PROMT11
Maintaining electrical equipment

Overview

This standard identifies the competences you need to carry out corrective maintenance activities on electrical equipment, in accordance with approved procedures. You will be required to maintain a range of electrical equipment, such as single, three-phase and direct current power supplies and control systems, motors and starters, switchgear and distribution panels, control systems, electrical equipment, wiring enclosures and luminaires. This will involve dismantling, removing and replacing faulty equipment, at component or unit level, on a variety of different types of electrical assemblies and sub-assemblies. You will be expected to apply a range of dismantling and reassembly methods and techniques, such as soldering, crimping, harnessing and securing cables and components.

Your responsibilities will require you to comply with organisational policy and procedures for the maintenance activities undertaken, and to report any problems with the maintenance activities that you cannot personally resolve, or that are outside your permitted authority, to the relevant people. You must ensure that all tools, equipment, and materials used in the maintenance activities are removed from the work area on completion of the activities, and that all necessary job/task documentation is completed accurately and legibly. You will be expected to work with minimal supervision, taking personal responsibility for your actions, and for the quality and accuracy of the work that you carry out.

Your underpinning knowledge will provide a good understanding of your work, and will provide an informed approach to applying electrical maintenance procedures. You will understand the dismantling and reassembly methods and procedures used, and their application. You will know about the electrical equipment worked on, component properties, functions and associated defects, in adequate depth to provide a sound basis for carrying out the maintenance activities, correcting faults and ensuring that the repaired equipment functions to the required specification and remains compliant with all standards and regulations.

You will understand the safety precautions required when carrying out the maintenance activities, especially those for isolating the equipment. You will also understand your responsibilities for safety and the importance of taking the necessary safeguards to protect yourself and others in the workplace.

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Performance criteria

You must be able to:

P1	Work safely at all times, complying with health and safety and other relevant regulations 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 time scale
P5	Report any instances where the maintenance activities cannot be fully met or where there are identified defects outside the planned schedule
P6	Complete relevant maintenance records accurately and pass them on to the appropriate person
P7	Dispose of waste materials in accordance with safe working practices and approved procedures

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Knowledge and understanding

You need to know and understand:

K1	The health and safety requirements of the area in which the maintenance activity is to take place, and the responsibility these requirements place on you
K2	The isolation and lock-off procedure or permit-to-work procedure that applies to maintenance activities (such as electrical isolation, locking off switchgear, removal of fuses, placing of maintenance warning notices, proving the isolation has been achieved and secured)
K3	How to recognise and deal with victims of electric shock (to include methods of safely removing victim from power source, isolating the power source, and methods of first aid resuscitation)
K4	Hazards associated with carrying out electrical maintenance activities (such as contact with live electrical components, misuse of tools, using damaged or badly maintained tools and equipment, not following laid-down maintenance procedures), and how to minimise these and reduce any risk
K5	The importance of wearing protective clothing and other appropriate safety equipment during the maintenance activities
K6	How to obtain and interpret drawings, circuit and physical layouts, charts, specifications, manufacturers' manuals, history/maintenance reports, graphical electrical symbols, BS7671/IEE wiring regulations, and other documents needed for the maintenance activities
K7	The purpose of the components which have been replaced/maintained
K8	The different types of cabling and their application (such as multicore cables, single core cables, steel wire armoured (SWA), mineral insulated (MI), screened cables)
K9	The different types of electric motors and motor starters
K10	The different types of control system, and their various components
K11	The application and use of a range of electrical components (such as plugs, switches, sockets, lighting and fittings, junction boxes, consumer units)
K12	The various lighting systems used (including tungsten, sodium, mercury vapour and fluorescent)
K13	The different types of wiring enclosures that are used (to include conduit, trunking and traywork systems)
K14	The care, handling and application of ohmmeters, multimeters and other electrical measuring instruments
K15	Company policy on the repair/replacement of components, and the procedure for obtaining replacement parts, materials and other consumables necessary for the maintenance activities
K16	How to check that the replacement components meet the required specification/operating conditions (such as values, tolerance, current carrying capacity, voltage rating, power rating, working temperature range)

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Knowledge and understanding

K17	The techniques used to dismantle/assemble electrical equipment (such as unplugging, de-soldering, removal of screwed, clamped and crimped connections)
K18	Methods of removing and replacing cables and wires in wiring enclosures without causing damage to existing cables
K19	The use of BS7671/IEE wiring, and other, regulations when selecting wires and cables and when carrying out tests on systems
K20	Methods of attaching identification markers/labels to removed components or cables to assist with re-assembly
K21	The tools and equipment used in the maintenance activities (including the use of cable stripping tools, crimping tools, soldering irons and torches, gland connecting tools)
K22	Methods of checking that components are fit for purpose, and the need to replace ‘lifed’ items (such as motor brushes, seals and gaskets overload protection devices)
K23	How to make adjustments to components/assemblies to ensure they function correctly
K24	How to check tools and equipment are free from damage or defects, are in a safe and usable condition, and are configured correctly for the intended purpose
K25	The importance of making ‘off-load’ checks before proving the equipment with the electrical supply on
K26	The generation of maintenance documentation and/or reports following the maintenance activity
K27	The equipment operating and control procedures to be applied during the maintenance activity
K28	How to use appropriate lifting and handling equipment in the maintenance activity
K29	The problems that can occur during the electrical maintenance activity, and how they can be overcome
K30	The organisational procedure(s) to be adopted for the safe disposal of waste of all types of materials
K31	The extent of your own authority and to whom you should report if you have a problem that you cannot resolve

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Scope related to performance criteria

1 Carry out all of the following maintenance activities:

1.1 plan and communicate the maintenance activities to cause minimal disruption to normal working
1.2 obtain and use the correct issue of company and/or manufacturers' drawings and maintenance documentation
1.3 adhere to procedures or systems in place for risk assessment, COSHH, personal protective equipment and other relevant safety regulations and procedures to realise a safe system of work
1.4 ensure the safe isolation of equipment (such as electricity, mechanical, gas, air or fluids)
1.5 provide and maintain safe access and working arrangements for the maintenance area
1.6 carry out the maintenance activities using appropriate techniques and procedures
1.7 re-connect and return the equipment to service on completion of the maintenance activities
1.8 dispose of waste items in a safe and environmentally acceptable manner, and leave the work area in a safe condition

2 Carry out maintenance activities on eight of the following types of electrical equipment:

2.1 single-phase power supplies
2.2 three-phase power supplies
2.3 direct current power supplies
2.4 motors and starters
2.5 switchgear and distribution panels
2.6 control systems and components
2.7 electrical plant
2.8 wiring enclosures
2.9 luminaires
2.10 other specific electrical equipment

3 Carry out all of the following maintenance activities, as applicable to the equipment being maintained:

3.1 isolating and locking-off equipment
3.2 disconnecting and reconnecting wires and cables
3.3 attaching suitable cable identification markers
3.4 removing electrical units/components
3.5 checking components for serviceability
3.6 replacing damaged/defective components
3.7 removing and replacing damaged wires and cables

Scope related to performance criteria

3.8 removing and replacing wiring enclosures
3.9 setting and adjusting replaced components
3.10 making ‘off-load’ checks before powering up
3.11 functionally testing the completed system

4 Replace/refit a range of electrical components, to include ten of the following groups of components:

4.1 cables and connectors
4.2 contactors
4.3 relay components
4.4 overload protection devices
4.5 locking and retaining devices (cable ties, clips, proprietary fasteners)
4.6 lighting fixtures
4.7 batteries
4.8 switches and sensors
4.9 capacitors
4.10 rectifiers
4.11 encoders or resolvers
4.12 inverter and servo controllers
4.13 circuit boards
4.14 thermistors or thermocouples
4.15 solenoids
4.16 transformers
4.17 other specific components

5 Maintain electrical equipment to one of the following:

5.1 organisational guidelines and codes of practice
5.2 equipment manufacturers operation range
5.3 BS7671/IEE wiring regulations
5.4 BS, ISO and/or BSEN standards

6 Complete the relevant paperwork from one of the following, and pass it to the appropriate people:

6.1 job cards
6.2 maintenance logs or reports permits to work/formal risk assessment and/or sign on/off procedures
6.3 company specific documentation

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