SEMRETRS307

Maintain electrical equipment within a traction and rolling stock system

Overview

This standard identifies the competencies you need to carry out corrective maintenance activities on electrical equipment within a traction and rolling stock system, in accordance with approved procedures. You will be required to maintain a range of electrical equipment, such as single and three-phase power supplies, traction motors, switchgear and distribution panels, control systems and equipment, and luminaries, which are working in an integrated system involving two of the following interactive technologies: mechanical systems, fluid power or process controller. The term traction and rolling stock used in this standard applies to passenger, freight and on-track machines (OTM). Where it is relevant these standards also apply to traction and rolling stock that has been fitted with the European Train Control System (ETCS).

You will be expected to isolate and disconnect items and components of the interactive technologies, in order to gain access to and remove the electrical units and components that require replacing or repair. This will involve dismantling and reassembling a variety of different types of electrical equipment which, in some instances, may need to be dismantled to the component level.

Your underpinning knowledge will provide a good understanding of your work and will provide an informed approach to applying electrical maintenance procedures within a traction and rolling stock system. You will also know about the integrated technology assemblies and sub-assemblies, their properties, functions and associated defects, in adequate depth to provide a sound basis for carrying out the dismantling and reassembly process effectively. You will understand the maintenance methods and procedures used, and their application within a traction and rolling stock system, in sufficient depth to be able to carry out the maintenance activities, correct faults, and ensure that the repaired equipment functions to specification and remains compliant with all standards and regulations. You will also know about the interaction of the other associated integrated technologies and have sufficient knowledge to carry out the maintenance and testing safely and effectively.

You will be required to demonstrate safe working practices throughout.

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 follow the relevant maintenance schedules to carry out the required work
P3 carry out the maintenance activities within the limits of your personal authority
P4 carry out the maintenance activities in the specified sequence and in an agreed timescale
P5 report any instances where the maintenance activities cannot be met or where there are identified defects outside the planned schedule
P6 complete relevant maintenance records and pass them on to the appropriate person
P7 dispose of waste materials in accordance with safe working practices and approved procedures

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 isolation and lock-off procedure or permit-to-work procedure that applies to the system (such as electrical isolation, locking off switchgear, placing of maintenance warning notices, proving the isolation has been achieved and secured)
K3 the specific health and safety precautions to be applied during the maintenance activity, and their effects on others
K4 the classification of different voltage levels and the authority requirements for working on them
K5 what constitutes a hazardous voltage/current and how to recognise victims of electric shock
K6 how to reduce the risks of an electric shock (such as insulated tools, rubber matting and isolating transformers)
K7 the importance of wearing protective clothing and other appropriate safety equipment (PPE) during the maintenance activities
K8 hazards associated with carrying out electrical maintenance activities on an integrated system (such as handling fluids, stored pressure/force, electrical supplies, electrical/electronic interfaces, using damaged or ill-maintained tools and equipment, not following laid-down maintenance procedures), and how to minimise these and reduce any risks
K9 how to obtain and interpret drawings, charts, specifications, manufacturers' manuals, history/maintenance reports, graphical electrical symbols, wiring regulations and other documents needed for the maintenance activities
K10 the principles of how the system functions, its operation sequence, the working purpose of individual units/components, and how they interact with other systems such as ETCS, AWS or TPWS and Wheel Slip/Slide protection circuits
K11 the procedures and precautions to be adopted to eliminate electrostatic discharge (ESD) hazards when working with and handling electronic devices
K12 the different types of cabling and their application (such as multi-core cables, single-core cables, steel wire armoured (SWA), data cables, fibre optic cables, screened cables)
K13 the different types of electric traction motors

K14 the different types of control systems and their various components
K15 the application and use of a range of electrical components (such as plugs, switches, sockets, lighting and fittings, junction boxes, relays, protection devices)
K16 the various lighting systems used including tungsten, light emitting diodes (LED), sodium, mercury vapour and fluorescent
K17 the different types of wiring supports that are used (to include conduit, trunking and traywork systems)
K18 the care, handling, pre use checks and application of multimeters and other electrical measuring instruments
K19 the procedure for obtaining replacement parts, materials and other consumables necessary for the maintenance activities
K20 company policy on repair/replacement of components during the maintenance activities
K21 the techniques used to dismantle/assemble integrated equipment (such as release of pressures/force, proof marking to aid re-assembly, plugging exposed pipe/component openings, dealing with soldered joints, screwed, clamped and crimped connections)
K22 methods of removing and replacing cables and wires in wiring enclosures, without causing damage to existing cables
K23 the use of manufacturers data when selecting wires and cables, and when carrying out tests on systems
K24 methods of attaching identification marks/labels to removed components or cables, to assist with re-assembly
K25 methods of checking that components are fit for purpose, and the need to replace `lifed' items (such as motor brushes, seals and gaskets, and overload protection devices)
K26 the importance of recording the serial numbers of removed and newly fitted components affecting the rolling stock asset tree
K27 the maintenance requirements for 'lifed', consumable and on condition components
K28 how to make adjustments to components/assemblies
K29 how to check that tools and equipment are free from damage or defects, are in a safe and usable condition, and are configured for the intended purpose
K30 the importance of making system integrity checks before proving the equipment with the electrical supply on
K31 the generation of maintenance documentation and/or reports on completion of the

maintenance activity
K32 the equipment operating and control procedures to be applied during the maintenance activity
K33 how to use lifting and handling equipment in the maintenance activity
K34 the problems that can occur during the electrical maintenance activity, and how they can be overcome
K35 the organisational procedure to be adopted for the safe disposal of waste of all types of materials
K36 the extent of your own authority and to whom you should report if you have a problem that you cannot resolve
K37 the steps to be followed to vent or de-pressurise the areas to be worked on

Scope/range related to performance criteria

1.
During the maintenance activity, as applicable to the equipment being maintained, individuals will:
2.
Appropriate dismantling and re-assembly techniques may be used to deal with the following:
3.
Types of electrical equipment, on which maintenance activities are carried out, could include:
4.
Types of maintenance activities carried out, as applicable to the equipment being maintained, could include:
5.
Types of electrical components to be replaced/refitted could include the following:
6.
Maintenance activities may need to comply with the following:
7.
Types of paperwork/records that need to be completed and passed to the appropriate people could include:

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