

Overview

This standard identifies the competences you need to carry out corrective maintenance activities to process control equipment, in accordance with approved procedures. This will involve dismantling, removing and replacing faulty peripheral components and process controller units, in line with company policy on process control equipment, such as fixed I/O, rack mount and modular systems. You will also need to be able to load and download process control programs, check them for errors, make authorised edits, and create and maintain back-up copies of completed programs.

Your responsibilities will require you to comply with organisational policy and procedures for the maintenance activities undertaken, and to report any problems with these activities, or with the process control system, tools or equipment used, that you cannot personally resolve, or are outside your permitted authority, to the relevant people. You will be expected to work to instructions, alone or in conjunction with others, taking personal responsibility for your own actions, and for the quality and accuracy of the work that you carry out.

Your underpinning knowledge will be sufficient to provide a sound basis for your work, and will enable you to adopt an informed approach to applying maintenance procedures to process control systems. You will have an understanding of dismantling and reassembly methods and procedures, and their application. You will know how the process control system functions and the purpose of individual components, in adequate depth to provide a sound basis for carrying out any repair or adjustment. In addition, you will have sufficient knowledge of these components to ensure that they are fit for purpose and meet the specifications, thus providing a sound basis for carrying out reassembly. You will also know about the interaction of the other associated integrated technologies, and will have sufficient knowledge to carry out the dismantling and reassembly of the process control system, safely and effectively.

You will understand the safety precautions required when carrying out the maintenance activities, especially those for isolating the equipment. You will be required to demonstrate safe working practices throughout, and will understand your responsibility for taking the necessary safeguards to protect yourself and others in the workplace.

Performance criteria

You must be able to:

- P1 work safely at all times, complying with health and safety and other relevant 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 deal with problems within your control and report those that cannot be solved
- P6 complete and store all relevant documentation in accordance with organisational requirements
- P7 dispose of waste materials in line with organisational and environmentally safe procedures

Knowledge and understanding

You need to know and understand:

- K1 how to work safely at all times, complying with health and safety and other relevant regulations, directives and guidelines
- K2 the importance of wearing the appropriate personal protective equipment (PPE), and of keeping the work area clean and tidy
- K3 how to obtain and interpret information from job instructions and other documents needed for the maintenance activities
- K4 the basic principles of how the system functions, and its operating sequence
- K5 the devices and systems for storing programmes
- K6 how to search the user program within the process controller for specific elements

- K7 the techniques involved in editing, and the procedure to be followed for 'on' and 'off-line' programming
- K8 the procedure for obtaining replacement parts, materials and other consumables necessary for the maintenance process
- K9 the techniques used to dismantle/assemble equipment
- K10 methods of attaching identification marks/labels to removed components or cables, to assist with reassembly
- K11 methods of checking that components are fit for purpose, and the need to replace batteries, boards and other failed items
- K12 how to check that tools and equipment are free from damage or defects, are in a safe and usable condition, and are configured correctly for their intended purpose
- K13 the importance of making 'off-load' checks before proving the equipment with the electrical supply on
- K14 the generation of maintenance documentation and/or reports following the maintenance activity
- K15 the equipment operating and control procedures to be applied during the maintenance activity
- K16 how to use lifting and handling equipment correctly and safely in the maintenance activity
- K17 the issues that can occur during the maintenance of the process control system, and how they can be overcome
- K18 the organisational procedure to be adopted for the safe disposal of waste of all types of materials

K19 the extent of your own responsibility and to whom you should report if you have problems that you cannot resolve

Scope/range related to performance criteria

1. Carry out all of the following during the maintenance activities:
 - 1.1. undertake the maintenance activities to cause minimal disruption to normal working
 - 1.2. use the correct issue of maintenance documentation (such as drawings, manuals, maintenance records, schedules)
 - 1.3. adhere to procedures or systems in place for risk assessment, 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 mechanical, electricity, gas, air or fluids)
 - 1.5. ensure that safe access and working arrangements have been provided for the maintenance area
 - 1.6. carry out the scheduled maintenance tasks, 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
 - 1.9. leave the work area in a safe and tidy condition

2. Carry out maintenance activities on one of the following types of process controller equipment:
 - 2.1. fixed input/output (I/O)
 - 2.2. modular
 - 2.3. rack mount

3. Carry out four of the following program maintenance activities on the process control system:
 - 3.1. select and use appropriate programming devices (such as terminals, hand-held programmers and personal computers)
 - 3.2. programme by computer-based authoring (to include subroutines)
 - 3.3. use ladder logic, statement lists, or system flowcharts
 - 3.4. carry out on-line monitoring of programs
 - 3.5. produce back-ups of completed programs
 - 3.6. use 'on' and 'off-line' programming
 - 3.7. edit, enter and remove contacts from lines of logic

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- 3.8. use single-step mode of operation
 - 3.9. load, read and save programs
 - 3.10. alter counter and timer settings
 - 3.11. force contacts on and off
4. Carry out all of the following maintenance activities:
 - 4.1. take electrostatic discharge (ESD) precautions when handling components and circuit boards
 - 4.2. proof mark or label removed wires and components
 - 4.3. replace peripheral devices (such as sensors, actuators, relays, switches)
 - 4.4. replace components (such as power supplies, circuit boards and controller units)
 - 4.5. check components for serviceability
 - 4.6. use program 'full-run' modes of operation
 - 4.7. replace back-up batteries (as appropriate)
 - 4.8. functionally test the system
 - 4.9. record the results of the maintenance activity
 - 4.10. report or take action with regard to any defects that require immediate attention (such as replacing non-'lified' components)
5. Maintain process control equipment, in accordance with one of the following:
 - 5.1. BS7671/IET wiring regulations
 - 5.2. BS, ISO and/or BSEN standards
 - 5.3. organisational guidelines and codes of practice
 - 5.4. equipment manufacturer's operation range
6. Complete one of the following maintenance records, and pass it to the appropriate person:
 - 6.1. job cards
 - 6.2. permits to work/formal risk assessment and/or sign-on/off procedures
 - 6.3. maintenance log or report
 - 6.4. organisational specific documentation
 - 6.5. electronic reports

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