ST S 43013

Perform circuit function testing of Signalling Works (SCS13)

Version 1.0

Date in Force: 28 May 2018
Perform circuit function testing of Signalling Works (SCS13) ST S 43013

Approved by: George Gadzuric
Professional Head Signalling and Control Systems
Engineering System Integrity

Authorised by: Jonathon Mckinnon
Engineering Technical Publications Manager
Systems Integrity

Disclaimer

This document was prepared for use by Sydney Trains or its contractors only.

All Sydney Trains engineering documents are periodically reviewed, and new editions are published, between editions, amendments may also be issued. It is the document user’s sole responsibility to ensure that the copy of the document they are viewing is the current version including any amendments that may have been issued. Errors or omissions in this document should be reported to Sydney Trains.

Sydney Trains makes no warranties, express or implied, that compliance with the contents of this document shall be sufficient to ensure safe systems or work or operation.

Document control

<table>
<thead>
<tr>
<th>Version</th>
<th>Date</th>
<th>Author/ Prin. Eng.</th>
<th>Summary of change</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>28 May 2018</td>
<td>Mark Albrecht</td>
<td>First issue as Sydney Trains</td>
</tr>
</tbody>
</table>

Summary of changes from previous version

<table>
<thead>
<tr>
<th>Summary of change</th>
<th>Section</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table of Contents

1  Perform Circuit Function Testing of Signalling Works (SCS13) ............... 4
1.1 Elements .............................................................................................................. 4
1.2 Performance Criteria ............................................................................................ 4
1.3 Range of Variables ............................................................................................... 7
1.4 Knowledge Requirements .................................................................................... 8
1.5 Competency Requirements ................................................................................. 9
1.6 Evidence Guide .................................................................................................... 9
1.7 Assessment Context .......................................................................................... 10
1 Perform Circuit Function Testing of Signalling Works (SCS13)

This unit covers the application of knowledge and skills required to perform circuit function testing of new or altered signalling works. (Non operational)

<table>
<thead>
<tr>
<th>1.1 Elements</th>
<th>1.2 Performance Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCS13.1 Prepare to carry out circuit function testing of signalling equipment</td>
<td>SCS13.1.1 Obtain all necessary documentation and work instructions.</td>
</tr>
<tr>
<td></td>
<td>SCS13.1.2 Accurately determine the scope of the work to be carried out, and the status of the previously tested equipment.</td>
</tr>
<tr>
<td></td>
<td>SCS13.1.3 Identify the circuit function tests to be carried out, the sequence in which they are to be performed, and the methods to be used.</td>
</tr>
<tr>
<td></td>
<td>SCS13.1.4 Ensure that all design documentation required for the work is available, accessible and a current approved issue.</td>
</tr>
<tr>
<td></td>
<td>SCS13.1.5 Ensure that documentation is available for reporting and recording the work to be undertaken in compliance with organisational requirements.</td>
</tr>
<tr>
<td></td>
<td>SCS13.1.6 Check that the resources provided, including competent staff, tools and calibrated equipment, are appropriate for the work.</td>
</tr>
<tr>
<td></td>
<td>SCS13.1.7 Ensure independence of testing - that testing staff did not install the installation under test.</td>
</tr>
<tr>
<td>1.1 Elements</td>
<td>1.2 Performance Criteria</td>
</tr>
<tr>
<td>--------------</td>
<td>---------------------------</td>
</tr>
<tr>
<td>SCS13.1.8</td>
<td>Ensure that all necessary planning and reporting arrangements for track access and worksite protection ('work on track') are completed, and work locations are accessed safely, notifications made within agreed timescales and in accordance with site access procedures.</td>
</tr>
<tr>
<td>SCS13.2</td>
<td>Safely manage work and interfaces to ensure that the circuit function testing does not compromise the integrity of the existing signalling system.</td>
</tr>
<tr>
<td>SCS13.2.1</td>
<td>Conduct a Risk Assessment to ensure that your work practices minimise the risk of damage or disturbance to equipment under test and other adjacent equipment.</td>
</tr>
<tr>
<td>SCS13.2.2</td>
<td>Clearly identify the boundaries between the installation under test and operational equipment, define the limits of circuit function testing.</td>
</tr>
<tr>
<td>SCS13.2.3</td>
<td>Ensure that the circuit function testing process and relevant information is communicated clearly to all team members.</td>
</tr>
<tr>
<td>SCS13.2.4</td>
<td>Where damage or disturbance to operational equipment occurs, or is noticed, ensure it is protected, reported and dealt with in accordance with organisational procedures.</td>
</tr>
<tr>
<td>SCS13.3</td>
<td>Lead Circuit Function Testing of the signalling installation to confirm compliance with design and specification</td>
</tr>
<tr>
<td>SCS13.3.1</td>
<td>Carry out the circuit function tests in an appropriate sequence using approved methods and procedures.</td>
</tr>
<tr>
<td>SCS13.3.2</td>
<td>Follow the appropriate procedures for use of tools and equipment to carry out the required circuit function tests.</td>
</tr>
<tr>
<td>SCS13.3.3</td>
<td>Record the results of all circuit function tests.</td>
</tr>
<tr>
<td>1.1 Elements</td>
<td>1.2 Performance Criteria</td>
</tr>
<tr>
<td>----------------------------------</td>
<td>------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td></td>
<td>SCS13.3.4 Review the test results and promptly resolve any inconsistent or incomplete test results.</td>
</tr>
<tr>
<td></td>
<td>SCS13.3.5 Identify any defects or variations from the circuit function testing activities and document them for appropriate action.</td>
</tr>
<tr>
<td></td>
<td>SCS13.3.6 Ensure that all tools, test devices, and equipment are removed on completion of testing – links in place, temporary bridges etc removed and accounted for, inspection area is clear, location is secured and notifications made within agreed timescales and in accordance with site access/egress procedures.</td>
</tr>
<tr>
<td></td>
<td>SCS13.3.7 Analyse and compare the test results against the design, installation and specification requirements to identify any faults or variations.</td>
</tr>
<tr>
<td>SCS13.4</td>
<td>Certification and the finalisation of circuit function testing and reporting activities</td>
</tr>
<tr>
<td></td>
<td>SCS13.4.1 Certify all circuit function test results.</td>
</tr>
<tr>
<td></td>
<td>SCS13.4.2 Report completion of activities in line with organisational procedure.</td>
</tr>
<tr>
<td>SCS13.5</td>
<td>Determine the status of the tested signalling systems &amp; equipment</td>
</tr>
<tr>
<td></td>
<td>SCS13.5.1 Confirm that all testing records are complete and accurately reflect the results of the testing activities carried out.</td>
</tr>
<tr>
<td></td>
<td>SCS13.5.2 Take effective and safe course of action to promptly resolve any inconsistencies in the test results.</td>
</tr>
<tr>
<td></td>
<td>SCS13.5.3 Handover to others the certified signalling installation which you have tested, including notifying any restrictions or limitations.</td>
</tr>
</tbody>
</table>
1.3 Range of Variables

Signal Location includes:

- Relay rooms
- Walk in locations
- Apparatus cupboards
- Signalling equipment outside a Relay room, walk in location, or apparatus cupboard

Relevant standards and instructions include:

- SWMS & SWI's
- Inspection and Testing Principles
- Inspection and Testing Procedures
- Signalling Safeworking Procedures
  - Risks and Controls Associated with Testing and Certifying Equipment
  - Renewals Work
  - Use of Radio Transmitters Near Electronic Signalling Systems
  - Safety Issues for Signalling Personnel
  - Signalling Locations and Equipment – Security Locks and Keys
  - Calibration of Tools and Instruments for Signalling Applications
- Equipment Specifications
- Manufacturers equipment manuals

Standard configuration documents and records include:

- Circuit Books
- Track plan / signalling plan or Detailed Site Surveys (DSS)
- Work Instructions
- Testing Plan

Work activities may include:

The Circuit Function Tester competency (refer MN S 41412) allows personnel to be able to work in a live signalling environment as outlined below:

- Carry out inspection and testing of new or altered signalling works in accordance with an Inspection and Test Plan provided by others and in conjunction with (SPG 0711.1 Roles, Responsibilities and Authorities Table 1 - Minimum Licensing or Authorisation requirements for suitably experienced personnel implementing New and Altered Works).
- The work may include leading a small team of Assistant Testers and / or Circuit Testers.
Perform circuit function testing of Signalling Works (SCS13) ST S 43013

- The work may be conducted as interface wiring or as standalone new work.

**Note:** This unit does not include verification that the system interlocking functions in compliance with design, or validation of the design to specifications and signalling principle

**Tests may include:**

The types of inspection and testing activities on new or altered signalling works is described in with *(SPG 0711.3 Inspection and Testing Principles Section 2.3 Table of Typical Inspections & Tests to Verify Physical & Functional Compliance)*.

- Contact Proving Test
- Circuit Function Test
- Circuit Strap and Function Test
- Through Circuit Function Test
- Through System Function Test
- Power Supply Polarity Test
- Power Supply Isolation Test
- Points Correspondence Test
- Points Out of Correspondence Test
- Earth leakage Test
- Tests from ST S 43012 may also be included which are:
  - Documentation Check
  - Correlation Checking
  - Apparatus Inspection
  - Wire Count
  - Null Count
  - Insulation Test
  - Bell Continuity Test
  - Hand Trace

### 1.4 Knowledge Requirements

The following underlying knowledge elements are requirements for the achieving of this competence

- Read and follow work instructions
- Read and interpret signalling documentation
- Correct selection and use of test equipment and meters or gauges
- Correct application of test methods
- Use of appropriate testing communication protocol
- Test recording and documentation
- Reporting and contact relationships
1.5 Competency Requirements

The following knowledge, competency and entry requirements shall be demonstrated as a prerequisite to the awarding of this competency:

Pre-Requisite Entry Requirements

- Rail Industry Safety Induction card (RISI)
- WHS General Construction Induction Training Card (GIT Card also known as White Card)
- Rail Safety Worker Category 1 Health
- Electrical Trades Certificate or Relevant Tertiary Qualification and
- Demonstrated experience in either Circuit Tester Authorisation or IRSE Licence 1.3.170 – Signalling Functional Tester.

Training Requirements

- TfNSW EI40 Sydney Trains Signalling Safeworking Procedures
- TfNSW ST46 Signal Circuit Inspection and Testing
- TfNSW EJ11 Electrical Installation Standards and Practice for Sydney Trains Signalling Equipment
- TfNSW EJ05 Signalling Principles 1
- TfNSW EJ06 Signalling Principles 2

Technical Competency requirements


Behavioural Competency requirements

- Working with people
- Adhering to principles and values
- Planning and organising
- Following instructions and procedures
- Coping with pressures and setbacks
- Deciding and initiating action
- Analysing

Note: Circuit Function Tester competency requires a Sydney Trains Authorisation as described in (MN S 41412) Process for Signalling Personnel – Authorisations & Licensing Section 6.1.

1.6 Evidence Guide

This provides essential advice for the assessment of the unit and must be read in conjunction with the performance criteria and range statement.

Each element and associated performance criteria must be demonstrated on at least two occasions, one of two being a practical demonstration.
Before the critical aspects of evidence are considered, all pre-requisites must be met.

Candidates demonstrate their knowledge and understanding of Circuit Function Testing by:

- Documentary evidence of appropriate training and qualifications held
- Responses to questioning by the competence assessor

Candidates demonstrate their competence to carry out inspection and circuit function testing of a new or altered signalling installation by:

- Log book showing relevant experience of inspection and testing of signalling works
- Supervisor’s report on testing and inspection performance.
- Practical demonstration of the required range of inspection and testing activities in a real or simulated signalling installation

**Critical aspects of evidence required to demonstrate competency in this unit:**

Demonstrated consistent performance across a representative range of contexts from the prescribed items below:

Perform Circuit Function testing of new signalling works including the following:

- Site access obtained correctly
- Interpreting signalling documentation correctly
- Identifying the risks of inspection and testing in a live Signal Location
- Mitigating the risks that were identified
- Directing and communicating effectively with team members
- Perform each of the individual inspection and testing activities listed in *(SPG 0711.3 Inspection and Testing Principles Section 2.3).*
- Completing relevant records and documentation
- Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items

**1.7 Assessment Context**

This unit should be assessed as it relates to normal workplace practice using procedures, information and resources typical of a workplace. This should include a suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible replicate the real workplace environment both behaviourally and functionally.