

**EM167** Test and calibrate instrumentation and control equipment and circuits used in food and drink operations

**SQA Unit Code**

**HD6D 04**

**Level 3**

**SCQF Level 6**

**Credit value 39**

**Unit Summary**

This standard identifies the competences you need to carry out tests and calibration of instrumentation and control equipment and circuits used in food and drink operations, in accordance with approved procedures. You will be required to carry out the various tests and calibration on a range of instrumentation 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 and control; vibration monitoring equipment; photo-optic instruments; analysers recorders and indicators; telemetry systems; emergency shutdown systems and other specific instrumentation, to establish that they are functioning at optimal level and to specification. 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.

You will be required to carry out tests and calibration which will include voltage and current levels, resistance values, waveform, open/short circuit, signal injection, logic state, pressure/leak tests, signal measurement and transmission and other specific or special-to-type tests.

You will be expected to work with minimal 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. Test and calibrate 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 testing and calibrating 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>Follow appropriate procedures for use of tools and equipment to carry out the required tests and calibration</p> <p>Set up and carry out the tests and calibrations using the correct procedures and within agreed timescales</p> <p>Record the results of the tests and calibrations in the appropriate format</p> <p>Review the results and carry out further tests if necessary</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 safety requirements of the area in which the testing and calibrating activity is to take place, and the responsibility these requirements place on you not to compromise food safety
2. your responsibilities under regulations relevant to the instrumentation and control equipment and circuit testing activities being undertaken
3. the isolation and lock-off procedure or permit-to-work procedure that applies to the system and instruments being worked on, including critical control points
4. the specific health and safety food and drink precautions to be taken when carrying out instrument and circuit testing and calibration activities
5. what constitutes a hazardous voltage and how to recognise victims of electric shock
6. how to reduce the risks of a phase to earth shock (including insulated tools, rubber mating and isolating transformers)
7. the importance of wearing protective clothing, and other appropriate safety equipment (PPE) during the testing and calibrating activities
8. the requirements of the British Retail Consortium (BRC) guidelines and standards in relationship to the testing and calibration activities
9. the specific requirements of your customer/client specifications in relationship to the testing and calibration activities
10. your responsibilities in relationship to Hazard Analysis and Critical Control Points (HACCP, TACCP, VACCP) during the testing and calibration activities
11. hazards associated with carrying out testing and calibrating activities on instrumentation and control systems (including stored pressure/force/temperature, electrical supplies, process controller interface, using damaged or badly maintained tools and equipment, not following laid-down testing and calibration procedures), and how to minimise them and reduce any risks
12. how the testing and calibrating activities may affect the work of others, and the procedure for informing them of the work to be carried out

13. the procedures and precautions to be adopted to eliminate/protect against electrostatic discharge (ESD)
14. how to obtain and interpret circuit drawings, calibration data, instrument specifications, manufacturers' manuals, history/maintenance reports, symbols used on instrumentation and control documents, and other documents needed in the testing and calibration process
15. the basic principles of operation of the instrumentation and control equipment being tested/calibrated, how the system functions, its operating sequence, the working purpose of individual units/components and how they interact
16. 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
17. the reasons for making sure that control systems are isolated or put into manual control, and appropriate trip locks or keys are inserted, before removing any sensors or instruments from the system
18. the identification of instrument sensors (including how to identify their markings, calibration information, component values, operating parameters and working range)
19. methods of checking and calibrating instruments, and the type and range of equipment that can be used
20. how to set up and apply the appropriate test and calibration equipment (including pressure testing in incremental stages)
21. how to check that the test and calibration equipment is free from damage or defects, is in a safe, clean and usable condition, and is configured correctly for the intended purpose
22. the processes in place to segregate the tools and equipment used into high or low risk areas
23. the checks required to ensure that all tools, materials and components are all accountable before operating the equipment
24. how to analyse the test and calibration results, and how to use comparison and sequential techniques
25. the environmental control requirements and company operating procedures relating to the testing and calibrating activities
26. the cleaning requirements/policies in place before returning the equipment into full operational production
27. the documentation required, and the procedures to be followed, at the conclusion of the testing and calibrating
28. what to do if instruments or control circuits do not meet the required calibration parameters
29. 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

