

Ref	NR/L2/TEL/30098
Issue	2
Date	26 August 2008
Compliance Date	26 August 2008

Level 2

Testing and Commissioning of Telecommunications Equipment and Systems

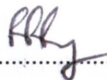
Endorsement & Authorisation

Endorsed by:



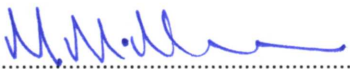
D Petersen, Working Group Chair

Authorised by:



pp- A Ross, Steering Group Chair

Accepted for issue by:



M McManus, National Standards Manager

This document is the property of Network Rail. It shall not be reproduced in whole or part nor disclosed to a third party without the written permission of the Standard Owner.

© Copyright 2008 Network Rail

Uncontrolled copy once printed from its electronic source.

Published & Issued by: Network Rail 40 Melton Street, London NW1 2EE



Documents

Document Sharing Hub

Ref:	NR/L2/TEL/30098
Issue:	2
Date:	26 August 2008
Compliance Date	26 August 2008

Issue record

Issue	Date	Comments
1	February 2006	Issue for stakeholder
2	August 2008	Updated to reflect Phase 2A reorganisation

Compliance

This Network Rail standard is mandatory and shall be complied with by Network Rail and its contractors if applicable from 26 August 2008.

When this standard is implemented, it is permissible for all projects, which have formally completed GRIP Level 4, to continue to comply with the Issue of any relevant Network Rail Standards current when GRIP Level 4 was reached and not to comply with requirements contained herein unless the designated Standard Owner has stipulated otherwise in the accompanying Briefing Note.

Reference documentation

See section 3.

Disclaimer

In issuing this document for its stated purpose, Network Rail makes no warranties, express or implied, that compliance with all or any documents it issues is sufficient on its own to ensure safe systems of work or operation. Users are reminded of their own duties under health and safety legislation.

Supply

Copies of documents are available electronically, within Network Rail's organisation. Hard copies of this document may be available to Network Rail people on request to the relevant controlled publication distributor. Other organisations may obtain copies of this document from IHS (Technical Indexes Ltd) tel: 01344 328039.

Ref:	NR/L2/TEL/30098
Issue:	2
Date:	26 August 2008
Compliance Date	26 August 2008

Contents

1	Purpose	4
2	Scope	4
3	Reference Documentation	4
4	Definitions	5
5	Testing and Commissioning Procedure	7
6	Testing Documentation	8
7	Pre-Testing and Commissioning Activities	16
8	Testing Phases	16
9	System Testing and Co-ordination	20
10	Recording and Certification	23
11	Modifications to Existing Systems	26
12	Actions Following Equipment or System Failure During Testing	28
13	Testing as a Part of a Large Scheme	31
14	Commissioning	31
15	Post Testing and Commissioning Activities	32

Ref:	NR/L2/TEL/30098
Issue:	2
Date:	26 August 2008
Compliance Date	26 August 2008

1 Purpose

This Specification, in support of Company Standard [NR/CS/TEL/30092](#) Telecommunication Testing and Commissioning Procedure, expands upon the requirements for the testing and commissioning of telecoms assets on Network Rail controlled infrastructure.

This specification is supported by associated work instructions detailing the testing and commissioning requirements for telecoms assets.

2 Scope

This Specification is mandatory on Network Rail and its contractors involved in the telecoms testing and commissioning process as defined below.

This Specification shall apply to both newly installed equipment/systems and to modified or upgraded equipment/systems, except for those undertaken as part of the day-to-day maintenance activities.

For non-safety related telecoms equipment/systems the design contractor or installer may undertake the testing and entry into service activities subject to agreement by the Principal Renewal & Enhancement Engineer [Control & Coms] and the Network Rail Project Engineer (NR PE). The NR PE and the Contractors Responsible Engineer/Commissioning Manager (CRE/CM) shall agree the level of testing activity and documentation required for non-safety related telecoms equipment/systems.

This Specification does not cover:

- a) the testing of trainborne equipment
- b) testing undertaken on day to day maintenance or repair (see [NR/SP/TEL/31001](#) Telecommunications Maintenance Testing and Failure Investigation)
- c) contractual Health and Safety Requirements
- d) the design of telecoms equipment and systems
- e) the installation of telecoms equipment and systems (see [NR/CS/TEL/30029](#) Telecoms Installation)
- f) the handback of the new or modified asset to maintenance (see [NR/SP/MTC/088](#) Responsibility for Maintenance of Changed Assets)

3 Reference Documentation

GE/RT8000	The Rule Book
GK/RT0101	Competence Standards for Signalling and Telecommunications Staff
GK/RT0105	The Transmission of Safety Related Information
GK/RT0188	Testing of Microprocessor controlled SPT Concentrator Systems
GK/RT0209	Testing and Commissioning of Signalling and Operational

Ref:	NR/L2/TEL/30098
Issue:	2
Date:	26 August 2008
Compliance Date	26 August 2008

NR/GN/TEL/10117	Telecommunications Systems
NR/SP/TEL/11189	Competence Management Systems for Work on Control and Communications Systems
NR/SP/TEL/30022	Testing Telephones at Level Crossings
NR/CS/TEL/30029	Technical Requirements for Communications Engineering Schemes and Services
NR/CS/TEL/30092	Telecommunications Installation
NR/SP/TEL/31001	Telecommunications Testing and Commissioning Procedure
NR/WI/TEL/30104	Telecommunications Maintenance Testing and Failure Investigation
NR/WI/TEL/30103	Testing Requirements – Signal Box Concentrators
NR/WI/TEL/30102	Testing Requirements - PETS
NR/SP/ACC/029	Testing Requirements – Operational Voice Recorders
NR/SP/MTC/088	Product Acceptance
NR/SP/BUS/02009	Responsibility for Maintenance of Changed Assets
RDM06	Engineering Management for Projects
	GRIP Renewals Development Manual – Telecommunications Renewals
	Railway (Safety Critical Work) Regulations 1994

4 Definitions

Acceptance

Acknowledgement that the commissioned system meets the functional requirements of the design criteria.

Approval

Acknowledgement that the proposed documentation meets the requirements for testing and commissioning.

Commissioning

The process by which equipment and systems are made ready for service following installation and testing, e.g. change-over of systems, transfer of circuits.

Commissioning Manager (CM)

The person within the testing and commissioning organisation with overall responsibility for the management of the testing and commissioning activities.

Contractors Responsible Engineer (CRE)

The person within the design organisation with responsibility for the day-to-day management and co-ordination of the technical and engineering activities within the contract. Other competent personnel within the design organisation may carry out some of the tasks assigned to the CRE, however the CRE shall be responsible for their delivery.

Where Network Rail is responsible for the design an individual from the design team may be appointed to perform the duties of the CRE.

Ref:	NR/L2/TEL/30098
Issue:	2
Date:	26 August 2008
Compliance Date	26 August 2008

Designer

The organisation or person responsible for the design of the system to the Reference System Design.

Factory Acceptance Test (FAT)

A factory acceptance test is applied prior to delivery on site to demonstrate stability and functionality of the equipment. Generally, testing can be on both system and software.

Network Rail Project Engineer (NR PE)

The person who is responsible to the Project Manager for the day to day management of the project in accordance with [RT/E/P/02009](#) Engineering Management for Projects.

Network Rail Project Manager (NR PM)

The person with the responsibility to manage the project to deliver the remit in accordance with [RT/E/P/02009](#) Engineering Management for Projects.

Operational Telecoms Equipment/Systems

Equipment or systems that are used for:

- a) authorising and safeguarding the movement of trains
- b) safety related communications systems used for the direct operation of the railway.

Person in Charge of Testing (PICOT)

A competent person responsible for documenting, managing and undertaking the testing and commissioning activities.

Safety Related Application

The use of a product which, if it fails to conform to the safety requirements pertinent to the application, could increase risk to trains, persons working on the railway or the public.

Site Acceptance Test (SAT)

A Site Acceptance Test is applicable to an on-site assembly of all sub-systems, cabling and wiring forming a system and is carried out ahead of any integrated testing or commissioning to demonstrate the functionality of the equipment and all the system interfaces in the operational environment.

Sub-systems

Sub-systems comprise a combination of products and application logic. The technology based sub-systems used for telecoms systems are mechanical, electrical, electronic or programmable electronic systems. Examples include:

Ref:	NR/L2/TEL/30098
Issue:	2
Date:	26 August 2008
Compliance Date	26 August 2008

- a) human-machine interface
- b) telephone concentrator
- c) software programme for the system or equipment that forms the system
- d) transmission systems

Systems

An organised set of sub-systems, people and procedures capable of providing a service or executing a defined function or group of functions. A system will typically be comprised of:

- a) sub-systems
- b) the working practices and procedures associated with the use of the sub-systems
- c) the people who use/operate the systems, and
- d) the interfaces and interactions between each of these

Tester

A competent person assigned to perform the tests assigned by the PICOT or TIC.

Tester in Charge (TIC)

A competent person assigned to specify and/or perform the tests assigned by the PICOT who may sign off the results of tests on behalf of the PICOT.

5 Testing and Commissioning Procedure

This specification follows the procedure flow chart detailed in section 6 of the Company Standard [NR/CS/TEL/30092](#), Telecommunication Testing and Commissioning Procedure.

5.1 Supervision and Audit Arrangements

Testing works shall be subject to levels of Network Rail supervision, quality checks and audit that are sufficient to confirm that the approved procedures and methods of work are applied correctly. This shall take account of the complexity of the work, the competence of the testing personnel, the risks associated with the testing, the likelihood of system failure and the proposed contingency plans.

The NR PE shall determine the level of Network Rail supervision, quality checks or audit of the testing process and personnel required, which shall be documented in the Test Strategy.

5.2 Responsibilities

The responsibilities for all persons involved in the testing and commissioning of telecoms assets on Network Rail infrastructure are defined in the Company Standard [NR/CS/TEL/30092](#), Telecommunication Testing and Commissioning Procedure. Specific responsibilities and required work may be expanded upon as per the requirements detailed within this Specification to add further clarity.

Ref:	NR/L2/TEL/30098
Issue:	2
Date:	26 August 2008
Compliance Date	26 August 2008

5.3 Appointment of PICOT

The PICOT shall be appointed upon completion of the Test Strategy as defined by section 7.2 of [NR/CS/TEL/30092](#) Telecommunication Testing and Commissioning Procedure. Should the Test Strategy be combined within the Test Plan the PICOT shall be appointed prior to the production of the Test Plan.

The NR PE shall approve the appointment of the PICOT confirming that the PICOT is competent in accordance with [GK/RT0101](#) – Competence Standards for Signalling and Telecommunications staff and RT/E/P/02009 – Engineering Management for Projects.

6 Testing Documentation

The production of the testing and commissioning documents shall take place as detailed by the flow chart shown below:-

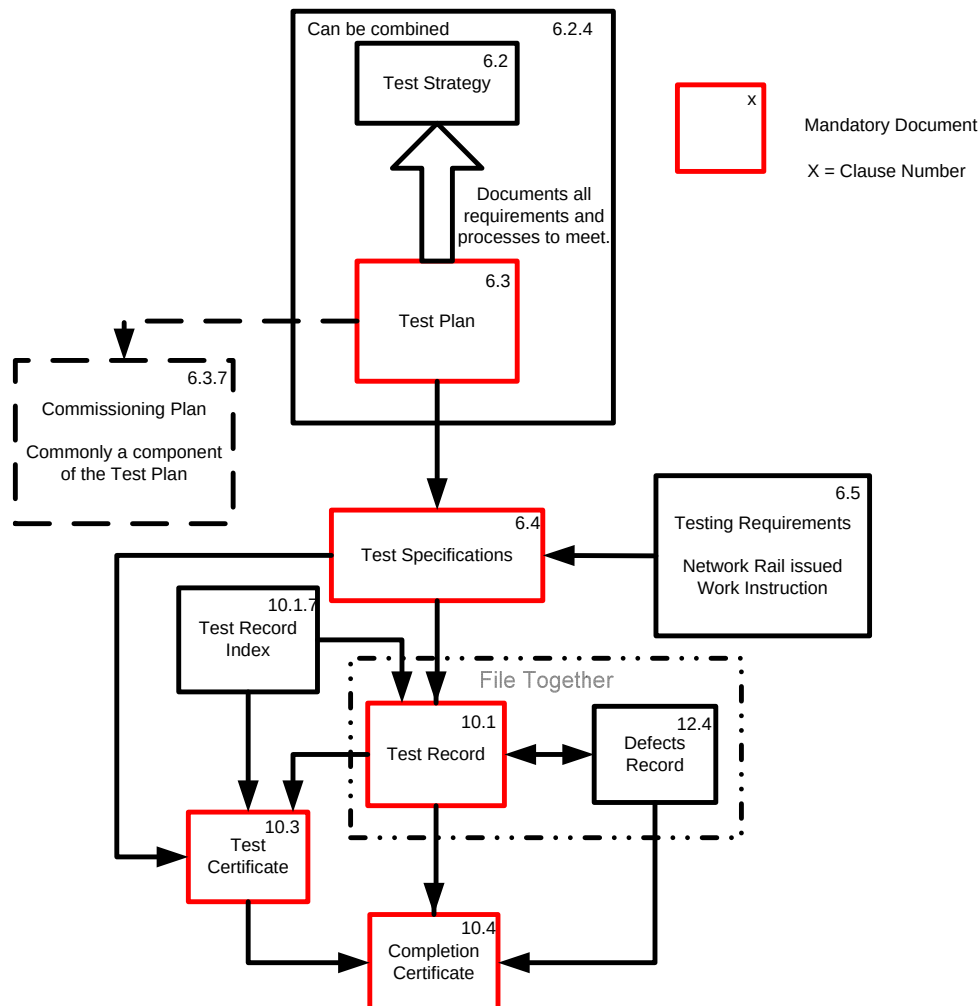


Figure 1: Document Requirements

Ref:	NR/L2/TEL/30098
Issue:	2
Date:	26 August 2008
Compliance Date	26 August 2008

6.1 Document Requirements

The extent of the documentation required is defined in Table 1 and shall be agreed between the NR PE and the CRE prior to the production of the initial documentation.

Document Title	Clause	Requirement	Responsible for production	Approved by	Accepted by
Test Strategy	6.2	telecommunications testing forms a part of a interdisciplinary scheme, e.g. re-signalling or SCADA scheme, otherwise the relevant strategic issues shall be covered in the Test Plan	CM	CRE	NR PE
Test Plan	6.3	Mandatory Document	PICOT	CRE	NR PE
Commissioning Plan	6.3.7	Commonly forms a part of the Test Plan, it is permissible for the details of the commissioning arrangements to be separately documented after the test plan is issued, where this facilitates the management of the testing.	PICOT	CRE	NR PE
Test Specifications	6.4	Mandatory Document	Testing and Commissioning Organisation	PICOT	NR PE
Testing Requirements	6.5	Network Rail issued Work Instruction that defines minimum test requirements through supporting work instructions	N/A	N/A	N/A
Test Record Index	10.1.7	Shall be produced when multiple Test Records are produced	PICOT	N/A	CRE
Test Record	10.1	Mandatory Document	Tester	N/A	CRE
Defects Record	12.1	Shall be produced upon detection of minor or major defects	PICOT	N/A	N/A
Test Certificate	10.3	Mandatory Document	PICOT	N/A	N/A
Completion Certificate	10.4	Mandatory Document	PICOT	N/A	NR PM

Table 1: Document Requirements

Ref:	NR/L2/TEL/30098
Issue:	2
Date:	26 August 2008
Compliance Date	26 August 2008

6.1.1

The testing and commissioning contractor may produce generic document portfolios for the testing and commissioning of common telecoms products.

6.2 Test Strategy

The Test Strategy, where required, documents the proposed testing methodology prepared on the basis of the project Telecommunication Requirement Specification and the Reference System Design. The CM is responsible for the production of the Test Strategy and its approval by the CRE. The CRE shall submit the Test Strategy for acceptance by the NR PE.

6.2.1

The Test Strategy shall include a documented assessment of the risks involved in undertaking the testing and commissioning and the mitigating measures to be undertaken to reduce the risks ALARP, refer to [GK/RT0209](#) – Testing and Commissioning of Signalling and Operational Telecoms Systems for details of possible risks for operational telecoms schemes and projects.

Where these assessments establish risks to the safe and effective running of the railway the Test Strategy shall include outline proposals for arrangements to mitigate these issues.

6.2.2

The Test Strategy shall be kept up to date during the project life cycle reflecting any changes made. Any changes shall be reviewed by the CRE and NR PE as a part of the change control process periodically throughout the duration of the project and shall be accepted by the NR PE.

6.2.3

The Test Strategy front sheet shall detail:

1. Project/Scheme Title and Reference Number
2. Contractors Project Managers and Responsible Engineers Names
3. Name and Signature of the Producer and Approver

Ref:	NR/L2/TEL/30098
Issue:	2
Date:	26 August 2008
Compliance Date	26 August 2008

6.2.4

The minimum Test Strategy headers are laid out in the list below and shall be used at all times, those having no relevance being marked as “not applicable”.

1. Revision History
2. Related Documents
3. Document Distribution
4. Project Scope
 - 4.1 Location
 - 4.2 Description of Work (including use of novel or specialist equipment)
 - 4.3 Outline Testing Requirements and Commissioning Date
 - 4.4 Dependencies and Inter Disciplinary Relations
 - 4.5 Communications, Transport and Accommodation
 - 4.6 Testing resources and Training Requirements
5. Stagerworks and Possessions
6. Project Testing Constraints
 - 6.1 Extent of Validation Testing
7. Test Plan Requirements
8. Safety Requirements Supervision and Audit Arrangements
 - 8.1 Risk Assessments
 - 8.2 Safety Case Requirements and Related Product Testing
9. Proposed Methods of Changeover
10. Documentation Required for Entry into Service

Further headers may be added to the Test Strategy where additional information is necessary.

6.2.5

Where the Test Strategy forms a part of the Test Plan, headers 6 and 8, as detailed in section 6.2.4, shall be added to the Test Plan header list.

6.3 Test Plan

A Test Plan shall be produced for all projects detailing all the information required to correctly test and commission the telecoms equipment/systems being installed including all the activities, resource requirements and timescales required as a part of the testing and commissioning process.

6.3.1

The PICOT is responsible for the production of the Test Plan and its approval by the CRE. The CRE shall submit the Test Plan for acceptance by the NR PE. .