IMPEM161

Carry out fault diagnosis on instrumentation and control equipment and circuits used in food and drink operations

Overview

This standard identifies the competences you need to carry out efficient and effective fault diagnosis on instrumentation and control equipment and circuits used in food and drink operations, in accordance with approved procedures.

You will be able to diagnose faults on a range of instrumentation and control equipment, including pressure, flow, level and temperature instruments; fiscal monitoring equipment; smoke, heat, gas, water, chemical and metal detection and alarm systems; industrial weighing systems; linear and rotational speed measurement; vibration monitoring equipment; photo-optic instruments; analysers, recorders and indicators; telemetry systems; emergency shutdown systems and other specific instrumentation, both at assembly and component level.

You will be able to use a variety of fault diagnostic methods and techniques, and to utilise a number of diagnostic aids and equipment. From the evidence gained, you will be expected to identify the fault and its probable cause, and to determine appropriate action to remedy the problem. Food and drink operations is a term used in this standard to cover the following sub sectors of Meat, Drinks, Confectionery, Fresh Produce, Bakery, Seafood and Dairy.

Your will be able to comply with organisational policy and procedures for the fault diagnostic activities undertaken, and to report any problems with these activities or with the tools and equipment used that you cannot personally resolve, or that are outside your permitted authority, to the relevant people. You will be expected to work with a minimum of supervision, taking personal responsibility for your own actions, and for the quality and accuracy of the work that you carry out.

Performance criteria

You must be able to:

1. work safely at all times, complying with health and safety, environmental and other relevant food and drink regulations, directives and guidelines
2. obtain and use the correct issue of company and/or manufacturers' drawings and maintenance documentation
3. plan the fault diagnosis using available information about the fault
4. review and use all relevant information on the symptoms and problems associated with the product or asset
5. investigate and establish the most likely causes of the fault or faults
6. insert or override any relevant system trip defeats (including fire extinguishant, emergency shutdown) in accordance with organisational procedures
7. provide and maintain safe access and working arrangements for the fault finding/maintenance area
8. use electrostatic discharge (ESD) precautions in accordance with organisational procedures
9. select, use and apply diagnostic techniques, tools and aids to locate faults
10. collect equipment fault diagnostic evidence from `live' and isolated circuits
11. disconnect or isolate components, or parts of circuits, to confirm the diagnosis in accordance with organisational procedures
12. complete the fault diagnosis in accordance with organisational procedures
13. determine the implications of the fault or faults for other work and for safety considerations
14. use the evidence gained to draw valid conclusions about the nature and probable cause of the fault or faults
15. complete records and documentation in accordance with organisational requirements
16. dispose of waste materials in accordance with safe working practices and approved procedures

Knowledge and understanding

You need to know and understand:

1. the health and safety and environmental requirements of the area in which the fault diagnosis activity is to take place, and the responsibility these requirements place on you not to compromise food safety
2. the isolation and lock-off procedure or permit-to-work procedure that applies to the system, including the critical control points
3. the specific health and safety food and drink precautions to be applied during the fault diagnosis activity, and their effects on others
4. the requirements of the British Retail Consortium (BRC) guidelines and standards in relationship to the fault diagnosis activities
5. the specific requirements of your customer/client specifications in relationship to the fault diagnosis activities
6. your responsibilities in relationship to Hazard Analysis and Critical Control Points (HACCP), Threat Assessment and Critical Control Points (TACCP), Vulnerability Assessment and Critical Control Points (VACCP) during the fault diagnosis activities
7. what constitutes a hazardous voltage and how to recognise victims of electric shock
8. how to reduce the risks of a phase to earth shock (including insulated tools, rubber mating and isolating transformers)
9. the importance of wearing protective clothing and other appropriate safety equipment (PPE) during the fault diagnostic activities
10. hazards associated with carrying out fault diagnosis on instrumentation and control equipment (including contact with live electrical connections; stored energy including pneumatic, hydraulic, capacitive/inductive/electrostatic; misuse of tools), and how to minimise them to reduce any risks
11. the basic principles of how the instrumentation and control circuit functions, its operating sequence, the working purpose of individual units/components and how they interact
12. the principles of the equipment's design features for safe operation in a food or drink environment including minimising the chance of contaminates or foreign

bodies in the final product
13. the procedure to be adopted to establish the background of the fault
14. how to evaluate the various types of information available for fault diagnosis
15. how to use the various aids and reports available for fault diagnosis
16. how to use various types of fault diagnostic equipment needed to investigate the problem
17. the various fault finding techniques that can be used (including half-split, input-to-output, emergent problem sequence, six point technique, function testing, unit substitution, injection and sampling techniques, and equipment self-diagnostics), and how they are applied
18. how to evaluate sensory conditions (by sight, sound, smell, touch)
19. how to analyse evidence and evaluate possible characteristics and causes of specific faults/problems
20. how to relate previous reports/records of similar fault conditions
21. the care, handling and application of instrumentation test instruments (including multimeters, logic probes, oscilloscopes, signal tracers, signal generators)
22. how to check that test instruments are within current calibration dates, and that they are free from damage and defects
23. the precautions to be taken to prevent electrostatic discharge (ESD) damage to electronic circuits and components
24. the processes in place to segregate the tools and equipment used into high or low risk areas
25. the checks required to ensure that all tools, materials and components are all accountable before operating the equipment
26. how to obtain instrumentation drawings, circuit and physical layouts, charts, specifications, manufacturers' manuals, history/maintenance reports, and other documents needed in the fault diagnostic activities
27. the cleaning requirements/policies in place before returning the equipment into full operational production
28. the reasons for making sure that control systems are isolated or put into manual control, and appropriate trip locks, keys or program overrides are inserted, before isolating any sensors or instruments from the system
29. how to evaluate the likely risk to yourself and others, and the effects the fault could have on the overall system or process
30. how to prepare a report, or take follow-up action, on conclusion of the fault

diagnosis, in accordance with company policy

31. the extent of your own authority and to whom you should report if you have problems that you cannot resolve

IMPEM161

Carry out fault diagnosis on instrumentation and control equipment and circuits used in food and drink operations

Developed by	Improve
Version Number	3
Date Approved	26 Feb 2021
Indicative Review Date	31 Jan 2024
Validity	Current
Status	Original
Originating Organisation	NSAFD
Original URN	IMPEM161
Relevant Occupations	Manufacturing Technologies, Plant and Machine Operatives, Process Operatives, Process, Plant and Machine Operatives
Suite	Food and Drink
Keywords	Food and Drink; Fault diagnosis; instrumentation; control equipment; control circuits; engineering; maintenance; manufacturing; diagnostic techniques; faults; maintenance documentation.