 7505 Signalling detection interface.
- (f) AS 7507 Rolling Stock outlines.
- (g) AS 7508 Track forces and stresses.
- (h) AS 7509 Dynamic behaviour.
- (i) AS 7510 Braking systems.
- (j) AS 7511 Driver supervisory systems.
- (k) AS 7513 Interior environments.
- (l) AS 7514 Wheels.
- (m) AS 7515 Axles.
- (n) AS 7516 Axle bearings.
- (o) AS 7517 Wheelsets.
- (p) AS 7518 Suspension.
- (q) AS 7519 Bogie structures.
- (r) AS 7520 Body structural requirements.
- (s) AS 7521 Interior crashworthiness.
- (t) AS 7522 Access and egress.
- (u) AS 7523 Emergency equipment.
- (v) AS 7524 Coupler and Drawgear.
- (w) AS 7527 Event recorders.
- (x) AS 7528 - Internal communications.
- (y) AS 7529 Fire safety.
- (z) AS 7530 Electrical systems.
- (aa) AS 7531 Lighting and Rolling stock visibility.
- (bb) AS 7532 Audible Warning Devices.
- (cc) AS 7533 Driving cabs.
- (dd) I.S. EN 15663 : 2017 Railway applications – vehicle reference masses.

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ISBN: Enter ISBN.

AS 7501:2019
Rolling stock compliance certification
Draft for public comment

