SEMRES321

Conduct specific testing of signalling electronic equipment

Overview

This standard identifies the competencies you need to conduct specific testing of high-integrity electronic signalling sub-systems to confirm their conformity to the authorised design. You will carry out specific testing activities to confirm that the electronic signalling equipment complies with specifications and to provide suitable and sufficient evidence to confirm that the equipment is fit for handover to bring it into operational use. The signalling equipment in this standard can be for overground or underground rail transportation systems and can apply to the European Train Control System (ETCS).

You will be required to use the appropriate tools and equipment throughout the testing activities, apply a range of methods and techniques to test the system equipment and make connections as appropriate to the equipment installed. Where appropriate, you may also work with computers or electronic controllers, making connections and testing hardware/software. The testing and checking activities will include making checks in line with your permitted authority and assisting others to ensure that the signalling equipment functions to the required specifications.

On completion, you will ensure the work area is cleared of all tools, equipment, and materials, and complete job documentation accurately. Collaboration and following instructions are key. As a result of the tests, you will determine whether the system is functioning correctly and appropriately to the authorised design and identify any faults or variations to the specifications.

Safety is a key theme; you must practice and demonstrate safe working methods, understanding and implementing necessary precautions to protect yourself and others.

Performance criteria

You must be able to:

P1 maintain safe working practices and comply with all relevant health and safety regulations, directives, and guidelines
P2 determine the scope of the work to be carried out and the status of the previously tested equipment
P3 confirm that all the required documentation is available and the information supplied is accurate in its identification of the work to be completed
P4 identify any necessary changes to safety requirements upon site arrival and report to the relevant person(s) without delay
P5 identify and interpret the appropriate procedures and instructions for use of tools and test equipment when carrying out the required tests to ensure that true and accurate measurements are taken
P6 confirm that the tests/checks are appropriate to the equipment and are in line with testing procedures/instructions
P7 set up and carry out the tests/checks using approved procedures and within agreed timescales
P8 carry out tests/checks as required by the test plan in sufficient detail to establish the equipment status
P9 confirm that all testing records are complete and reflect the results of the testing activities carried out
P10 analyse any test evidence and ensure it is thorough and identifies the state of the completed testing
P11 compare the analysis against the product specification and identify any faults or variations from specification
P12 identify, analyse and deal with any inconsistencies in the test data
P13 ensure all actions are taken within the limits of your own authority and where doubt arises you seek advice from suitable reference documents or relevant person(s)
P14 record the results of the tests in the appropriate format
P15 check that the progression of work is recorded in full and in line with your organisation's procedures
P16 review the results and carry out further tests if necessary
P17 confirm compliance with the design details, specifications, industry standards, wiring diagrams and plans in accordance with testing instructions
P18 protect, report and deal with any damage or disturbance to operational equipment

in accordance to operational processes

P19 define the limits of testing and identify the boundaries between the product under test and operational equipment and performance of signalling assets

Knowledge and understanding

You need to know and understand:

K1 the relevant health and safety regulations, directives, guidelines, and safe working practices and procedures defined by your organisation, as appropriate to the activity and your working area
K2 the relevant railway possession and protection arrangements for the work site and equipment to provide a safe system of work and how to check these have been implemented
K3 how to locate and access the site
K4 how to secure the system for testing purposes
K5 how to define the limits of testing to ensure operational equipment is not affected
K6 the activities which may compromise system functionality and integrity including the operational constraints to carrying out testing activities
K7 how to identify, analyse and deal with influencing factors whilst carrying out the tests, including environmental factors
K8 the isolation and lock-off procedure or permit-to-work procedure that applies to the system (such as electrical isolation, locking off switchgear, placing of warning notices, proving the isolation has been achieved and secured)
K9 the classification of different voltage levels and the authority requirements for working on them
K10 what constitutes a hazardous voltage/current and how to recognise victims of electric shock
K11 how to reduce the risks of an electric shock (such as insulated tools, rubber matting and isolating transformers)
K12 the importance of wearing protective clothing and other appropriate safety equipment (PPE) during the testing activities
K13 the hazards associated with carrying out signalling test activities (such as stored energy, radio frequency radiation, electrical supplies, electrical/electronic interfaces, using damaged or ill-maintained tools and equipment, not following laid-down testing procedures), and how to minimise these and reduce any risks
K14 how to source, interpret and analyse relevant technical information, standards diagrams, instructions, specifications and control tables and other related information, including as appropriate, previous testing information
K15 how to locate and identify the equipment to be tested and/or checked
K16 the principles of operation of the equipment to be tested

K17 the correct mode of operation of the system, equipment and/or component to be tested, including acceptable operational variances
K18 the types of analytical methods and techniques in checking and testing, including as appropriate, observation, calculation and comparison
K19 your organisation's procedures for the use, care and control of inspection tools and equipment including as appropriate calibration procedures
K20 how to select and use the correct tools and test equipment and confirm they are suitable for use and calibrated
K21 the importance of calibrating tools and test equipment
K22 the procedures and precautions to be adopted to eliminate electrostatic discharge (ESD) hazards when working with and handling electronic devices
K23 how to interpret and analyse information from measuring instruments, including as appropriate, performing calculations
K24 how to use test equipment so as to ensure true and accurate measurements are taken
K25 the types of defects or variations that could occur in signalling equipment, products and assets
K26 how defects and variations can affect the safety and performance of signalling system
K27 what constitutes a significant defect or variation
K28 the procedures for the control of a non-conforming component or asset
K29 when independent testing is required
K30 the transfer of responsibility procedures for signalling products and assets
K31 the conditions that must be fulfilled prior to transfer of responsibility of the allocated tasks
K32 how to verify that the testing has been completed
K33 the procedures for the control of testing
K34 the relevant reporting lines and procedures that are approved by your organisation
K35 the limits of your own authority and responsibility and those of others involved

Scope/range related to performance criteria

1.
Types of health and safety legislation, regulations and safe working practices and procedures, as applicable to the work location and activities, could include:
2.
Site testing locations could include:
3.
Types of signalling electronic equipment, on which testing is conducted, could include:

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