

**EM161** Carry out fault diagnosis on instrumentation and control equipment and circuits used in food and drink operations

**SQA Unit Code**

**HD69 04**

**Level 3**

**SCQF Level 6**

**Credit value 58**

**Unit Summary**

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 required 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 expected 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 responsibilities will require you 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.

In order to be assessed as competent you must demonstrate to your assessor that you can consistently perform to the requirements set out below. Your performance evidence must include at least one observation by your assessor.

You must be able to:	You need to show:
<p>1. Carry out fault diagnosis on instrumentation and control equipment and circuits used in food and drink operations</p> <p>This means you:</p> <p>Work safely at all times, complying with health and safety and other relevant food and drink regulations, directives and guidelines</p>	<p>Evidence must be work-based, simulation alone is only allowed where shown in <b><i>bold italics</i></b></p> <p>Evidence of carrying out fault diagnosis on instrumentation and control equipment and circuits used in food and drink operations as part of your role in accordance with workplace procedures and within the limits of your own responsibilities.</p>

<p>Review and use all relevant information on the symptoms and problems associated with the product or asset</p> <p>Investigate and establish the most likely causes of the fault or faults</p> <p>Select, use and apply diagnostic techniques, tools and aids to locate faults</p> <p>Complete the fault diagnosis within the agreed time and inform the appropriate people when this cannot be achieved</p> <p>Determine the implications of the fault or faults for other work and for safety considerations</p> <p>Use the evidence gained to draw valid conclusions about the nature and probable cause of the fault or faults</p> <p>Record details on the extent and location of the faults in an appropriate format</p>	
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You need to know and understand:

Evidence of knowledge and understanding should be collected during observation of performance in the workplace. Where it cannot be collected by observing performance, other assessment methods should be used.

1. the health and safety 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, TACCP, 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 contaminants 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

Evidence of performance may employ examples of the following assessment:

- observation
- written and oral questioning;
- evidence from company systems (e.g. Food Safety Management System)
- reviewing the outcomes of work
- checking any records of documents completed
- checking accounts of work that the candidate or others have written