Division / Business Unit: Safety, Engineering and Technology
Function: Signalling
Document Type: Standard

Inspection and Testing of Signalling - Roles, Responsibilities & Authorities

ESC-21-01

Applicability

ARTC Network Wide SMS

Publication Requirement

Internal / External

Primary Source

SCP 07, S1,

Document Status

Version #	Date Reviewed	Prepared by	Reviewed by	Endorsed	Approved
1.4	15 Sep 2021	Standards	Stakeholders	A/Manager Signalling Standards	A/General Manager Technical Standards 16/09/2021

Amendment Record

Amendment Version #	Date Reviewed	Clause	Description of Amendment
1.0	27 Apr 09		First issue. Supersedes in part NSW Standard SCP 07 v1.2 and SA/WA Standard S2 v1.1
1.1	07 Oct 09		Disclaimer updated as per Risk & Safety Committee 14/09/2009
1.2	13 Aug 10	All	Issued as final.
1.3	21 May 20	1.3, 2.2, 4,	Updated for inclusion of minor responsibility changes

		5.1, 5.3, 5.4, 5.5, 5.5.2, 5.7.1, 5.7.2, 5.7.3	associated with temporary bridging.
1.4	15 Sep 21	Various	Updated to clarify the roles and responsibilities for bridging on shared level crossings and other minor updates

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1 General

1.1 Purpose

This Standard sets out the Roles, Responsibilities and Authorities associated with the Inspection and testing for Certifying New and Altered Signalling Works.

1.2 References

This Standard shall be read in conjunction with the ARTC Standards, Procedures and work Instructions.

- ESC-21-02 Inspection and Testing of Signalling - Plans, Programs, Documentation and Packages
- ESC-21-03 Inspection and Testing of Signalling - Inspection and Testing Principles
- ESC-21-04 Inspection and Testing of Signalling - Standard Forms
- ESM-24-01 Bridging or False Feeding Signalling Circuit
- Signalling Maintenance Procedures
- Signal Engineering Glossary of Signalling Terms.

Australian Standards including:

- AS 4292.1 Railway safety management Part 1: General requirements
- AS4292 2 Railway safety management Part 2: Track, civil and electrical infrastructure
- AS 4292.4 Railway safety management Part 4: Signalling and telecommunications systems and equipment.
- AS/NZS 4360 Risk Management
- AS7716 Signalling Testing Process
- AS7717 Signal Testing and Commissioning.

Signal Engineering Instructions and Guidelines:

- As issued from time to time and published on the Engineering pages of the ARTC Intranet/extranet
- Network Alteration Notice – NAN per EGP-03-01.

1.3 Definitions, abbreviations and acronyms

Signalling definitions are contained in the Engineering (Signalling) Standard **Glossary of Signalling Terms**.

The position names and grades used in this document are current at the time of publishing. Unless otherwise documented, name changed positions shall retain the roles and responsibilities set out herein.

The following definitions are used in this Standard:

Engineering Authority

Engineering Authority is held by the ARTC General Manager Technical Standards or as delegated for signalling to the Manager Signalling Standards.

Primary engineering authority exists within the Approved design.

Engineering Authority for signalling design tasks is delegated by the Manager Signalling Standards to accredited Signal engineers who are required to perform such tasks in the normal course of their duties– as follows:

Delegation of Engineering Authority for Signal Design

Activity	To
Performance of design related tasks in accordance with the Signalling Safeworking Procedures.	Signal Engineers.
Performance of construction related tasks in accordance with the Signalling Construction Standards and Signalling Safeworking Procedures.	Signal Engineers or ARTC representatives involved in Construction of New and Altered works
Level Crossing Monitor site specific logic programming.	Competent person who has been trained in Level Crossing Monitor Programming
Level Crossing Site Plans	Level Crossing Program/Project Manager

Competency Certified

The term “competency certified” shall refer to the competence standards that have been satisfied in the process of the issue of “Statements of Competency”.

2 Introduction

2.1 General

This ARTC Engineering Standard applies to the Personnel, Roles, Responsibilities and Authorities associated with the inspection and testing, quality of installation and commissioning work necessary for safety assurance of New and Altered Signalling Works on ARTC and shared infrastructure.

Inspection and testing shall be read as including verification and validation tasks.

Notwithstanding the application of the certification inspection and testing of the completed work as set out in the Standards these will not, in themselves, provide sufficient assurance as much of the installation will be “hidden” from these certification inspections and tests. Therefore, it is imperative that installation work is carried out by suitably accredited, fit and competent personnel and that the installation practices and workmanship be appropriately supervised, inspected, tested and recorded during the installation. These inspection and tests shall be planned and implemented in an Inspection and Testing Plan and Installation Work Package.

2.2 Interfaces with Network Control and Telecommunications Systems

Signalling Control Systems and telecommunications systems are the responsibility of the Operational Technology group. The signalling Commissioning Manager shall ensure that prior to commissioning new and altered signalling works that interface to a signalling control system or telecommunications system that all functional interfaces are duly certified as inspected, tested, fit for purpose and demonstrating reliability collaboratively between all system groups. Further at commissioning, the train control or telecommunications system group shall provide documentation certifying that the system has been inspected, tested, fit for purpose and reliability.

Where the Communications and Control systems are brought into use at a later date using a previously commissioned signalling interface – the Operational Technology group shall be responsible to independently certify and bring the train control or telecommunications system into use using an appropriately accredited Commissioning Manager.

2.3 Interface Coordination

This Procedure sets out the requirements applicable for new and altered signalling works implemented by an internal group separate from the asset owner. This relationship creates a functional interface between the parties that is addressed throughout the inspection and testing Standards. Should the asset owner require internally implement works and thereby eliminate this functional interface then the Infrastructure maintainer shall ensure that an effective Network Alteration Notice be used for internal interface coordination.

2.4 Role of Inspection and Testing in the achievement of System Safety

Signalling inspection and testing, and certification thereof, to current standards by certified and competent designers, constructors and maintainers is the method of safety assurance of the signalling system.

Signalling inspection and testing is complicated by the spatial spread of signalling interlocking and control functions, the time spread of construction of a signalling project, staging of the works into existing systems and interaction with functional, operational and technical areas of ARTC and third parties. It is therefore imperative that all stages of the inspection and testing process are

planned and systematically implemented and documented by responsible signalling personnel who place the highest priority on the achievement of system safety.

2.5 Safety Assurance

This standard informs signalling personnel of the roles, responsibilities and authorities associated with the quality of installation, inspection and testing, and commissioning work necessary for the safety assurance of new and altered signalling on the ARTC infrastructure.

Inspection and testing shall be read as including verification and validation tasks.

Inspection and tests shall be recorded in an Inspection and Testing Plan and in Installation and Commissioning Work Packages. The verification and validation process shall include:

- Clear definition and communication of responsibilities
- Detailed and comprehensive planning, risk assessment and programming
  Application of proven inspection and testing practices by licensed, and competent personnel
- Use of appropriate, calibrated test equipment.
- Monitoring and control of progress
- Detailed recording of results

The total verification and validation process shall be fully documented and strictly followed in accordance with this standard and to RISSB standard AS7716.

The application of inspection, testing and certification of the completed work as set out in this standard will not in itself provide sufficient assurance, as much of the installation will be “hidden” from many commissioning certification inspections and tests. It is therefore imperative that installation work is carried out by suitably competent, and where necessary licensed, personnel and that the installation practices and workmanship be appropriately supervised, inspected, tested and recorded during the installation. These inspection and tests shall be planned and implemented in an Inspection and Testing Plan and Installation Work Package.

3 Safeworking, Network Rules and Procedures

It is essential that the Network Rules and Procedures be observed. Testing arrangements must not interfere with or endanger the correct operation of signalling equipment in service.

In particular, testing must not result in false clearance of a signal indication in the face of a train nor allow any set of points to be released after a train has accepted a proceed authority that indicates the points are closed and locked.

Qualified workers shall be provided as protection officers/hand signallers for signals, points and level crossings booked out of use as stipulated in the Network Rules and Procedures.

Network Forms shall be duly completed for notification of signalling apparatus taken out of use or restored to use and for certification of new or altered works brought into use.

Details of all removals and new and altered works that results in a change to any physical or operational interface with signallers or train drivers shall be published in the Safe Notice/Train Notice with at least one week notice prior to the implementation of the changes.

It is desirable that all field activities associated with the de-commissioning, changing-over and testing work and commissioning, be carried out in an environment where rail traffic is excluded. If rail traffic cannot be excluded or will operate in close proximity, the engineer shall *refer to the relevant worksite protection document.*

There shall be clear understanding and agreement documented between all involved parties of the safeworking systems to be employed during the period from the shutdown of the old system to the commissioning of the new system.

Signalling equipment installed but not yet commissioned or decommissioned but not yet removed is to be secured against interference.

4 General Responsibilities for Inspection and Testing New and Altered Works

It is the duty of each person performing safety-related work to carry out the work and documentation carefully and competently to the required Standards and in accordance with applicable Standards and/or approved drawings, and to check their work for completion and quality.

Persons conducting certification inspection and testing are to report each time they detect safety related errors or omissions in the work, equipment, or documentation to the Commissioning Manager.

Basic principles include:

- Each new or altered piece of signalling apparatus shall be inspected, independently tested, verified and certified.
- Appropriately experienced, accredited and competent personnel shall conduct independent inspection and testing of the work.
- Construction of new and altered signalling shall be conducted in accordance with the relevant Standards, Procedures and Instructions by suitably experienced competency assessed Signal engineers, Site Managers, Team leaders, Work group leaders and Signal electrical / mechanical personnel.

- Only ARTC type-approved equipment shall be commissioned.

4.1 Independence of Certification Inspection and Testing

The principle of independent inspection and testing of new and altered work is that no safety critical outcome should rely solely on one person doing and also certifying their own work. The independent person conducting the inspection, testing and certification work is responsible for the safety of the work.

Any person who has installed vital equipment or circuits for new and altered work shall not carry out the certification inspection and tests of the particular items or circuit elements that they have installed.

At a project engineering level there are integrity advantages in having more rather than less familiarity with the physical and functional characteristics of the project. For example, the Tester in Charge in the role of Commissioning Manager has the direct knowledge of the project, its interfaces and history necessary to ensure comprehensive inspection and testing planning, coordination and implementation.

In deciding the appropriate degree of independence, a balanced judgement by experienced signal engineers is necessary depending on the nature and complexity of the project however the major determinant would be the competency to the required level, competence and experience of the person performing the certification inspection and testing. The lack of availability of suitable personnel shall not justify any lowering or absence of the required independence.

5 Personnel Responsibilities and Authorities

The following sections defines the roles and responsibilities of the roles related to testing and commissioning activities. Also refer within this standard to the typical project responsibility matrix and work breakdown structure for roles, and section that defines the minimum Role or Authorisation requirements for suitably experienced persons undertaking test activities. Manager Signalling Standards

5.1 Manager Signalling Standards

The Manager Signalling Standard or delegate is responsible for:

- Signalling Standards
- Engineering Waivers
- Type approval of new equipment

5.2 Principal Engineer Signal Design

The Principal Engineer Signal Design shall exercise the delegated responsibilities and engineering Signalling Design Authority for authorising and approving configuration and design changes to the existing or new signalling system in accordance with the ARTC Engineering Principles, Standards, Manuals, Instructions and Guidelines.

5.3 Project Manager

The Project Manager is responsible to ensure that sufficient numbers of competency assessed personnel are allocated to manage, perform and verify inspections and tests, and any corrective actions including.

A Project Manager will be appointed for the complete project whereas a Commissioning Manager will only be required for a portion of a project.

- Selection and provision of a Commissioning Manager based on knowledge of their suitability,
- Provision of a Signal Project Engineer
- Provision of a Signals Tester in Charge
- Provision of Control systems engineer and control systems.
- Ensure that all stakeholders, third parties, adjacent rail operators who share infrastructure with ARTC are aware of all works being undertaken and are involved in the works as identified.
- Provision of active management support for the Commissioning Manager in meeting inspection and testing responsibilities,
- Assist Team Managers in the allocation of experienced, accredited resources to support the works program, including the provision of plant and materials. Where practicable staffing shall be allocated to maximise job knowledge and process efficiency by allocating the same personnel for the duration of each activity,
- Staff changes shall be assessed against project delivery timeframes and delivery impacts and effectively communicated to the ARTC signalling representative,

- Ensure any bridging design and relevant documents shall be approved by the design engineer and agreed by the ARTC signalling representative,
- Ensure that minor work packages, installation work packages and commissioning work packages are to be submitted to the ARTC Regional Signal Maintenance Engineer or representative for review and acceptance approval before project work commences, inclusive of operational plans, signal functional specifications, control tables signal/signal arrangement plans, signal plans and other designs to ensure all areas of design have been captured and reviewed by the ARTC Regional Signal Engineer or representative.
- Provide active management support, systems, procedures, processes, and auditing,
- Approval in principle of the Inspection and Testing Plan,
- Registration of inspection and testing documentation,
- Provision of appropriate training courses for inspection and testing,
- Provision of management support for the commissioning process,
- Regular oversight of the implementation of the construction, inspection, testing and independence of personnel conducting inspection and testing,
- Ensuring archival of inspection and testing documents and packages.
- Arrange for test locomotives as required by the Commissioning Manager.

The management structure used by the Project Manager to deliver the works will be dependent on the project scope and Program. The responsibilities of persons other than those described in this Standard must be defined in the Project Manager's project plan.

The Project Manager may delegate to a Team Manager the general responsibilities for the management of personnel and equipment including rostering, training, PPE, vehicles, and day to day matters.

The Project Manager shall arrange to make available to the Commissioning Manager and Team Managers information regarding any "work under supervision" restrictions associated with personnel provided for inspection, testing and certification activities.

5.4 Tester In Charge

The Tester In Charge has the responsibility to ensure that the new and altered works are planned, installed, inspected and tested to Design, Standard and Schedule. The responsibilities nominated for Commissioning Manager shall be read as those for the Tester In Charge when the Tester In Charge is also the Commissioning Manager.

The Tester In Charge is responsible for:

- For the installation compliance with ARTC Equipment and Engineering Standards,
- Directing controlling and ensuring that all the installation inspection and testing plans, procedures, activities and tasks are competently and correctly completed and recorded,
- Liaising with the Regional representative with regard to regional Interfaces, and interfaces to other rail operators or third parties
- Liaising with other Rail Infrastructure Managers with regard to shared infrastructure and interfaces and procedures for all works being undertaken.

- Ensuring changes to personnel are effectively managed and any impacts appropriately assessed,
- For signing off some elements of the safety assurance of completed works, and for certifying that the systems and equipment have been properly installed using an Inspection and Testing Plan and Installation Work Package, have undergone and passed the specified pre-commissioning tests and inspections necessary to ensure safe and reliable operation. Further, the Tester In Charge is responsible to ensure that all outstanding inspections and tests are carried over (transferred) to the Commissioning Work Package for completion during the Commissioning phase,
- For ensuring that the materials and equipment provided meet the Standards requirements, are Type approved where required, and have been through the normal (or any special) acceptance inspection and testing procedures. The Tester In Charge shall advise the Commissioning Manager (where applicable) accordingly and provide the specified documentation appropriately completed and signed,
- Planning and supervision of the installation and carrying out quality control inspection and tests from the initial stages of the works to ensure that the signalling will operate reliably and be ready for certification testing as planned without any necessity for rework or modification at a stage where critical path, critical resource or critical costs could jeopardise the orderly conduct of certification testing,
- For ensuring that the installation work does not interfere with the normal operation and integrity of the railway. All work shall be planned and implemented as agreed in consultation with the various relevant asset owner/s and documented in the Project Work Interface Agreement and Interface Coordination Plan for the works,
- Ensure that all necessary testing has been undertaken and completed for Communications Based Train Control systems such as the ARTC Advanced Train Management Systems (ATMS) and Trainborne, Trackside subsystems, AMS, network control systems, power and redundancy systems, communications systems, static and dynamic tests etc. Ensure all verification and validation tests have been undertaken and performed in accordance with ARTC Standards and ATMS testing and commissioning plan.
- Ensuring any temporary bridging is undertaken in accordance with approved designs and managed accordingly,
    - Ensure that approved bridging design and relevant documents have been reviewed and accepted by competent signalling representative and bridging authority issued.
    - Ensure the acceptance of all relevant rail authorities has been received when bridging being applied on shared level and pedestrian crossings.
    - Ensure that test plan includes the testing to be followed on ARTC and other adjacent railway lines once bridging applied to ensure that no unsafe situation will arise from the temporary bridging, typically on operational line for shared level and pedestrian crossings with other Rail Infrastructure Managers.
    - Ensure that the test plan includes the testing to be followed on ARTC and other adjoining or shared railway lines once bridging removed to ensure that no unsafe situation will arise from the temporary bridging for shared level and pedestrian crossings.

- Ensure that testing being carried out to ensure that there is no adverse impact of bridging application or removal on any operational line and will not be result in any form of an unsafe outcome.
- Ensure that all jumpers are recorded and managed as per testing and commissioning processes.
- Ensure that bridging design and relevant documents in the commissioning work package are correct and fit for purpose for planned commissioning activities.
- Liaise with the protection officer to ensure that temporary bridging activity has been agreed by ARTC and all safeworking arrangements are in place.
- Ensure the testing team understands impact of the bridging.

- Ensure that all bridging, temporary test jumper wire, false feeding of signal and other circuits activities is included in the commissioning work package are consistent with the possession plan/operational safe working plan.
- For ensuring that safe access is provided to signalling apparatus in consultation with the Regional signalling representative. The Tester In Charge is responsible for ensuring that the signalling equipment is set out and located in accordance with the signalling design principles,
- Prevent any further interference with the signalling following and during certification testing except under the direction of the Commissioning Manager,
- Challenge and bring to the attention of the Commissioning Manager any unclear, unusual or unsatisfactory feature of the vital design or installation and any potential risk to the reliability and integrity of the signalling.
- Form independent test team/s consisting of suitably competent and experienced personnel,
- Assess Test assistant's knowledge of the communication protocols to be used and ensure the appropriate familiarity with the particular apparatus and testing procedures.The Tester in Charge by signing signalling works into use is attesting to the infrastructure integrity and reliability of the new or altered signalling in accordance with ARTC Standards, Manuals, Procedures, Guidelines and Signal Engineering Instructions.

The Tester In Charge shall ensure that the existing signalling is secure against accidental or inadvertent interference; otherwise the existing signalling shall be disconnected and included in the certification inspections and tests prior to restoration into use.

Signalling Works - Installation Phase

- Collaborate with the Regional signal representative to develop and obtain authorisation of the Project Work Interface Agreement and Interface Coordination Plan for the new and altered works then keep them updated using the Network Alteration Notice,
- Collaborate with the Regional signal representative for the provision of access and possessions in accordance with the Works program,
- Advise the Regional signal representative of the limits, timing, exclusions of other work groups/work trains and contingency planning requirements for possessions required to construct the works,

- Advise the Project Manager of the resource requirements to support the Works program, including assessed, experienced personnel, to suit the required team structures, plant, equipment and materials,
- Preparation of the Installation Work Package,
- Gain acceptance and approval from the ARTC Regional Signal Engineer or representative for the Installation Work Package and bridging design and documents after they have been reviewed by a competent ARTC signalling representative.
- Implement the Installation Work Package,
- Authorising and registering Installation work instructions,
- Issue, use and completion of Installation work instructions,
- Receiving, checking and actioning Installation work instructions,
- Completion of the Register of Work Instructions.

Minor Signalling Works, Preparation - Installation and Commissioning Phases.

The Tester In Charge shall also be the Commissioning Manager for all works utilising a Minor works package. Roles and responsibilities shall generally be as for major signalling works, and:

- Preparation of the Works program, Minor works package,
- Documenting the scope of works to be covered by the implementation and commissioning including:
- Inspection, testing and certification work package documentation requirements for the installation and commissioning work,
- Integrity and/or system function testing requirements to be conducted by the Commissioning Manager,
- Review and authorise the Minor works package,
- Obtain approval in principle to use the Minor works package,
- Ensure that approved bridging design and documents have been reviewed and agreed by a competent signalling representative.
- Implement the Minor works package:
- Receiving, checking and actioning the work instructions,
- Issue to the team leaders - copies of the “Minor Signalling Works - Installation, Inspection, Testing and Commissioning Log” (Minor Works Log) to be maintained throughout the works. Regularly collect and review the Log sheets to oversee the resolution of the reports.
- Document and report in the “Minor Works - Log” all defects, defective material, incidents and items requiring further action related to the performance of the installation, inspection, testing and commissioning of the works.
- Attend to post commissioning defect rectification and arrange project closeout / Practical and Final Certificates.

5.4.1 Use of Test Assistants

Competent testers and assistants shall carry out independent inspection, testing and certification plus documentation as directed by the Tester In Charge.

Testers and those assisting in certification testing shall be competent and shall diligently carry out the instructions of the Tester In Charge and assist in ensuring the tests are correct and comprehensive.

Testers shall:

- Verify that the installation and equipment conform to the approved design and site drawings.
- Comply with the procedures and practices detailed in this series of documents.
- Following consultation and agreement with the Commissioning Manager, exercise the authority to require re-testing of portions of the work where doubt arises as to the performance of testing assistants, integrity / security / interference or issues.
- Verify that the installation complies with the applicable equipment and construction specifications regarding the installation quality, personnel access, safety and reliability.
- Challenge and bring to the attention of the Commissioning Manager any unclear, unusual or unsatisfactory feature of the vital design or installation and any potential risk to the reliability and integrity of the signalling.
- Form independent test team/s consisting of suitably authorised or licensed personnel.
- Ensure Test Assistant's knowledge of the communication protocols to be used and ensure the appropriate familiarity with the particular apparatus and testing procedures.

5.5 Commissioning Manager

The Commissioning Manager shall be competent for the skill and the ARTC statement of competency shall reflect this and is responsible for the inspection, testing, certification and booking into use the project.

The Commissioning Manager shall be responsible to ensure that all of the inspection and testing tasks defined within the signalling specifications are carried out and recorded as prescribed.

The Commissioning Manager is the person responsible for the implementation of an effective, proven, auditable process for verification and validation of the safety integrity of the signalling system, and for compliance of signalling standards for the new or altered signalling when commissioned. If appointment to the project occurs after partial completion of the project, then the Commissioning Manager shall have the authority to order retesting, examination or uncovering of any portions of the installation where there is any doubt, insufficient documentation, or lack of evidence of independent verification. All preceding installation inspection and testing records shall also be endorsed by the Signal engineer to whom the certification personnel reported, and that person shall be considered as having the same responsibility as the Commissioning Manager up to that point in time.

The Commissioning Manager is responsible for determining that the commissioning can proceed. If errors are discovered in certification testing that cast significant doubt on the overall effectiveness of the design checking or installation supervision, the Commissioning Manager shall

confer with the Project Manager and ARTC signalling representative to agree on appropriate risk mitigation strategies to be implemented

The responsibility for the certification of the safety of signalling works to be commissioned ultimately lies with the competent signal engineer who signs the works as “brought into use:

- Regardless of the nature of the signalling works the competent signal engineer responsible for safety certification and bringing the works into use is to be designated as “Tester in Charge”,

The Commissioning Manager is accountable for the certification inspection and testing of the signalling works, prior to commissioning, to verify that it is:

- In conformance strictly with issued designs duly certified as checked and approved by authorised signal design engineers (including amendments and modifications),
- In compliance principally with the applicable standards for signalling safety and reliability,
- And consistent with basic signalling principles and practices.

The Commissioning Manager is not responsible for the design, that is the responsibility of the Principal Engineer Signal Design.

The Commissioning Manager shall be responsible for:

- Ensuring that commissioning Inspection, Testing and Certification activities are performed by experienced, independent, accredited competent personnel
- Ensuring that commissioning inspection, testing and certification activities reveal not only discrepancies between the installation and the signalling designs, but also will bring to attention basic flaws in the integrity of the signalling design and substandard workmanship and/or equipment,
- Closely liaising with the Principal Engineer Signal Design or delegate in relation to the planning and implementation of design integrity testing and all matters of design.

Where new or altered works are to interface with existing signalling the status of implementation of any previously issued design and jobs shall be established in accordance with the provisions set out in Standard ESC-21-03 Inspection and Testing of Signalling – Inspection and Testing Principles.

The Commissioning Manager and the Principal Engineer Signal Design (or delegate) shall ensure that signalling design drawings used for certification inspection and testing are the final approved designs inclusive of all modifications. The Commissioning Manager shall obtain details of and ensure the registration and testing of any modifications issued from the Principal Engineer Signal Design.

- Referring any unusual or special arrangements or proposals not in accordance with documented standards to the Principal Engineer Signals Assurance for determination. Any approved variations shall be implemented in accordance with the provisions stipulated within a Waiver or an approved design,
- Ensuring observance of the Network Rules and Regulations for bringing new and altered works into use,
- Ensuring that updated Interim Maintenance Copy drawings are available for maintenance personnel prior to booking into service,

- Ensure the use of the specified control documentation to ensure that all safety-related inspections and tests performed are integrated, that no safety-related test is missed, and all certifications are obtained prior to commissioning.
- Ensure that any bridging design and relevant documents are consistent with the Network possession plan/Operational Safeworking plan. In case of any discrepancies, it shall be communicated to the Principal Engineer Signal Design for immediate corrective action. Works shall not commence until all discrepancies are resolved.

The Commissioning Manager shall not allow the certification testing to be jeopardised by compression into too small a time-scale that over-extends testing personnel.

The Commissioning Manager may conduct Design Integrity testing for *Minor signalling works* to a design integrity test plan provided and approved by signal design.

Commissioning – Preparation Phase

- Advise the Regional signal representative of the limits, timing, exclusions of other work groups/work trains and contingency planning requirements for possessions required to commission the works or stage works,
- Advise the Project Manager of the resource requirements to support the commissioning Program, including competency assessed, experienced personnel, to suit the required team structures, plant and materials,
- Ensure the transfer of all outstanding activities from the Installation Work Package,
- Preparation of the Commissioning Work Package,
- Arranging pre-commissioning conferences and briefings
- Documenting the scope of works to be covered by the commissioning,
- Coordinating with the design Team leader for the Design integrity testing requirements,
- Ensure that Design Drawings and documentation have been submitted to ARTC Signal Plans;
- Ensure that all relevant and adjoining rail authorities' acceptance has been received when performing the bridging on shared infrastructure such as level and pedestrian crossings
- Ensure all personnel involved in shared level crossing bridging are competent to undertake works on the ARTC Network and have appropriate ARTC competency.
- Identifying teams required,
- Preparing the program,
- Preparing the Commissioning Notice,
- Preparing the Work instructions,
- Review and authorise the Commissioning work package,
- Obtaining approval in principle to use the Commissioning work package,
- Authorising and registering Pre-Commissioning work instructions,
- Issue, use and completion of Pre-Commissioning work instructions,
- Receiving, checking and actioning Pre-Commissioning work instructions,

- Completion of the Register of Work Instructions.

Commissioning – Implementation Phase

- Implementation of the Commissioning Work Package,
- Control of the Register of Work Instructions,
- Control of the Commissioning Log,
- Registering all Work Instructions,
- Preparing, authorising and registering new Commissioning work instructions,
- Issue Commissioning work instructions,
- Receiving, checking and actioning Commissioning work instructions,
- Ensure that all documentation has been appropriately signed,
- Completion of the Register of Work Instructions,
- Updating the register and filing completed Work Instructions,
- Monitoring the Program,
- Complete the Commissioning Status Certificate and sign off,
- Commission the new and altered works in accordance with the Network Rules and Procedures,
- Updating throughout the commissioning period the Interim circuit books, Drawings and preparation of any Track History Cards for issue at completion;
- Ensure the issue of the Interim Maintenance copies of the signalling design drawings and documentation to the nominated signals maintenance representative of ARTC.

Commissioning – Evaluation Phase

- Check that copies of all Safeworking Forms and Permits are in the Package,
- Check that copies of all Signalling Safeworking records are in the Package,
- Insert a copy of the Attendance Register in the Package,
- Control the Register of Post Commissioning Work Instructions,
- Issue Post Commissioning Work Instructions,
- Prepare, authorise and register new Post Commissioning work instructions,
- Receiving, checking and actioning Post Commissioning work instructions,
- Completion of the Register of Post Commissioning Work Instructions
- Updating the register and filing completed Work Instructions,
- Monitoring the Program,
- Conduct the Post-Commissioning Meeting.

5.5.1 Division of Roles and Responsibilities for Tester In Charge and Commissioning Manager

Where a project is planned to have both Tester In Charge and Commissioning Manager the typical arrangements required shall be in accordance with the following table “Tester In Charge and Commissioning Manager – Typical Division of Responsibilities” or otherwise as varied by a documented agreement between the parties.

For the pre-commissioning, commissioning and post-commissioning phases the Tester In Charge shall continue to complete the construction work, testing, defect rectification and handover under the control of the Commissioning Manager.

5.5.2 Tester In Charge and Commissioning Manager – Typical Division of Responsibilities

Table 2

TESTER IN CHARGE	COMMISSIONING MANAGER
GENERAL Manage or effectively delegate all aspects of the construction engineering and commissioning (except for activities nominated for the Commissioning Manager) of signalling system to final certificate including: **DESIGN AND DOCUMENT CONTROL** • Procedures to ensure use of approved and current versions of Plans. • Collaborate with the Regional representative and Signal design for all matters associated with the Signal Design. Responsible for the site management of Signal Design up to the Commissioning Period. Certify as updated and handover "Commissioning copies" of the Signal design to the Commissioning Manager at the start of the Commissioning period. • Registration of Working drawings and documents. • Implements the site aspects of the signalling document control. **SITE ENGINEERING DESIGN** (Engineering Design Authority) • Type Approvals, • Detailed Site Survey Plans, • Signal Sighting Agreements, • Services Searches. • Construction / Installation Drawings and documents.	**GENERAL** Involved with the project from and including the Concept development stage until post commissioning. Monitors and audits the implementation of the Inspection and Testing Plan and Installation Work Package. Responsible for the formal inspection, testing and certification on site and at supplier's premises. Monitors installation, inspection, testing and commissioning processes including: 1. Review and Authorise the Inspection & Testing Plans. 2. Review and Authorise the Installation Work Package. 3. Review and Authorise the Testing and Commissioning Program. 4. Nominates any areas of the Inspection and Testing Plan to be undertaken by the Tester In Charge. 5. Reviews and audits Pre-test certificates and equipment test certificates. 6. Implements the inspection, testing and commissioning portion of the Commissioning Work Package procedure/s. 7. Ensures experience and competency certification of personnel proposed for testing / commissioning activities. 8. Review & Authorise the Commissioning Work Package/s. 9. Ensure that staff are suitably competent for the allocated task.

TESTER IN CHARGE	COMMISSIONING MANAGER

INTERFACE PLAN
(All Functional Areas & Regional signal representative).
• Project Work Interface Agreement with the Regional signal representative. Liaising with the ARTC Regional Signal Engineer or representative with regard to regional Interfaces, and interfaces to other rail operators or third parties
• Liaising with other Rail Infrastructure Managers with regard to shared infrastructure and interfaces and procedures for all works being undertaken
• Site access and Possession requirements with the Regional representative.
• Statutory Approvals.
• Special Requirements.
• Operational requirements including;
  ○ Weekly Notice,
  ○ Safe Notices,
  ○ Special Train Notices.
  ○ Electrical – power and lighting.
  ○ New supply points,
  ○ Upgrading of new supply points
  ○ Electrical – traction supply.
  ○ Air gap locations;
  ○ Overhead wiring clearances,
  ○ Arrangements at substations and section huts,
• Safe access arrangements to signals and trackside equipment,
	CERTIFICATION INSPECTION AND TESTING
	Responsible for the effective implementation of the formal inspection, testing and certification of the Works,
	• Controls and directs the testing engineers and teams,
	• Audits the inspection and testing process and records,
	• Manages the use and control of certification documentation.
	DESIGN AND DOCUMENT CONTROL
	• Responsible for the management of Working drawings and Modifications during the Commissioning Period.
	• Responsible to ensure certification of Working drawings during the commissioning period eg Signalling Plans and Track Insulation Plans.
	SITE ENGINEERING DESIGN
	Responsible to ensure completion of certification of Site drawings and Signal design during the commissioning period eg Signal sighting Forms, Signalling and Track insulation Plans.

TESTER IN CHARGE	COMMISSIONING MANAGER
DETAILED IMPLEMENTATION OF REQUIREMENTS • Scope, equipment, materials, plant, construction resources and cost control, • Preparation and updating the Summary and Detailed Works, Installation, Inspection & Testing and Commissioning programs, • Ensure effective Process control • Ensure the clear identification of all “Out of use” Signalling equipment • Preparation and implementation of the Inspection and Testing Plan (Strategy, Outline and Detailed Plans) • Preparation and Implementation of the Installation Work Package	**PRE-COMMISSIONING** • Controls and coordinates planning of any permitted “Other Party” works during the Commissioning period. • Controls and coordinates with the design team and project team ensuring any bridging is undertaken as per approved possession plan and circuit design/s. • Prearranges for the coordination, content and delivery of infrastructure certification by “others” that directly interface with the Signalling system eg Train Control & Telecommunication systems, Electrical power or traction, Trackworks, Civil or others. • Conducts the Pre-commissioning meeting with the Team leaders of the commissioning work teams. **COMMISSIONING** • Responsible for the overall control and implementation of the Commissioning Work Package. • Responsible for the registration and process of application and removal of temporary circuit bridging applied for commissioning purposes. • Responsible for the registration and implementation of all approved design modifications issued during the commissioning period. • Responsible to ensure provision of infrastructure Certification by integrated works by “others” prior to booking the signalling infrastructure into use. **Responsible for the completion of the Commissioning Certificate authorising to proceed to “Bring-into-use”.**

TESTER IN CHARGE	COMMISSIONING MANAGER
• Conduct (or delegate) the inspection of all site installation and apparatus eg cable route inspection, foundations and equipment set out • Conduct (or delegate) the testing eg documentation checks, wiring Pre-tests and checks, earthing and cable insulation testing. • Manages the resources, equipment and process of the formal inspection and testing • Preparation of the Commissioning Work Package: 1. Project schedule and plant-materials and personnel resources for construction, Pre-testing, Inspection and commissioning. 2. Collaborates with the Project Manager, Team Manager/s and Commissioning Manager for the provision of construction and testing resources. 3. Collaborates with the ARTC Regional Signal Engineer or representative for the provision of the necessary track Possessions, rail traffic management coordination including provision of test locomotives, and ensure that all adjacent rail operators, especially so in regards shared infrastructure such as level and pedestrian crossings are aware of the project planned activities, 4. Ensure that all bridging, temporary test jumper wire, false feeding of signal and other circuits activities is included in the commissioning work package are consistent with the possession plan/operational safe working plan. • Access control and protection. • Defects rectification. • Provision to maintenance of timely “Interim Maintenance Copies” of circuit books, plans and drawings. Track history cards, updated asset change data and any other required documentation. • (Where applicable) Preparation, Implementation, Commissioning and Handover of Signalling Works utilising a Minor Works Package	Commission the new and altered works into use in accordance with the Network Rules and Procedures. **POST COMMISSIONING** Responsible for the evaluation of the Commissioning Work Package and development and implementation of new Post Commissioning Work instructions including: • Transfer from the Commissioning work package new or outstanding commissioning activities to Post commissioning Work instructions. • Transfer to the Tester in Charge the Post commissioning activities and work. • Completes the Infrastructure integrity Certification in accordance with ARTC requirements. • Conducts a post-commissioning inspection of the working newly commissioned installation and train inspection of the signal sighting. • Mark up, sign-off and return of the Certified Commissioning Copies of design issued drawings and documents. • **Conducts Post commissioning reviews of the Project completion lessons learnt and process improvement and feed back to the Project Manager.**

TESTER IN CHARGE	COMMISSIONING MANAGER
• Provision of Handover Documentation Package, Practical and Final completion.	

TESTER IN CHARGE	COMMISSIONING MANAGER
QUALITY ASSURANCE INCLUDING:- • Quality Management System • Procurement and Contract management • Equipment/material test certificates complete and retained • Maintains records of the calibration of test equipment used for certification inspection and testing of infrastructure. • Archive of project files and testing documentation. **ENVIRONMENTAL MANAGEMENT SYSTEM** Develop, implement and manage the required system and processes	

5.6 Interface with the Regional Representative

The relevant ARTC Business Unit is primarily responsible for infrastructure integrity; this includes permission for access and provision of track possessions, Project Work Interface Agreements, Interface Coordination Plans and review or overview of the delivery of new and altered works delivered by other divisions and 3rd parties.

For each project / job the Region shall nominate a competent ARTC Regional Signal Engineer or representative responsible for the following:

- Approval, development process and maintenance of interface coordination planning throughout the project lifecycle,
- Liaising with other Rail Infrastructure Managers regarding shared infrastructure such as level and pedestrian crossings, and interfaces and procedures for all works being undertaken
- Collaborate for the provision of the necessary track possessions and access in accordance with the Project Work Interface Agreement, Interface Coordination Plan and the Works Program,
- Arrange for the provision and issue of the approved design and manage the control of documentation throughout the project life cycle,
- Manage configuration control process to provide and maintain accurate status of the approved configuration of equipment on the region,
- Manage configuration management (update documentation and databases) to ensure records accurately reflect existing assets,
- In order to authorise commissioning of the works on ARTC or shared infrastructure, the ARTC Regional Signal Engineer or representative shall remain satisfied that the works are to the agreed requirements, by means of regular liaison with the Project Manager throughout the project and by approval-in-principle of the installation and commissioning work packages, along with review of minor work packages, installation work packages and commissioning work packages, inclusive of operational plans, signal functional specifications, control tables signal/signal arrangement plans, signal plans and other designs.

5.7 Construction Personnel

5.7.1 Team Manager

Team Manager or equivalent shall be responsible for the management of personnel and equipment including; Resource planning, depots, vehicles, OH&S, briefing, rostering, training, PPE, briefing Team leaders and provision of access to and/or copies of ARTC Engineering Standards, Procedures, Instructions and Divisional Instructions.

The Team Manager shall oversee the personnel “Experience and Assessment Log Books” to verify the correct use and identify experience requirements.

The team Manager shall allocate personnel resources primarily to fulfil the job requirement for competency certification, experience and knowledge of the equipment and systems involved. Further, shall allocate personnel to facilitate the maintenance of experience on all types of equipment and systems. Where a “Statement of Competency” nominates that “work under supervision” is required, in collaboration with site management arrange to allocate to the areas where the required experience may be gained.

The Team Manager is responsible to ensure the provision of adequate personnel requirements, whilst ensuring independence of verification personnel.

The Team Manager may carry out Signalling duties in accordance with their ARTC accreditation.

5.7.2 Site Manager

A Site Manager or equivalent will be appointed to projects depending on the size and nature of the project. If a Site Manager is appointed to a specific project is responsible to safely resource, procure and implement the construction of the new and altered project infrastructure whilst ensuring the integrity of the existing infrastructure to design and specification. The Site Manager shall be responsible to manage the completion of the installation and commissioning inspection and testing plan/s and work instructions for the preparation, implementation and evaluation of the works as directed by the Tester In Charge/Commissioning Manager.

- The Site Manager shall direct and manage a multi-disciplinary work team (or teams/contractors) engaged in the construction of the project to ensure safety, time, resource and budgetary constraints under the direction of the Commissioning Manager including: Develop in consultation with the Commissioning Manager, review, agree and assign and monitor delegated responsibilities in line with the responsibility assignment matrix (R.A.M.),
- Supervise, direct and conduct installation inspection and testing activities within the limitations of their accreditation,
- Ensuring the works are constructed in accordance with the relevant ARTC practices and procedures, Signal Construction Standards, Instructions and Guidelines,
- Ensuring the works are constructed in accordance with the approved design,
- Ensuring the works are implemented in accordance with the requirements of the Signalling Maintenance Procedures,
- Ensuring the works are implemented in accordance with the Network Rules and Procedures,
- Ensuring that the works are implemented in accordance with the Project Work Interface Agreement and Interface Coordination Plan,
- Ensuring the works are constructed, documented and inspected and tested in accordance with the approved Installation Work Package,
- Ensuring the construction work is conducted by personnel who have the relevant experience and competency certification whilst ensuring independence of verification personnel,
- Ensuring the construction work is conducted and documented to comply with approved quality processes including rectification work, timely procurement, storage and preservation of materials, works program and costs,
- Arranging for sufficient personnel, whilst ensuring independence of verification personnel,
- Responsible for the performance, signing and returning of work instruction/s.

Signalling Works - Installation Phase

Responsible to support the Commissioning Manager and perform the delegated tasks as directed:

- Safely manage the construction of the works to ARTC Standards, Manuals, Instructions, cost and time, including plant, personnel, equipment and material resources,
- Team leader as nominated on Installation Work Instructions,
- Arrange for, set up and test construction site communications systems, prepare registers for recording details of issue.

Commissioning – Preparation Implementation and Evaluation Phases

Responsible to support the Commissioning Manager and perform the delegated tasks as directed:

- Safely manage the implementation, commissioning and evaluation of the works to ARTC Standards, Manuals, Instructions, cost and time, including plant, personnel, equipment and material resources,
- Manage the construction activities, plant, personnel and material resources,
- Implement and or conduct as Team Leader - Work instructions as nominated by the Commissioning Manager,
- Arrange for, set up, pre-test and manage commissioning communications systems, prepare registers for recording details of issue,
- Manage the provision and suitable registration of commissioning spares, and equipment eg. Spare signalling apparatus, torches and batteries, emergency wet weather gear and tarpaulins,
- Manage the completion of site clean-up:
- Removal of any equipment housings, redundant wiring, cable routes,
- Removal and disposal of remaining redundant equipment / foundations, stockpiles.

Minor Signalling Works

Roles and responsibilities shall generally be as for major signalling works, and:

- Document and report in the “Minor Signalling Works - Installation, Inspection, Testing and Commissioning Log” (Minor Works Log) all defects, defective materials, incidents and items requiring further action related to the performance of the installation, inspection, testing and commissioning of the works. Regularly (weekly) present the log to the Commissioning Manager/Tester In Charge for review and sign off.

5.7.3 Work Group Leader

Work Group Leaders or equivalent are responsible to implement ARTC Policies, Standards, Instructions, Practices, and Procedures including Installation and Commissioning Inspection and Testing Plan/s, Work Packages and Work Instructions for the preparation, implementation and evaluation of the works as directed by the Commissioning Manager/Tester In Charge

Where a project structure does not include a Site Manager, the Team Manager shall nominate a Team Leader whose responsibilities shall include those nominated herein for a Site Manager.

The Work Group Leader is responsible to ensure the implementation of the following activities or delegate and effectively communicate to the various team leaders and work groups:

- Review, agree and assign delegated responsibilities in line with the responsibility assignment matrix (R.A.M.),
- Apply policies and procedures to ensure the highest standards of WHS, Safeworking, Environmental and Quality principles are practiced and maintained in the workplace,
- Implement the construction of the works to specification by leading multi-discipline work team/s or contractors, supervise, and conduct installation inspection and testing activities within the limitations of their accreditation,
- Organise and direct personnel and materials in the construction of the works,
- Organise and direct plant for the construction of the works,
- Supervise quality and specification compliance during the construction of the works,
- Perform, sign and return work instruction/s,
- The day-to-day resolution of general matters.

5.7.4 Competency

All resources shall comply to ARTC competency standards at all times when undertaking works on ARTC infrastructure.

At all times when undertaking works on shared infrastructure all resources shall show compliance with procedures and requirements of adjacent RIM.